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Equipment Management System Compilation

设备管理制度汇编



Hengyi Industries Sdn Bhd

恒逸实业（文莱）有限公司

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Hengyi Industries Sdn Bhd
恒逸实业（文莱）有限公司

HYBN-T3-07-0001-2018-1

Equipment Classification and Process Management System

设备分级与全过程管理制度

Issued Date : Dec. 2018

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 HENGYI	Hengyi Industries Sdn Bhd 恒逸实业（文莱）有限公司			
	Equipment Classification and Process Management System 设备分级与全过程管理制度			
	Doc No.	HYBN-T3-07-0001-2018-1	Ver No.	1

1 Purpose

目的

This System is hereby formulated to standardize the equipment classification and whole-process management and to define the responsibilities of departments and relevant personnel at all levels in equipment classification and whole-process management.

为规范设备分级与全过程管理，明确各部门及各级相关人员在设备分级与全过程管理中的职责，特制订本制度。

2 Scope of Application

适用范围

This System is applicable to all departments of the Company.

本制度适用于公司各部门。

3 Terms and Definitions

术语和定义

Equipment means Equipment Management equipment, power equipment, electrical equipment, instrumentation, metering equipment, etc.

设备：指机械、动力、电气、仪表、计量等设备。

4 Management Responsibilities

管理职责

4.1 Specified administrative authority

归口管理部门

4.1.1 Equipment Management Dept. is the specified administrative authority of the Equipment Classification and Process Management System. It shall be responsible for formulating (revising) the Equipment Management System and organizing the specialized examination, assessment and comparison of the Equipment.

机械动力部是设备分级与全过程管理的归口管理部门，负责制(修)订设备管理制度，组织设备专业检查、考核、评比。

4.1.2 Be responsible for reviewing the Equipment Repair or Renewal Plan submitted by the operation department, organizing the implementation of the Plan approved, and organizing the quality inspection and completion acceptance of important equipment overhaul and unit shutdown maintenance.

负责审核运行部上报的设备修理、更新计划；组织实施经批准后的计划；组织重要设备大修、装置停工检修的质量检查、竣工验收。

4.1.3 Be responsible for review of renewal/abandonment judgment and renovation scheme of important equipment, and for signing the technical appendices of repair, renewal and technical renovation projects.

负责重要设备更新判废鉴定、改造方案的审核；负责修理、更新和技术改造项目的技术附件签署。

4.1.4 Be responsible for organizing preparation of the list and the annual reserve quota of spare parts and accessories and for mapping, substitution and plan approval of spare parts and accessories.

组织编制备品配件明细表及年度储备定额；负责备品配件测绘、替代以及计划审定。

4.1.5 Be responsible for the annual inspection plans of the Company's boiler, pressure vessel, pipeline and other special equipment and organizing the implementation of such plans, and for reviewing the inspection scheme.

负责公司锅炉、压力容器及管道等特种设备年度检验计划并组织实施；审定检验方案。

4.1.6 Be responsible for planning and establishment of the highest metro-logical standard and value trace-ability system and for the value transfer and tracing of metering equipment.

负责策划和建立最高计量标准及量值溯源体系，开展计量设备的量值传递和量值溯源。

4.1.7 Be responsible for managing the online monitoring system of physical objects and equipment of fixed assets and for overhaul and renovation of buildings and structures.

负责固定资产的实物及设备在线状态监测系统管理；负责建筑物、构筑物的大修、改造。

4.1.8 Be responsible for investigation, handling and statistical report of an equipment accident, for establishment of major equipment defects management records and for organizing rectification.

负责设备事故的调查、处理及统计上报工作；建立重大设备缺陷管理台帐并组织整改。

4.1.9 Be responsible for archive management of design and construction drawings and as-built documents for unit shutdown overhaul and annual repair, equipment renewal plan, and for organizing the operation department to establish technical document of Equipment.

负责做好装置停工大修和年度修理、设备更新计划设计施工图纸、竣工资料的存档管理工作；组织运行部建立设备技术档案。

4.1.10 Be responsible for examination and supervision of the equipment inspection and maintenance and the work that shall be well done by an outsourcing organization as required by the Contract.

检查、督促设备检维修工作以及外协单位按合同要求应做好的工作。

4.2 Coordinated management departments

协同管理部门

4.2.1 The Scheduling & Dispatch Dept. is responsible for preparing and transmitting to lower levels the annual overall network of unit startup and shutdown, timely circulating a notice on terrible weather information, and implementing precautions.

计划调度部负责编制、下达年度装置开停工总体网络；及时通报恶劣气象信息，落实防范措施。

4.2.2 The HSE Dept. is responsible for management of fire and gas accident protection equipment, supervision and direction of site safety of each department, and organizing the investigation into an equipment accident.

HSE 管理部负责消防、气防设备的管理，对各部门现场安全进行监察、指导；组织设备事故的调查。

4.2.3 The Materials Supply Dept. is responsible for material procurement, putting materials in storage, taking care of them, applying for and maintaining the material codes.

物资装备部负责物资采购，做好物资入库、保管以及物料编码的申请、维护。

4.2.4 The GM's Office is responsible for routine maintenance of ancillary facilities to buildings and structures (except for elevator and air conditioner).

总经理办公室负责建筑物、构筑物附属设施（电梯、空调除外）的日常维修。

4.2.5 The Information Management Dept. is responsible for reviewing each department's purchase of computers and ancillary equipment and other electronic office equipment, selecting the type of network equipment, server, terminal and ancillary equipment, and signing the technical appendices.

信息管理部负责审核各部门计算机及附属设备等办公电子设备购置；负责网络设备、服务器、终端及附属设备选型，签订技术附件。

4.3 Executive departments

执行部门

4.3.1 The operation department is the executive department of this System.

运行部为本制度的执行部门。

4.3.1.1 Be responsible for daily management, including equipment inspection and problem rectification, of the department itself.

做好本部门设备检查、问题整改等日常管理工作。

4.3.1.2 Be responsible for establishing equipment records and full-staff equipment contracting system, and managing the technical file of Equipment.

建立设备台帐以及全员设备承包体系；管理设备技术档案。

4.3.1.3 Be responsible for organizing the abandonment judgment and renewal type selection of general equipment, participating in abandonment judgment important equipment, applying

for maintenance, overhaul, renewal and renovation of Equipment, taking part in design review and equipment type selection of technical renovation project, and managing construction on site.

组织一般设备的判废鉴定和更新选型；参与重要设备的判废工作；负责设备维修、大修、更新、改造的申请；参与技术改造项目的设计审查、设备选型；负责现场施工管理。

4.3.1.4 Be responsible for developing the safe operation rules of equipment and for the prevention, judgment and emergency treatment of an equipment fault.

负责制定设备的安全操作规程及设备故障的预防、判断和紧急处理。

4.3.2 The Electrical Operation Dept. is responsible for the operation and operation management, maintenance and repair, renewal and type selection for application of electrical equipment.

电气运行部负责电气设备的运行和运行管理、维护和修理、更新和应用选型。

4.3.3 The Instrument Control Dept. is responsible for the operation and operation management, testing and calibration, fault analysis, maintenance and repair, renewal and type selection for application of instruments.

仪表控制部负责仪表设备的运行和运行管理、检测和校验、故障分析、维护和修理、更新和应用选型。

4.3.4 The Equipment Maintenance Dept. is responsible for the daily maintenance, overhauling and rush repair of Equipment Management parts of the Company's main production equipment, and for the renewal and type selection for application of repair equipment.

设备检修部负责公司主要生产设备机械部份的日常维护和检修、抢修，检修设备的更新和应用选型。

4.3.5 The executive departments are responsible for submitting of their respective metering equipment calibration plans and cooperatively completing the calibration, comparison and intermediate check of their respective metering equipment. The Electrical Operation Dept. the Instrument Control Dept. and the Lab Dept. shall be also responsible for managing and calibrating the self-calibrated metering equipment.

各执行部门负责本部门计量设备校准计划的申报，配合完成本部门计量设备的校准、比对和期间核查；电气运行部、仪表控制部、质量检验部同时负责自行校准计量设备的管理和校准。

5 Management Content

管理内容

5.1 Classification management

分级管理

5.1.1 The Company's equipment is classified as important equipment (see Appendix 1) and

general equipment.

公司设备划分为重要设备（见附件 1）、一般设备两类。

5.1.2 The Company's equipment is managed at two levels, i.e. the company-level management with the Equipment Management Dept. being responsible for equipment management across the Company and mainly responsible for management of important equipment, and the operation department-level management with the operation department being in charge of equipment management of its own department.

公司设备管理实行公司、运行部两级管理:机械动力部负责全公司的设备管理，并主要负责重要设备管理，为公司级管理；运行部负责本部门的设备管理，为运行部级管理。

5.2 Whole-process management

全过程管理

5.2.1 Type selection of equipment

设备选型

5.2.1.1 Type selection principle: Adopt new equipment, materials and structures whenever possible based on the principle of keeping technologically advanced and also consider standardization, serialization and generalization of equipment to meet HSE management requirements.

选型原则：以技术先进为原则，尽量采用新设备、新材料、新结构，同时考虑标准化、系列化、通用化，满足HSE管理要求。

5.2.1.2 Type selection for renewal of equipment shall be applied for by the project department and reviewed and approved by the Equipment Management Dept.; before initiation of important equipment renewal, the Equipment Management Dept. organizes technical and economic appraisal and the equipment type selection is submitted to the Company's leader in charge for review and approval; with regard to type selection for renewal that need have its design commissioned, the equipment department is responsible for its application, the Equipment Management Dept. is responsible for review and approval and for commissioning the design, and technical and economic appraisal must be made for important equipment before its design is commissioned.

设备更新选型由项目所属部门负责申报，机械动力部负责审批；重要设备更新立项前由机械动力部组织技术经济论证，设备选型报公司主管领导审批；需委托设计的更新选型，由设备所属部门位负责申报，机械动力部负责审批并委托设计，重要设备委托设计前须经技术经济论证。

5.2.2 Equipment procurement

设备采购

5.2.2.1 Materials Supply Dept. shall make purchase in accordance with technical requirements submitted by the Equipment Management Dept.

物资装备部应根据机械动力部提报的技术要求进行采购。

5.2.2.2 Prior to procurement of important equipment and such general equipment as is specially required in terms of performance, the Equipment Management Dept. is responsible for organizing to sign the technical appendices.

对于重要设备、性能有特别要求的一般设备，采购前应由机械动力部负责组织签订技术附件。

5.2.2.3 For important equipment, in-factory supervision shall be implemented and the intermediate quality inspection shall be strictly conducted; besides, accessories specified in the technical appendices shall be provided.

重要设备应实行驻厂监造，严格中间质量检验；并提供按技术附件规定的配件。

5.2.2.4 After equipment has been purchased, the Materials Supply Dept. shall organize relevant departments to conduct factory acceptance; if any equipment fails to pass the acceptance, the Materials Supply Dept. shall contact the Supplier for its disposition.

设备购入后由物资装备部组织有关部门进行入厂验收，验收不合格的由物资装备部与供应商联系处理。

5.2.2.5 All departments shall specify the specification & model and selection requirements during handling the procurement application procedures; in the case of any change at the time of procurement (ordering) by the Materials Supply Dept. the purchase cannot be made until the change has been confirmed by equipment using department and Equipment Management Dept.

各部门在办理申购手续时，应写明规格型号、选用要求，物资装备部在采购（订货）时，如有变更，应经设备使用部门和机械动力部确认后采购。

5.2.3 Equipment installation

设备安装

5.2.3.1 Newly purchased equipment shall be installed by the construction contractor appointed by the Equipment Management Dept. after it has passed the acceptance.

新购置的设备验收合格后，由机械动力部安排施工单位进行安装。

5.2.3.2 Equipment installation must be entrusted to a construction contractor with corresponding qualification, and the construction contractor shall make a thorough construction plan and a strict quality assurance system.

设备安装须委托有相应资质的施工单位，施工单位应当制订周密的施工方案和严格的质保体系。

5.2.4 Equipment test run

设备试运

5.2.4.1 After equipment has been installed, the construction contractor shall prepare a test run scheme and the Equipment Management Dept. is responsible for review of the test run scheme of important equipment; the department in which the equipment is located is responsible for review of the test run scheme of general equipment and for participating in countersigning the test run scheme of important equipment.

设备安装后由施工单位编制试运转方案，机械动力部负责重要设备试运转方案的审核；设备所在部门负责一般设备试运转方案的审核，并参与重要设备试运转方案的会签。

5.2.5 Equipment acceptance

设备验收

5.2.5.1 Upon completion of equipment renewal or new equipment construction, the Equipment Management Dept. organizes relevant department for “three inspections and four determinations” and for intermediate handover and completion acceptance of project after problem rectification.

设备更新或新增设备施工完毕后，由机械动力部组织相关部门进行“三查四定”，问题整改后进行项目中交和竣工验收。

5.2.5.2 The Equipment Management Dept. shall organize relevant organizations to file the as-built documents immediately upon handover and acceptance of project.

机械动力部在项目交工验收后，及时组织相关单位做好竣工资料的归档。

5.2.6 Equipment records

设备台帐

5.2.6.1 Equipment records must be established for such equipment, facility and system as constitute fixed assets and as can be independently used and complete a certain means of production.

凡构成固定资产，能独立使用并完成一定生产手段的设备、设施系统，须建立设备台帐。

5.2.6.2 A technical file must be established for each set of production equipment from the time of putting it into use to the time of scrapping it. The contents must be detailed and the records must be real, accurate and complete.

要求每一台生产设备从投用至报废建立技术档案，内容要具体详细，记录真实、准确、齐全。

5.2.7 Equipment use and maintenance requirements

设备使用和维护要求

Refer to 5.3 of this System.

参照本制度 5.3的规定。

5.2.8 Equipment maintenance

设备检修

Comply with *Equipment Maintenance Management System*.

参照《设备检修管理制度》执行。

5.2.9 Scrapping and renewal

报废与更新

5.2.9.1 The operation department shall carry out equipment scrapping and renewal in a planned way according to actual operation state of Equipment and in compliance with the *Fixed Assets Management System* and the *Equipment Repair, Renewal Plan and Cost Management System*.

运行部应根据设备实际运行状况有计划进行设备报废和更新工作，具体参照《固定资产实物管理制度》、《设备修理、更新计划和费用管理制度》执行。

5.3 Requirements for operating and maintenance personnel

使用和维护人员要求

5.3.1 Operating personnel

操作人员

5.3.1.1 Operating personnel must receive specialized technical training and pass examinations before they take up their posts. Special equipment operating personnel must also obtain the special work permits before they take up their posts.

操作人员必须经过专业技术培训，经考试合格后方可上岗操作，特种设备的操作人员还必须取得特种作业证后方可上岗。

5.3.1.2 Operating personnel shall meet the requirements of "four understandings and three abilities" (i.e. the understanding of structure, the understanding of principle, the understanding of performance, the understanding of purpose, and the ability to operate, the ability to maintain and the ability to eliminate fault) about the equipment operated, strictly follow the operating procedures, and not operate the equipment under over-temperature, over-pressure, over-speed and over-load; besides, they shall do a good job in equipment sanitation and maintenance to keep windows bright, floor clean, groove bottom visible and equipment tidy.

操作人员应对所操作的设备做到“四懂”、“三会”（即“懂结构、懂原理、懂性能、懂用途”和“会使用、会维护保养、会排除故障”），严格遵守操作规程，不准超温、超压、超速、超负荷运行；做好设备卫生及维护保养，保持窗明、地净、沟见底、设备整洁。

5.3.1.3 Operating personnel shall strictly implement the patrol inspection system. They shall inspect equipment on specified patrol inspection route at specified time and complete the operation and defect records; they shall complete the inspection of contracted equipment on time in each month, timely eliminate any problem that can be dealt with and report inspection results to team leader who will fill in and submit the "Summary of Registration and Handling of Problems from Contracted Equipment Inspection".

严格执行巡回检查制度。按规定的巡检线路和时间对设备进行检查，并填写运行及缺陷记录；每月按时完成对承包设备检查，对能处理的问题及时予以消除，并把检查结果反馈给班长，由班长集中填写“承包设备检查问题登记表”并上报。

5.3.1.4 Standby equipment shall be inspected before use and cannot be put into operation until it is confirmed to be normal; equipment lubrication shall meet the requirements of "five determinations" and "three-stage filtration".

备用设备在使用前应进行检查，确认正常后方可投入运行；对设备润滑做到“五定”和“三级过滤”。

5.3.2 Equipment leaders -in-charge

设备管理人员

5.3.2.1 Equipment leaders -in-charge shall conduct daily and weekly equipment inspection on schedule and keep records, focus on understanding of the operational and technical status of the equipment in the unit or area in the charge thereof, register and timely arrange the

disposition of the faults and defects in operation. The deputy operation department leader in charge of equipment is responsible for organizing the monthly inspection of equipment and timely organizing the rectification of any problem found in monthly inspection.

设备管理人员应按时开展设备的日、周检查并做好记录，着重了解所主管的装置或区域内设备运行和技术状况，将运行中发生的故障、缺陷登记，并及时安排处理；对重要设备进行巡检；运行部主管设备的副部长负责组织设备月检查，对月检查中存在的问题，及时组织整改。

5.3.2.2 Equipment leaders -in-charge shall recheck and confirm the problems and defects found out by operating personnel in daily patrol inspection and equipment contracting inspection, report the disposition suggestions to the team/group, and handle them in accordance with the equipment defect and fault handling procedures.

设备管理人员对操作人员日常巡检、设备承包检查过程中查出的问题和缺陷进行复查、确认，并将处理意见反馈给班组，并设备缺陷及故障处理程序进行处理。

5.3.2.3 Equipment leaders -in-charge shall supervise, urge and inspect the operating personnel's implementation of regulations and systems about periodic hand turning and switching of standby (stopped) pumps, patrol inspection of equipment and status monitoring management of rotating equipment, so as to ensure the equipment of their own department is in good condition.

督促、检查操作人员对备用（停用）机泵定期盘车和切换、设备巡回检查和转动设备状态监测管理等规定、制度的执行情况，确保本部门设备处于完好状态。

5.3.2.5 Equipment leaders -in-charge shall properly conduct the monthly pump vibration test and report the results; they shall arrive at the unit site immediately upon receiving the equipment problem reflected in the unit to analyze the faults, make handling schemes and conduct whole-process tracking.

做好每月一次的机泵测振及上报工作；接到装置反映的设备问题后，应及时到达装置现场进行故障分析、制定处理方案，并全过程追踪。

5.3.2.6 They shall strengthen site management to reduce the phenomena of escaping, spilling, dripping and leakage.

加强现场管理，减少装置的跑、冒、滴、漏。

5.3.3 Process technicians

工艺技术人员

5.3.3.1 Process technicians shall conduct daily inspection of the operating personnel's implementation of process cards and strictly control the temperature, pressure, component mix proportion and other process indexes affecting safe operation of equipment.

工艺技术人员每天检查操作人员工艺卡片执行情况，严格控制影响设备安全运行的温度、压力、组份配比等工艺指标。

5.3.3.2 Be responsible for preparing technical documents related to equipment for unit; supervise and urge operating personnel to operate in accordance with operating procedures.

负责编制装置设备相关技术文件；督促操作人员按操作规程进行操作。

5.3.4 Equipment Maintenance Dept., Electrical Operation Dept. and Instrument Control Dept. (hereinafter referred to as "the Maintenance Dept.")

设备检修部、电气运动部、仪表控制部（以下简称维保部门）

5.3.4.1 The Maintenance Dept. shall conduct patrol inspection of Equipment Management and electrical instrument discipline and timely report any fault information found to the operation department. It shall conduct patrol inspection on specified contents along specified routes at specified time, and inquire equipment operation of unit operating personnel. Any defect found shall be timely reported and actively eliminated.

维保部门要做好机电仪专业巡检并及时向运行部反馈发现的故障信息，巡检应当做到：按规定的巡检内容、路线、时间要求检查，并向装置操作人员了解设备运行情况；发现缺陷及时上报，并积极予以消除。

5.3.4.2 The Maintenance Dept. must ensure 24 hours of duty, and rush to the site immediately upon receiving a notice on equipment fault to confirm the fault, present handling scheme or suggestions, and organize manpower for maintenance, and timely report a major problem (if any) to relevant departments and leaders.

维保部门须保证 24 小时值班，在接到设备故障通知后，立即赶到现场确认，提出处理方案或建议，并组织力量检修，重大问题应及时向有关部门和领导汇报。

5.4 Equipment perfectness management

设备完好管理

5.4.1 Equipment is technically classified as perfect equipment and imperfect equipment. The perfectness criteria of equipment shall comply with the *Petrochemical Equipment Perfectness Standard* of Sinopec.

设备的技术状况分为完好和不完好，设备的完好标准执行中石化《石油化工设备完好标准》。

5.4.2 Counting equipment perfectness ratio: The operation department is responsible for counting perfectness ratio of equipment (except for electrical equipment and instruments) in this department; the Electrical Operation Dept. and the Instrument Control Dept. are responsible for counting the perfectness ratio of electrical equipment and instrument in the charge thereof respectively.

设备完好率统计：运行部负责统计本部门设备（电气、仪表除外）完好率；电气运行部、仪表控制部负责统计所管理的电气、仪表设备完好率。

5.4.3 Calculation method of perfectness ratio of equipment in use: Perfectness ratio of equipment in use=Quantity of perfect equipment in use/total quantity of equipment in use ×100%. See Appendix 2 for details about statistical coverage and calculation method of equipment quantity.

在用设备完好率计算方法：在用设备完好率=在用设备完好台数/在用设备总台数×100%。设备台数统计范围及设备台数计算方法详见附件 2。

5.4.4 The operation department shall collect the statistics for the following main technical indexes on a monthly basis and report them to the Equipment Management Dept.:

运行部每月应对下列主要技术指标进行统计并上报机械动力部:

5.4.4.1 Perfectness ratio, availability and self-control rate of instruments; effective utilization ratio and fault rate of key units (specially referring to the specially maintained units); equipment perfectness ratio and important equipment perfectness ratio; leakage rate of static sealing points.

仪表完好率、投用率、自控率；关键机组（专指特护机组）有效利用率、故障率；设备完好率和重要设备完好率；静密封点泄漏率。

5.4.4.2 Static sealing leak point management: Static sealing leak points must be registered on hanging signs indicating the leak detection time, leak position, hanging sign number and the measures taken or measures to be taken in the next step; leak points at important positions must be intensively monitored to ensure they are controllable; leak points that have been eliminated shall be timely cancelled to form closed-loop management.

静密封泄漏点管理：静密封泄漏点须挂牌登记，注明泄漏发现时间、泄漏部位、挂牌号及已采取的措施或下步准备采取的措施等；对重要部位的泄漏点须加强监护，确保泄漏处于可控状态；对已消除的泄漏点及时注销，形成闭环管理。

5.4.4.3 Statistics for static sealing leak points: The operation department is responsible for collecting statistics for static sealing leak points of process equipment, process pipeline and pump equipment of this department. Refer to Appendix 3 for detailed scope of statistics for static sealing points.

静密封泄漏点统计：运行部负责统计本部门工艺设备、工艺管道及机泵设备静密封泄漏点。静密封点统计范围详见附件 3。

5.5 Technical file management

技术档案管理

5.5.1 Technical files of equipment are subject to company-level and operation department-level management, and records shall be established for managing technical files of equipment.

设备技术档案实行公司、运行部两级管理，设备技术档案管理应建立台帐。

5.5.2 Three sets of complete as-built documents (including electronic editions) shall be established after overhaul and renewal of important equipment; within one month upon completion of maintenance, the construction contractor shall be responsible for establishment and handover of as-built documents. As-built documents of equipment must include complete contents and accurate data and have each item number (such as repair number and renewal number) indicated, and be submitted to GM's Office, Equipment Management Dept. and the equipment operation department respectively for filing; within one month upon maintenance of

general equipment, the construction contractor shall submit the as-built documents to the equipment department, which shall complete the filing of as-built documents within one month upon receipt of them.

重要设备经大修、更新后要建立三套完整的设备竣工资料（含电子版），在完成检修后一个月内，施工单位负责做好设备竣工资料的建立和移交工作。设备竣工资料要求内容齐全、数据精确，同时注明各项目编号（如：修理号、更新号等），分别交总经理办公室、机械动力部、设备所在运行部存档；一般设备检修后施工单位应在一个月内将竣工资料交设备所在部门，设备所在部门在收到竣工资料一个月内完成建档工作。

5.5.3 Four sets of complete as-built documents of equipment must be established for a technical renovation project. Within one month upon passing the completion acceptance, the construction contractor shall be responsible for establishment and handover of as-built documents of equipment. As-built documents of equipment must have each item number (such as technical measure number) indicated, and be submitted to GM's Office, Equipment Management Dept., Scheduling & Dispatch Dept. and the equipment department respectively; the equipment department shall complete the filing of as-built documents within one month upon receipt of them.

技术改造项目要求建立四套完整的设备竣工资料。在竣工验收合格后一个月内，施工单位负责做好设备竣工资料的建立和移交工作。设备竣工资料要注明项目编号（如：技措号等），分别交总经理办公室、机械动力部、计划调度部、设备所在部门，设备所在部门在收到竣工资料一个月内完成建档工作。

5.5.4 Technical files of equipment mainly consist of: equipment card (including technical characteristics such as equipment item number, name, specification & model and main technical parameters, manufacturer, installation location and commissioning date), list of auxiliary equipment, rotating equipment pre-commissioning records, equipment installation instructions, major defect records, equipment inspection and overhaul records, replacement and corrosion of main accessories, equipment accident records, equipment running time records (for important equipment, the time of shutdowns and startups, continuous running time, annual accumulated running time, accumulated running time over the years and the reason for shutdowns shall be recorded; for general equipment, the annual accumulated running time and the accumulated running time over the years shall be recorded), technical renovation records of equipment, various power procedures (including running, operation, test, safety, accident handling and other procedures), primary connection diagram of power supply system, records of DCS control system, interlock protection system diagram, etc.

设备技术档案主要包括：设备卡片（包含技术特性：如设备位号、名称、规格型号及主要技术参数、制造厂、安装地点、投产日期等）、附属设备明细表、动设备联动试车记录、设备安装使用说明书、重大缺陷记录、设备检验、设备大修记录、主要配件更换及腐蚀情况、设备事故记录、设备运行时间记录（重要设备记录每次停、开时间、连续运行时间、年累计运行时间、历年累计运行时间及每次停车原因；一般设备记录年累计运行时间和历年累计运行时间）、设备技术改造

记录、各类动力规程（包括运行、操作、试验、安全、事故处理等规程）、供电系统一次接线图、DCS 控制系统台帐、联锁保护系统图等。

5.6 Interface Division between Equipment Management Disciplines

设备管理专业界面划分

See Appendix 5.

见附件 5。

6 Supervision and Inspection

监督检查

Equipment Management Dept. is responsible for supervising each department's implementation of the Equipment Classification and Process Management System and incorporating it into the Company's performance management for regular inspection and assessment.

机械动力部负责对各部门执行设备分级与全过程管理情况进行监督，并纳入公司绩效管理，定期进行检查和考核。

7 Associated Procedures and Records

关联程序和记录

7.1 Associated procedures

关联程序

7.1.1 Equipment Classification and Whole-Process Management Procedures

HYBN-T2-07-0001-2018-1

设备分级与全过程管理程序 HYBN-T2-07-0001-2018-1

7.1.2 Management Procedure for Technical File of Equipment HYBN-T2-07-0002-2018-1

设备技术档案管理程序 HYBN-T2-07-0002-2018-1

7.2 Associated records

关联记录

7.2.1 Defective Equipment Registration Form HYBN-T6-07-0001-001-2018

不完好设备登记表 HYBN-T6-07-0001-001-2018

7.2.2 Summary of Registration and Handling of Problems from Contractor's Equipment Inspection HYBN-T6-07-0002-001-2018

承包设备检查问题登记处置汇总表 HYBN-T6-07-0002-001-2018

7.2.3 Weekly (Monthly) Checklist of Equipment HYBN-T6-07-0003-001-2018

设备周(月)检查表 HYBN-T6-07-0003-001-2018

7.2.4 Key Unit Operation Status Form HYBN-T6-07-0004-001-2018

关键机组运行状况表 HYBN-T6-07-0004-001-2018

7.2.5 Technical Status Form of Equipment HYBN-T6-07-0005-001-2018

设备技术状况表 HYBN-T6-07-0005-001-2018

7.2.6 Statistical Table of Static Sealing Leak Points HYBN-T6-07-0006-001-2018

静密封泄漏点统计表 HYBN-T6-07-0006-001-2018

8 Supplementary Rules

附则

8.1 This System is under the jurisdiction of Equipment Management Dept.

本制度由机械动力部归口管理。

8.2 This System is drafted by Equipment Management Dept.

本制度起草部门：机械动力部。

8.3 Equipment Management Dept. is responsible for the interpretation of this System.

本制度解释权归机械动力部拥有。

8.4 Revision, preparation and approval of this System are shown in table 1:

本制度版本编制和审批情况见表 1:

Table 1 Revision, preparation and approval of document

表 1 文件版本编制和审批情况

1	2018-12-31	Pan Xiaoming 潘小明	Tong Xueyun 童雪云	Xu Ye 徐野	Chen Liancai 陈连财
Revision 版本	Issued date 颁布日期	Prepared by 编制人	Reviewed by 审核人	Authorized by 审定人	Approved by 批准人

9 Appendices

附件

Appendix 1 Important Equipment Classification Standard

附件 1 重要设备划分标准

Appendix 2 Statistics for and Calculation Method of Equipment Quantity

附件 2 设备台数统计及设备台数计算方法

Appendix 3 Statistical Method of Static Sealing Points

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Appendix 4 Equipment Classification Catalog

附件 4 设备分类目录

Appendix 5 Interface Division between Equipment Management Disciplines

附件 5 设备管理专业界面划分

Appendix 1

附件 1

Important Equipment Classification Standard 重要设备划分标准

1 Classification standard of important dynamic and static equipment (excluding power plant equipment, electrical equipment and instruments)

重要动、静设备划分标准（不含电站、电气及仪表设备）

1.1 Towers with diameters $\geq 3200\text{mm}$ or with diameters $\geq 2000\text{mm}$ and design pressure $\geq 4.0\text{MPa}$.

直径大于等于 3200mm 或直径大于等于 2000mm 且设计压力大于等于 4.0MPa 的塔器。

1.2 Hydrogenation vessels with design pressure $\geq 10\text{MPa}$ and volume $\geq 20\text{ m}^3$.

设计压力大于等于 10MPa 且容积大于等于 20 立方米的加氢容器。

1.3 Heat exchangers: 1) Threaded locking ring heat exchanger; 2) Flexible tube-sheet heat exchanger; 3) Heat exchanger with heat exchange area $\geq 1500\text{ m}^2$; 4) Heat exchanger with heat exchange area $\geq 500\text{ m}^2$ and design pressure $\geq 6.4\text{MPa}$; 5) Heat exchanger with heat exchange area $\geq 250\text{ m}^2$ and design pressure $\geq 10\text{MPa}$.

换热器：1) 螺纹锁紧环换热器；2) 挠性管板换热器；3) 换热面积大于等于 1500 平方米的换热器；4) 换热面积大于等于 500 平方米且设计压力大于等于 6.4MPa 的换热器；5) 换热面积大于等于 250 平方米且设计压力大于等于 10MPa 的换热器。

1.4 All spherical tanks.

所有球罐。

1.5 Storage tank with a volume $\geq 50000\text{ m}^3$.

容积大于等于 50000 立方米的储罐。

1.6 Heating furnace with design heat load $\geq 10\text{MW}$.

设计热负荷大于等于 10MW 的加热炉。

1.7 Various alloy steel (except for 16MnR) reactors and regenerators; reactor, heater and vaporizer for flexicoking, and three-stage cyclone separator.

各类合金钢（16MnR 除外）反应器、再生器；灵活焦化三器、三级旋风分离器。

1.8 All specially maintained equipment.

所有特护设备。

1.9 Material pumps with shaft power greater than or equal to 600kW.

轴功率大于等于 600kW 的物料泵。

1.10 Material pumps with shaft power greater than or equal to 250kW and medium temperature greater than or equal to 350°C.

轴功率大于等于 250kW，介质温度大于等于 350°C 的物料泵。

1.11 Water pumps with shaft power greater than or equal to 1000kW and head greater than

100m.

轴功率大于等于 1000kW、扬程大于 100 米的水泵。

1.12 Pumps with shaft power greater than or equal to 200kW and head greater than or equal to 1000m.

轴功率大于等于 200kW、扬程大于等于 1000 米的泵。

1.13 Compressors and fans with shaft power greater than or equal to 500kW.

轴功率大于等于 500kW 的压缩机、风机。

1.14 Turbines with rated power greater than or equal to 500kW and used for driving compressors and electric generators.

额定功率大于等于 500kW 用于驱动压缩机、发电机的汽轮机。

1.15 Refrigerators with shaft power greater than or equal to 400kW.

轴功率大于等于 400kW 的冷冻机。

1.16 Special valves with electrohydraulic actuators.

带有电液执行机构的特种阀门。

1.17 Air coolers with design pressure greater than or equal to 10MPa.

设计压力大于等于 10MPa 的空气冷却器。

2 Classification standard of important power plant equipment, electrical equipment and instruments

电站、电气及仪表重要设备划分标准

2.1 All classes of electric generators.

所有发电机类。

2.2 35kV transformer

35kV 变压器

2.3 110kV transformer

110kV 变压器。

2.4 Motors with power of 2000kW and above.

2000kW 及以上电动机。

2.5 Medium pressure and above steam boilers.

中压及以上蒸汽锅炉。

2.6 Turbines.

汽轮机。

2.7 Water pumps (including motors) with shaft power greater than or equal to 1000kW and head greater than 1000m.

轴功率大于等于 1000kW、扬程大于 1000 米的水泵（含电机）。

2.8 Air compressors and fans (including motors) with shaft power greater than or equal to 500kW.

轴功率大于等于 500kW 的空压机、风机（含电机）。

2.9 Electrostatic precipitator (boiler).

电除尘器（锅炉）。

2.10 Instrument class. Complete sets of DCS, ESD (SIS), CCS and DEH systems and specific UOP and SCS control systems and foreign trade flowmeters used for the main unit.

仪表类。主装置使用的整套 DCS、ESD（SIS）、CCS、DEH 系统和特定的 UOP、SCS 控制系统、对外贸易流量计。

Appendix 2

附件 2

Statistics for and Calculation Method of Equipment Quantity

设备台数统计及设备台数计算方法

1 Statistics for Equipment Quantity

设备台数统计

1.1 Scope of statistics

统计范围

1.1.1 All in-use, standby and stopped equipment meeting the requirements of fixed assets (excluding stockpiled, life, medical, analysis instruments and tools, etc.) shall be included in the scope of statistics for equipment quantity.

凡在用、备用和停用的具备固定资产条件的设备（不包括库存、生活、医疗、分析仪表及工具等）都属于设备台数的统计范围。

1.1.2 New and modified units and such equipment as is officially delivered for use upon completion of its technical renovation shall be included in the scope of statistics from the date of notice sent by the Equipment Management Dept.

新建和改造装置、技术改造项目竣工并正式交付使用的设备，按机械动力部通知日期起列入统计范围。

1.1.3 Equipment whose installation has been completed and which has been officially delivered for production but not been used, and equipment stopped for a long term due to change of production plan shall be included in the scope of statistics.

已安装竣工并正式交付生产但未使用的设备，以及因生产方案变动而长期停用的设备列入统计范围。

1.1.4 After having been unsealed, mothballed and idle equipment shall be included in the scope of statistics from the month when its procedures are handled and approved.

封存、闲置设备启封后，从办理手续并经批准的当月起列入统计范围。

1.2 The following equipment shall not be included in the scope of statistics:

下列设备不列入统计范围

1.2.1 Removed, transferred and scrapped equipment shall not be included in the scope of statistics from the month when its procedures are handled and approved.

拆迁、外调、报废设备，从办理手续并经批准的当月起不列入统计范围。

1.2.2 Mothballed and idle equipment shall not be included in the scope of statistics from the month when its procedures are handled and approved.

封存、闲置设备，从办理手续并经批准的当月起不列入统计范围。

1.2.3 Stockpiled equipment which has been received from the materials department but not been installed shall not be included in the scope of statistics.

已从物资部门领出但未安装的库存设备不列入统计范围。

1.2.4 Process pipes, cables, structures and buildings shall not be included in the scope of statistics.

工艺管道、电缆、构筑物、建筑物等不列入统计范围。

1.2.5 Equipment mainly used for living and logistics, such as air conditioner, refrigerator, washing machine, fridge, motorbike, automobile, copying machine, computer and walkie talkie, shall not be included in the scope of statistics.

主要用于生活后勤的设备，如空调、冷冻机、洗衣机、冰箱、摩托车、汽车、复印机、计算机、对讲机等不列入统计范围。

1.2.6 Instruments & apparatus and tools used for analysis, test and check, and such equipment as is used for measurement and photographing shall not be included in the scope of statistics.

用于分析、试验、校对的仪器仪表、工具，以及测量、拍照用的设备不列入统计范围。

1.2.7 Various mobile equipment (such as lubricating oil filter and mobile air compressor), mixers in various storage tanks, and air preheater on heating furnace shall not be included in the scope of statistics.

各类移动设备（如润滑油过滤机、移动式空气压缩机）；各类贮罐中的搅拌机；加热炉上的空气预热器等设备不列入统计范围。

1.2.8 Equipment that has no independent function in accessory equipment of large-scale units or small equipment (except for that falling within the scope of pressure vessel) shall not be included in the scope of statistics.

大型机组等设备的附属设备中不具备独立作用的设备或小型设备（属压力容器范畴的除外）不列入统计范围。

2 Equipment quantity calculation

设备台数计算

2.1 Equipment quantity shall be counted as per the equipment classification catalog, as detailed in Appendix 4.

设备台数按设备分类目录进行统计，详见附件 4。

2.2 Process equipment shall be calculated by set; overlapped equipment shall be all calculated by set no matter whether their process item numbers are separated; overlapped quantity cannot be calculated as one set through merging.

工艺设备按台计算，重叠设备不论工艺位号是否分开，一律按台数计算，不能把重叠台数合并按一台计算。

2.3 Equipment that has independent function in accessory equipment of large-scale units, such as rotating equipment and coolers (above $\Phi 500$) in lubricating oil, sealing oil and cooling systems, and all accessory equipment that falls within the scope of pressure vessel shall be counted separately.

大型机组等设备的附属设备中具有独立作用的设备，如润滑油系统、封油系统和冷却系统中的转

动设备及 $\Phi 500$ 以上的冷却器等设备，属于压力容器的所有附属设备，均应单独统计。

2.4 Transmission equipment shall be calculated as per unit. An auxiliary unit matching a main unit and having a power smaller than 100KW shall not be calculated separately and shall be calculated together with the main unit as one set. An auxiliary unit matching a main unit and having a power greater than or equal to 100KW shall be calculated separately with the main unit.

传动设备按机组计算，与主机配套的附机且功率小于 100 千瓦的，不单独统计，与主机一起按一台计算；凡与主机配套的附机且功率大于或等于 100 千瓦的，与主机分别计算。

2.5 Power equipment, such as transformer, switch cabinet, UPS, and such motor, turbine and electric generator as have power greater than or equal to 100kW, shall be calculated separately.

动力设备，如变压器、开关柜、UPS、功率大于或等于 100 千瓦的电动机、汽轮机、发电机等，单独统计。

2.6 Instruments shall be calculated by set. All independent elements that can form detection and control loops shall be calculated by sets respectively, including regulating element, measuring transmission element, display element, computing element, assistant element, special element and various actuators.

仪表设备按台计算，凡是能组成检测、控制回路的独立单位分别按台数统计，包括调节单元、测量变送单元、显示单元、计算单元、辅助单元、特殊单元及各种类型的执行器等。

Appendix 3

附件 3

Statistical Method of Static Sealing Points 静密封点统计方法

1 Scope of statistics for static sealing points

静密封点统计范围

1.1 Flanges, valves, unions, plugs, threaded elbows, tees and other fittings on all equipment and pipelines; oil leveler of pump equipment, and fittings on accessory pipelines; pressure gauges, thermometer joints and glass plate level gauges on equipment and pipelines; air-cooled tube bundle plugs; exposed expansion joint of heating furnace tube; joints of other equipment.

所有设备、管道上的法兰、阀门、活接头、丝堵、丝扣弯头、三通等管件；机泵设备的油标，附属管线上的管件；设备及管道上的压力表、温度计接头，玻璃板液位计；空冷管束堵头；加热炉炉管的外露涨口；其它设备的接合部位。

1.2 Oil switch of electrical equipment, transformers and other oil-filled electrical equipment; orifice plate and regulating valve of instrumental equipment, and fittings and joints on accessory pipelines.

电气设备的油开关、变压器及其它充油电气设备；仪表设备的孔板、调节阀，附属管线上的管件与接头。

2 The joint positions of the following equipment, pipelines and pipe fittings shall not be included in the scope of statistics for static sealing points.

下列设备、管道及管件的接合部位不列入静密封点统计范围。

2.1 Removed, transferred and scrapped equipment; mothballed and idle equipment; equipment kept in stock and uninstalled; buried pipes and pipe fittings; sealed transmission part of equipment.

拆迁、外调、报废设备；封存、闲置设备；未安装的库存设备；埋地管道及管件；设备传动密封部位。

2.2 Equipment and pipelines mainly used for living and logistics, and water, steam, air and other pipelines and fittings used for analytical experiment, test and check.

主要用于生活后勤的设备及管道，以及用于分析化验，试验、校对的水、汽、风等管道及管件。

3 Static Sealing Area Division and Responsibilities

静密封区域划分和职责

3.1 Production units may be divided into several areas by equipment arrangement or technological process; auxiliary systems may be zoned by technological process and equipment layout; the operation departments may conduct the division for convenience of collection of statistics and management.

生产装置可按设备布置或工艺流程将本装置划分为若干区域；辅助系统可按工艺流程结合设备布局进行划分区域；运行部可以从便于统计和管理方便出发来进行区域划分。

3.2 The supply department is responsible for the part from power pipeline network to user's first valve (including valve); Instrument Control Dept. is responsible for the instrument process pipelines, air ducts and heat tracing pipes; the transmission department is responsible for the part from petroleum process pipeline or heat tracing pipe to the first flange of user's first valve (excluding valve); equipment and pipelines of units are in the charge of the corresponding departments.

动力管网至用户第一阀门（包括第一个阀门）为界，由输送供应部门负责；仪表的工艺管路、风管、加热伴管由仪表控制部负责；石油工艺管路、保温伴管至用户第一个阀门的第一道法兰为界（不包括阀门）由送出部门负责；各装置所属设备、管路由所属部门负责。

4 Statistics for Static Sealing Points

静密封点统计

4.1 Statistics for static sealing points and labor division

静密封点统计与分工

4.1.1 Each operation department is responsible for counting static sealing points of process equipment, process pipeline and pump equipment in this department; Electrical Operation Dept. is responsible for counting static sealing points of non-utility equipment and such electrical equipment as is in the charge thereof; Instrument Control Dept. is responsible for counting static sealing points of non-utility equipment and such instruments as are in the charge thereof. 运行部负责本部门工艺设备、工艺管道及机泵设备的静密封点统计；电气运行部负责自用设备及由本部负责管理的电气设备静密封点统计；仪表控制部负责自用设备及由本部负责管理的装置仪表设备静密封点统计。

4.2 Demarcation points for collecting statistics for static sealing points of equipment and pipelines: Equipment inlets and outlets are taken as demarcation points, static sealing points inside inlet and outlet flanges (including flange) are counted in equipment body and those outside flanges are counted in pipelines; condensate drain pipes of equipment are drained locally, static sealing points of those pipes not drained into system are counted in equipment body, and for those pipes drained into system, static sealing points outside the first flanges are counted in pipelines; for venting from the top of equipment (including safety valve), static sealing points of pipes not discharging into system are counted in equipment, and static sealing points outside the first flanges of pipes with joint seals are counted in pipelines.

设备与管道静密封点统计分界点：以设备出入口为分界点，出入口法兰（包括法兰）以内算设备本体上的静密封点，法兰以外的统计到管道上；设备排凝管就地排放，不排入系统的统计在设备本体上；排入系统的，以第一道法兰为准，法兰以外的统计到管道内；设备顶部放空（包括安全阀），未排入系统的统计到设备上，有管道连接密封排放者，以第一道法兰为准，法兰以外的统计到管道内。

4.3 Static sealing points in static sealing area: They are counted one by one respectively by

process equipment, process pipeline, pump equipment, electrical equipment, instrumental equipment and other equipment.

静密封区域内的静密封点：分别按工艺设备、工艺管道、机泵设备、电气设备、仪表设备和其它设备逐台设备、逐条管线进行统计。

4.4 Static sealing is measured in points: one static sealing joint is counted as one sealing point. Details are as follows:

静密封按点计算：一个静密封接合处算一个密封点。具体规定如下：

4.4.1 A pair of flanges, regardless of their specifications and size, is counted as one sealing point; for a valve, either end of it connected by flange is counted as one point respectively, valve cover is counted as one point, and gland cover is counted as one point. In general, for a valve, regardless of its specification and size and connection of either end of it by flange, screw thread or welding, four sealing points are calculated. Under any special circumstance, such as where a valve body is provided with screwed plug or venting is closely downstream of it, five sealing points shall be calculated for such valve. If a valve body is provided with screwed plug and has venting closely downstream of it, six sealing points shall be calculated for this valve.

一对法兰，不论其规格大小，均算一个密封点；一个阀门，阀门两端与法兰连接处各算一个点，大盖算一个点，填料盖算一个点。一般情况下，一个阀门不论其规格大小及两端的连接形式为法兰、丝扣、焊接等，均按四个密封点计算。特殊情况，如阀体有丝堵或阀后紧接放空，则一个阀门按五个密封点计算。若既有阀体丝堵，阀后又紧接放空，则按六个密封点计算。

4.4.2 For a union, three sealing points are calculated; for a threaded elbow, two sealing points are calculated; for a threaded tee, three sealing points are calculated; a pressure gauge connector is counted as one sealing point; a sheathed thermometer joint is counted as one sealing point; a screwed plug or an exposed expansion joint is counted as one sealing point.

一个活接头按三个密封点计算；一个丝扣弯头按两个密封点计算；一个丝扣三通按三个密封点计算；一个压力表接头按一个密封点计算；一个套管温度计接头按一个密封点计算；丝扣堵头或外露涨口，一个堵头（一个涨口）按一个密封点计算。

4.4.3 For a single-sided glass plate level gauge, one plate is counted as one sealing point and the number of sealing points for a set of level gauge is counted by multiplying the number of plates by 1; for a double-sided glass plate level gauge, one plate is counted as one sealing point and the number of sealing points for a set of level gauge is counted by multiplying the number of plates by 2. For others, the number of sealing points shall be calculated in the light of the aforementioned requirements.

玻璃板液位计，单面的，一块板算一个密封点，一组液位计按板块数乘 1 统计密封点；双面的，一块板算两个密封点，一组液位计按板块数乘 2 统计密封点。其它比照上述规定统计计算密封点。

4.4.4 If a valve is connected to a flange, the connection is only counted as one sealing point, instead of counting sealing points based on both flange and valve, and in general, the sealing point is counted in valve rather than flange. Only when a flange separately forms a static sealing joint can the static sealing point of flange be counted. Static sealing points are counted

in the same manner when other pipe fittings are connected to each other.

若阀门与法兰连接，则连接处只算一个密封点，不能既按法兰统计密封点，又按阀门统计密封点，一般统计在阀门上而不统计到法兰上。只有法兰单独成为一个静密封接合处时才统计法兰静密封点。其它管件相互连接时以此类推统计静密封点。

5 Criteria for Inspection of Static Sealing for Leakage

静密封泄漏检验标准

5.1 Equipment and pipeline joints are visually inspected for coking, smoking and material leakage.

设备及管路的结合部位用肉眼观察，不结焦、不冒汽、无物料渗漏。

5.2 Welding or joint positions or the joints of instrument process pipes and air pipes are tested with soapy water for leakage and bubbles (at vacuum positions, inspection is conducted by thin paper strip suction method).

焊接或联接部位或仪表工艺管、空气管的联接处，用肥皂水试漏，无气泡（真空部位，用薄纸条吸的办法）。

5.3 Gas and other flammable and explosive gas systems are inspected with soapy water for emergence of bubbles.

在瓦斯气等易燃易爆气体系统，用肥皂水检查无气泡。

Appendix 4

附件 4

Equipment Classification Catalog 设备分类目录

No. 编号	Classification 大类名称	No. 编号	Classification 大类名称
1	Furnace 炉类	15	Manufacturing, processing and maintenance 制造加工检维修类
2	Tower 塔类	16	Test and inspection equipment 试验与检测设备类
3	Reaction equipment 反应设备类	17	Information and communication equipment 信息与通讯设备类
4	Tank 罐类	18	Special equipment for safety and environmental protection 安全环境保护专用设备类
5	Heat exchange equipment 换热设备类	19	Office and ancillary facilities 办公及辅助设施类
6	Pipe and valve 管道与阀门类	20	Building and structure 建构筑物类
7	General machinery 通用机械类	21	Drilling equipment 钻井设备类
8	Oil/gas loading, unloading and injection facilities 油/气装卸加注设施类	22	Special vehicle for drilling and production 钻采特车类
9	Power equipment 动力设备类	23	Logging equipment 测井及录井设备类
10	Electrical equipment 电气设备类	24	Geophysical equipment 物探设备类
11	Automatic control and instrumentation 自动控制与仪器仪表类	25	Injection and production equipment 注采设备类
12	Lifting and transportation 起重运输类	26	Seismic and geological data processing and interpretation equipment 地震地质资料处理解释设备类
13	Ship 船舶类	27	Special machinery for refining and chemical engineering 炼油化工专用机械类
14	Engineering machinery 工程机械类	28	Other equipment 其它设备类

Appendix 5

附件 5

Interface Division between Equipment Management Disciplines

设备管理专业界面划分

1 Division of Business Interface between Instrument Control Dept. and Production Operation Dept.

仪表控制部与生产运行部业务界面的划分

1.1 Non-remote, non-controlled, direct-reading local instruments, such as local pressure gauge, mercurial thermometer, bulb thermometer, bimetallic thermometer, glass plate (pipe) level gauge, magnetic flap level gauge and flowmeter, is in the charge of Production Operation Dept.

不远传、不带控制的直读式就地仪表，如就地压力表、水银温度计、温包式温度计、双金属温度计、玻璃板（管）液位计、磁翻板液位计、流量计等由生产运行部门负责。

1.2 Installation, daily maintenance and leaking stoppage of measuring element protection sleeve welded to equipment, primary instrument valve and pipeline upstream of it, and orifice flange (orifice plate is supplied by Instrument Control Dept.) are in the charge of Production Operation Dept.

与设备焊接成一体的测量元件保护套管、仪表一次阀及前管线、孔板法兰的安装(孔板由仪表控制部提供)及日常维护和堵漏等由生产运行部门负责。

1.3 Production Operation Dept. is responsible for the body of cylinder valve used for cutting off, oil controlled valve and flue damper, while Instrument Control Dept. is responsible for cylinder and control parts (including solenoid valve and position monitoring switch). Production Operation Dept. is responsible for the body and actuator of shut-off valve integrating actuator and valve body (such as diaphragm valve and brake valve), while Instrument Control Dept. is responsible for the control part (including solenoid valve and position monitoring switch).

作切断用的气缸阀阀体部分、液动阀、烟道挡板等由生产运行部负责，气缸及控制部分（包括电磁阀、回信器等）由仪表控制部负责；执行机构与阀体一体化的切断阀（隔膜阀、闸阀等）的阀体及执行机构由生产运行部负责，控制部分（包括电磁阀、回信器等）由仪表控制部负责。

1.4 Instrument Control Dept. is responsible for connector linking flange to measuring element, and regulating valve (including self-operated regulating valve); it is also responsible for the automatic control signal part of oil controlled valve, the cylinder and automatic control signal part of cylinder valve (solenoid valve, position monitoring switch, air pipeline and accessories), and long stroke actuator of flue damper. The sealing surface at terminal connection between instrument and equipment or pipeline serves as the management interface; Instrument Control Dept. is responsible for daily management of this sealing point, with cooperation from Production Operation Dept.

法兰联接测量元件的联接件、调节阀（包括自力式调节阀）由仪表控制部负责；液动阀自控信号部分和带气缸阀的缸体及自控信号部分（电磁阀、回讯器、气源管线及附件）、烟道挡板的长行程执行机构等由仪表控制部负责；仪表与设备、管道的终端连接处的密封面作为管理界面，该密封点由仪表控制部负责日常管理，生产运行部配合。

1.5 The maintenance such as replacement, if necessary, of the connecting pipes and flanges of instruments and measuring elements, the pipe nozzles, the regulating valves and the connecting flanges and orifice flanges of pipes etc. shall be proposed by the Instrument Control Dept. The maintenance shall be commissioned by the Production Operation Dept. with the cooperation from the Instrument Control Dept. The Instrument Control Dept. provides the drawings and purchase orders of pipe nozzles and flanges. Upon completion of such maintenance, joint acceptance shall be conducted. Instrument Control Dept. is responsible for the management, maintenance, gasket replacement and leaking stoppage of regulating valve, impulse lines downstream from all primary valves, and heat tracing lines used exclusively for instruments. Thermal insulation of regulating valve body, orifice flange and pipe-mounted instruments themselves caused by process renovation or repair shall be commissioned uniformly by the Production Operation Dept.; piecemeal thermal insulation shall be in the charge of Instrument Control Dept.

仪表测量元件的接管及法兰、管咀、调节阀与管道的连接法兰、孔板法兰等，如需更换等检修，由仪表控制部提出，生产运行部负责委托实施，仪表控制部配合，其中管咀及法兰，由仪表控制部提供图纸和订货清单，检修完毕共同验收。调节阀、所有一次阀后的引压管及专供仪表使用的仪表伴热线管理、维护、换垫、堵漏等，均由仪表控制部负责。因工艺改造或检修引起调节阀阀体、孔板法兰及管道式仪表本体的保温，统一由生产运行部负责委托，零星保温由仪表控制部负责。

1.6 Instrument Control Dept. is responsible for managing the heat tracing valves and pipelines shared with process from the first welding joint at the branch or from the first sealing surface downstream from the branch valve.

与工艺共用的伴热阀门和管线，从分支处的第一道焊口或分支阀门后的第一道密封面开始归仪表控制部管理。

1.7 Instrument Control Dept. is responsible for internal hygiene in the back of instrument and panel of instrument operation room, hygiene in independent enclosed panel, and internal hygiene in control console; Production Operation Dept. is responsible for hygiene on and in the front of instrument panel (including mimic panel), hygiene in the back of independent enclosed panel and hygiene of control console.

仪表操作室的仪表和盘后内部卫生、独立的封闭式盘内的卫生、以及操作台内部卫生均由仪表控制部负责；仪表盘面（包括模拟盘）及盘前和独立封闭式盘后、操作台的卫生由生产运行部负责。

1.8 For large unit and pump group states monitoring system, Instrument Control Dept. is responsible for the probe and lead wire part of state monitoring system, while Equipment Management Dept. is responsible for signal receiving, analysis and processing of state

monitoring system; and application for relevant accessories is made based on the principle that one in charge shall make the application.

对于大机组及泵群状态监测系统，仪表控制部负责状态监测系统的探头及引线部份，机械动力部负责状态监测系统的信号接收、分析处理部份，相关配件的申报按谁管理谁申报的原则执行。

2 Interface Division between Instrument Control Dept. and Electrical Operation Dept.

仪表控制部与电气运行部的界面划分

2.1 The Electrical Operation Dept. is responsible for installation and management of power supply lines from the distribution room of units to the general distribution box of instruments, while the Instrument Control Dept. is responsible for switches and power supply lines in the general distribution box of instruments (the maintenance and replacement of main switch may be entrusted to the Electrical Operation Dept. and the capacity of main switch need be selected through consultation with the Electrical Operation Dept.).

装置配电间到仪表总配电箱之间的供电线路安装和管理由电气运行部负责，仪表总配电箱内的开关及供电线路由仪表控制部负责（总开关的检修、更换可委托电气运行部，总开关的容量选择需同电气运行部协商）。

2.2 The Instrument Control Dept. is responsible for all accessories and leading wires in the instrumentation circuit system; the Electrical Operation Dept. is responsible for all accessories and leading wires in the electrical circuit system. Where the equipment not belonging to a discipline fails in the circuit and that discipline is incapable of handling it, a commission form may be filled in to commission corresponding discipline to cope with the maintenance. If either party does maintenance in the counterpart's circuit system, the counterpart must assign personnel to provide cooperation.

凡属仪表回路系统内的所有附件及引线由仪表控制部负责，凡属电气回路系统的所有附件及引线由电气运行部负责，在回路中非本专业设备出现故障且本专业又无能力处理时，可填写委托单，委托相应专业检修处理。双方在对方回路系统中检修作业时，对方专业必须派人配合。

2.3 The terminal block shared by electrical and instrument disciplines in intermediate connection cabinet of instrument cabinet room is taken as the demarcation between Electrical Operation Dept. and Instrument Control Dept.; Instrument Control Dept. is responsible for the intermediate connection cabinet, terminals in it and their connection, while Electrical Operation Dept. is responsible for the circuits coming out of the connection cabinet; Instrument Control Dept. provides cooperation when Electrical Operation Dept. works in the instrument cabinet room. Where the control and junction boxes on site (such as motor temperature monitoring switch) are regarded as the demarcation points, Electrical Operation Dept. is responsible for the boxes, terminals in the boxes and terminal connection in the charge thereof, while Instrument Control Dept. is responsible for the boxes, terminals in the boxes and terminal connection in the charge thereof. After Electrical Operation Dept. (Instrument Control Dept.) has completed construction in equipment in the charge of Instrument Control Dept. (Electrical Operation Dept.), the Instrument Control Dept. (Electrical Operation Dept.) is responsible for

final confirmation that terminals and wiring are in good condition.

电气运行部与仪表控制部的分管界面以仪表机柜室的中间接线柜的电仪公用接线端子为界，中间接线柜、柜内端子及其接线完好由仪表控制部负责，出接线柜的线路由电气运行部负责，电气运行部在仪表机柜室工作，仪表控制部配合；部分以现场控制箱、接线箱为分界点的（如电机温度回讯等），由电气运行部管理的箱体、箱内端子及其接线完好由电气运行部负责，由仪表控制部管理的箱体、箱内端子及其接线完好由仪表控制部负责。电气运行部（仪表控制部）到仪表控制部（电气运行部）管辖的设备内施工完成后，由仪表控制部（电气运行部）专业负责最终确认端子及接线完好。

2.4 With regard to local control cabinet integrating instrument and electrical disciplines, in principle, equipment belonging to the instrument circuit shall be in the charge of Instrument Control Dept. while equipment belonging to the electrical circuit shall be in the charge of Electrical Operation Dept. The control cabinet itself shall be managed based on the principle that one in charge shall assume the responsibilities. Under exceptional circumstances, interface division shall be performed through negotiation based on use condition on site.

涉及仪、电一体化的就地控制柜，原则上属于仪表回路中的设备管理由仪表控制部负责，属于电气回路中的设备由电气运行部负责，控制柜本体的管理，按照谁为主，谁负责原则，特殊情况根据现场使用实际协商划分。

2.5 For motor coil and bearing temperature signals entering DCS/SIS and other control systems, the intermediate terminal box on site shall be taken as the demarcation; the part from outgoing line to DCS system shall be in the charge of Instrument Control Dept., while motor coil temperature measuring element shall be in the charge of Electrical Operation Dept. The electrical department is responsible for the intermediate terminal box on the motor body, including its internal connection terminals, while the instrument control department is responsible for the intermediate terminal box not on the motor body, including its internal connection terminals.

进 DCS/SIS 等控制系统的电机线圈、轴承温度信号，以现场中间端子箱为界，引出线至 DCS 系统部分由仪表控制部负责，电机线圈测温元件由电气运行部负责。中间端子箱在电机本体上由电气部负责，包括其内部接线端子，中间端子箱非在电机本体上由仪控部负责，包括其内部接线端子。

2.6 Electrical Operation Dept. is responsible for management of UPS placed in the instrument control room.

放置在仪表控制室的 UPS 的管理由电气运行部负责。

2.7 Sootblower control box and equipment in it shall be managed by Electrical Operation Dept. (If there is any problem of pressure gauge, solenoid valve of pneumatic valve and other equipment in the box, the Instrument Control Dept. may be entrusted with its solving.) When the sootblower has both electrical control box and instrument control box in it, the electrical and instrument control boxes shall be managed by the electrical and instrument control departments respectively. Motor, electrically operated valve, limit switch, igniter and electrical

cable ducts (including incoming power lines) of sootblower shall be managed by Electrical Operation Dept.; pneumatic valve, flame detector (or flame probe) and solenoid valve of sootblower shall be managed by Instrument Control Dept. The output terminal block in sootblower control box on site is regarded as the demarcation point between electrical and instrumental equipment.

吹灰器设备的控制箱及箱内设备由电气运行部管理（箱内的压力表、气动阀电磁阀等设备存在问题时，可委托仪表控制部处理）；当吹灰器设备中既有电气控制箱又有仪表控制箱时，则电气、仪表控制部各自管理其中的电、仪控制箱。吹灰器设备的电动机、电动阀、限位开关、点火器及电气电缆管线（包括电源进线）由电气运行部管理；吹灰器设备的气动阀、火焰检测器（或火焰探头）、电磁阀等由仪表控制部管理。电、仪设备的分界点以现场吹灰器控制箱内配出端子排为界。

2.8 When it comes to troubleshooting of electroEquipment Management integration equipment or equipment at electrical and instrumental interface, the discipline that is the first to receive the notice shall timely inform its counterpart, and the counterpart shall promptly send personnel to jointly find the cause of trouble.

当涉及机电一体化或电气、仪表交接面的设备故障处理时，先接到通知的专业应及时通知对方专业，对方专业应及时派员共同查找故障原因。

2.9 Equipment Management Dept. shall organize the Equipment Management, electrical and instrumental disciplines to divide the labor in management of any newly added electroEquipment Management integration equipment.

新增机电一体化设备的管理分工，由机械动力部组织机、电、仪等相关专业协调划分。

2.10 The instrument and control department shall be responsible for the accessories of the control loops attached to the high pressure steam regulating valve and extraction valve of the turbine body of the power station, and the interface shall be bounded by the first terminal on site.

电站汽轮机本体高调门、抽汽门所配带的控制回路的附件，由仪控部负责，分界面以现场第一道端子为界。

3 Division of Business Interface between Electrical Operation Dept. and Production Operation Dept.

电气运行部与生产运行部业务界面的划分

3.1 Interface division for lubrication of motor bearing bush. Filling of lubricating oil and daily maintenance of oil sight glass for bearing bush of a motor shall be in the charge of Production Operation Dept., and the Electrical Operation Dept. and the Production Operation Dept. shall jointly undertake the daily patrol inspection; If Electrical Operation Dept. finds any oil level and quality problem in bearing bush, it shall timely contact the Production Operation Dept. for solving. The maintenance of motor sliding bearings is entrusted to the equipment maintenance department by the electrical operation department.

电机轴瓦润滑界面划分。电动机轴瓦润滑油的加油及油视镜的日常维护工作应由生产运行部门负责，电气运行部和生产运行部共同承担日常的巡回检查工作，电气运行部发现轴瓦油位、油质问题时应及时联系生产运行部处理。电动机滑动轴承的检修，由电气运行部负责委托给设备检修部检修。

3.2 Production Operation Dept. is responsible for coupler connecting pump (unit) to motor; Electrical Operation Dept. is responsible for fabrication of motor-side coupler if it is necessary due to electrical reasons. The operation department need participate in the rotation confirmation after motor maintenance.

泵（机组）与电机相联的联轴器由生产运行部负责，当电气原因引起电动机侧联轴器需要制作时，由电气运行部负责。电动机检修后转向确认需运行部参加。

3.3 Division of labor in motor foundation. If the motor foundation is integrated with the foundation of rotating equipment body, the foundation shall be managed by the operation department. If the motor-side foundation need be renovated separately due to electrical reasons, the Electrical Operation Dept. shall be responsible for the renovation.

电动机基础的分工。电动机与转动设备本体基础为一体化的由运行部负责管理。当电气原因需要对电机侧基础单独进行改造时，由电气运行部负责实施。

3.4 Division of labor in electrically operated valves of production units. Valve body shall be in the charge of Production Operation Dept., while the electric head in the charge of Electrical Operation Dept.

生产装置的电动阀分工。阀体部份由生产运行部负责，电动头部份由电气运行部负责。

4 Interface Division for Purified Instrument Air Pipelines

仪表净化风管线界面划分

4.1 Purified instrument air pipelines with diameter \geq DN25 (including valves of the same diameter) are in the charge of Production Operation Dept., while those with diameter $<$ DN25 (including valves of the same diameter) are in the charge of Instrument Control Dept. (including the first weld joint or valve at diameter change position); besides, the purified air pipelines (including the first weld joint or valve at diameter change position) with diameter $<$ DN25 independently used by Production Operation Dept. are in the charge of Production Operation Dept.

仪表净化风管线大于和等于 DN25 的管线（包括同口径阀门）由生产运行部负责，小于 DN25 的净化风管线（包括同口径阀门）由仪表控制部负责（包括变径处第一道焊缝或阀门），其中生产运行部独立使用的小于 DN25 的净化风管线（包括变径处第一道焊缝或阀门）由生产运行部负责。

4.2 Purified instrument air is supplied in a centralized manner at 0.14MPa, and the instrument filter, pressure relief valve, safety valve and pressure setting device installed in the unit shall be in the charge of Instrument Control Dept.

仪表净化风采用 0.14MPa 集中式供气方式，装置中安装的仪表过滤器、减压阀、安全阀、压力设定器等由仪表控制部负责。

4.3 The emergency air supply tank installed for instrument regulating valve or shut-off valve

and the filter installed on the main purified air pipeline shall be in the charge of Production Operation Dept. if they fall within the scope of pressure vessel.

仪表调节阀或切断阀配有事故气源储罐以及净化风主管线上的过滤器，如属于压力容器的由生产运行部负责。

4.4 Maintenance and dehydration of an air storage tank for a purified air inlet unit shall be in the charge of the operation department of this unit; filter on pipeline downstream of the purified air storage tank, and daily dehydration of emergency air supply tank shall be in the charge of Instrument Control Dept.

净化风进装置的储气罐由所在装置运行部负责设备维护和脱水管理；净化风储气罐后管线上的过滤器、事故气源罐的日常脱水工作由仪表控制部负责。

5 Division of Telecommunication System in Process Plant Area

装置区电信系统划分

5.1 Industrial video monitoring system in production areas of plants and units is in the charge of Instrument Control Dept.; industrial video monitoring system of distribution room is in the charge of Electrical Operation Dept.; all video monitoring systems related to security are in the charge of Information Management Dept.

装置及单元等生产区域的工业视频监控系统由仪表控制部负责；配电间的工业视频监控系统由电气运行部负责；所有安防相关的视频监控系统由信息管理部负责。

5.2 Wireless communication facilities, terminals, telecommunication lines, telephone system, access control system, patrol system and generic cabling system are in the charge of Information Management Dept.

无线通讯设施、终端、电信线路、电话系统、门禁系统、巡更系统、综合布线系统由信息管理部负责。

5.3 Fire alarm system is in the charge of the Electrical Operation Dept.

火灾报警系统由电气运行部负责。

6 Work division between Electrical Operation Department and Equipment Maintenance Department

电气运行部与设备检修部的分工

6.1 The electrical operation department shall be responsible for the inspection, disconnection and on/off of power supply for the temporary power supply needed for the maintenance of production equipment, and the equipment maintenance department shall provide power supply facilities.

生产装置设备检修中需要的临时用电，由电气运行部负责用电设备的检查、拆接线、停送电，设备检修部提供用电设施。

6.2 During motor maintenance, the electrical operation department shall be responsible for dismantling and inspecting the rotor or lifting the motor. The equipment maintenance department is responsible for the special position of the motor and the cooperation of the crane.

电动机检修中，需拆检转子或起吊电动机时，由电气运行部负责；对于电动机位置特殊及需吊机

配合时，由设备检修部负责。

6.3 During motor repair, the electrical operation department shall be responsible for dismantling the coupling bolts and couplings, and properly keep the dismantled coupling bolts, diaphragms, couplings, anchor bolts, gaskets and other parts. After the motor repair is completed, be responsible for restoring and bringing the bolts to the full buckle, restore the motor gasket to the original position, and do not need to tighten the anchor bolts for restoration. The equipment maintenance department is responsible for alignment, and the electrical operation department is responsible for disassembly damage or loss.

电动机检修中，联轴器螺栓及联轴器由电气运行部负责拆卸，将拆下的联轴器螺栓、膜片、联轴器、地脚螺栓、垫片等零部件妥善保管。电机检修完成后，负责恢复并将螺栓带至满扣，电机垫片恢复至原位，地脚螺栓恢复不需要拧紧，设备检修部负责进行找正，因拆卸损坏或丢失，由电气运行部负责。

6.4 When the alignment of electric equipment requires machining, the appointed contractor can be directly entrusted to repair it. When the motor rotor needs to be balanced, the electric operation department shall install half coupling and cooling fan blades, and the equipment maintenance department shall carry out dynamic balance test.

电动设备找正需要进行机加工时，可直接委托指定承包商修复；电动机转子需要做平衡时，由电气运行部安装半联轴器及冷却风叶，设备检修部进行动平衡试验。

6.5 When the coupling needs to be replaced as a whole, the pair of wheels on both sides of the coupling shall be removed and replaced by the equipment maintenance department, and the installation position of the motor pair of wheels shall be confirmed by the electrical operation department.

联轴器需要整体更换时，联轴器两侧对轮由设备检修部拆除及更换，电机对轮安装位置由电气运行部确认。

6.6 If the shaft head of the motor is connected with gears, the motor and the casing shall be removed by the equipment maintenance department during the motor repair, and then the electrical operation department shall carry out the motor repair, and the equipment maintenance department shall reset the motor after the motor repair.

对于电机轴头带齿轮连接的，在进行电机检修时，电机与机壳联由设备检修部进行拆除，然后由电气运行部进行电机维修，电机检修后再由设备检修部进行复位。

6.7 The disassembly and assembly of electrical and equipment connection parts such as electric valve and pipeline pump shall be divided according to the principle of "whoever needs it shall disassemble and assemble".

电动阀及管道泵等电气与设备联接部件的拆装，根据“谁需要谁拆装”原则分工。

6.8 The electric operation department is responsible for the cooler installed on the motor body, and the equipment maintenance department is responsible for the split type (cooler not installed on the motor body).

安装于电机本体上冷却器由电气运行部负责，分体式（未安装在电机本体上的冷却器）由设备检

修部负责。

6.9 The equipment maintenance department shall be responsible for dismantling and removing the motor when repairing the direct-connected pipeline pump, direct-connected reducer and direct-connected axial flow fan. The electrical operation department shall be responsible for repairing and installing the damaged skeleton seal, labyrinth seal and felt seal on the gland side of the motor (the equipment maintenance department shall be responsible for special seals); When this part of the seal is a mechanical seal, if the motor shaft is worn out, the repair and processing dimensions of the shaft seal part shall be given by the equipment maintenance department, and the electrical operation department shall be responsible for processing. After the repair is completed, the equipment maintenance department shall replace the mechanical seal and the motor in place, and the mechanical and electrical discipline shall jointly conduct trial operation.

直连式管道泵、直连减速机及直连式轴流风机检修时由设备检修部负责解体并拆下电动机，电动机压盖侧损坏的骨架密封及迷宫式密封、毛毡密封由电气运行部负责修理并安装（特殊密封由设备检修部负责）；当该部分密封为机械密封时，如电动机轴发生磨损后，轴密封部位修复加工尺寸由设备检修部给出标准图纸，电气运行部负责加工，修复完成后交由设备检修部回装机械密封并回装电动机就位，机、电两专业共同试运转。

6.10 When directly connected high-speed pump motor and shielded pump motor are repaired, the equipment maintenance department is responsible for dismantling, the electrical operation department is responsible for repairing the motor, machining and repairing the main shaft of the motor, the equipment maintenance department is responsible for installing the mechanical seal (the electrical operation department is responsible for the side frame seal of the motor gland) and positioning the motor, and the mechanical and electrical specialties jointly test run.

直连式高速泵电动机、屏蔽泵电动机检修时，由设备检修部负责拆卸，电气运行部负责电动机的检修及电动机主轴的加工修复，设备检修部负责机械密封（电动机压盖侧骨架密封由电气运行部负责）安装及电动机就位，机、电两专业共同试运转。

6.11 When the belt-driven axial-flow air-cooled fan motor is repaired, the electrical operation department is responsible for dismantling the motor pulley and other parts. After the motor is repaired, the electrical operation department is responsible for installing in place and the equipment maintenance department is responsible for aligning. The equipment maintenance department shall be responsible for the disassembly and assembly of the fixed blades of the direct-connected air cooling fan.

皮带传动轴流式空冷风机电动机检修时，电气运行部负责拆卸电动机皮带轮等零部件，电动机检修完成后由电气运行部安装就位，设备检修部负责找正；直连空冷风机固定叶片谁需要检修谁拆装，可调叶片由设备检修部负责拆装。

6.12 When the motor with sliding bearing is repaired, the equipment maintenance department is responsible for repairing the sliding bearing and the bearing seal, the auxiliary facilities such as fan blades are dismantled by the electrical operation department, and the electrical

operation department is responsible for measuring and adjusting the gap between the rotor and stator of the motor, the rotor and stator of the exciter and the gap between the partition plates of the motor.

带有滑动轴承的电动机检修时，由设备检修部负责滑动轴承及轴承密封的修配，风叶等附属设施由电气运行部拆装，电动机转子和定子、励磁机转子和定子间隙测量、调整以及电动机隔板间隙的调整由电气运行部负责。

6.13 The electrical operation department is responsible for providing the core-pulling technical requirements and precautions for synchronous machines and generators, and the equipment maintenance department is responsible for lifting.

同步机、发电机抽芯工作由电气运行部负责提供抽芯技术要求及注意事项，设备检修部负责起重。

6.14 When the motor of the unit is repaired, the equipment maintenance department shall be responsible for the disassembly of the coupling. After the motor repair is completed, the equipment maintenance department shall install and align the coupling.

机组的电动机检修时，由设备检修部负责联轴器的拆卸，电动机检修完成后由设备检修部进行联轴器安装及找正。

7 Work division between Instrument Control Department and Equipment Maintenance Department

仪控部与设备检修部的分工

7.1 For instrument control valves, when the diameter is greater than or equal to 150mm, it shall be dismantled by the equipment maintenance department. If diameter is less than 150mm then it is by instrument discipline to disassemble.

对于仪表控制阀，当直径大于等于 150mm 的由设备检修部拆装；小于 150mm 的由仪表专业拆装。

7.2 The equipment maintenance department is responsible for the repair of fans and pumps brought by the instrument control department.

仪表所带的风机、泵的检修由设备检修部负责。



Hengyi Industries Sdn Bhd
恒逸实业（文莱）有限公司

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Equipment Defect and Fault Management System

设备缺陷及故障管理制度

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 HENGYI	Hengyi Industries Sdn Bhd 恒逸实业（文莱）有限公司			
	Equipment Defect and Fault Management System			
	设备缺陷及故障管理制度			
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1 Purpose

目的

This System is hereby formulated to standardize equipment defect and fault management of managerial personnel and operating personnel and to ensure safe operation of equipment.

为规范管理人员和操作人员对设备缺陷及故障的管理，确保设备安全运行，特制订本制度。

2 Scope of Application

适用范围

This System applies to all involved departments.

本制度适用于各部门。

3 Terms and Definitions

术语和定义

3.1 Equipment Defect means such equipment degradation, damage to components and parts, failure to meet process control criteria and other phenomena as are caused by various reasons and can be classified into Common Defect and Major Defect according to its nature.

设备缺陷：指由于各种原因造成的设备性能下降、零部件损伤、达不到工艺控制指标等现象，设备缺陷按其性质可分为一般缺陷和重大缺陷。

3.2 Common Defect means such defects as can be eliminated timely and with which the equipment can still operate without the need for special monitoring measures.

一般缺陷：指能够及时消除、虽带病运行但不需采取特殊监护措施的设备缺陷。

3.3 Major Defect means such defects as are likely to cause equipment accident but with which the equipment must operate under special monitoring measures due to production needs.

重大缺陷：指可能引发设备事故，但因生产需要必须采取特殊监护措施而带病运行的设备缺陷。

3.4 Fault means the loss of partial or all functions of equipment that are defined in technical documents due to certain reason.

故障：指设备因某种原因丧失技术文件中明确的部分或全部功能。

4 Management Responsibilities

管理职责

4.1 Specified administrative authority

归口管理部门

4.1.1 Equipment Management Dept. is the specified administrative authority of equipment defect and fault, which shall be responsible for formulating the Equipment Defect and Fault Management System and inspecting and supervising each department's equipment defect and fault management.

机械动力部是设备缺陷及故障的归口管理部门，负责制定设备缺陷及故障管理制度，检查、监督各部门设备缺陷及故障管理工作。

4.1.2 Be responsible for identifying major equipment defect and establishing records; and be responsible for organizing the formulation of major defect monitoring measures, handling plans and rectification plans, and conducting whole-process tracking.

负责鉴定重大设备缺陷并建立台帐；组织制订重大缺陷监控措施、处理预案、整改方案，并全过程跟踪。

4.2 Coordinated management departments

协同管理部门

4.2.1 Planning & Dispatching Dept. participates in formulation of major defect monitoring measures and handling plans and is responsible for ascertaining the responsible department of any public utility tunnel defect and fault.

计划调度部参与制订重大缺陷监控措施、处理预案；负责落实公共管廊缺陷及故障的责任部门。

4.2.2 HSE Dept. participates in formulation of major defect monitoring measures and handling plans.

HSE 管理部参与制订重大缺陷监控措施、处理预案。

4.2.3 Electrical Operation Dept., Instrument Control Dept. and Equipment Maintenance Dept. (hereinafter referred to as the Maintenance Dept.) are responsible for handling any equipment defects on site and provide equipment defect handling records.

电气运行部、仪表控制部、设备检修部（以下简称维保部门）负责现场设备缺陷的处理；提供设备缺陷相关处理记录。

4.3 Executive departments

执行部门

4.3.1 The operation departments are the executive departments, which shall be responsible

for daily management of equipment defect and faults in their respective departments and for filing and giving information feedback about equipment defect handling records.

运行部为执行部门，负责本部门设备缺陷及故障的日常管理；做好有关设备缺陷处理记录归档及信息反馈。

4.3.3 Be responsible for rectification of common defects and establishing common defect management records; and be responsible for preparing and submitting the application form for approval of major defect and cooperating in rectification of any major defect.

负责一般缺陷的整改，建立一般缺陷管理台帐；编制、上报重大缺陷立项申请表，配合做好重大缺陷整改。

5 Management Content

管理内容

5.1 Management principles

管理原则

5.1.1 Closed-loop management: Equipment defect and fault are subject to the whole-process closed-loop management of inspection and discovery, rectification and treatment, recording and filing.

闭环管理：设备缺陷及故障实行检查发现、整改处理、记录归档全过程闭环管理。

5.1.2 Classification management: Common defects are in the charge of the department where equipment is located; Equipment Management Dept. is responsible for organizing to handle major defects and the operation departments are responsible for site management.

分级管理：一般缺陷由设备所在部门负责管理；重大缺陷由机械动力部组织处理，运行部负责现场管理。

5.1.3 Electronic management: All equipment defects and faults are managed online by EM management system; the *Application Form for Approval of Major Equipment Defects*, and the *Major Defect Management Records of Equipment* are completed, submitted and managed in electronic form in this system.

电子化管理：所有设备缺陷及故障通过 EM 管理系统实行在线管理，《设备重大缺陷立项申请表》、《设备重大缺陷管理台帐》以电子文档的方式在系统中进行填报和管理。

5.2 Inspection and handling

检查与处理

5.2.1 Where any equipment defect is found by the operation department, it shall be entered into the EM management system upon being reviewed by the team leader on duty, and its nature shall be determined preliminarily after necessary emergency measures have been taken. Any common defect that can be handled immediately shall be directly notified by operating

personnel to the Maintenance Dept., which then will arrive at the site timely to eliminate such defect; any common defect that cannot be handled immediately shall be reported by operating personnel to the person in charge of equipment of the operation department, and the technician in charge of the equipment will establish the common defect management records and include the same into the maintenance plan, and eliminate the defects during unit maintenance; any equipment defect discovered by operating personnel in the public utility tunnel under the jurisdiction of any other department shall be timely notified to the Planning & Dispatching Dept. for handling.

运行部发现设备缺陷时，由当班班长审核后录入 EM 管理系统，并采取必要的应急措施后，初步判断其性质。对于一般缺陷，能立即处理的，操作人员直接通知维保部门及时到现场进行消缺处理；不能立即处理的，操作人员汇报运行部设备主管人员，由设备主管技术员建立一般缺陷管理台帐，列入检修计划，待装置检修时进行消缺；如操作人员发现设备缺陷存在于其它部门所辖的公共管廊上，应及时通知计划调度部落实处理。

5.2.2 Any major equipment defect shall be reported by operating personnel in time, confirmed on site by the person in charge of equipment and then reported to the leader of operation department and the Equipment Management Dept. for review. Equipment Management Dept. organizes the risk evaluation for major equipment defects, makes the defect elimination plan, and supervises and urges the Maintenance Dept. to timely eliminate the defects and, in the case of failure to eliminate such defects, organizes the formulation of equipment operation monitoring measures and the preparation of maintenance plan and eliminates defects during equipment maintenance, provided that safety is ensured.

对于重大设备缺陷，操作人员应及时上报，经设备主管人员现场确认并报运行部领导及机械动力部进行审核。机械动力部组织重大设备缺陷进行风险评估、制订消缺方案、督促维保部门及时消缺，如不能消缺，应在确保安全的前提下，组织制订设备运行监控措施，组织编制检修计划，待装置检修时进行消缺。

5.2.3 For any major equipment defect, the operation department shall submit the *Application Form for Approval of Major Equipment Defects* to the Company's leader in charge for review and approval; upon approval, the Equipment Management Dept. shall establish the major defects management records.

对于重大设备缺陷，由运行上报重大设备缺陷立项申请表，经公司主管领导审批后由机械动力部建立重大缺陷管理台帐。

5.2.4 Where an equipment defect involves different departments, the Equipment Management Dept. will uniformly organize the formulation of treatment plans and coordinate the implementation of such plans.

设备缺陷如涉及不同部门，由机械动力部统一组织制订治理方案、协调实施。

5.2.5 If any defective equipment needs to be re-started after shutdown, it shall be fully checked for compliance with the operation requirements; if it fails to reach the operation conditions, the defect must be handled before the equipment is put into operation.

缺陷设备因停运后需再次启运时，应全面检查设备能否满足运行要求；如不具备启运条件，必须

对缺陷进行处理后才能投入运行。

5.2.6 The operation department shall complete the closed-loop work within 3 days after the Maintenance Dept. has coped with equipment defect or fault; any maintenance records that need be entered into the EM system shall be entered by the operation department and the Maintenance Dept. within one week upon defect elimination.

维保部门处理完设备缺陷或故障后，运行部应在消缺后 3 天内完成缺陷闭环工作；对需录入 EM 系统的检修记录，运行部与维保部门应在消缺后一周内录入。

5.2.7 Report to the Equipment Management Dept. within 5 days upon the occurrence of any fault in any important equipment.

重要设备发生故障后，运行部应在 5 天内填写《设备故障分析报告》报机械动力部。

6 Supervision and Inspection

监督检查

Equipment Management Dept. is responsible for supervising the equipment defect and fault management and incorporating the same into performance management for regular inspection and examination.

机械动力部负责设备缺陷及故障管理进行监督并纳入绩效管理，定期进行检查和考核。

7 Associated Procedures and Records

关联程序和记录

7.1 Associated procedures

关联程序

7.1.1 Equipment Defect and Fault Handling Procedures HYBN-T2-07-0002-2018-1

设备缺陷及故障处理程序 HYBN-T2-07-0002-2018-1

7.1.2 Equipment Defect and Fault Analysis Procedures HYBN-T2-07-0003-2018-1

设备缺陷及故障分析程序 HYBN-T2-07-0003-2018-1

7.2 Associated records

关联记录

7.2.1 Common Defect Management Records of Equipment HYBN-T6-07-0007-001-2018

设备一般缺陷管理台帐 HYBN-T6-07-0007-001-2018

7.2.2 Major Defect Management Records of Equipment HYBN-T6-07-0008-001-2018

设备重大缺陷管理台帐 HYBN-T6-07-0008-001-2018

7.2.3 Application Form for Approval of Major Equipment Defects

HYBN-T6-07-0009-001-2018

设备重大缺陷立项申请表 HYBN-T6-07-0009-001-2018

7.2.4 Equipment Fault Analysis Report HYBN-T6-07-0010-001-2018

设备故障分析报告 HYBN-T6-07-0010-001-2018

8 Supplementary Rules

附则

8.1 This System is under the jurisdiction of Equipment Management Dept.

本制度由机械动力部归口管理。

8.2 This System is drafted by Equipment Management Dept.

本制度起草部门：机械动力部。

8.3 Equipment Management Dept. is responsible for the interpretation of this System.

本制度解释权归机械动力部拥有。

8.4 Preparation and approval of this System are shown in Table 1:

本制度编制和审批情况见表 1:

Table 1 Revision, preparation and approval of document

表 1 文件版本编制和审批情况

1	2018-12-31	Pan Xiaoming 潘小明	Tong Xueyun 童雪云	Xu Ye 徐野	Chen Liancai 陈连财
Revision 版本	Issued date 颁布日期	Prepared by 编制人	Reviewed by 审核人	Authorized by 审定人	Approved by 批准人



Hengyi Industries Sdn Bhd
恒逸实业（文莱）有限公司

HYBN-T3-07-0003-2018-1

Special Care Management System for Large Compressors

大机组特护管理制度

Issued Date: Dec. 2018

颁布日期：2018 年 12 月

 HENGYI	Hengyi Industries Sdn Bhd 恒逸实业（文莱）有限公司				
	Special Care Management System for Large Compressors 大机组特护管理制度				
	Doc No.	HYBN-T3-07-0003-2018-1	Ver No.	1	Page 1 of 16

1 Purpose

目的

This System is formulated to ensure that the operation of large compressors is under comprehensive and systematic monitoring and guarantee the safe operation of devices in a long period.

为确保大机组运行状况处于全面、系统的监控状态，保证装置长周期安全运行，特制订本制度。

2 Scope of Application

适用范围

This System is applicable to the special care management of large compressors of the Company.

本制度适用于公司大机组的特护管理。

3 Terms and Definitions

术语和定义

Large compressors: centrifugal compressors and reciprocating compressors with a shaft power of not less than 500KW.

大机组：指轴功率大于等于 500KW 的离心式压缩机和往复式压缩机。

4 Management Responsibilities

管理职责

4.1 Specified administrative authority

归口管理部门

4.1.1 The Equipment Management Dept. is the specified administrative authority of the special care for large compressors, which shall be responsible for formulating (revising) the special care management system for large compressors, reviewing and publishing the list of special care equipment and personnel and the changes, guiding and urging all departments to implement this System.

机械动力部是大机组特护的归口管理部门，负责制（修）订大机组特护管理制度，负责审核并公

布特护设备清单、人员清单及变更情况，指导、督促各部门执行本制度。

4.1.2 Organize the weekly inspection and monthly evaluation of the special care for large compressors, and organize all departments to analyze the causes of the major problems found in the inspection and formulate countermeasures.

组织大机组特护的周检及月讲评工作；组织各部门对检查中发现的重大问题进行原因分析，制订对策措施。

4.1.3 Organize the test and confirmation of the interlocking protection system after the overhaul of special care equipment; Organize to clean the depot spare parts before and after maintenance and before statutory holidays.

组织对特护设备大修后联锁保护系统的试验、确认；在检修前后及法定节假日前组织对库存备件进行清理。

4.2 Coordinated management departments

协同管理部门

The Materials Supply Dept., as the collaborative management department for the special care of large compressors, shall be responsible for the purchase, quality inspection and storage of spare parts of special care equipment (including auxiliary machines) and for the comprehensive cleaning of spare parts before December 30 every year and giving feedback to the Equipment Management Dept.

物资装备部是大机组特护的协同管理部门，负责特护设备（包括辅机）备品配件的采购、质量检验及保管；负责在每年 12 月 30 日前对备品配件进行一次全面清理，并反馈至机械动力部。

4.3 Executive departments

执行部门

4.3.1 The operation department, as the executive department of special care for large compressors, shall formulate the working standards for patrol inspection of the special care equipment of the department, specify the contents and requirements of special care inspection, and report to the Equipment Management Dept. for record.

运行部为大机组特护的执行部门，制定本部门特级维护设备巡回检查的工作标准，明确特护检查的内容和要求，报机械动力部备案。

4.3.2 Be responsible for the daily inspection of special care equipment; Participate in weekly inspection and monthly evaluation of special care equipment organized by the Equipment Management Dept.; Finish all tasks assigned in the evaluation meeting in a timely manner.

负责特护设备日检工作；参加机械动力部组织的特护设备周检及月讲评；按时完成讲评会布置的各项工作。

4.3.3 Deal with the general problems found in daily and weekly inspection, and report the major problems to the Equipment Management Dept. and take corresponding measures.

处理日检、周检中查出的一般问题，对于重大问题上报机械动力部并采取相应措施。

4.3.4 Participate in the test and confirmation of the interlocking protection system after the overhaul of special care equipment; Be responsible for the management of special care equipment.

参与特护设备大修后联锁保护系统的试验、确认；负责特护设备牌的管理。

4.3.5 The Equipment Maintenance Dept., Electrical Operation Dept. and Instrument Control Dept. (referred to as the "Maintenance Dept.") shall timely deal with the maintenance tasks entrusted.

设备检修部、电气运行部、仪表控制部（以下简称维保部门）应对委托的检修任务及时处理。

5 Management Content

管理内容

5.1 Special care equipment

特护设备

See Appendix 1 for the list.

清单见附件 1

5.2 Special care personnel

特护人员

5.2.1 The special care personnel are composed of the staff of the Equipment Management Dept., the operation department where the special care equipment belongs and the Maintenance Dept.

特护人员由机械动力部、特护设备所在运行部、维保部门的人员组成。

5.2.2 The department involved in special care shall assign persons with strong sense of responsibility and good technical skills to take part in the daily inspection, and arrange the technical director or team leader or superior for the weekly inspection.

参加特护的部门应指定责任心强、技术素质好的人员参加日检，安排主管技术员或班长以上人员参加周检。

5.2.3 The list of special care personnel for daily and weekly inspection shall be published after being reviewed and approved by the Equipment Management Dept., and the change of personnel shall be also approved by the Equipment Management Dept.

日检、周检特护人员名单由机械动力部审核后予以公布，人员变更须经机械动力部批准。

5.3 Daily inspection

日检

5.3.1 The special care personnel for daily inspection shall check the special care equipment twice a day according to the working standard with the special care card put on from 8:00 to 10:00 and from 14:00 to 16:00. Moreover, the personnel shall check the operating parameters and conditions of the special care equipment, and fill in the *Daily Inspection and Countersignature Records of the Special Care Equipment*.

日检特护人员每天按工作标准对特护设备巡回检查两次并挂特护牌，时间为 8:00~10:00、14:00~16:00，对特护设备的运行参数及状况进行检查，并填写《特护设备日检会签记录表》。

5.3.2 The technical director of the operation department shall inspect the special care equipment once a day with the special care card put on, fill in the column of "Comments of Technical Personnel" in the *Daily Inspection and Countersignature Records of the Special Care Equipment*, and check the implementation of the daily inspection of special care personnel.

运行部主管技术人员应对特护设备每天巡检一次，并挂特护牌，填写《特护设备日检会签记录表》中“装置技术人员意见”栏，并检查作业人员特护日检执行情况。

5.3.3 The daily inspection for special care shall be uninterrupted throughout the year, and the daily inspection on holidays shall be carried out by the personnel on duty.

全年特护日检不间断，节假日的日检由值班人员负责。

5.3.4 One piece of *Daily Inspection and Countersignature Records of the Special Care Equipment* shall be prepared every month and placed in the specified location and managed by the operation department, and kept for 1 year.

《特护设备日检会签记录表》每月一本，放置在指定位置，由运行部负责管理，保存期为 1 年。

5.3.5 The problem found by the special care personnel in the daily inspection shall be promptly addressed or reported to relevant personnel to implement the special care management procedures for large compressors.

特护人员在日检中发现的问题应及时处理或通知有关人员，执行大机组特护管理程序。

5.4 Weekly inspection

周检

5.4.1 The special care personnel for weekly inspection shall pay attention to the running state of compressors, and check the running status and parameters of the special care equipment and the implementation of special care daily inspection after gathering on every Wednesday morning or at the time as specified by the director of the Equipment Management Dept. at the place specified by the Equipment Management Dept. The special care card shall be put on as follows: the card for the "first week" shall be put on for the first weekly inspection every month and the "second week" for the second weekly inspection, and so on. In addition, the *Weekly Inspection and Countersignature Records of the Special Care Equipment* shall be filled in and kept by the Equipment Management Dept. for future reference for 1 year.

周检特护人员应关注机组运行状态，并于每周三上午或按机械动力部主管人员通知时间在指定地点集合后，对特护设备的运行状况、运行参数、特护日检情况等进行检查，并挂特护牌，每月第

一次周检则挂“一周”，第二次周检则挂“二周”，依此类推。填写《特护设备周检会签记录本》，由机械动力部保存备查，保存期为1年。

5.4.2 The director of the Equipment Management Dept. shall track the problems found in the weekly inspection and coordinate to solve major problems and problems requiring multi-discipline cooperation.

机械动力部主管人员应跟踪周检问题的处理，协调解决重要问题和需多专业协同处理的问题。

5.5 Monthly evaluation

月讲评

5.5.1 The Equipment Management Dept. shall organize a special care evaluation once a month. The management personnel of all disciplines shall attend the evaluation on time and make a record.

机械动力部每月组织一次特护讲评，各专业管理人员应按时参加，并作好讲评记录。

5.5.2 The operation department shall collect the equipment operation data of the current month and the task completion information of last month before the monthly evaluation, and assign personnel to participate in the evaluation on time, and fill in the *Operation Situation of Special Care Equipment* before the 5th day of each month.

运行部在月讲评前应做好本月设备运行情况和上月任务完成情况的收集，并指派人员按时参加讲评，在每月5日前填报《特护设备运行情况表》。

5.5.3 The evaluation shall focus on the common problems found and good experience obtained in the operation and management of special care equipment, on the key technical problems requiring multi-discipline cooperation, and on the main operation, online monitoring and maintenance status, major defects, rectification, major technical renovation and application of new technologies of the special care equipment.

讲评内容：特护设备运行和管理中出现的共性和好的经验；需要多专业协同解决的关键技术问题；特护设备的主要运行、在线监测、检修状况、重要缺陷、整改情况、重大技术改造及新技术应用情况。

5.5.4 The Equipment Management Dept. shall summarize the special care management and assign the key tasks for the next month (stage) during the evaluation.

机械动力部在月讲评时要对特护管理工作进行总结，布置下月（阶段）工作重点。

5.6 Emergency management

应急管理

5.6.1 The Equipment Management Dept. shall organize the operation department and the Maintenance Dept. to guide the startup or major operation of the special care equipment after overhaul. In case the special care equipment is abnormal or must run with defects, the operation department shall inform the Equipment Management Dept. which shall lead to

organize consultation and propose corresponding measures.

特护设备在大修后的开车或重大操作，由机械动力部组织运行部、维保部门到场进行指导；特护设备出现异常或需带病运行时，运行部应通知机械动力部，由机械动力部牵头组织进行会诊，提出相应措施。

5.7 Others

其它

5.7.1 Special care shall be suspended during the maintenance of the special care equipment.

特护设备检修期间，暂停特护工作。

5.7.2 Bladder type hydropneumatic accumulators for energy storage play an important role in energy storage and pressure stabilization in the oil system of special care equipment and are of great significance in reducing pressure fluctuations in the oil system caused by switching operations of oil pumps and oil filters and ensuring the smooth operation of the compressor. See Appendix 2 for the application requirements of the accumulators.

能量存储用囊式蓄能器在特护设备油系统中起到存储能量、稳定压力的重要作用，对于减少油泵、滤油器切换等操作引起的油系统压力波动，保障机组的平稳运行有重要的意义，其使用要求见附件 2。

6 Inspection and Supervision

检查与监督

The Equipment Management Dept. shall be responsible for the supervision, inspection and assessment of special care of large compressors by the operation department.

机械动力部负责对运行部大机组特护执行情况进行监督检查并考核。

7 Associated Procedures and Records

关联程序和记录

7.1 Associated procedures

关联程序

7.1.1 Special Care Management Procedures for Large Compressors
(HYBN-T2-07-0005-2018-1)

大机组特护管理程序 HYBN-T2-07-0005-2018-1

7.1.2 Emergency Management Procedures for Large Compressors
(HYBN-T2-07-0006-2018-1)

大机组应急管理程序 HYBN-T2-07-0006-2018-1

7.2 Associated records

关联记录

7.2.1 1030-K101A Daily Inspection and Countersignature Records
(HYBN-T6-07-0011-001-2018)

1030-K101A 日检会签记录表 HYBN-T6-07-0011-001-2018

7.2.2 1030-K101B Daily Inspection and Countersignature Records
(HYBN-T6-07-0012-001-2018)

1030-K101B 日检会签记录表 HYBN-T6-07-0012-001-2018

7.2.3 1040-K101 Daily Inspection and Countersignature Records
(HYBN-T6-07-0013-001-2018)

1030-K101 日检会签记录表 HYBN-T6-07-0013-001-2018

7.2.4 1040-K102A Daily Inspection and Countersignature Records
(HYBN-T6-07-0014-001-2018)

1040-K102A 日检会签记录表 HYBN-T6-07-0014-001-2018

7.2.5 1040-K102B Daily Inspection and Countersignature Records
(HYBN-T6-07-0015-001-2018)

1040-K102B 日检会签记录表 HYBN-T6-07-0015-001-2018

7.2.6 1040-K102C Daily Inspection and Countersignature Records
(HYBN-T6-07-0016-001-2018)

1040-K102C 日检会签记录表 HYBN-T6-07-0016-001-2018

7.2.7 1050-K101 Daily Inspection and Countersignature Records
(HYBN-T6-07-0017-001-2018)

1050-K101 日检会签记录表 HYBN-T6-07-0017-001-2018

7.2.8 1050-K201 Daily Inspection and Countersignature Records
(HYBN-T6-07-0018-001-2018)

1050-K102 日检会签记录表 HYBN-T6-07-0018-001-2018

7.2.9 1050-K202 Daily Inspection and Countersignature Records
(HYBN-T6-07-0019-001-2018)

1050-K202 日检会签记录表 HYBN-T6-07-0019-001-2018

7.2.10 1050-K203 Daily Inspection and Countersignature Records
(HYBN-T6-07-0020-001-2018)

1050-K203 日检会签记录表 HYBN-T6-07-0020-001-2018

7.2.11 1050-K501 Daily Inspection and Countersignature Records
(HYBN-T6-07-0021-001-2018)

1050-K501 日检会签记录表 HYBN-T6-07-0021-001-2018

7.2.12 1050-K701 Daily Inspection and Countersignature Records
(HYBN-T6-07-0022-001-2018)

1050-K701 日检会签记录表 HYBN-T6-07-0022-001-2018

7.2.13 1056-K101 Daily Inspection and Countersignature Records
(HYBN-T6-07-0023-001-2018)

1050-K101 日检会签记录表 HYBN-T6-07-0023-001-2018

7.2.14 1070-K101 Daily Inspection and Countersignature Records
(HYBN-T6-07-0024-001-2018)

1050-K101 日检会签记录表 HYBN-T6-07-0024-001-2018

7.2.15 1070-K201 Daily Inspection and Countersignature Records
(HYBN-T6-07-0025-001-2018)

1050-K102 日检会签记录表 HYBN-T6-07-0025-001-2018

7.2.16 5501-11ST01 Daily Inspection and Countersignature Records
(HYBN-T6-07-0026-001-2018)

5501-11ST01 日检会签记录表 HYBN-T6-07-0026-001-2018

7.2.17 5501-12ST01 Daily Inspection and Countersignature Records
(HYBN-T6-07-0027-001-2018)

5501-12ST01 日检会签记录表 HYBN-T6-07-0027-001-2018

7.2.18 5501-13ST01 Daily Inspection and Countersignature Records
(HYBN-T6-07-0028-001-2018)

5501-13ST01 日检会签记录表 HYBN-T6-07-0028-001-2018

7.2.19 5501-14ST01 Daily Inspection and Countersignature Records
(HYBN-T6-07-0029-001-2018)

5501-14ST01 日检会签记录表 HYBN-T6-07-0029-001-2018

7.2.20 5501-15ST01 Daily Inspection and Countersignature Records
(HYBN-T6-07-0030-001-2018)

5501-15ST01 日检会签记录表 HYBN-T6-07-0030-001-2018

7.2.21 5501-16ST01 Daily Inspection and Countersignature Records
(HYBN-T6-07-0031-001-2018)

5501-16ST01 日检会签记录表 HYBN-T6-07-0031-001-2018

7.2.22 1030-K101A Weekly Inspection and Countersignature Records
(HYBN-T6-07-0032-001-2018)

1030-K101A 周检会签记录表 HYBN-T6-07-0032-001-2018

7.2.23 1030-K101B Weekly Inspection and Countersignature Records
(HYBN-T6-07-0033-001-2018)

1030-K101B 周检会签记录表 HYBN-T6-07-0033-001-2018

7.2.24 1040-K101 Weekly Inspection and Countersignature Records
(HYBN-T6-07-0034-001-2018)

1040-K101 周检会签记录表 HYBN-T6-07-0034-001-2018

7.2.25 1040-K102A Weekly Inspection and Countersignature Records
(HYBN-T6-07-0035-001-2018)

1040-K102A 周检会签记录表 HYBN-T6-07-0035-001-2018

7.2.26 1040-K102B Weekly Inspection and Countersignature Records
(HYBN-T6-07-0036-001-2018)

1040-K102B 周检会签记录表 HYBN-T6-07-0036-001-2018

7.2.27 1040-K102C Weekly Inspection and Countersignature Records
(HYBN-T6-07-0037-001-2018)

1040-K102C 周检会签记录表 HYBN-T6-07-0037-001-2018

7.2.28 1050-K101 Weekly Inspection and Countersignature Records
(HYBN-T6-07-0038-001-2018)

1040-K101 周检会签记录表 HYBN-T6-07-0038-001-2018

7.2.29 1050-K201 Weekly Inspection and Countersignature Records
(HYBN-T6-07-0039-001-2018)

1040-K201 周检会签记录表 HYBN-T6-07-0039-001-2018

7.2.30 1050-K202 Weekly Inspection and Countersignature Records
(HYBN-T6-07-0040-001-2018)

1040-K202 周检会签记录表 HYBN-T6-07-0040-001-2018

7.2.31 1050-K203 Weekly Inspection and Countersignature Records
(HYBN-T6-07-0041-001-2018)

1040-K203 周检会签记录表 HYBN-T6-07-0041-001-2018

7.2.32 1050-K501 Weekly Inspection and Countersignature Records
(HYBN-T6-07-0042-001-2018)

1050-K501 周检会签记录表 HYBN-T6-07-0042-001-2018

7.2.33 1050-K701 Weekly Inspection and Countersignature Records
(HYBN-T6-07-0043-001-2018)

1050-K701 周检会签记录表 HYBN-T6-07-0043-001-2018

7.2.34 1056-K101 Weekly Inspection and Countersignature Records
(HYBN-T6-07-0044-001-2018)

1040-K101 周检会签记录表 HYBN-T6-07-0044-001-2018

7.2.35 1070-K101 Weekly Inspection and Countersignature Records
(HYBN-T6-07-0045-001-2018)

1040-K101 周检会签记录表 HYBN-T6-07-0045-001-2018

7.2.36 1070-K201 Weekly Inspection and Countersignature Records
(HYBN-T6-07-0046-001-2018)

1040-K201 周检会签记录表 HYBN-T6-07-0046-001-2018

7.2.37 5501-11ST01 Weekly Inspection and Countersignature Records
(HYBN-T6-07-0047-001-2018)

5501-11ST01 周检会签记录表 HYBN-T6-07-0047-001-2018

7.2.38 5501-12ST01 Weekly Inspection and Countersignature Records
(HYBN-T6-07-0048-001-2018)

5501-12ST01 周检会签记录表 HYBN-T6-07-0048-001-2018

7.2.39 5501-13ST01 Weekly Inspection and Countersignature Records
(HYBN-T6-07-0049-001-2018)

5501-13ST01 周检会签记录表 HYBN-T6-07-0049-001-2018

7.2.40 5501-14ST01 Weekly Inspection and Countersignature Records
(HYBN-T6-07-0050-001-2018)

5501-14ST01 周检会签记录表 HYBN-T6-07-0050-001-2018

7.2.41 5501-15ST01 Weekly Inspection and Countersignature Records
(HYBN-T6-07-0051-001-2018)

5501-15ST01 周检会签记录表 HYBN-T6-07-0051-001-2018

7.2.42 5501-16ST01 Weekly Inspection and Countersignature Records
(HYBN-T6-07-0052-001-2018)

5501-16ST01 周检会签记录表 HYBN-T6-07-0052-001-2018

7.2.43 Operation Situation of Special Care Equipment (HYBN-T6-07-0053-001-2018)

特护设备运行情况表 HYBN-T6-07-0053-001-2018

7.2.44 List of Special Care Personnel for Special Care Equipment
(HYBN-T6-07-0054-001-2018)

特护设备特护人员申报表 HYBN-T6-07-0054-001-2018

7.2.45 List of Special Care Personnel for Special Care Equipment
(HYBN-T6-07-0055-001-2018)

特护设备特护人员一览表 HYBN-T6-07-0055-001-2018

7.2.46 Monthly Evaluation Records of Special Maintenance of Special Care Equipment
(HYBN-T6-07-0056-001-2018)

特护设备特级维护月讲评记录 HYBN-T6-07-0056-001-2018

7.2.47 List of Special Care Equipment (HYBN-T6-07-0057-001-2018)

特护设备特护设备清单 HYBN-T6-07-0057-001-2018

7.2.48 Inspection Records of Air Pressure of Bladder of Accumulator
(HYBN-T6-07-0058-001-2018)

蓄能器皮囊气压检查记录表 HYBN-T6-07-0058-001-2018

8 Supplementary Rules

附则

8.1 This System is under the jurisdiction of Equipment Management Dept.

本制度由机械动力部归口管理。

8.2 This System is drafted by Equipment Management Dept.

本制度起草部门：机械动力部。

8.3 Equipment Management Dept. is responsible for the interpretation of this System.

本制度解释权归机械动力部拥有。

8.4 Revision, preparation and approval of this System are shown in Table 1:

本制度版本编制和审批情况见表 1:

Table 1 Revision, preparation and approval of document

表 1 文件版本编制和审批情况

1	2018-12-31	Zhang Zhaohui 张召辉	Tong Xueyun 童雪云	Xu Ye 徐野	Chen Liancai 陈连财
Revision 版本	Issued date 颁布日期	Prepared by 编制人	Reviewed by 审核人	Authorized by 审定人	Approved by 批准人

9 Appendices

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Appendix 1 List of Special Care Equipment

附件 1 公司特护设备清单

Table 2 List of Special Care Equipment

表 2 公司特护设备清单

Competent unit 所属单位	Unit name 装置名称	Equipment name 设备名称	Equipment tag No. 设备位号
Refining Dept. #2 炼油二部	2.2 MMTPA Diesel Hydrotreating Unit 220 万/年柴油加氢精制	Makeup hydrogen compressor 新氢压缩机	1030-K-101A/B
Refining Dept. #2 炼油二部	2.2 MMTPA Diesel Hydrocracking Unit 220 万/年加氢裂化	Recycle hydrogen compressor 循环氢压缩机	1040-K101
Refining Dept. #2 炼油二部	2.2 MMTPA Diesel Hydrocracking Unit 220 万/年加氢裂化	Makeup hydrogen compressor 新氢压缩机	1040-K102A/B/C
Refining Dept. #3 炼油三部	1.5 MMTPA Aromatics Complex 150 万/年芳烃联合	Prehydrogenation recycle hydrogen compressor 预加氢循环氢压缩机	1050-K101
Refining Dept. #3 炼油三部	1.5 MMTPA Aromatics Complex 150 万/年芳烃联合	Reformed recycle hydrogen compressor 重整循环氢压缩机	1050-K201
Refining Dept. #3 炼油三部	1.5 MMTPA Aromatics Complex 150 万/年芳烃联合	Reformed hydrogen primary supercharger 重整氢一级增压机	1050-K202
Refining Dept. #3 炼油三部	1.5 MMTPA Aromatics Complex 150 万/年芳烃联合	Reformed hydrogen secondary supercharger 重整氢二级增压机	1050-K203
Refining Dept. #3 炼油三部	1.5 MMTPA Aromatics Complex 150 万/年芳烃联合	Disproportionation recycle hydrogen compressor 歧化循环氢压缩机	1050-K501
Refining Dept. #3 炼油三部	1.5 MMTPA Aromatics Complex 150 万/年芳烃联合	Isomerization recycle hydrogen compressor 异构化循环氢压缩机	1050-K701

Refining Dept. #3 炼油三部	Light Naphtha Isomerization Unit 轻石脑油异构化	Light naphtha isomerization recycle hydrogen compressor 轻石异构化循环氢压缩机	1056-K101
Refining Dept. #4 炼油四部	1 MMTPA Flexicoking Unit 100 万/年灵活焦化	Main air blower 主风机	1070-K101
Refining Dept. #4 炼油四部	1 MMTPA Flexicoking Unit 100 万/年灵活焦化	Rich gas compressor 富气压缩机	1070-K201
Power Dept. 热电部	Thermal Power Station 热电站	55MW steam turbine 55MW 汽轮机	5501-11-ST-01
Power Dept. 热电部	Thermal Power Station 热电站	55MW steam turbine 55MW 汽轮机	5501-12-ST-01
Power Dept. 热电部	Thermal Power Station 热电站	55MW steam turbine 55MW 汽轮机	5501-13-ST-01
Power Dept. 热电部	Thermal Power Station 热电站	55MW steam turbine 55MW 汽轮机	5501-14-ST-01
Power Dept. 热电部	Thermal Power Station 热电站	7MW waste heat steam turbine 7MW 余热汽轮机	5501-15-ST-01
Power Dept. 热电部	Thermal Power Station 热电站	7MW waste heat steam turbine 7MW 余热汽轮机	5501-16-ST-01

Appendix 2 Application Requirements of Bladder Type Hydropneumatic Accumulators for Energy Storage

附件 2 能量存储用囊式蓄能器使用要求

1 Installation

安装

1.1 The air charging valve of the accumulator shall be installed vertically and upwardly, with sufficient space reserved for maintenance, inspection and repair.

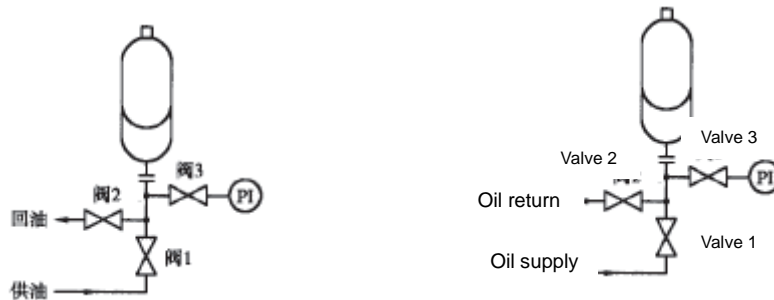
蓄能器应充气阀朝上垂直安装，并留有足够的维护、检查和检修空间。

1.2 The accumulator shall be fixed reliably and shall not be fixed by direct welding.

蓄能器应固定可靠，不得直接焊接固定。

1.3 A shut-off valve (valve 1) shall be installed between the accumulator and the pipeline to be used in case of air filling, oil filling or long-time shutdown; An oil drain valve (valve 2) shall be set behind the shut-off valve. If possible, a pressure gauge shall be installed in front of the oil drain valve for online inspection of air bladder's pressure (as shown in the figure on the right). An additional accumulator of the same specification can be connected in parallel if possible for the convenience of switching during inspection. Moreover, a small-diameter oil inlet bypass can be added to prevent oil shock.

蓄能器和管路之间应安装切断阀（阀 1），供充气、充油或长时间停机时使用；切断阀后应设置放油阀（阀 2），可能的情况下在放油阀前安装压力表，供在线检查气囊压力时使用（见右图）。条件允许的情况下可额外并联一只同规格的蓄能器，以备检查时切换。为防止进油冲击，可增设小口径进油旁路。



1.4 The inflating needle valve cover of the accumulator shall be provided with an "O" ring to prevent air leakage from the bladder.

蓄能器充气针阀盖应设置“O”型圈，以防止皮囊向外漏气。

2 Nitrogen filling

氮气的充装

2.1 Before nitrogen filling, the shut-off valve between the slow accumulator and the pipeline shall be slowly closed, and the oil valve shall be opened to slowly drain the oil in the accumulator.

充气前应关闭蓄能器和管路之间的切断阀，打开放油阀，缓慢排净蓄能器中的油。

2.2 Nitrogen shall be filled with slowly to avoid damage of the bladder.

充气应缓慢进行，以防冲破皮囊。

2.3 Oxygen, compressed air or other flammable gases shall not be filled with.

不得充装氧气、压缩空气或其他易燃气体。

2.4 Nitrogen filling shall be performed with special tools attached to the unit which shall be properly kept by the operation department.

氮气的充装使用随机所带的专用工具，该工具由运行部妥善保管。

2.5 Charging pressure standard: the charging pressure of the bladder of lubricating oil accumulator shall be 80% of the lower limit of the lubricating oil pressure and that of the control oil accumulator shall be 80% of the lower limit of the control oil pressure. The charging pressure of the system accumulator bladder shall be 80% of the lower limit.

充气压力标准：润滑油蓄能器皮囊充气压力为润滑油压低报警值的 80%；控制油蓄能器皮囊充气压力为控制油压力低报警值的 80%；系统蓄能器皮囊充气压力为低报警值的 80%。

2.6 Check the air tightness of the inflating needle valve of the accumulator after charging, screw on the valve cover, and check the air tightness of the valve cover.

充气完成后应检查蓄能器充气针阀气密性，然后拧上阀盖，再检查阀盖的气密性。

3 Examination and maintenance

检查和维护

3.1 The bladder pressure shall be periodically checked, with records made by following the format as described later.

皮囊气压应定期检查，并做好纪录，记录格式后附。

3.1.1 Inspection period: the accumulator in normal operation shall be inspected every six months; The bladder pressure shall be checked once the accumulator is stopped for maintenance.

检查周期：正常运行的蓄能器每六个月检查一次；每次机组停机检修时，应检查皮囊气压。

3.1.2 Inspection method of bladder pressure:

皮囊气压的检查方法：

3.1.2.1 Close the shut-off valve between the accumulator and the pipeline, slowly drain the oil in the accumulator, and directly check the charging pressure with the charging tool.

关闭蓄能器和管路之间的切断阀，缓慢排净蓄能器中的油，利用充气工具直接检查充气压力。

3.1.2.2 For the inspection of accumulator with a pressure gage in front of the oil drain valve, the shut-off valve between the accumulator and the pipeline shall be slowly closed and the oil drain valve shall be slowly opened to check the indication change of the pointer. The pointer slowly drops at the beginning and then rapidly drops when a certain pressure is reached. The pressure where sudden change occurs to the moving speed of the indicator is the charging pressure.

在放油阀前有压力表的蓄能器，检查时关闭蓄能器和管路之间的切断阀，缓慢打开放油阀，注意压力表指针的变化，开始时指针慢慢下降，达到某压力时，急速下降到零，指针移动的速度发生突变的压力值即为充气压力。

3.2 The operator shall check the inflating needle valve of the accumulator and other sealing

points for air tightness once a month and make records.

操作人员每月一次检查蓄能器充气针阀和其他密封点的气密性，并做好记录。

3.3 When the air pressure of the bladder is less than 70% of the standard charging pressure, nitrogen shall be added and the final charging pressure shall be recorded.

气囊气压小于充气压力标准的 70%时，应补充氮气并纪录最终充气压力。

3.4 The shut-off valve between the accumulator and the pipeline shall be closed in case of long-time suspension of the accumulator, thus to keep the oil pressure in the accumulator above the charging pressure.

蓄能器长期停用时，应关闭蓄能器和管路之间的切断阀，保持蓄能器里的油压在充气压力以上。

3.5 For any accumulator listed as a pressure vessel, the pressure bearing shell shall be inspected periodically in accordance with the Specifications for Vessel. For an accumulator not listed as a pressure vessel, the pressure bearing shell shall be inspected periodically by referring to the specifications for pressure vessels.

蓄能器已列入压力容器的，承压壳体按《容规》定期检验，不属于压力容器的，参照压力容器定期检验。

3.6 Before the accumulator is disassembled for maintenance, the shut-off valve between the accumulator and the pipeline shall be closed, the pressure oil shall be removed, and the nitrogen in the bladder shall be removed with the charging tool.

蓄能器检修拆卸前应关闭蓄能器和管路之间的切断阀，卸去压力油，使用充气工具放掉皮囊中的氮气。

3.7 Oil filling shall be conducted slowly (preferably through a small-diameter bypass) when the accumulator is put into use after inspection and maintenance, to avoid system pressure fluctuation.

蓄能器检查和检修结束投用时，应缓慢充油（最好用小口径旁路），避免引起系统压力波动。

3.8 The accumulator bladder shall be replaced in case of overhaul of the accumulator.

蓄能器皮囊更换周期与机组大检修同步。



Hengyi Industries Sdn Bhd
恒逸实业（文莱）有限公司

HYBN-T3-07-0004-2018-1

Lubrication Management System

润滑管理制度

Issued Date: Dec. 2018

颁布日期：2018 年 12 月

 HENGYI	Hengyi Industries Sdn Bhd 恒逸实业（文莱）有限公司				
	Lubrication Management System				
	润滑管理制度				
Doc No.	HYBN-T3-07-0004-2018-1	Ver No.	1	Page 1 of 13	

1 Purpose

目的

This System is hereby formulated to reduce the wear, extend the service life and guarantee safe and stable operation of equipment.

为减少设备磨损，延长设备使用寿命，保证设备安全稳定运行，特制订本制度。

2 Scope of Application

适用范围

This System is applicable to lubrication management of rotating equipment of the Company.

本制度适用于公司转动设备的润滑管理。

3 Terms and Definitions

术语和定义

Lubrication: refers to application of lubricants between the contact surfaces of each friction pair in relative motion to form a lubrication film between the friction surfaces, separate the dry friction surfaces and convert dry friction into friction between lubricant molecules, so as to reduce friction and wear.

润滑：指在发生相对运动的各对摩擦副的接触面之间加入润滑剂，使摩擦面之间形成润滑膜，将干摩擦面分隔开来，变干摩擦为润滑剂分子之间的摩擦，以达到降低摩擦和减小磨损为目的。

4 Management Responsibilities

管理职责

4.1 Specified administrative authority

归口管理部门

4.1.1 The Equipment Management Dept. is the specified administrative authority of lubrication management, which shall be responsible for formulating the lubrication management system, organizing to solve the technical problems in lubrication management, and guiding and supervising equipment lubrication management of all departments.

机械动力部是润滑管理的归口管理部门；负责制订润滑管理制度；组织解决润滑管理中的技术问

题。指导、督促各部门设备润滑管理。

4.1.2 Review and approve the reports concerning equipment lubrication and the purchase plan of lubricating oil (grease), and be responsible for the application and promotion of advanced lubrication technologies.

审核设备润滑相关报表以及润滑油（脂）的采购计划，负责润滑先进技术的应用和推广。

4.2 Coordinated management departments

协同管理部门

4.2.1 The Materials Supply Dept. shall be responsible for the purchase management of lubricating oil (grease) and for the reserve quota of special lubricating oil (grease) for emergencies and minimum reserve quota of working oil (grease) to prevent excessive reserve or shortage.

物资装备部负责润滑油（脂）的采购管理；负责特殊润滑油（脂）的事故储备定额和常用油（脂）的最低储备定额工作，防止出现过量积存或缺油。

4.2.2 HSE Dept. shall be responsible for disposing of waste lubricating oil in accordance with the Hazardous Waste Management Regulations.

HSE 管理部负责按照危废物管理规定处置废润滑油。

4.3 Executive departments

执行部门

4.3.1 The operation department, as the executive department of this System, shall be responsible for equipment lubrication management of the department.

运行部为本制度的执行部门，负责本部门设备润滑管理。

4.3.2 Prepare reports related to equipment lubrication, declare the annual consumption plan of lubricating oil (grease) and be responsible for the storage and use of equipment lubricating oil (grease) and recovery of waste oil (grease) for the department.

编制设备润滑相关报表，申报润滑油（脂）年度用油计划；负责本部门设备润滑用油（脂）的储存、使用和废油回收等工作。

4.3.3 Cooperate with the application and promotion of advanced lubrication technologies and solve the technical problems in lubrication management.

配合润滑先进技术的应用和推广、解决润滑管理中的技术问题。

4.3.4 The Lab Dept. shall be responsible for the analysis of lubricating oil (grease) and the input of the analysis results into the LIMIS system.

质量检验部负责润滑油（脂）的分析，并将结果输入 LIMIS 系统。

4.3.5 The Electrical Operation Dept. shall be responsible for lubrication management of grease lubricated motor bearings.

电气运行部负责脂润滑电机轴承的润滑管理。

5 Management Content

管理内容

5.1 Plan and procurement

计划与采购

5.1.1 The operation department shall report the actual consumption and year-end inventory of lubricating oil (grease) of this year in late December every year, and prepare the next annual plan of lubricating oil (grease) in the EM system which shall be approved by the Equipment Management Dept. The Materials Supply Dept. shall purchase according to the annual plan approved by the Equipment Management Dept.

运行部于每年 12 月下旬上报本年度润滑油（脂）实际消耗量及年终库存量，并在 EM 系统中编制润滑油（脂）下一年度计划，由机械动力部负责审批。物资装备部根据机械动力部审批的年度计划进行采购。

5.1.2 For working oil products, the lubricating oil (grease) requisition plan of the next month shall be reported in the EM system before the 25th day of each month; For non-working oil products, the requisition plan shall be reported 1 month in advance.

对于常用油品，每月 25 日前在 EM 系统中上报下月润滑油（脂）领用计划；对于不常用油品，应提前 1 个月上报领用计划。

5.1.3 Working oil products include L-DAB100 and L-DAB150 reciprocating compressor oil, L-TSA32, L-TSA46 and L-TSA68 anti-rust turbine oil, L-HM32, L-HM46 and L-HM68 anti-wear hydraulic oil, L-CKD150, L-CKD220 and L-CKD320 industrial closed gear oil, 2# and 3# lithium-based grease and 10# industrial white oil. Others are not commonly used.

常用油品种类为：L-DAB100 往复压缩机油、L-DAB150 往复压缩机油、L-TSA32 防锈汽轮机油、L-TSA46 防锈汽轮机油、L-TSA68 防锈汽轮机油、L-HM32 抗磨液压油、L-HM46 抗磨液压油、L-HM68 抗磨液压油、L-CKD150 工业闭式齿轮油、L-CKD220 工业闭式齿轮油、L-CKD320 工业闭式齿轮油等；2#、3# 锂基脂、10# 工业白油，其余为不常用油。

5.2 Storage and issuing

储存和发放

5.2.1 The lubricating oil (grease) of the operation department shall be properly stored and kept and not be piled up in the open air. Also, reserve for more than 30 days shall be kept and shall be kept on the site for no more than one year.

运行部润滑油（脂）应妥善储存保管，不得露天堆放，并保持 30 天以上的润滑油（脂）储备量，现场储存时间不得超过一年。

5.2.2 The lubricating oil depot of the operation department shall be rain-proof, sun-proof, dust-proof, dry, clean and well ventilated, and provided with adequate fire-fighting facilities;

Lubricating oil (grease) shall be provided with a qualified label, indicating the brand name of oil (grease), and different brands of lubricating oil (grease) shall be stored separately. The storage life of the oil (grease) is one year as indicated on the certificate.

运行部润滑油库应防雨、防晒、防尘、干燥清洁、通风良好，并有完善的消防设施；润滑油（脂）要有合格标签，注明油（脂）牌号，不同牌号的润滑油（脂）要分别储存，不得混装或混合堆放；合格证保存期为一年。

5.2.3 Lubricating oil (grease) in the warehouse of the Materials Supply Dept. shall be stored by categories and specifications. Each category shall be equipped with an oil (grease) label, indicating the name and brand of the oil (grease), time when the oil (grease) is put into the warehouse and quality identification time. The shelf life of the certificate is one year. The storage life of the oil (grease) is one year as indicated on the certificate.

物资装备部储存库房中的润滑油（脂），应按种类、规格分类存放，每类要有油（脂）标签，注明油（脂）名称、牌号、入库时间及质量鉴定时间；合格证保存期为一年。

5.2.4 The Materials Supply Dept. shall sample the newly warehoused lubricating oil and conduct routine analysis to ensure the oil is qualified. Copies of the qualification certificate of each batch of oil (indicating the oil delivery time) shall be given to the receiving department together with the oil. The operation department shall have the right to request the Materials Supply Dept. to spot check the quality of the new oil and also have the right to reject the unqualified oil.

物资装备部应对每种新入库润滑油进行采样及常规项目分析，确保入库新油质量合格，每批次油的合格证复印件（注明送油时间）在发放时一起给领用部门；运行部在领用时，有权要求物资装备部对新油质量进行抽检，对抽检不合格的油有权拒收。

5.2.5 The Materials Supply Dept. shall entrust the Lab Dept. to sample and analyze the lubricating oil that has been stored for more than one year upon delivery to the warehouse for viscosity, flash point and acid value. Unqualified oil as per the analysis shall be treated as waste oil and not be used while qualified oil shall be verified by the Equipment Management Dept. and issued to the receiving department together with the analysis sheet.

物资装备部对入库后储存时间超过 1 年的润滑油，在发放前必须委托质量检验部进行抽样分析，主要分析项目：粘度、闪点、酸值。分析不合格的按废油处理，严禁使用；分析合格的由机械动力部确认，与分析单同时发放给用油部门。

5.3 Usage

使用

5.3.1 The operation department shall request for oil as per the oil types specified in the *"Five Fixations" for Pump Equipment Lubrication*. When the oil (grease) type need to be changed, the influencing factors shall be identified and the "Application for Change of Lubricating Oil Type" shall be filled in and submitted to the Equipment Management Dept. for review.

运行部应严格按《机泵设备润滑“五定表”》规定的用油品种领用；需要变更润滑油（脂）品种时，

应识别影响因素并填写“润滑油种变更申请单”，报机械动力部审核。

5.3.2 Five fixations for lubrication

润滑五定

5.3.2.1 The five fixations for lubrication include fixed person, fixed point, fixed quality, fixed quantity and fixed time as follows:

润滑五定（即定人、定点、定质、定量、定时）的内容为：

(1) Fixed person: The lubrication point of each set of equipment shall be in the charge of a fixed person responsible for oil adding and replacement.

定人：每台设备的润滑点都有固定的加、换油负责人。

(2) Fixed point: Oil shall be injected from the lubrication point as specified by the *"Five Fixations" for Pump Equipment Lubrication*.

定点：按《机泵设备润滑“五定表”》规定的润滑点注油。

(3) Fixed quality: Oil shall be of the type and brand as specified by the *"Five Fixations" for Pump Equipment Lubrication*.

定质：按《机泵设备润滑“五定表”》规定的润滑油（脂）品种、牌号注油。

(4) Fixed amount: Oil shall be injected as per the amount as specified by the *"Five Fixations" for Pump Equipment Lubrication*.

定量：按《机泵设备润滑“五定表”》规定的注油量注油。

(5) Fixed time: Oil shall be injected and replaced at the time as specified by the *"Five Fixations" for Pump Equipment Lubrication*.

定时：按《机泵设备润滑“五定表”》规定的时间加换油。

Note: for the equipment with fully closed bearing and requiring no external grease adding, the “five fixations” for lubrication can be reduced to “three fixations”, i.e.: fixed person, fixed point and fixed quality.

注：针对采用全封闭轴承，无需外部加脂的设备，润滑“五定”内容仅包括定人、定点、定质。

5.3.2.2 The *"Five Fixations" for Pump Equipment Lubrication* shall be prepared as follows:

《机泵设备润滑“五定表”》编制要求如下：

(1) For oil lubrication, the column of the person in charge of the oil adding and replacement can be filled with "outdoor operator", the column of adding cycle with "as per the oil level", and the column of oil amount as "appropriate". The column of oil replacement cycle shall be filled with "as per the analysis" for periodic analysis when the oil replacement cycle is no more than 180 days. For equipment with special requirements, the column of oil replacement cycle shall be filled with as per the equipment instructions.

对于油润滑，加、换油负责人一栏可统一填写为“外操”；加油周期填写为“视油位”；加油量填写为“适量”；换油周期不大于 180 天，做定期分析的换油周期填写为“视分析”，有特殊要求的设备，原则上按设备使用说明书要求填写换油周期。

(2) For grease lubrication, the column of the person in charge of the grease adding and

replacement can be filled with "maintenance personnel". The lubrication of motor bearings shall be in the charge of the Electrical Operation Dept. and that of other parts can be in the charge of the Equipment Maintenance Dept. entrusted by the operation department. Grease adding shall be completed with the first week of every month when the grease adding cycle is no more than 1 month and postponed in case of holidays; The column of grease amount shall be filled with "overflow". The grease shall be replaced in case of maintenance.

对于脂润滑，加、换油负责人一栏可统一填写为“维修人员”；其中电机轴承由电气运行部负责，其它脂润滑部位运行部可委托设备检修部；加脂周期不大于 1 个月，在每月初的 1 周内（遇节假日顺延）完成；加脂量填写为“溢出”；换油周期与检修同步。

(3) The oil quantity to be added or replaced shall be quantified.

加换油量应具体量化。

5.3.3 The operation department shall complete the revision of the *"Five Fixations" for Pump Equipment Lubrication* by January every year according to the change of equipment and submit to the Equipment Management Dept. for approval. For the sporadically updated or new equipment, the *"Five Fixations" for Pump Equipment Lubrication* shall be prepared and submitted to the Equipment Management Dept. for approval two weeks before the equipment is put into operation.

运行部根据设备变更情况，于每年 1 月份完成《机泵设备润滑“五定表”》的修订，并报机械动力部审批；对于零星更新或新增设备，在设备投运前两周制订《机泵设备润滑“五定表”》，并报机械动力部审批。

5.3.4 Appliance and oil station management

器具和油站管理

5.3.4.1 The lubricating oil depot shall be equipped with nameplates, and explosion-proof lamps and ventilation facilities inside.

润滑油库应设置铭牌；内部应设置防爆灯具、通风设施。

5.3.4.2 The operation department shall provide complete lubricating oil (grease) appliances of uniform specifications according to the type of lubricating oil (grease), including oil barrel, fixed oil drum, oil pump, oil pail (pot), hand oil can, filter funnel, oil pan, three-stage filter screen, grease drum and grease gun.

运行部按润滑油（脂）的品种成套配备统一规格的润滑油（脂）器具。基本器具有：领油大桶、固定油桶、油抽子、提油桶（壶）、手油壶、过滤漏斗、接油盘、三级滤网、油脂桶、油脂枪等。

5.3.4.3 The lubrication appliance shall be clearly marked with oil type and brand and special appliances shall be used for special purpose. The appliance shall be neatly arranged by categories and specifications, cleaned regularly, kept clean and intact, and included in the shift hand-over and take-over.

润滑器具应清晰标记油种牌号，专具专用；器具应按种类规格摆放整齐，定期清扫，保持清洁完好，并纳入交接班内容。

5.3.4.4 Lubricating oil must go through "three-stage filtration" before use. See figure 1 for the schematic diagram of "three-stage filtration" for equipment lubrication.

润滑油在使用前必须经过“三级过滤”，设备润滑“三级过滤”示意图见图 1。

5.3.4.5 Filter precision: the first-stage strainer is 60-mesh, the second is 80-mesh, and the third is 100-mesh.

滤网过滤精度：一级为 60 目，二级为 80 目，三级为 100 目。

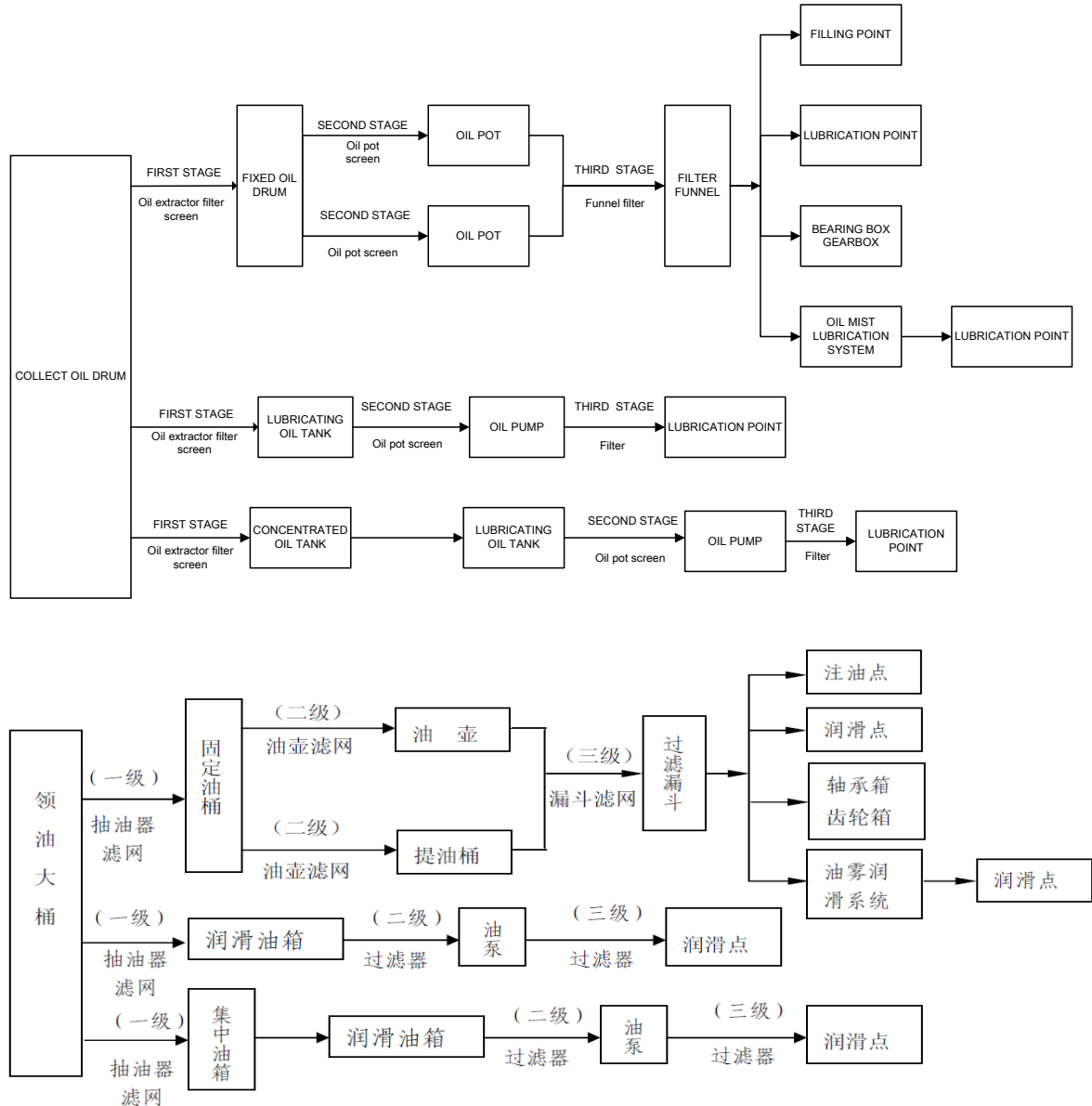


Figure 1 Schematic diagram of "three-stage filtration" for equipment lubrication

图 1 设备润滑“三级过滤”示意图

5.3.5 Lubricating oil analysis

润滑油分析

5.3.5.1 The Lab Dept. shall prepare the analysis plan and complete the analysis task on time

according to the lubricating oil analysis list and frequency issued by the Equipment Management Dept.

质量检验部根据机械动力部下达的润滑油分析清单及分析频次，编制分析计划并按时完成分析任务。

5.3.5.2 The Lab Dept. shall be responsible for sending the sampling bottles to the operation department for sampling and then the Lab Dept. shall take the bottles with samples back for analysis. In addition, the Lab Dept. must sign the hand-over/take-over document with the operation department when sending or taking lubricating oil sampling bottles, and informal sampling bottles are forbidden. The Lab Dept. shall also input the analysis results into the LIMIS system within 7 days, and the analysis results shall be confirmed by the equipment personnel of the operation department.

质量检验部负责将采样瓶送至运行部并取回分析，运行部负责采样；质量检验部在送、取润滑油采样瓶时，必须与运行部签字交接，禁止使用非正规采样瓶；质量检验部应在 7 天之内把分析结果输入 LIMIS 系统中，运行部设备人员应对分析结果进行确认。

5.3.5.3 The monthly sampling shall be performed every 30 days with a deviation of no more than 3 working days. The quarterly sampling shall be conducted every 90 days with a deviation of more than 10 days.

月度采样的时间间隔为 30 天，前后偏差不得超过 3 个工作日；季度采样的时间间隔为 90 天，前后偏差不得超过 10 天。

5.3.5.4 The routine analysis items of lubricating oil include viscosity, acid value, flash point, water content and impurity. The machine (pump) unit with an independent lubricating oil system shall be comprehensively analyzed after overhaul or one month before shutdown for maintenance, including viscosity, flash point, acid value, water content, elemental spectral analysis, anti-emulsification and anti-oxidation. If the oil is analyzed to be unqualified, the operation department shall report to the Equipment Management Dept., make a replacement plan, and analyze the cause.

润滑油常规分析项目为：粘度、酸值、闪点、水份、杂质五项；具有独立润滑油系统的机（泵）组，在大修后或装置停工检修前一个月，需进行全分析，包含粘度、闪点、酸值、水份、元素光谱分析、抗乳化、抗氧化性等。分析不合格时，运行部应报告机械动力部，做好置换或更换计划，并进行原因分析。

5.3.5.5 The newly received lubricating oil must be provided with a copy of the analysis certificate, or re-sampling is necessary for analysis.

新领的润滑油必须有分析合格证书复印件，如缺少必须重新采样分析。

5.3.5.6 After the maintenance of the machine (pump) unit with an independent lubricating oil system, the lubricating oil system shall circulate for more than 4 hours and cannot be put into operation until it is analyzed to be qualified. The oil tank shall be dehydrated at least once a week. Dehydration and inspection are necessary upon each oiling, and records shall be made also. If the water content in the oil tank is high in normal operation, the cause shall be found and the dehydration frequency shall be increased.

具有独立润滑油系统的机（泵）组检修后，润滑油系统应循环 4 小时以上，分析合格后方可试车投用。油箱每周应不少于一次脱水检查，每次加油后应进行脱水检查，并做好记录；正常运行中发现油箱含水量多时，应查找原因并增加脱水频次。

5.3.6 Lubricating oil (grease) adding and replacement standards

加换润滑油（脂）标准

See Appendix 1 for lubricating oil (grease) adding and replacement standards

加换润滑油（脂）标准见附件 1

5.4 Waste assessment and disposal

判废及处置

5.4.1 Oil that meets one of the following conditions shall be deemed as waste: (1) it is unqualified as per analysis and unable to reach the standard through measures such as heating, filtration and dehydration; (2) its color obviously changes after long-term use; (3) it is from pump maintenance, regular oil replacement or other circumstances and unserviceable.

符合下列条件之一者为废油：分析不合格，无法通过加热、过滤、脱水等措施达到标准的；长期使用颜色明显变色的；机泵检修、定期换油或其他情况更换下来无法利用的。

5.4.2 If the quantity for one replacement exceeds 1000kg, the "Application for Waste Assessment of Lubricating Oil" shall be filled in, in writing, and submitted to the Equipment Management Dept. for approval after being reviewed and approved by the director of the operation department.

润滑油更换数量一次超过 1000kg 的，应书面填写“润滑油判废申请单”，经运行部主管领导审核同意后报机械动力部审批。

5.4.3 During the overhaul, the operation department shall actively re-use the oil withdrawn from each machine (pump) and pay attention to the recovery and treatment of waste oil. It is strictly prohibited to pour or discharge the waste oil into the storm drain system.

大检修期间，各机（泵）退出的油品，运行部应积极做好再利用工作，同时应重视废润滑油回收与处理工作，严禁将废油品倒入或排入雨水沟系统内。

5.5 Lubrication file

润滑档案

5.5.1 The equipment with an independent oil station shall be provided with a dependent lubrication file, covering lubrication card, oil addition and replacement situation, treatment measures for unqualified oil as per analysis, change of oil type and renovation of lubrication system.

具有独立油站的设备应单独建立润滑档案，润滑档案的内容应包括：润滑卡片、加换油情况、油

质分析异常时的处理措施、油种变更、润滑系统改造等。

5.5.2 Lubrication files shall not be established for equipment without an independent oil station, but the lubrication data shall be registered in the equipment file.

无独立油站的设备不单独建立润滑档案，但应在设备档案中登记润滑资料。

5.5.3 Equipment lubrication, upon completion, shall be timely recorded in the EM system.

设备润滑作业完成后，应及时在设备 EM 系统中记录。

6 Inspection and Supervision

检查与监督

The Equipment Management Dept. shall supervise, inspect and assess the lubrication management of the operation department.

机械动力部负责对运行部润滑管理工作进行监督检查并考核。

7 Associated Procedures and Records

关联程序和记录

7.1 Associated procedures

关联程序

7.1.1 Lubricating Oil Requisition Procedures (HYBN-T2-07-0007-2018-1)

润滑油领用程序 HYBN-T2-07-0007-2018-1

7.1.2 Lubricating Oil Analysis Management Procedures (HYBN-T2-07-0008-2018-1)

润滑油分析管理程序 HYBN-T2-07-0008-2018-1

7.1.3 Waste Assessment and Disposal Management Procedures of Lubricating Oil (HYBN-T2-07-0009-2018-1)

润滑油判废及处置管理程序 HYBN-T2-07-0009-2018-1

7.1.4 "Five Fixations" Management Procedures for Equipment Lubrication (HYBN-T2-07-0010-2018-1)

设备润滑五定管理程序 HYBN-T2-07-0010-2018-1

7.1.5 Three-stage Filtration Management Procedures for Equipment Lubrication (HYBN-T2-07-0011-2018-1)

设备润滑三级过滤管理程序 HYBN-T2-07-0011-2018-1

7.1.6 Equipment Lubrication Inspection Procedures (HYBN-T2-07-0012-2018-1)

设备润滑检查程序 HYBN-T2-07-0012-2018-1

7.2 Associated records

关联记录

7.2.1 Application for Change of Lubricating Oil Type (HYBN-T6-07-0059-001-2018)

润滑油种变更申请单 HYBN-T6-07-0059-001-2018

7.2.2 "Five Fixations" for Pump Equipment Lubrication (HYBN-T6-07-0060-001-2018)

机泵设备润滑“五定”表 HYBN-T6-07-0060-001-2018

7.2.3 Annual Plan of Lubricating Oil (Grease) (HYBN-T6-07-0061-001-2018)

润滑油（脂）年度计划表 HYBN-T6-07-0061-001-2018

7.2.4 Requisition Plan of Lubricating Oil (Grease) (HYBN-T6-07-0062-001-2018)

润滑油（脂）领用计划表 HYBN-T6-07-0062-001-2018

7.2.5 Application for Waste Assessment of Lubricating Oil (Grease)

(HYBN-T6-07-0063-001-2018)

润滑油（脂）判废申请表 HYBN-T6-07-0063-001-2018

8 Supplementary Rules

附则

8.1 This System is under the jurisdiction of Equipment Management Dept.

本制度由机械动力部归口管理。

8.2 This System is drafted by Equipment Management Dept.

本制度起草部门：机械动力部。

8.3 Equipment Management Dept. is responsible for the interpretation of this System.

本制度解释权归机械动力部拥有。

8.4 Revision, preparation and approval of this System are shown in Table 1:

本制度版本编制和审批情况见表 1:

Table 1 Revision, preparation and approval of document

表 1 文件版本编制和审批情况

1	2018-12-31	Zhang Zhaohui 张召辉	Tong Xueyun 童雪云	Xu Ye 徐野	Chen Liancai 陈连财
Revision 版本	Issued date 颁布日期	Prepared by 编制人	Reviewed by 审核人	Authorized by 审定人	Approved by 批准人

9 Appendices

附件

Appendix 1: Lubricating oil (grease) adding and replacement standards

附件 1: 加换润滑油（脂）标准

Appendix 1:

附件 1:

Lubricating oil (grease) adding and replacement standards**加换润滑油（脂）标准**

1 Lubricating oil (grease) adding standards

加润滑油（脂）标准

1.1 Oil adding shall follow the oil level indication if any. When oil level indication is not available, the following standards shall be followed:

有油位刻度线时，加油以刻度线为准；无刻度线时按下述标准执行：

1.1.1 Circulating lubrication: oil shall be added to the specified liquid level of the tank and the oil cooler shall have an oil temperature of no more than 49°C at the outlet.

循环润滑：油箱油位应加至规定液位，油冷器出口油温不应超过 49°C。

1.1.2 Oil ring lubrication: the oil level shall be kept at D/4 when the inner diameter of oil ring is D=25 ~ 40mm, D/5 when the inner diameter is D=45 ~ 60mm and D/6 when the inner diameter is D=70 ~ 130mm.

油环带油润滑：当油环内径 D=25~40mm 时，油位高度应保持在 D/4；当油环内径 D=45~60mm 时，油位高度应保持在 D/5；当油环内径 D=70~130mm 时，油位高度应保持在 D/6。

1.1.3 Submerged lubrication: the oil level shall be at the upper edge of the lower ball of the bearing or immerse the ball in case of $n < 1500\text{r.p.m}$, above the center of the lower ball but not immerse the upper edge of the ball in case of $3000\text{r.p.m} \geq n \geq 1500\text{r.p.m}$, and below the center of the lower ball but not lower than the lower edge of the ball in case of $n > 3000\text{r.p.m}$.

浸油润滑：当 $n < 1500\text{r.p.m}$ 时，油位在轴承下部滚珠的上缘或浸没滚珠；当 $3000\text{r.p.m} \geq n \geq 1500\text{r.p.m}$ 时，油位在轴承下部滚珠中心以上，但不得浸没滚珠上缘；当 $n > 3000\text{r.p.m}$ 时，油位在轴承下部滚珠中心以下，但不得低于滚珠下缘；

1.1.4 Lubrication of reducer: the oil level shall be 2 ~ 3 times the height of the lower tooth of the higher gear pair for lubrication of a reducer with spur or helical gears. The oil shall submerge the full tooth width of one gear for lubrication of a reducer with bevel gears. The oil level shall be 2 ~ 3 times the height of the worm gear when the worm is above the worm gear for lubrication of a reducer with worm gears. The oil shall immerse the height of worm thread when the worm is below or on the side of the worm gear.

减速机的润滑：当为正斜齿轮减速机时，油面应浸没高齿轮副低齿高的 2~3 倍；当为伞形齿轮减速机时，油面应浸没其中一个齿轮的全齿宽；当为蜗轮蜗杆减速时，若蜗杆在蜗轮上方时，则油面应浸没蜗轮齿高的 2~3 倍；若蜗杆在蜗轮下方或侧面时，则油位应浸没蜗杆螺纹高度。

1.1.5 Forced lubrication: the oil level standard shall be determined according to the shop instructions of the equipment or after actual calibration.

强制润滑：应按设备出厂说明书或实际标定后确定油位标准。

1.1.6 Lubrication with grease: the amount of grease added shall be 1/2 of the volume of the

bearing box in case of $n \leq 3000 \text{r.p.m.}$, and $1/3$ in case of $n > 3000 \text{r.p.m.}$.

脂润滑：当 $n \leq 3000 \text{r.p.m.}$ 时，加脂量为轴承箱容积的 $1/2$ ；当 $n > 3000 \text{r.p.m.}$ 时，加脂量为轴承箱容积的 $1/3$ 。

2 Lubricating oil (grease) replacement standards

更换润滑油（脂）标准

2.1 The lubricating oil (grease) in use, if visually checked to meet one of the following conditions, shall be replaced: the lubricating oil becomes black obviously after continuous use for more than five years; the lubricating oil (grease) is seriously emulsified; the lubricating grease becomes dry and hard or contains visible solids.

对在用润滑油（脂）经目测检查，凡符合下列条件之一者，应置换或更换：润滑油连续使用时间超过五年且外观颜色明显变黑；润滑油（脂）乳化严重；润滑脂变干变硬或有明显可见的固体颗粒。

2.2 The lubricating oil in use requiring routine analysis only, if meeting one of the following conditions, shall be partially replaced with new oil: the viscosity change exceeds 10% of the viscosity grade of the lubricating oil; the acid value exceeds 10% of the standard; the variation range of flash point exceeds 10% of the standard; the content of Equipment Management impurities is higher than 0.1% or many granular impurities are found in the oil although the content of Equipment Management impurities is no more than 0.1%; the water content is higher than 0.1%.

对只做常规分析的在用润滑油，凡符合下列条件之一者，应部分置换或更换新油：粘度变化超过润滑油粘度等级的 10%；酸值超过标准的 10%；闪点变化范围超过标准的 10%；机械杂质高于 0.1% 或机械杂质含量虽未超过 0.1%，但油中有较多的颗粒状杂质；水含量高于 0.1%。

2.3 The lubricating oil in use requiring unconventional analysis, the Equipment Management Dept. and the operation department shall jointly determined whether replacement is necessary based on relevant standards.

对于需再做非常规分析的在用润滑油，由机械动力部与运行部参照相关标准共同判定。



Hengyi Industries Sdn Bhd
恒逸实业（文莱）有限公司

HYBN-T3-07-0005-2018-1

Spare Parts Management System

备品配件管理制度

Issued Date: Dec. 2018

颁布日期：2018 年 12 月

 HENGYI	Hengyi Industries Sdn Bhd 恒逸实业（文莱）有限公司			
	Spare Parts Management System 备品配件管理制度			
	Doc No.	HYBN-T3-07-0005-2018-1	Ver No.	1

1 Purpose

目的

This System is hereby formulated to ensure equipment inspection and maintenance and reasonable reserve of spare parts.

为保障设备检维修工作，合理储备备品配件，特制订本制度。

2 Scope of Application

适用范围

This System applies to all involved departments.

本制度适用于各部门。

3 Terms and Definitions

术语和定义

Spare parts: refer to equipment components, materials and parts that are reserved and purchased for normal operation and maintenance of equipment.

备品配件：为满足设备正常运行和维修所储备和采购的设备部件、材料和配件。

4 Management Responsibilities

管理职责

4.1 Specified administrative authority

归口管理部门

4.1.1 The Equipment Management Dept. is the specified administrative authority of spare parts, which shall be responsible for the technical management and plan approval of spare parts.

机械动力部是公司备品配件的归口管理部门，负责备品配件的技术管理和计划审批。

4.1.2 Organize to prepare the list, consumption quota and reserve quota of spare parts, be responsible for the warehouse entry inspection of parts attached to important equipment, coordinate to solve the problems in spare parts management, and organize the repair of spare parts, the surveying and the approval of surveying drawings (including outsourced drawings).

组织编制公司备品配件明细表、消耗定额及储备定额；负责重要设备随机配件入库验收；协调解决备品配件管理中出现的问题；组织备品配件的修复、测绘及测绘图纸（含外委）的审核。

4.2 Coordinated management departments

协同管理部门

4.2.1 The Materials Supply Dept. shall be responsible for the review of reserve quota, the purchase, supply and inventory management of spare parts, and the organization of the identification and disposal of spare parts. In addition, the Materials Supply Dept. shall provide the basic data and list of spare parts, and give instructional advice on material purchasing cycle.

物资装备部负责储备定额的审核，负责备品配件的采购、供应和库存管理，组织对库存备品配件进行鉴定和处置；负责提供备品配件的基础资料、目录清单；负责提供物资采购周期指导性意见。

4.2.2 The Finance Dept. shall be responsible for verifying the reserve funds of spare parts.

财务管理部负责核定备品配件储备资金。

4.3 Executive departments

执行部门

4.3.1 The operation department, as the executive department, shall be responsible for preparing the list, consumption quota and reserve quota of spare parts and for the declaration of spare parts plan. In addition, it shall participate in the quality acceptance of parts attached to the equipment, and submit the list of changed parts and suggestions on the handling of original parts.

运行部为执行部门，负责编制本部门备品配件明细表、消耗定额及储备定额；负责本部门备品配件计划的申报；参与随机配件的质量验收；提报变更设备配件清单和对原有配件的处理意见。

4.3.2 The Equipment Maintenance Dept. shall be responsible for receiving and checking the quality of parts for maintenance, reporting the replacement and transformation information of parts of important equipment for maintenance to the Equipment Management Dept., surveying, repairing and processing and accepting the parts as required, and feeding back the consumption of parts.

设备检修部负责对检修用配件的领用和质量复核，将重要设备检修配件更换、改造等动态上报机械动力部，按要求对配件进行测绘、修复、加工和质量验收工作，并对配件消耗量的信息反馈。

5 Management Content

管理内容

5.1 Material management

资料管理

5.1.1 The scope and quantity of the materials to be provided must be indicated in the purchase contract of newly purchased equipment. In general, such technical documents as assembly drawings (including the list of parts) and instructions shall be made in five copies and attached with an electronic version, one for the Equipment Management Dept. the Materials Supply Dept. and the operation department respectively and others for the GM's Office for filing.

新购设备采购合同中必须注明所提供资料的范围和数量。通常装配图（含配件清单）、说明书等技术文件一式五份并附电子版文本。机械动力部、物资装备部、运行部各一份，其余归总经理办公室存档。

5.1.2 The operation department shall file the drawings of vulnerable parts of the equipment in use, among which the drawings and materials of important equipment must be complete.

运行部归档整理在用设备的易损件图纸，其中重要设备图纸资料必须齐全。

5.1.3 The Equipment Management Dept., the Materials Supply Dept. and the operation department shall complete the following basic management data of parts by the end of December every year:

每年 12 月底前，机械动力部、物资装备部、运行部应当完善如下配件管理基础资料：

5.1.3.1 Basic data such as equipment assembly drawing and component drawing (provided by the Materials Supply Dept. and archived by the operation department);

设备装配图、部件图等基础资料（物资装备部提供，运行部存档）；

5.1.3.2 List of equipment parts established in the EM system (by the operation department);

在 EM 系统中建立设备配件明细表（运行部）；

5.1.3.3 List and reserve quota of equipment parts (provided by the operation department and the Equipment Management Dept.);

设备配件明细表及储备定额（运行部、机械动力部）；

5.1.3.4 Storage records and cards of inventory spare parts and parts attached to equipment (provided by the Materials Supply Dept.).

库存备件、随机备件保管帐目和卡片（物资装备部）。

5.2 Quota management

定额管理

5.2.1 If the equipment reserves cannot meet the needs, the Equipment Management Dept. shall apply to the Company for approval, after which the Finance Dept. shall adjust.

设备储备金额无法满足需要，由机械动力部向公司提出申请，经审批后由财务管理部调整。

5.2.3 Formula to calculate reserve quota of spare parts:

备品配件储备定额数量测算公式：

$$N=A \cdot K \cdot a \cdot \frac{T}{P}$$

Where: N -- reserve quota (Nr.)

式中：N—储备定额数量（件）

A – quantity of equipment of the same kind (set)

A—同类设备台数（台）

K – quantity of the same spare parts on each equipment (Nr.)

K—每台设备上相同备件数量（件）

P – service life of parts (month)

P—配件使用期限（月）

T – manufacturing and ordering cycle of parts (month)

T—配件制造或订货周期（月）

a -- Coefficient of inequality (determined as per A and K)

a—不平均系数（由 A、K 确定）

Table 1 Coefficient of inequality a

表 1 不平均系统 a

A•K	1	2~5	6~10	10~20	20 以上
A	1	0.9	0.8	0.7	0.6

5.2.4 The Materials Supply Dept. shall purchase, reserve and keep the materials according to the quota.

物资装备部按储备定额实施采购、储备和保管。

5.3 Plan and procurement management

计划与采购管理

5.3.1 The Materials Supply Dept. shall purchase and make up the shortage in the spare parts reserve quota. The parts included in the work order submitted by the operation department shall be purchased in time.

物资装备部对备品配件储备定额中出现的短缺应采购补齐；对运行部提报的工单内配件应当及时采购。

5.3.2 The operation department shall report the parts required by equipment maintenance or the reserve materials through the ERP system according to the maintenance plan, and the Materials Supply Dept. shall procure according to the ERP work order.

运行部根据检修计划通过 ERP 系统集中提报设备检修所需配件或储备备料，物资装备部根据 ERP 工单进行采购。

5.3.3 Parts to be purchased in case of emergency can be declared immediately, applied for by the operation department, then approved by the Equipment Management Dept. after being signed by the person in charge of the equipment and finally purchased by the Materials Supply

Dept. The operation department shall provide the demand plan within 3 days according to the specified procedures.

紧急采购配件可即时申报，由运行部提出申请，经本部门设备负责人签字后报机械动力部审批，由物资装备部进行采购，运行部在 3 日内按规定程序补办需求计划。

5.3.4 The Equipment Management Dept. shall organize to sign the technical appendix in case of changing the original manufacture of spare parts and the material and processing technology of parts.

备品配件如需变更原生产厂家、调整配件材质、加工工艺等，由机械动力部组织签订技术附件。

5.3.5 The Materials Supply Dept. shall inform the Equipment Management Dept. of the purchase of spare parts that has not been completed as planned at the end of each month.

物资装备部每月末应当向机械动力部通报未能按计划完成的配件采购情况。

5.4 Inventory management

库存管理

5.4.1 The Materials Supply Dept. shall carry out quality inspection for the warehousing of spare parts and go through the warehousing acceptance procedures. Spare parts to be warehoused shall be provided with qualification certificates.

物资装备部对备件入库要进行质量检验，办理入库验收手续；入库备件要有产品合格证。

5.4.2 The rotor inventory shall be placed according to the standard, and regularly turned, maintained and recorded.

库存转子按标准要求放置，定期盘转、防护保养并记录。

5.4.3 The spare parts attached to the equipment (including two-year spare parts) shall be delivered to the Materials Supply Dept. for storage after being counted.

设备的随机备件（含两年备件），经清点后直接移交物资装备部保管。

5.4.4 In case of any quality defects of spare parts that may affecting the use including appearance, assembly size and performance, the receiving department shall have the right to return the inventory, and the Materials Supply Dept. shall mark the spare parts of the same batch in a timely manner to avoid re-use.

凡发现备件外观、装配尺寸、性能等影响使用的质量问题，领用部门有权退库，物资装备部应及时对同批次配件作好标识，防止再次领用。

5.4.5 The Materials Supply Dept. shall ensure in the storage process that the specifications and materials are clear, the drawing No. is accurate and no corrosion, damage, deformation or deterioration is found. Also, it shall clean up the inventory of parts once a year and guarantee consistence between the accounts, materials and cards (drawings). The Materials Supply Dept. shall apply to discard the useless parts which are eliminated or corroded which shall be reviewed and verified by the Equipment Management Dept. and treated according to the specified procedures.

物资装备部在保管过程中要做到：规格材料明、图号准、不锈蚀、不损坏、不变形、不变质。每

年清理一次配件库存，做到账、物、卡（图）相符。对因淘汰、锈蚀的无用配件，提出报废申请，由机械动力部组织相关部门进行审核、鉴定，按规定程序进行处理。

5.5 Requisition management

领用管理

5.5.1 The spare parts shall be requested for by the Maintenance Dept. as per the maintenance order.

备品配件的领用由维修部门根据维修工单进行领用。

5.5.2 The borrowing procedures shall be gone through and also the warehouse-p\out procedures shall be transacted within 15 days if parts are needed in advance due to equipment shutdown for maintenance or equipment repair.

因装置停工检修、设备抢修需预先借用配件，应当办理借用手续，并在 15 日内办完领料出库手续。

5.5.3 The parts that have been borrowed but not used in the maintenance due to some reasons, of which the surface is not damaged, the outer packing is intact and the delivery certificate materials are complete, can be returned to the warehouse within one week after the maintenance together with the excess materials for maintenance of which the service quality is not affected.

对已领出、借用配件因故未在检修中更换使用，若配件表面未受损、外包装良好、出厂合格证资料齐全等且不影响使用的检修余料，允许在检修完成一周内作退库处理。

5.6 Replacement management

替代管理

5.6.1 The operation department shall fill in the *Application for Replacement of Spare Parts* and submit for approval by all levels if the spare parts provided by the original equipment manufacturer need to be replaced. The *Application for Replacement of Spare Parts* shall serve as the basis for the first purchase of the Materials Supply Dept.

原设备厂家提供的备品配件需要替代时，运行部应填报《备品配件替代申请表》，并逐级审批，《备品配件替代申请表》作为物资装备部首次采购依据。

5.6.2 The Equipment Management Dept. shall organize to implement the surveying, trial production and trial application of the spare parts to be replaced with.

机械动力部组织实施备品配件替代的测绘、试制、试用等工作。

5.7 Repair and surveying management

修复、测绘管理

5.7.1 The repair and surveying of parts of the Company shall be implemented within the

Company if possible. When parts need to be outsourced for repair and surveying, the Equipment Management Dept. shall organize to review the feasibility and implement the plan.

凡公司配件进行修复和测绘，应尽可能在公司内部实施；凡需外委修复和测绘配件时，由机械动力部组织对可行性、方案进行审核并实施。

5.7.2 The Materials Supply Dept. shall be responsible for the transport, warehousing and storage of the repaired parts which shall be accepted by the operation department and checked by the Equipment Management Dept. for the service condition.

物资装备部负责配件修复后的接运、入库和保管，运行部对修复配件进行验收，机械动力部对使用情况进行检查。

6 Inspection and Supervision

检查与监督

The Equipment Management Dept. shall be responsible for supervising the management of spare parts by the operation department, and notifying the problems and urging the operation department for rectification.

机械动力部负责对运行部备品配件管理进行监督，并对问题进行通报，督促其整改。

7 Associated Procedures and Records

关联程序和记录

7.1 Associated procedures

关联程序

7.1.1 Spare Parts Management Procedures (HYBN-T2-07-0013-2018-1)

备品配件管理程序 HYBN-T2-07-0013-2018-1

7.1.2 Parts Repair and Surveying Procedures (HYBN-T2-07-0014-2018-1)

配件修复、测绘工作程序 HYBN-T2-07-0014-2018-1

7.1.3 Spare Parts Reserve Quota Management Procedures (HYBN-T2-07-0015-2018-1)

备品配件储备定额管理程序 HYBN-T2-07-0015-2018-1

7.1.3 Spare Parts Replacement Management Procedures (HYBN-T2-07-0016-2018-1)

备品配件替代管理程序 HYBN-T2-07-0016-2018-1

7.1.4 Spare Parts Plan Declaration Procedures (HYBN-T2-07-0017-2018-1)

备品配件计划申报程序 HYBN-T2-07-0017-2018-1

7.2 Associated records

关联记录

7.2.1 Spare Parts Schedule (HYBN-T6-07-0064-001-2018)

备品配件计划表 HYBN-T6-07-0064-001-2018

7.2.2 Application for Replacement of Spare Parts (HYBN-T6-07-0065-001-2018)

备品配件替代申请表 HYBN-T6-07-0065-001-2018

7.2.3 Spare Parts Reserve Quota (HYBN-T6-07-0066-001-2018)

备品配件储备定额表 HYBN-T6-07-0066-001-2018

8 Supplementary Rules**附则**

8.1 This System is under the jurisdiction of Equipment Management Dept.

本制度由机械动力部归口管理。

8.2 This System is drafted by Equipment Management Dept.

本制度起草部门：机械动力部。

8.3 Equipment Management Dept. is responsible for the interpretation of this System.

本制度解释权归机械动力部拥有。

8.4 Revision, preparation and approval of this System are shown in Table 2:

Table 2 Revision, preparation and approval of the System**表 2 本制度编制和审批情况**

1	2018-12-31	Hong Yong 洪勇	Tong Xueyun 童雪云	Xu Ye 徐野	Chen Liancai 陈连财
Revision 版本	Issued date 颁布日期	Prepared by 编制人	Reviewed by 审核人	Authorized by 审定人	Approved by 批准人



Hengyi Industries Sdn Bhd
恒逸实业（文莱）有限公司

HYBN-T3-07-0006-2018-1

Rotating Equipment Condition Monitoring Management System

转动设备状态监测管理制度

Issued Date: Dec. 2018

颁布日期：2018 年 12 月

 HENGYI	Hengyi Industries Sdn Bhd 恒逸实业（文莱）有限公司			
	Rotating Equipment Condition Monitoring Management System 转动设备状态监测管理制度			
	Doc No.	HYBN-T3-07-0006-2018-1	Ver No.	1

1 Purpose

目的

This System is hereby formulated to guarantee comprehensive and systematic operation of the rotating equipment.

为保证转动设备处于全面、系统的运行状态，特制订本制度。

2 Scope of Application

适用范围

This System is applicable to condition monitoring management of rotating equipment of the Company.

本制度适用于公司转动设备的状态监测管理。

3 Terms and Definitions

术语和定义

Rotating equipment: refers to motor, generator, steam turbine, centrifugal compressor, screw compressor, centrifugal pump, fan and other rotating machineries.

转动设备：指电动机、发电机、蒸汽轮机、离心压缩机、螺杆式压缩机、离心泵、风机等转动机械。

4 Management Responsibilities

管理职责

4.1 Specified administrative authority

归口管理部门

4.1.1 The Equipment Management Dept. is the specified administrative authority for rotating equipment condition monitoring, which shall be responsible for formulating (revising) the rotating equipment condition monitoring management system and guiding all departments to implement the system.

机械动力部是转动设备状态监测的归口管理部门，负责制（修）订转动设备状态监测管理制度，指导各部门执行本制度。

4.1.2 Be responsible for organizing and coordinating the installation, maintenance, update, parts declaration and technical training of the online condition monitoring system.

负责组织、协调在线状态监测系统的安装、维护、更新、配件申报和技术培训。

4.2 Coordinated management departments

协同管理部门

The GM's Office shall coordinate with the function realization and daily maintenance of network of the online condition monitoring system of rotating equipment.

总经理办公室负责配合转动设备在线状态监测系统网络部分的功能实现、日常维护。

4.3 Executive departments

执行部门

4.3.1 The operation department, as the executive department for rotating equipment condition monitoring, shall be responsible for the daily condition monitoring of rotating equipment.

运行部为转动设备状态监测的执行部门，负责转动设备的日常状态监测工作。

4.3.2 The Instrument Control Dept. shall be responsible for the function realization, daily maintenance, parts declaration, repair and commissioning of the online condition monitoring system of rotating equipment.

仪表控制部负责转动设备在线状态监测系统仪表部分的功能实现、日常维护、配件申报，维修和调试工作。

5 Management Content

管理内容

5.1 Testing instruments and methods

测试仪器、方法

5.1.1 The vibration measuring instruments, methods, measuring point arrangement and evaluation criteria are shown in Appendix 1.

振动测量仪器、方法、测点布置和评定标准见附件 1。

5.1.2 Refer to vibration monitoring for temperature measuring instruments, methods and measuring point arrangement. The Evaluation criteria shall be based on bearing, lubrication type and data attached to the equipment. For the forced lubrication system, the temperature rise of bearing oil is recommended not to exceed 28 °C and the bearing metal temperature shall be less than 93 °C; For the oil ring lubrication or splash lubrication system, the temperature rise of oil bath is recommended not to exceed 39 °C (or the oil bath temperature shall be lower than 82 °C).

温度测量仪器、方法、测点布置参照振动监测；评定标准根据轴承、润滑类型和设备随机资料确定。对于强制润滑系统，推荐轴承油的温升不应超过 28°C，轴承金属温度应小于 93°C；对于油环润滑或飞溅润滑系统，推荐油池的温升不应超过 39°C，（或油池温度应低于 82°C）。

5.1.3 All departments, under the unified organization and coordination of the Equipment Management Dept., shall be equipped with vibration and temperature measuring instruments and offline data acquisition and analysis instruments.

各部门在机械动力部统一组织协调下配置振动、温度测量仪器、离线数据采集分析仪。

5.1.4 The pumps set with such vibration sensors and temperature sensors as eddy current and acceleration ones can be directly monitored by the instrument or online monitoring system. The online condition monitoring system or offline data acquisition and analysis instruments used by special care pumps shall be analyzed and diagnosed for vibration.

对安装有涡流、加速度等振动传感器及温度传感器的机泵，可直接通过仪表或在线监测系统进行监测；对特护机泵使用在线状态监测系统或离线数据采集分析仪进行振动分析诊断。

5.2 Rotating equipment monitoring

转动设备监测

5.2.1 The operators of each department shall monitor the rotating equipment at least once a day, and the technicians shall monitor the rotating equipment at least once a month, with the interval no more than 40 days.

各部门操作员每日对转动设备至少监测一次，技术人员每月对转动设备至少监测一次，两次监测的间隔时间不大于 40 天。

5.2.2 The rotating equipment shall be mainly monitored for such operating parameters as vibration and maximum temperature of the bearing.

转动设备监测内容包括轴承部位的振动、最高温度等运行参数。

5.2.3 The operators of all departments shall register the monitoring results in the EM system on a daily basis. (In case of failure of the EM system, a written record shall be filled in, covering the time, monitor, device name, tag No., monitoring value and unit, and the record shall be kept for one year).

各部门操作员每日将监测结果在 EM 系统中登记。（若 EM 系统故障，需填写纸版记录，记录内容包括时间、监测人、装置名称、位号设备，监测数值、单位等，记录保存一年）。

5.2.4 The technicians of all departments shall sort out and summarize the monitoring results of the last month before the 5th day of each month, forming a monthly report which shall be uploaded to the EM system.

各部门技术人员每月 5 日前将上月监测结果整理汇总，形成月报并上传至 EM 系统中。

5.2.5 Vibration and temperature monitoring is not required for special rotating equipment such as reciprocating compressors.

特殊转动设备如往复机、往复泵等的振动、温度监测不作要求。

5.2.6 The daily monitoring management procedures of rotating equipment shall be

implemented in case of vibration, excessive temperature or other abnormalities during the monitoring process of rotating equipment.

转动设备监测发现振动、温度超标或其它异常问题，执行转动设备日常监测管理程序。

5.2.7 The Equipment Management Dept. shall organize to monitor and diagnose the rotating equipment with complicated problems.

机械动力部负责组织对存在复杂问题的转动设备进行监测诊断。

5.3 Online condition monitoring system

在线状态监测系统

5.3.1 The online condition monitoring system includes the online condition monitoring and fault analysis system of large compressors and the condition monitoring and fault analysis system of pump groups.

在线状态监测系统包括：大机组在线状态监测及故障分析系统、泵群状态监测及故障分析系统。

5.3.2 The online condition monitoring management personnel include the online condition monitoring professional of the Equipment Management Dept. and the equipment management personnel of the operation department with an online condition monitoring system.

在线状态监测管理人员包括：机械动力部在线状态监测专业人员、安装有在线状态监测系统的运行部设备管理人员。

5.3.3 The online condition monitoring management personnel shall check the system operation condition every working day and timely organize to deal with any abnormality.

在线状态监测管理人员应当每个工作日查看系统运行情况，及时组织处理异常问题。

5.3.4 The management personnel shall analyze the process of startup and shutdown through the online condition monitoring system, judge in time in case of any abnormality, and guide the startup and shutdown operations.

管理人员应利用在线状态监测系统对开停车过程进行分析，出现异常及时判断，指导开停车操作。

5.3.5 The server of the online condition monitoring system is dedicated to the running condition monitoring, and the management personnel shall not quit the monitoring software at will or carry out irrelevant operations.

在线状态监测系统的服务器只限于运行状态监测的专用软件，管理人员不得随意退出监测软件，或进行无关操作。

5.3.6 The condition monitoring management personnel of the Equipment Management Dept. shall analyze the condition monitoring situation of the special care equipment every month and report the monitoring situation at the monthly evaluation meeting.

机械动力部状态监测管理人员每月对特护设备的状态监测情况进行分析，在月讲评会上通报监测情况。

5.3.7 The Instrument Control Dept. shall be responsible for providing the instrument signal to the input end of the online condition monitoring system of rotating equipment, for the safety isolation with interlocking signals and for the establishment of field sensor bit No., wiring and

measuring point arrangement of vibration instruments.

仪表控制部负责提供仪表信号到转动设备在线状态监测系统的输入端；负责带连锁信号的安全隔离；负责建立现场传感器位号、接线与振动仪表测点布置等。

6 Inspection and Supervision

检查与监督

The Equipment Management Dept. shall be responsible for the supervision, inspection and assessment of the implementation of rotating equipment condition monitoring.

机械动力部负责对转动设备状态监测执行情况进行监督检查并考核。

7 Associated Procedures and Records

关联程序和记录

7.1 Associated procedures

关联程序

7.1.1 Daily Monitoring Management Procedures of Rotating Equipment (HYBN-T2-07-0018-2018-1)

转动设备日常监测管理程序 HYBN-T2-07-0018-2018-1

7.1.2 Online Condition Monitoring System Management Procedures (HYBN-T2-07-0019-2018-1)

在线状态监测系统管理程序 HYBN-T2-07-0019-2018-1

7.2 Associated records

关联记录

Pump condition monitoring table (HYBN-T6-07-0067-001-2018)

机泵状态监测表 HYBN-T6-07-0067-001-2018

8 Supplementary Rules

附则

8.1 This System is under the jurisdiction of Equipment Management Dept.

本制度由机械动力部归口管理。

8.2 This System is drafted by Equipment Management Dept.

本制度起草部门：机械动力部。

8.3 Equipment Management Dept. is responsible for the interpretation of this System.

本制度解释权归机械动力部拥有。

8.4 Revision, preparation and approval of this System are shown in Table 1:

本制度版本编制和审批情况见表 1:

Table 1 Revision, preparation and approval of document

表 1 文件版本编制和审批情况

1	2018-12-31	Zhang Zhaohui 张召辉	Tong Xueyun 童雪云	Xu Ye 徐野	Chen Liancai 陈连财
Revision 版本	Issued date 颁布日期	Prepared by 编制人	Reviewed by 审核人	Authorized by 审定人	Approved by 批准人

9 Appendices

附件

Appendix 1 The vibration measuring instruments, methods, measuring point arrangement and evaluation criteria

附件 1 振动测量仪器、方法、测点布置和评定标准。



Appendix 1 The vibration measuring instruments, methods, measuring point arrangement and evaluation criteria

附件 1 振动测量仪器、方法、测点布置和评定标准。

The criteria are applicable to the field measurement and evaluation of vibration intensity of rotating equipment with a rotating speed of 600~12000r/min.

本标准适用于转速为 600~12000r/min 旋转设备振动烈度的现场测量与评定。

1 Measuring instrument

测量仪器

1.1 Measuring instruments consisting of a sensor, a filter amplifier, an indicator and a power supply are generally used, and other instruments by which the same results can be obtained are permitted.

一般采用由传感器、滤波放大器、指示器和电源装置等组成的测量仪表，允许采用能取得同样结果的其他仪器。

1.2 The filter amplifier of the measuring instrument shall be designed with a band pass frequency of 10Hz~1000Hz, with the allowable deviation being 10% of the indicated value.

测量仪表滤波放大器的带通频率为 10Hz~1000Hz，测量允许偏差为指示值的±10%。

1.3 The maximum linear response of the vibration velocity of the sensor shall be at least 3 times the full-range vibration velocity in the sensing direction, and the lateral sensitivity of the sensor shall be less than 10%.

传感器振动速度线性响应的最大值至少为感受方向上满量程振动速度的 3 倍，传感器横向灵敏度应小于 10%。

1.4 The direct-reading instrument shall be capable of indicating or recording the RMS of the vibration velocity.

直读仪器应能指示或记录振动速度的均方根值。

1.5 The measuring instrument shall be powered by battery as far as possible.

测量仪表尽可能采用电池为电源装置。

1.6 The measuring instrument shall be calibrated regularly to ensure reliable measurement results.

测量仪表需定期校准，保证具有可靠的测量结果。

2 Measurement method

测量方法

The RMS of the vibration velocity measured on the casing surface and with a frequency with the range of 10Hz~1000Hz shall be used as the measuring parameter to characterize the Equipment Management vibration state, and the maximum value measured at the specified point in the specified direction used as the vibration intensity of the machine.

在机壳表面测得的、频率在 10Hz~1000Hz 范围内的振动速度的均方根作为表征机械振动状态的测量参数，在规定点和规定的测量方向上测得的最大值作为机器的振动烈度。

3 Measuring point arrangement

测点布置

The measuring point shall be generally arranged on the main bearing or bearing seat and measuring shall be conducted in radial and axial directions. For vertically- or obliquely-mounted machines, the measuring point shall be arranged at the position where the maximum vibration reading can be obtained or the specified position, and the measuring point position and the measured value shall be recorded. The measuring point shall be set at a fixed position and marked conspicuous. No measuring points shall be set on such parts as machine shield and cover plate.

测点一般布置在每一主轴承或轴承座上，并在径向和轴向两个方向上进行测量。对于立式或倾斜安装的机器，测点应布置在能得出最大振动读数的位置或规定的位置上，并将测点位置和测量值一同记录。测点位置应固定，一般应作明显标记。机器护罩、盖板等零件不适宜做测点。

4 Evaluation criteria

评定标准

4.1 Equipment categories: I – small rotating equipment with power of less than 15 kW; II – medium rotating equipment with power of less than 300 kW; III – large rotating equipment with a rigid equipment-support system; IV – large rotating equipment with a flexible equipment-support system.

设备分类：I – 小型转机，15kW 以下；II – 中型转机，300kW 以下；III – 大型转机，机器—支撑系统为刚性状态；IV – 大型转机，机器—支撑系统为挠性状态。

4.2 Intensity rating:

烈度评定：

4.2.1 Table 2 shows the vibration intensity rating.

振动烈度评定等级表见表 2

4.2.2 Zoning criteria: Zone A – the condition that the newly delivered machine can reach or excellent condition; Zone B – the condition where the machine can be running for a long time or qualified condition; Zone C – the condition where the machine can be running for a short time but corresponding remedial measures must be taken or unqualified condition; Zone D – unallowable condition.

分区标准：A 区—新交付使用的机器应达到的状态或优良状态；B 区—机器可以长期运行或合格状态；C 区—机器尚可短期运行但必须采取相应补救措施或不合格状态；D 区—不允许状态。

Table 2 Vibration intensity rating

表 2 振动烈度评定等级表

Range of vibration intensity 振动烈度的范围		Vibration intensity rating 振动烈度评定等级			
Rating range (mm/s) 分级范围 mm/s	RMS of velocity limit within the range (mm/s) 在该范围极限上的速度 均方根值 mm/s	I	II	III	IV
0.38		A	A	A	A
0.45					
0.71					
1.12		B	B	B	B
1.8					
2.8		C	C	C	C
4.5					
7.1		D	D	D	D
11.2					
18					
28					
45					
71					

振动烈度的范围		振动烈度评定等级			
分级范围mm/s	在该范围极限上的速度均方 根值mm/s	I	II	III	IV
0.38		A	A	A	A
0.45					
0.71					
1.12		B	B	B	B
1.8					
2.8		C	C	C	C
4.5					
7.1		D	D	D	D
11.2					
18					
28					
45					
71					



Hengyi Industries Sdn Bhd
恒逸实业（文莱）有限公司

HYBN-T3-07-0007-2018-1

Standby Pump Turn And Periodic Switch Management System

备用机泵盘车和定期切换管理制度

Issued Date: Dec. 2018

颁布日期：2018 年 12 月

 HENGYI	Hengyi Industries Sdn Bhd 恒逸实业（文莱）有限公司			
	Standby Pump Turn And Periodic Switch Management System 备用机泵盘车和定期切换管理制度			
	Doc No.	HYBN-T3-07-0007-2018-1	Ver No.	1

1 Purpose

目的

This System is formulated in order to standardize the related requirements of the rotating equipment turning and periodic switching, effectively maintain the standby equipment, timely detect hidden faults and eliminate defects, and ensure the safety of continuous production equipment.

为了规范动设备盘车和定期切换的相关要求，对备用设备进行有效维护，及时发现隐蔽故障消除缺陷，保证连续生产装置的安全，特制定本制度。

2 Scope of Application

适用范围

2.1 This System is applicable to pump turning and periodic switching management of each device in the company.

本制度适用于公司范围内各装置机泵的盘车和定期切换管理。

2.2 This System is not applicable to idle pumps.

闲置停用机泵不适用本制度。

3 Terms and Definitions

术语和定义

3.1 Turning refers to hand turning of equipment before startup of the motor to judge whether the motor-driven load (i.e. the Equipment Management or transmission part) is stuck leading to resistance increase, so as not to damage the equipment due to the increase of startup load of the motor.

盘车：指在启动电机前，用人力将设备转动，用以判断由电机带动的负荷（即机械或传动部分）是否有卡死而阻力增大的情况，从而不会使电机的启动负荷变大而损坏设备。

3.2 Switching: switching between the standby equipment and the running equipment within a certain period.

切换：在一定周期内，将备用设备和运行设备进行切换运行的工作。

4 Management Responsibilities

管理职责

4.1 Specified administrative authority

归口管理部门

4.1.1 The Equipment Management Dept. is the specified administrative authority of this System, which shall be responsible for reviewing, preparing and revising the standby pump turning and periodic switching system and inspecting and assessing this system.

机械动力部是本制度的归口管理部门，负责备用机泵盘车和定期切换制度的审核、编制、修订，负责本制度的检查与考核。

4.1.2 The Equipment Management Dept. shall be responsible for reviewing and approving the *List of Standby Pump Turning Frequency and Switching Period* submitted by each operation department.

机械动力部负责对各运行部上报的《备用机泵盘车频次和切换周期一览表》进行审核、批准。

4.2 Executive departments

执行部门

4.2.1 Each operation department shall ensure that all pumps within the area under jurisdiction works as per the standby pump turning frequency and switching period and report the *List of Standby Pump Turning Frequency and Switching Period* to the Equipment Management Dept.

各运行部负责对所辖区域所有机泵按照备用机泵盘车频次和切换周期，向机械动力部上报《备用机泵盘车频次和切换周期一览表》。

4.2.2 Each operation department shall be responsible for determining relevant persons in charge and organizing the implementation of the standby pump turning and periodic switching.

各运行部负责落实相关责任人，并组织实施备用机泵的盘车和定期切换。

4.2.3 Each operation department shall be responsible for the self-inspection of the standby pump turning and periodic switching within the area under jurisdiction, and for the assessment in accordance with the relevant provisions.

各运行部负责对所辖区域内备用机泵的盘车和定期切换执行情况进行自检，并按照相关规定进行考核。

4.2.4 The Electrical Operation Dept., Instrument Control Dept. and Equipment Maintenance Dept. shall be responsible for the professional inspection and confirmation of equipment.

电气运行部、仪表控制部、设备检修部负责设备的专业检查和确认。

5 Management Content

管理内容

5.1 Standby pump turning procedures

备用机泵盘车程序

5.1.1 Purpose of pump turning

机泵盘车的目的

5.1.1.1 Periodic turning: to prevent hot deformation or bending deformation of the rotor of the standby pump by periodic turning.

定期盘车：通过定期盘车防止备用机泵转子热变形或弯曲变形。

5.1.1.2 Turning prior to startup: to prevent the motor from being burnt due to dynamic and static friction or overload during pump startup by checking whether the standby pump is stuck through turning prior to the startup.

启动前的盘车：通过启动前的盘车检查备用机泵是否存在卡涩现象，防止机泵启动时发生动静摩擦或因过载烧毁电机。

5.1.2 Provisions on standby pump turning

备用机泵盘车规定

5.1.2.1 The following equipment is not subject to hand turning during standby period: the canned pump, the vertical pump, the reciprocating pump (the metering pump), the stand blender, the self-starting pump, the pump that runs intermittently and frequently each day, and the air cooling fan.

所有的屏蔽泵、立式泵、往复泵（计量泵）、立式搅拌器、带自启动的机泵、每天频繁间断运行的机泵、空冷风机，备用期间不盘车。

5.1.2.2 During the standby period of the unit equipped with an independent lubricant station, the oil pump of the lubricant station shall be running, and the standby lubricant pump shall be switched once a month.

配有独立润滑油站的机组在备用期间，润滑油站的油泵应处于运行状态，备用润滑油泵应每月切换一次。

5.1.2.3 Other standby pumps shall be turned once a day. The pump to be preheated after repair shall be turned during the preheating period as per the heating rate and turning frequency specified in the specification or manual, and it shall be turned once a day during the normal standby period.

其余备用机泵的盘车按规定每天盘车一次。对检修后需预热的机泵，在预热期间按照说明书或操作法规定的升温速率和盘车频次盘车，正常备用期间再改为每天盘车一次。

5.1.2.4 Each turning shall be no less than one circle and a half (for a pump with a gearbox, the number of turning circle(s) of output shaft of the gearbox shall prevail), i.e., 540°. After the turning, the white mark shall be upwards in odd days and the red mark upwards in even days (based on the current day). In case the last day of the previous month is an odd day, the turning on the first day of the current month shall be no less than two circles and the white mark shall be upwards after the turning. The turning shall be conducted between 12:00 and 18:00.

每次盘车不得少于一圈半（对带变速箱的机泵，以变速箱输出轴转动圈数为准），即 540°。盘车

后状态：单日白线朝上，双日红线朝上 (以当日日历单双为准)，当遇到上月最后一天日历为单日时，则当月第一天盘车不得少于二圈后白线朝上。盘车时间统一规定：12:00 至 18:00。

5.1.2.5 Each operation department shall make the turning marks and turning frequency marks with a unified specification for all the pumps requiring turning in the devices under jurisdiction, so as to facilitate the implementation by the team/group.

各运行部对所辖装置内所有需要盘车的机泵标识统一规格的盘车线及盘车频次标识，以方便班组执行。

5.1.2.6 The turning shall be flexible and free from deviation. Any abnormality if occurring shall be recorded in the EM of the equipment management system every day, and the Equipment Maintenance Dept. shall be contacted for treatment.

盘车应灵活自如无偏重现象，若有不正常现象，应当日在设备管理系统 EM 上进行记录，并联系设备检修部处理。

5.1.2.7 It is not permit to replace turning with inching.

严禁以点动代替盘车。

5.1.3 Pump turning procedures

机泵盘车步骤

5.1.3.1 For all pumps that need to be turned, make sure the motor operating column switch on site is in the "Lock-out" or "Stop" position during turning.

所有需盘车的机泵，盘车时应确保现场电机操作柱开关处于“锁停”或“停”位置。

5.1.3.2 Turning method: turn in the coupling position of the equipment through the turning wrench for over 540° generally by maintaining the white mark upwards in odd days and red mark upwards in even days.

盘车办法：用盘车扳手，在设备的联轴器位置进行盘车，一般盘车 540°以上，保持单日白线朝上，双日红线朝上。

5.1.3.3 For the pump which stops outside the specified time for turning, the on-duty operator shall correct the position of the pump turning mark to correspond with the date within 1 hour after shutdown of the pump if no maintenance is required.

在规定盘车时间之外停运的泵，若不检修，在该泵停下后1小时内，由当班操作人员应校正该泵盘车标记的位置，使之与日期相对应。

5.1.3.4 The pump turning, upon completion, shall be recorded in the shift hand-over and take-over log.

机泵盘车后要在交接班本上做好盘车情况记录。

5.1.4 Precautions for pump turning

机泵盘车注意事项

5.1.4.1 For pumps with strict requirements for rotary direction such as the pump with dry gas seal, the turning direction shall be consistent with the rotary direction.

对于干气密封等对旋转方向有严格要求的机泵，盘车方向应与机泵旋转方向一致。

5.1.4.2 Before startup, the pump must be turned to confirm flexibility. For the pump with self-start function, the switch must be turned from the automatic position to the manual position

and then locked before turning of the pump, after which the switch shall be returned to the automatic position; be turned to the automatic position after turning; If the on-site switch is under the "remote" control mode, it must be switched to the "local" control mode after contact with the central control room, and finally switched to the "remote" control mode after the completion of turning.

机泵启动前必须盘车确认灵活自如。对带自启动的机泵，启动前盘车时必须把开关由自动位置旋到手动位置并锁停后盘车，盘车后再把开关旋钮打到自动位置；现场开关位置处在“远程”控制模式的必须在与中控联系后先切换至“就地”控制模式，盘车完毕后再切至“远程”控制模式。

5.2 Periodic switching procedures of standby pump

备用机泵定期切换程序

5.2.1 Purpose of periodic switching of standby pump

备用机泵定期切换目的

Rotating equipment, if stops for a long time, may be subjected to phenomenon such as motor dampness, defective insulation, lubricating oil metamorphism, Equipment Management jamming and valve rust. The periodic switching system aims to check whether the standby equipment is in good condition and available, eliminate the performance problems resulted from long-time standby of the equipment and ensure the standby equipment can be reliably put into operation in case of maintenance or emergency.

转动设备若停运时间过长，会发生电机受潮、绝缘不良、润滑油变质、机械卡涩、阀门锈死等现象，实行设备的定期切换制度的目的在于检查处于备用状态的设备是否完好可用，消除备用设备长时间处于停用状态下产生的性能问题，以保证备用设备能够在运行设备检修或事故情况下可靠地投入运行。

5.2.2 Provisions on periodic switching of standby pump

备用机泵定期切换规定

5.2.2.1 Each operation department classifies the switching periods of other standby pumps within its jurisdiction according to the following three switching principles:

各运行部在对所辖范围内的其余备用机泵设备按以下三类切换原则对备用机泵切换周期进行分类：

(1) Routine periodic switching: standby equipment is switched once every three months when the standby equipment available and the process and equipment condition allow switching.

常规定期切换：是指具有备用设备，且工艺和设备条件允许进行切换操作的设备，备用设备每三个月切换一次。

(2) Special periodic switchover: standby equipment is switched once every six months when the standby equipment is available and the process and condition do not allow conventional switching operation and switching can only be done when special and necessary preventive measures haven been taken by the equipment and process personnel.

特殊定期切换：是指具有备用设备，但工艺和设备条件不允许进行常规的切换操作，需要由设备

工艺人员采取特殊的和必要的防范措施才能进行切换的设备，半年切换一次。

(3) Periodic switching is not required by pumps, air cooling fan and pneumatic diaphragm pumps which are running in an intermittent manner for technology reason. Also, periodic switching is not necessary for quite a small number of pumps for which system fluctuation may occur during the switching. In case of device or unit shutdown, switching or trail run shall be arranged for standby pumps during the startup and shutdown and meanwhile the reasons shall be explained in the *List of Standby Pump Turning Frequency and Switching Period*.

因工艺原因间歇运行的机泵、空冷风机、气动隔膜泵不执行定期切换，对极少数切换时容易引起系统波动的机泵，可以不执行定期切换，当装置或者单元停车时，在开停车过程中应安排备用机泵的切换或试运，同时在《备用机泵盘车频次和切换周期一览表》中注明原因。

5.2.2.2 Each operation department shall, in accordance with the classification principle, fill in and submit the *List of Standby Pump Turning Frequency and Switching Period* before January 15 every year, which shall be submitted to the Equipment Management Dept. for review after being confirmed by the supervisor of the operation department. In the event of any change in the number of pumps in daily operation, the operation department shall fill in the *List of Standby Pump Turning Frequency and Switching Period* again and submit it to the Equipment Management Dept. for review within 1 month after the change.

各运行部按照分类原则，每年 1 月 15 日前填报《备用机泵盘车频次和切换周期一览表》，经运行部主管领导确认后提交机械动力部审核。当日常出现机泵数量变更时，在机泵数量变更后的 1 个月内，由运行部重新填写《备用机泵盘车频次和切换周期一览表》，提交机械动力部审核。

5.2.2.3 Upon shutdown or maintenance/repair of the unit, the switching of its auxiliary pump must be completed before startup of the unit. The pump shall be running for at least 72 hours for trial after maintenance/repair.

5.2.2.4 For important standby equipment, the operation department shall notify the Electrical Operation Dept., Instrument Control Dept. and Equipment Maintenance Dept. one day in advance, so as to guarantee synchronous electrical, instrument and equipment inspection.

对于备用的重要设备，由运行部提前一天通知电气运行部、仪表控制部、设备检修部，以便同步对电气、仪表、设备检查。

5.2.2.5 In case of statutory holidays, all switching work shall be completed one week before the holidays.

遇到法定节假日，所有切换工作要求在节假日前一周完成。

5.2.2.6 The startup and shutdown records shall be checked in the equipment management system EM and confirmed within 5 days after the standby pump switching.

备用机泵切换后 5 天内在设备管理系统 EM 中检查开停机记录，并对机泵开停机记录进行确认。

6 Inspection and Supervision

检查与监督

The Equipment Management Dept. shall conduct supervision, inspection and assessment in

accordance with the provisions of this System.

机械动力部按照本制度的规定要求进行监督、检查、考核。

7 Associated Procedures and Records

关联程序和记录

7.1 Associated procedures

关联程序

7.1.1 Standby pump turning management procedures (HYBN-T2-07-0020-2018-1)

备用机泵盘车管理程序 HYBN-T2-07-0020-2018-1

7.1.2 Periodic switching management procedures for standby pump (HYBN-T2-07-0021-2018-1)

备用机泵定期切换管理程序 HYBN-T2-07-0021-2018-1

7.2 Associated records

关联记录

List of Standby Pump Turning Frequency and Switching Period (HYBN-T6-07-0068-001-2018)

备用机泵盘车频次和切换周期一览表 HYBN-T6-07-0068-001-2018

8 Supplementary Rules

附则

8.1 This System is under the jurisdiction of Equipment Management Dept.

本制度由机械动力部归口管理。

8.2 This System is drafted by Equipment Management Dept.

本制度起草部门：机械动力部。

8.3 Equipment Management Dept. is responsible for the interpretation of this System.

本制度解释权机械动力部拥有。

8.4 Revision, preparation and approval of this System are shown in Table 1:

本制度版本编制和审批情况见表 1:

Table 1 Revision, preparation and approval of document

表 1 文制度编制和审批情况

1	2018-12-31	Dang Zhanjun 档占军	Tong Xueyun 童雪云	Xu Ye 徐野	Chen Liancai 陈连财
Revision 版本	Issued date 颁布日期	Prepared by 编制人	Reviewed by 审核人	Authorized by 审定人	Approved by 批准人



Hengyi Industries Sdn Bhd
恒逸实业（文莱）有限公司

HYBN-T3-07-0008-2018-1

Atmospheric Storage Tank Management System

常压储罐管理制度

Issued Date: Dec. 2018

颁布日期：2018 年 12 月

 HENGYI	Hengyi Industries Sdn Bhd 恒逸实业（文莱）有限公司			
	Atmospheric Storage Tank Management System 常压储罐管理制度			
Doc No.	HYBN-T3-07-0008-2018-1	Ver No.	1	Page 1 of 10

1 Purpose

目的

This System is hereby formulated to guarantee the atmospheric storage tank safety management and safety production of the Company.

为保障公司常压储罐安全管理，确保安全生产，特制订本制度。

2 Scope of Application

适用范围

This System is applicable to all departments related to atmospheric storage tanks and is used for the safety management of the atmospheric storage tanks. The maintenance and repair of tanks containing liquid medium such as acid, alkali and sewage (oil) can be carried out according to this System.

本制度适用于常压储罐所在的各部门，用于常压储罐的安全管理；储存酸、碱、污水（油）等液态介质储罐的维护和检修可参照本制度执行。

3 Terms and Definitions

术语和定义

3.1 Atmospheric storage tank: refers to the vertical cylindrical steel welded storage tank building on a homogeneous foundation with enough bearing capacity and containing such medium as liquid oil and petroleum products, with a working temperature of above $-20\text{ }^{\circ}\text{C}$, an internal pressure of not more than 6000 Pa and a volume of not less than 100m^3 , of which the bottom is closely contacted with the homogeneous foundation.

常压储罐：是指建造在具有足够承载能力的均质基础上、罐底与基础紧密接触、储存液态石油及石油产品等介质，工作温度高于 -20°C 、内压不大于 6000Pa、容积不小于 100m^3 的立式圆筒形钢制焊接储罐。

3.2 Large floating-roof storage tank: refers to the steel external floating-roof storage tank with a unit volume of no less than $50,000\text{m}^3$.

大型浮顶储罐：是指单罐容积不小于 5 万立方米的钢制外浮顶储罐。

3.3 Light oil storage tank: refers to the storage tank containing light oil products with a final boiling point of no greater than $220\text{ }^{\circ}\text{C}$, mainly including tanks storing intermediate raw materials such as naphtha tank and coker gasoline tank, and tanks storing waste light oil with

light oil components, and sulfur-containing waste tanks.

轻质油储罐：是指储存终馏点不大于 220℃轻质油品的储罐，主要包括石脑油储罐、焦化汽油储罐等中间原料油储罐，以及含有轻质油组分的轻污油储罐、含硫污水储罐。

4 Management Responsibilities

管理职责

4.1 Specified administrative authority

归口管理部门

4.1.1 The Equipment Management Dept. is the specified administrative authority of the Company's atmospheric storage tanks, which shall be responsible for preparing (revising) the Company's atmospheric storage tank management system and supervising the implementation of the system.

机械动力部是公司常压储罐的归口管理部门；负责制（修）订公司常压储罐管理制度，并督促执行。

4.1.2 Organize to establish technical archives of atmospheric storage tank equipment and to formulate monitoring measures and elimination schemes for major defects and implement and improve the schemes, and review the application for deferred maintenance of atmospheric storage tanks.

组织建立常压储罐设备技术档案；组织制定重大缺陷的监控措施、消缺方案并落实整改；审核常压储罐延期检修申请。

4.1.3 Organize to prepare the annual maintenance plan of atmospheric storage tanks, review the maintenance plan and organize its implementation; Review and implement tank calibration. 组织编制常压储罐的年度检修计划，审核储罐检修方案并组织实施；审核并落实储罐的计量标定。

4.2 Coordinated management departments

协同管理部门

4.2.1 The Scheduling & Dispatch Dept. shall be responsible for the cleaning and overhaul schedule of atmospheric storage tanks, and organizing the drafting of the technical documents of tank cleaning and the tank cleaning work.

计划调度部负责常压储罐清罐、检修的时间安排，组织清罐技术文本的起草及清罐工作。

4.2.2 The HSE Dept. shall be responsible for the supervision and inspection of the safe operation of atmospheric storage tanks, for the management of fire-fighting and gas protection equipment of atmospheric storage tanks, for the review of HSE contents in the maintenance plan and safety confirmation before the maintenance and for organizing to prepare emergency plans and drills.

HSE 管理部负责常压储罐安全运行的监督检查；负责常压储罐的消气防器材的管理；负责检修方

案中 HSE 内容的审核及交出检修前的安全确认；组织编写事故应急预案及演练。

4.2.3 The Materials Supply Dept. shall be responsible for the purchase of materials needed for the maintenance of atmospheric storage tanks, for the warehouse-in and warehouse-out management of maintenance material, and for the determination of tank cleaning and maintenance units.

物资装备部负责常压储罐检修所需的物资采购，并做好检修材料的出入库管理；负责确定清罐及检修单位。

4.3 Executive departments

执行部门

4.3.1 The operation department is the executive department.

运行部门为执行部门。

4.3.1.1 Be responsible for the daily use management, inspection and maintenance of atmospheric storage tanks, for the establishment of technical achieves and for the archiving of maintenance data.

负责常压储罐日常使用管理、检查和维护、建立技术档案、做好检修资料归档。

4.3.1.2 Be responsible for the declaration of maintenance plans and field maintenance management of atmospheric tanks, for the regular external inspection, for the thickness measurement at fixed points, and for the inspection and verification of breathing valves and other accessories.

负责申报常压储罐检修计划、检修的现场管理；定期外部检查、定点测厚、呼吸阀及其它附件的检查与检定。

4.3.1.3 Be responsible for the implementation of monitoring measures for major defects or serious faults of atmospheric storage tanks, the formulation of defect elimination plans and the implementation of rectification measures.

负责常压储罐重大缺陷或严重故障的监控措施落实、消缺方案制定并落实整改措施。

4.3.2 The Equipment Maintenance Dept., the Electrical Operation Dept, and the Instrument Control Dept., shall conduct proper daily maintenance of their own disciplines. The Electrical Operation Dept. and the Instrument Control Dept. shall prepare maintenance plans by disciplines.

设备检修部、电气运行部、仪表控制部做好各自专业的日常维护。电气运行部、仪表控制部分专业编制专业检修计划。

4.3.3 The Lab Dept. shall test the concentration of combustible gas and analyze the water quality of large floating-roof storage tanks and light oil storage tanks in a periodic manner.

质量检验部定期对大型浮顶储罐和轻质油储罐进行可燃气体浓度检测及水质分析。

5 Management Content

管理内容

5.1 Safe operation

安全运行

5.1.1 The department of atmospheric pressure storage tanks shall establish post operation methods, and the management personnel and operators shall not take up post operation until they are trained to be qualified. The flow rate of oil input into and output from the floating-roof tank shall be properly controlled.

常压储罐所属部门应建立岗位操作法，管理和操作人员培训合格后方可上岗操作，应当控制好浮顶罐的油品输入输出的流速。

5.1.2 The change of medium contained by or operating condition of the storage tank, if required by the production, shall be applied for by the operation department, countersigned by the Equipment Management Dept. and the HSE Dept. and approved by the Scheduling & Dispatch Dept. before being implemented. Meanwhile, the relevant post operation methods shall be revised accordingly.

因生产需要改变储罐的储存介质或运行工况时，应由运行部提出、经机械动力部和 HSE 管理部会签、计划调度部批准后实施，并修订相关的岗位操作法。

5.1.3 During tank steaming, the internal temperature shall be controlled at 75 °C to avoid damages to the coating and floating roof sealing rubber. Meanwhile, the tank manhole and light hole shall be opened. In case of unusual weather conditions such as sudden rainfall, the steaming shall be stopped to avoid a negative pressure inside the tank.

蒸罐时宜控制罐内温度不大于 75℃，避免对储罐涂层、浮顶密封橡胶造成损坏，同时打开储罐人孔、通光孔等，遇突然降雨等异常天气时要停止蒸罐作业，避免罐内形成负压。

5.2 Examination and maintenance

检查和维护

5.2.1 Routine inspection

常规检查

5.2.1.1 Concentration testing of combustible gas in light oil storage tank:

轻质油储罐可燃气体浓度检测：

(1) The light oil storage tank without nitrogen seal shall be tested at least once a month, and the tank with nitrogen seal can be tested less frequently but at least once a quarter.

没有设置氮封的轻质油储罐每月检测不少于 1 次；设置氮封的可适当延长，但至少每季度检测 1 次。

(2) The testing shall focus on the gas-phase space between the internal floating roof dome and the floating roof, the part between the primary and secondary seals of the external floating

roof and the upper part of the external floating roof. The parts to be tested include the points at 5cm of the breathing opening of the internal floating roof, at 5cm of the primary seal of floating tray of the external floating roof, at the metering guide tube orifice and at the testing opening.

重点检测内浮顶拱顶和浮顶之间气相空间、外浮顶一、二次密封之间、外浮顶上部等部位，具体检测部位：内浮顶罐呼吸口 5cm 处、外浮顶罐浮盘一次密封胶带 5cm 处、计量导向管口和检测口。

5.2.1.2 For the large floating-roof storage tank, the combustible gas concentration inside and outside the secondary seal shall be tested twice a month. No less than 8 testing points shall be set for the tank with a volume of no less than 100,000m³ in a circumferential and uniform manner, and no less than 4 points set for the tank with a volume less than 100,000m³ in a circumferential and uniform manner. In case the concentration of combustible gas outside the secondary seal exceeds 25% of the lower explosion limit, the reason shall be found and rectification measures shall be taken. The problems which cannot be rectified shall be intensively monitored.

大型浮顶储罐应每月检测二次密封内、外部可燃气体浓度，容积大于等于 10 万立方米的检测点不少于 8 个（周向均布），小于 10 万立方米的检测点不少于 4 个（周向均布）；对二次密封外部可燃气体浓度超过爆炸下限 25% 的应查找原因并采取整改措施，不具备条件的重点监控。

5.2.1.3 The testing shall be performed under static working condition:

检测工作应在静态工况下进行：

(1) The testing shall be carried out by two operators, one for testing and the other for monitoring. The operators must wear a portable hydrogen sulfide concentration alarm device or other safety protection facilities, stand upwind, and immediately evacuate the site once the toxic gas concentration alarm sounds.

作业需两人进行，一人检测一人监护，作业人员必须配戴便携式硫化氢浓度报警仪或其它安全防护设施，站立在上风向，发现有有毒气体浓度报警时应迅速撤离作业现场。

(2) The operators shall eliminate the static electricity on human body before testing, and keep their bodies within the operation platform or the railings on the roof of the tank during the testing.

作业人员检测前应消除人体静电，作业时身体应处于作业平台或罐顶栏杆之内。

5.2.1.4 The operation department shall establish a water quality analysis system for the bottom of naphtha tank to analyze such parameters as the pH value, sulfur content, chloride ion concentration and iron ion concentration, providing a basis for the corrosion analysis.

运行部建立石脑油罐底水质分析制度，水质分析应包括 pH 值、硫含量、氯离子浓度、铁离子浓度等数据，为腐蚀状况分析提供依据。

5.2.1.5 The operation department shall organize the daily inspection, and register the problems found in the inspection in the EM system and make rectification. The problems which cannot be rectified at the moment shall be included in the maintenance plan and be disposed of through defect elimination. Items to be inspected include the following:

运行部应组织日常检查，对检查发现的问题，登记到 EM 系统并整改，对暂不具备整改条件的，

纳入检修计划，择机安排消缺处理。检查内容如下：

(1) Check the tank body for deformation, the welding joint for corrosion or leakage, the paint insulation for falling-off and the bottom and edge plate for corrosion or thinning.

检查罐体是否存在变形、焊缝有无腐蚀或渗漏、油漆保温是否脱落，罐底边缘板是否存在腐蚀减薄。

(2) Check the spiral staircase, anti-wind ring, platform, railings and other labor protection facilities for any damage.

检查盘梯、抗风圈以及平台、栏杆等劳动保护设施是否完好。

(3) Check the concrete foundation for cracking, the storm drain and sump oil drain in the tank farm for blocking, and the fire dike and separation dike for damage.

检查混凝土基础是否开裂、罐区雨水沟及污油沟是否畅通、防火堤及隔堤是否完好。

(4) Check the flame arrester, breathing valve, oil gauge hole, foam generator, automatic dehydrator, manhole, light hole, vent valve, heater, central drainage system, sampler, metal hose, liquid level gauge and other storage tank accessories for any damage.

检查阻火器、呼吸阀、量油孔、泡沫发生器、自动脱水器、人孔、透光孔、通气阀、加热器、中央排水系统、采样器、金属软管、液位计等储罐附件是否完好。

5.2.1.6 The lightning protection and anti-static facilities of storage tanks must meet the requirements of relevant specifications and standards, and shall be comprehensively checked once a half year, with grounding resistance detection arranged twice a year.

储罐防雷、防静电设施必须符合有关规范标准的要求，半年一次对防雷、防静电设施进行全面检查，每年安排两次接地电阻检测。

5.2.1.7 The roof (or external floating roof), wall (along the spiral staircase) and the lower ring plate of the tank shall be measured for thickness at fixed points at least once a year, and the measuring data shall be archived and managed. The fixed measuring points shall be marked clearly on the tank body. For a tank with an insulation layer, the insulation layer where the measuring point is located shall be movable for disassembly and inspection.

每年至少应对储罐顶（或外浮顶）、罐壁（沿盘梯）及下圈板进行1次定点测厚检查，并将数据归档管理；固定的测厚点应在罐体上做好明显标志，有保温层的储罐，其测厚点处保温层应制成活动块便于拆装与检测。

5.2.1.8 The respiratory valve of the storage tank shall be disassembled and inspected every six months (including the fire arrester), and the valve discs, seat and corrugated fire arrester shall be cleaned in time.

储罐的呼吸阀应每半年解体检查一次（包括阻火器），及时清洗阀盘、阀座和波纹阻火层。

5.2.2 Overall inspection

全面检查

5.2.2.1 The overall inspection shall be organized and carried out by the Equipment Management Dept. once every six years in general. The operation department shall apply for postponed maintenance for tanks containing medium with a corrosion rate of less than 0.1mm/a and provided with reliable anti-corrosion measures and verified to be in good

technical conditions as per the last inspection. Then, the overall inspection cycle can be extended after the application is approved by the Deputy Engineer in charge of the equipment, but shall not exceed 9 years.

全面检查由机械动力部组织实施。一般按 6 年一次进行，对于储存介质腐蚀性不强，腐蚀速率 $\leq 0.1\text{mm/a}$ ，并有可靠的防腐蚀措施，上一次全面检查确认储罐技术状况良好，由运行部办理延期检修手续，经公司主管设备的副总工程师审批后可延长全面检查时间，但最长不得超过 9 年。

5.2.2.2 The overall inspection cycle can be appropriately shortened in case any major defects of the tank are found in the inspection.

检查中发现储罐存在重大缺陷的，应适当缩短全面检查周期。

5.2.2.3 The contents and methods of overall inspection can be executed by referring to the *Regulations for Maintenance and Repair of Atmospheric Vertical Cylindrical Steel Welded Storage Tanks* (SHS 01012); the contents of maintenance and inspection and the regulations for maintenance of gas tanks can be executed by referring to the *Regulations for Maintenance and Repair of Gas Tanks* (SHS 01036). All inspections must be fully recorded and archived.

全面检查的内容和方法可参照《常压立式圆筒形钢制焊接储罐维护检修规程》(SHS 01012) 执行；气柜的维护检查内容和检修规程可参照《气柜维护检修规程》(SHS 01036) 执行，所有的检查工作都必须有完整的记录并存档。

5.2.3 Inspection in the rainy reason

雨季检查

5.2.3.1 The process operator shall check the drainage system of the floating roof and the drainage holes at the bottom of the foam weir plate for blocking once every 2 weeks and remove sundries on the floating roof in a timely manner.

工艺操作人员每两周检查 1 次浮顶排水系统和泡沫堰板底部排水孔是否畅通，及时清除浮顶的杂物。

5.2.3.2 The equipment management personnel shall check the sealing status of the floating roof sealing device once every two weeks, and deal with the abnormality if any in a timely manner.

设备管理人员每两周检查 1 次浮顶密封装置的密封状况，如有异常情况应及时处理。

5.2.3.3 The Electrical Operation Dept. shall check the connection between the conductive sheet on the seal and the tank wall twice a week to ensure the good contact between the two. Also, the electrical connection wires between the floating roof, escalator and tank wall shall be checked for breakage or twining shall be inspected at least once a month, together with the electrical connections between the sealing device and the floating roof and between the wiring metal pipe and the tank wall.

电气运行部每周检查 2 次密封上的导电片与罐壁的压接情况，确保导电片与罐壁接触良好；每月至少检查 1 次浮顶、扶梯、罐壁之间的电气连接线的有无断裂和缠绕，密封装置与浮顶、配线金属管与罐壁的电气连接情况。

5.2.3.4 The HSE Dept. shall test the automatic fire alarm system once a month and increase the test frequency to once every two weeks in the thunderstorm season. In case the automatic

fire alarm system cannot operate normally, timely measures shall be taken for rectification.

HSE 管理部每月试验 1 次火灾自动报警系统，在雷雨季节应每两周试验 1 次火灾自动报警系统，若发现自动报警系统不能正常运行，应及时采取措施进行整改。

5.3 Maintenance

检修

5.3.1 The Scheduling & Dispatch Dept. shall arrange the tank cleaning according to the annual maintenance plan. In case the arrangement fails to follow the plan, the Scheduling & Dispatch Dept. shall inform the Equipment Management Dept. and the operation department 2 months in advance, and the operation department shall apply for extension of tank cleaning.

计划调度部应按年度检修计划安排清罐，如果无法按计划安排，计划调度部应提前 2 个月告知机械动力部和运行部，运行部办理清罐延期审批手续。

5.3.2 The operation department shall prepare the monthly maintenance plan and submit necessary materials for the problems found in the daily inspection 2 months before the atmospheric tank cleaning. Upon beginning of the tank inspection, the operation department shall report the additional plan within 3 days.

在常压储罐计划清罐前 2 个月，运行部应针对日常检查中发现的问题编制月度检修计划并提报材料。储罐进入检查后，运行部需在 3 天内报追加计划。

5.3.3 The maintenance of atmospheric storage tanks shall comply with the *Code for Construction and Acceptance of Vertical Cylindrical Steel Welded Storage Tanks* (GB 50128) and the *Regulations for Maintenance and Repair of Atmospheric Vertical Cylindrical Steel Welded Storage Tanks* (SHS01012).

常压储罐检修应执行《立式圆筒形钢制焊接储罐施工及验收规范》GB 50128 和《常压立式圆筒形钢制焊接储罐维护检修规程》SHS01012。

5.3.4 The anti-corrosion of atmospheric storage tanks shall be subject to the *Technical Standard for Anti-Corrosion Engineering of Steel Petroleum Storage Tanks* (GB 50393) and the *Technical Management Regulations for Anti-Corrosion Technology of Storage Tanks of High-Sulfur Crude Oil Enterprises*. Corresponding anti-corrosion schemes shall be formulated according to the stored media, and proper anti-corrosion coatings shall be used, and the surface treatment methods and the thickness requirements of each coating shall be specified.

常压储罐的防腐蚀应执行《钢制石油储罐防腐蚀工程技术规范》GB 50393 和《高含硫原油企业储罐防腐蚀技术管理规定》，根据不同的储存介质制定相应的防腐蚀方案，正确选用防腐涂料，明确表面处理方式及每道涂层厚度要求等。

5.3.5 The maintenance, trial run, inspection and acceptance of gas tanks shall be in accordance with the *Regulations for Maintenance and Repair of Gas Tanks* (SHS 01036) and related design data.

气柜的检修、试车、检验与验收按照《气柜维护检修规程》(SHS01036) 及有关设计资料要求进行。

5.3.6 Upon completion of the maintenance of the high temperature storage tank, the operation department shall standardize the put-into-service procedures as follows: Firstly, open the heater at the bottom and open the steam drum to steam for 2 days to increase the temperature inside the tank. Then, open the inlet valve and control the oil flow rate at $\geq 0.5\text{m/s}$. Next, let the tank stand for a period after the liquid level reaches 1 m. Finally, put the tank into normal operation until the temperature inside the tank rises to over $90\text{ }^{\circ}\text{C}$.

高温储罐检修结束后，运行部应规范投用：首先打开罐底加热器，通蒸汽蒸罐 2 天，提高罐内温度，然后打开进油阀门，控制油品流速 $\geq 0.5\text{m/s}$ ，待罐内液位达 1 米后，静置一段时间，待罐内温度升高到 90°C 以上再正常使用。

6 Inspection and Supervision

检查与监督

The Equipment Management Dept. shall be responsible for the supervision, inspection and assessment of the management and implementation of the atmospheric storage tank by the operation department.

机械动力部负责对运行部常压储罐管理执行情况进行监督检查考核。

7 Associated Procedures and Records

关联程序和记录

7.1 Associated procedures

关联程序

7.1.1 Management Procedure for Atmospheric Storage Tank (HYBN-T2-07-0022-2018-1)

常压储罐管理程序 HYBN-T2-07-0022-2018-1

7.1.2 Management Procedure for Breathing Valve of Atmospheric Storage Tank (HYBN-T2-07-0023-2018-1)

常压储罐呼吸阀管理程序 HYBN-T2-07-0023-2018-1

7.2 Associated records

关联记录

7.2.1 Approval of Deferred Maintenance of Storage Tank (HYBN-T6-07-0069-001-2018)

储罐延期检修审批表 HYBN-T6-07-0069-001-2018

7.2.2 Approval of Deferred Cleaning of Storage Tank (HYBN-T6-07-0070-001-2018)

储罐清罐延期审批表 HYBN-T6-07-0070-001-2018

7.2.3 Annual Maintenance Plan of Storage Tank (HYBN-T6-07-0071-001-2018)

储罐年度检修计划 HYBN-T6-07-0071-001-2018

7.2.4 Concentration Testing of Combustible Gas in Storage Tank

(HYBN-T6-07-0072-001-2018)

储罐可燃气体浓度检测表 HYBN-T6-07-0072-001-2018

8 Supplementary Rules**附则**

8.1 This System is under the jurisdiction of Equipment Management Dept.

本制度由机械动力部归口管理。

8.2 This System is drafted by Equipment Management Dept.

本制度起草部门：机械动力部。

8.3 Equipment Management Dept. is responsible for the interpretation of this System.

本制度解释权归机械动力部拥有。

8.4 Revision, preparation and approval of this System are shown in Table 1:

本制度版本编制和审批情况见表 1:

Table 1 Revision, preparation and approval of document**表 1 文件版本编制和审批情况**

1	2018-12-31	Zhang Lei 张磊	Tong Xueyun 童雪云	Xu Ye 徐野	Chen Liancai 陈连财
Revision 版本	Issued date 颁布日期	Prepared by 编制人	Reviewed by 审核人	Authorized by 审定人	Approved by 批准人



Hengyi Industries Sdn Bhd
恒逸实业（文莱）有限公司

HYBN-T3-07-0009-2018-1

Heating Furnace Management System

加热炉管理制度

Issued Date: Dec. 2018

颁布日期：2018 年 12 月

 HENGYI	Hengyi Industries Sdn Bhd 恒逸实业（文莱）有限公司			
	Heating Furnace Management System 加热炉管理制度			
	Doc No.	HYBN-T3-07-0009-2018-1	Ver No.	1

1 Purpose

目的

This System is formulated to reinforce the management of tube heating furnaces and realize safe, economical and long-term operation.

为加强管式加热炉的管理，实现安全、经济、长周期运行，特制订本制度。

2 Scope of Application

适用范围

This System is applicable to the operation department related to heating furnaces.

3 Terms and Definitions

术语和定义

N/A.

无。

4 Management Responsibilities

管理职责

4.1 Specified administrative authority

归口管理部门

4.1.1 The Equipment Management Dept. is the specified administrative authority of the heating furnace, which shall be responsible for preparing the heating furnace management system and supervising and inspecting this system.

机械动力部是公司加热炉的归口管理部门，制（修）订公司加热炉管理制度，并监督检查。

4.1.2 Be responsible for reviewing and approving the heating furnace overhaul, update, inspection and maintenance plan and organizing the implementation and acceptance.

负责审批加热炉大修、更新、检验与检修计划，并组织实施和验收。

4.1.3 Be responsible for checking the operation and maintenance of heating furnaces by the operation department, as well as the regular monitoring of the heating furnace efficiency and the dew point temperature test of flue gas.

负责检查运行部加热炉操作、维护以及加热炉效率定期监测、烟气露点温度测试工作。

4.1.4 Be responsible for the technical exchange of heating furnaces and auxiliary equipment and the signing of technical appendices, and organize the promotion and application of new technologies, new processes, new materials and new equipment.

负责加热炉及附属设备的技术交流和技术附件签订工作，组织做好新技术、新工艺、新材料、新设备的推广应用。

4.2 Coordinated management departments

协同管理部门

4.2.1 The Scheduling & Dispatch Dept. shall be responsible for the energy saving, optimal operation and protection and interlocking management of heating furnaces; Organize the formulation of furnace operation methods and process indicators, organize the review and approval of furnace process technical documents; Properly manage the dispatching of furnace fuels and control the fuel quality; Organize and coordinate the sampling and analysis of heating furnace fuel oil (gas).

计划调度部负责加热炉的节能、优化运行及其保护联锁管理；组织制定加热炉操作法及工艺指标，组织审批加热炉工艺技术文件；做好加热炉燃料的调度管理和燃料品质控制；组织协调加热炉燃料油（气）采样分析工作。

4.2.2 The HSE Dept. shall be responsible for regular environmental monitoring of flue gas emission of heating furnaces.

HSE 管理部负责定期对加热炉的烟气排放进行环保监测。

4.3 Executive departments

执行部门

4.3.1 Each operation department is the executive department.

各运行部为执行部门。

4.3.1.1 Be responsible for the operation, daily maintenance and inspection of heating furnaces involved in the department; Establish basic technical archives; Be responsible for implementing the maintenance and repair works of heating furnaces and organizing the acceptance.

负责本部门加热炉的运行操作、日常维护和巡检；建立基础技术档案；负责本部门加热炉维护、维修项目的实施并组织验收。

4.3.1.2 Be responsible for preparing and reporting the overhaul, update, inspection and maintenance plans of heating furnaces involved in the department; Participate in the technical exchange of heating furnaces and auxiliary equipment and the signing of technical appendices.

负责本部门加热炉大修、更新、检验、检修计划的编制和上报；参与加热炉及附属设备的技术交流和技术附件签订工作。

4.3.1.3 Be responsible for the formulation and implementation of the emergency plan for major defects of heating furnaces involved in the department; Guarantee regular efficiency monitoring and flue gas analysis for heating furnaces at least once a month; Be responsible for the analysis of fuel oil (gas) and water quality as entrusted.

负责本部门加热炉重大缺陷应急预案的制定和落实工作；做好每月不少于一次的加热炉定期炉效监测及烟气分析工作；负责燃料油（气）、水质等分析的委托工作。

4.3.2 The Instrument Control Dept. shall be responsible for the daily maintenance of all instruments of the heating furnace and process interlocking check and maintenance; The Equipment Maintenance Dept. shall be responsible for the professional daily maintenance of heating furnace equipment.

仪表控制部负责做好公司加热炉各类仪表的日常维护及工艺联锁校核维护工作；设备检修部负责加热炉设备专业日常维护保养工作。

4.3.3 The Lab Dept. shall be responsible for analyzing the heating furnace fuel oil (gas) at least once a month.

质量检验部负责做好每月至少一次的加热炉燃料油（气）分析工作。

5 Management Content

管理内容

5.1 Basic management work

基础管理工作

5.1.1 The operation department shall establish the basic files of heating furnaces, one file for one furnace, and make a complete operation record.

运行部应建立加热炉基础档案资料，做到一炉一档，并有完整的运行记录。

5.1.1.1 The basic files shall include:

基础档案资料应包括：

(1) Heating furnace equipment records;

加热炉设备台帐；

(2) Structural drawing of complete equipment;

全套设备结构图纸；

(3) Operating procedures of heating furnace;

加热炉操作法；

(4) Accident plan, fault and accident records and cause analysis report of heating furnace;

加热炉事故预案、故障、事故记录及原因分析报告；

(5) Summary of Periodic Efficiency Monitoring and Analysis for Heating Furnace;

加热炉定期炉效监测分析汇总表；

(6) Maintenance, repair and technical renovation records and completion data;

检修、抢修、技术改造记录及竣工资料；

(7) Inspection report of furnace tube and fittings

炉管及附件检测报告。

5.1.1.2 The operating records shall include:

运行记录应包括:

(1) Process operation record;

工艺操作运行记录;

(2) Maintenance and repair records;

检、维修记录;

(3) Sulfur content analysis report of fuel

燃料含硫量分析报告。

5.1.2 The operation department shall organize trainings and exams on the required knowledge of heating furnace operators who shall not take up their posts before passing the trainings and exams.

运行部应组织开展加热炉操作人员应知、应会知识培训和考试，合格后方可上岗。

5.1.3 Fuel oil (gas) for the heating furnace shall be measured separately; At the same time, thermocouples, negative pressure meters and online oxygen content analyzers shall be installed to ensure normal use.

加热炉燃料油(气)应单独计量;同时安装热电偶、负压表和在线氧含量分析仪,并保证正常使用。

5.1.4 Each heating furnace shall be equipped with flue gas sampling points, for which the requirements are shown in Appendix 1.

每台加热炉应设置烟气取样点,烟气取样点的要求见附件1。

5.1.5 Regularly organize the quality analysis of fuel oil (gas) and make records. Control the total sulfur content in fuel gas which shall be $\geq 100\text{ppm}$, the total sulfur content in fuel oil which shall be $\geq 1\%$, the content of solid particles which shall be $\geq 2000\text{ppm}$ and the Engler viscosity of fuel oil which shall be $\geq 4.5\text{E}^0$; The pressure of fuel oil (gas) and steam system shall be stable; The atomized steam shall be superheated with a pressure higher than that of the fuel oil 0.05MPa . The Equipment Management Dept., the Scheduling & Dispatch Dept. and the operation department shall be responsible for putting forward the requirements for fuel oil (gas) quality analysis, and the Lab. Dept. shall issue the analysis frequency and implement the analysis.

定期组织对燃料油(气)的品质分析并建立台帐。控制燃料气中总硫含量 $\geq 100\text{ppm}$,燃料油中总硫含量 $\geq 1\%$,固体颗粒含量 $\geq 2000\text{ppm}$,燃料油的恩氏粘度 $\geq 4.5\text{E}^0$;燃料油(气)、蒸汽系统压力稳定;雾化蒸汽应为过热蒸汽,压力高于燃料油压力 0.05MPa 。机械动力部、计划调度部、运行部负责提出燃料油(气)品质分析需求,质量检验部下达分析频率并执行。

5.2 Operation and maintenance

运行维护

5.2.1 The heating furnace shall be operated in strict accordance with the operating procedures and control indexes. It is strictly prohibited to operate under excessive temperatures, pressures or loads. Also, try to avoid operating under excessively low loads (less than 60% of the design load).

加热炉操作运行要严格按操作法和控制指标进行，严禁超温、超压、超负荷运行，尽量避免过低负荷运行（指低于设计负荷的60%）。

5.2.2 The average thermal efficiency (hereinafter referred to as thermal efficiency) of the heating furnace during the normal operation period shall reach the following indexes:

加热炉在正常运行周期内的平均热效率（以下简称热效率）应达到以下指标：

(1) The thermal efficiency of heating furnace with thermal load of 10MW or above shall reach 90% at least;

热负荷在 10MW 及以上的加热炉的热效率应达到 90%以上；

(2) The thermal efficiency of heating furnace with thermal load of less than 10MW shall reach the design value.

热负荷在 10MW 以下的加热炉的热效率应达到设计值。

5.2.3 Energy control indexes for heating furnace operation:

加热炉操作运行节能控制指标：

(1) The exhaust gas temperature generally shall not be greater than 170 °C. calibration and flue gas dew point test shall be carried out if the sulfur content in fuel significantly deviates from the design value, and then the reasonable flue gas temperature of the heating furnace shall be confirmed (generally 20 ~ 30 °C higher than the dew point temperature).

排烟温度一般应不大于 170°C，如燃料含硫量偏离设计值较大，则应进行标定和烟气露点测试，然后确定加热炉合理的烟气排放温度（一般应高于露点温度 20~30°C）；

(2) The CO content in flue gas shall be ≤100ppm in general;

烟气中 CO 含量一般≤100ppm；

(3) The oxygen content in the flue gas at the top of the flow chamber shall be controlled at 2% ~ 4% for the heating furnace burning gas and 2% ~ 4% for the heating furnace burning oil;

对流室顶部烟气中的氧含量，燃气加热炉应控制在 2%~4%；燃料油加热炉应控制在 3%~5%；

(4) The external wall temperature of heating furnace shall comply with relevant design regulations, generally ≤80°C for the body and ≤90°C for the bottom.

加热炉外壁温度应符合相关设计规定，一般炉体要求≤80°C，炉底≤90°C。

5.2.4 The operation department shall tighten up the inspection and management of the heating furnace operation and strictly implement the patrol inspection system.

运行部要加强加热炉运行情况的管理，严格执行设备巡回检查制度。

5.2.4.1 The management personnel of the production equipment shall:

生产装置管理人员应做好下列工作：

(1) Inspect the operation of heating furnace at least once a day;

每日不少于一次的加热炉运行情况巡检；

(2) Inspect the operation and problems of heating furnace once a week and make records;

每周进行一次加热炉运行情况和问题检查，并做好记录备案；

(3) Prepare the operation analysis report of the heating furnace of the device every month, and complete the filling and reporting of "Summary of Efficiency Monitoring and Analysis for Heating Furnace" in the EM system before the 25th day of each month, which will be postponed in case of holidays.

每月编写本装置加热炉运行情况分析报告，并于 25 日前完成 EM 系统中“加热炉热效率监测汇总表”的填报，节假日顺延。

5.2.4.2 Operators of production equipment shall strengthen the regulation of the throttle, valve, air door and flue damper to ensure that the furnace chamber is bright and clear, to avoid the burner flame from being too long or too great and avoid smoking. Also, the flame shall not burn the furnace tube. Try to keep the nozzles generating consistent flames to maintain efficient operation.

生产装置操作人员要加强三门一板（油门、汽门、风门，烟道挡板）的调节，保证炉膛明亮不浑浊，避免燃烧器火焰过长、过大、冒烟，严禁舔管。要尽量保持多火嘴齐火焰，维持高效运行。

(1) The outdoor operator shall check the following items during patrol inspection:

外操人员巡检时要检查：

1) Check whether the burner and fuel oil (gas) system are coked and blocked, whether the combustion is normal, and whether the pilot burner is normal; If the oil or gas gun is found damaged or abnormally burning, it shall be replaced, adjusted or cleaned in time; For the standby burner, the air door and valve shall be closed.

燃烧器、燃料油（气）系统是否结焦堵塞、燃烧是否正常，长明灯是否正常点燃；对油枪或瓦斯枪发现损坏或不正常燃烧、熄灭应及时更换或调整、清理等；对备用的燃烧器应关闭风门、汽门。

2) Check whether the sight glass, fire hole, ignition hole, explosion-proof door, manhole door and elbow box are tight to prevent air leakage. Also, check whether the steel frame and steel plate of furnace body are intact and tight and over-temperature.

看火窗、看火孔、点火孔、防爆门、人孔门、弯头箱是否严密，防止漏风。检查炉体钢架和炉体钢板是否完好严密，是否超温。

3) Each shift shall check whether the radiation furnace tube is subjected to local over burning, cracking, bulking, bending and other abnormal phenomena, whether the inner lining of the furnace is free of falling off, whether the components in the furnace are free from abnormalities and whether the instrument monitoring system is normal.

每班检查辐射炉管有无局部过烧、开裂、鼓包、弯曲等异常现象，检查炉内壁衬里有无脱落，炉内构件有无异常，仪表监测系统是否正常。

4) Each shift shall check whether the burner's air regulation system, air door and damper are flexible and easy to use, whether the induced draft fan and blower of waste heat recovery system are in normal operation, and whether the steam fire-extinguishing system is in good condition.

每班检查燃烧器风量调节系统、风门挡板是否灵活好用，余热回收系统的引风机、鼓风机是否正常运行，蒸汽灭火系统是否完好。

5) The heating furnace with a soot blower shall be subjected to soot blowing at least once a day. The soot blower shall be checked for any fault, flexibility and convenience, and any damaged one shall be repaired immediately. The steam blower, if used, shall be thoroughly drained prior to soot blowing.

有吹灰器的加热炉，每天至少吹灰一次，并检查吹灰器有无故障，是否灵活好用，对损坏的吹灰器应联系修复；使用蒸汽吹灰器的，吹灰前必须先彻底疏水。

(2) Indoor operators shall strictly follow the operating procedures for proper heating furnace process operation control and always pay attention to the heating furnace's feeding and discharging system, including flow control, branch flow control, pressure control and flow, pressure, temperature, oxygen content indications which shall be checked for abnormality or deflection. In addition, the operators shall track whether the furnace control indicators are normal in a real-time manner, and find out the cause for any abnormality and timely adjust and eliminate the abnormality.

内操人员检查要求：应严格按操作法做好加热炉工艺操作控制，随时关注加热炉进出料系统，包括流控、分支流控、压控及流量、压力、温度、氧含量的指示是否正常、有无偏流等。实时跟踪加热炉各项控制指标是否正常，情况异常必须查明原因并及时调整处理。

5.2.5 Furnace shutdown must be strictly in accordance with the relevant provisions of the technical specifications and post operation methods. A strict and detailed shutdown plan shall be prepared before shutdown, specially indicating the requirements of preventing sulfides from spontaneous combustion in the convection chamber and austenitic stainless steel furnace tube from being stressed, corrosion and cracking due to polythionic acid. For this, dedicated personnel shall be arranged to manage these matters in actual implementation. For the austenitic stainless steel furnace tube of the convection chamber, spontaneous combustion can be prevented through chemical cleaning of the chamber. For the austenitic stainless steel furnace tube of the radiation chamber, alkali cleaning of furnace tube is available.

加热炉开停工必须严格按照技术规程、岗位操作法的有关规定执行，开停工前必须制定详细严谨的开停工方案，停工方案中特别要注明防止硫化物在对流室内自燃，以及防止连多硫酸造成奥氏体不锈钢炉管应力腐蚀开裂要求，在实际执行中对硫化物自燃和防止连多硫酸造成奥氏体不锈钢炉管应力腐蚀开裂要落实专人管理。对于对流室奥氏体不锈钢炉管可以结合对流室化学清洗进行预防，辐射室奥氏体不锈钢炉管可安排炉管的碱洗。

5.2.6 The operation department shall make emergency plans and submit to the head of the operation division of the Company for approval in case the heating furnace needs to be monitored for operation due to major defects. The operators of production equipment must seriously implement the special maintenance program during daily inspection.

加热炉因存在重大缺陷需监控运行时，运行部应制定应急预案，并报公司分管领导批准执行。生产装置操作人员在进行日常检查时，必须认真落实特护方案。

5.2.7 The Instrument Control Dept. shall check the instrument condition once a day and deal with any abnormality found in time. Also, all zirconia used in heating furnace shall be checked at least once a quarter, with records made, and the check results shall be timely reported to the

operation department for recording.

仪表控制部每天应检查一次仪表完好情况，发现异常应及时处理。每季度至少对加热炉使用的所有氧化锆校验一次，并做好记录，及时将校验结果反馈运行部备案。

5.2.8 The oxygen content in the daily operation of the heating furnace is that in zirconia. The operation department shall contact the Instrument Control Dept. for checking and report the processing information to the Equipment Management Dept. in a big difference lies between the analysis value given by the Lab. Dept., the monitoring value of furnace efficiency and the online zirconia display value.

加热炉日常运行氧含量以氧化锆为准，当质量检验部化验分析值、炉效监测值与在线氧化锆显示值差别较大时，运行部要及时联系仪表控制部进行校核并向机械动力部反馈处理信息。

5.3 Maintenance and repair

检维修

5.3.1 The operation department shall carefully prepare the furnace maintenance plan, fill in the overhaul, update and inspection items and report to the Equipment Management Dept. for approval before implementation according to the daily maintenance and shutdown inspection & testing results of the heating furnace as well as relevant provisions of the "Rules for Maintenance and Overhaul of Tubular Heating Furnace" (SHS01006-2004).

运行部根据对加热炉日常维护和停工检查、检测的结果，对照《管式加热炉维护检修规程》SHS01006-2004 的有关规定，认真编制加热炉检修计划，填报大修、更新和检验项目，报机械动力部批准后实施。

5.3.2 The operation department shall strengthen the daily maintenance of the heating furnace, especially the maintenance of the induced (forced) draught fan, flue damper, soot blower and other accessories and their actuators. In case of any problem, timely repair and troubleshooting are necessary to guarantee normal operation of the heating furnace.

运行部加强加热炉的日常维护，特别是对引（鼓）风机、烟道挡板、吹灰器等附件及其执行机构的保养。发现问题要及时修理，排除故障，不得影响加热炉的正常运行。

5.3.3 For shutdown of heating furnace for overhaul, the Instrument Control Dept. shall check, maintain and verify all the oxygen content analyzers (including probes), thermocouples and negative pressure meters (including probes).

加热炉大修停运时，仪表控制部应对全部氧含量分析仪（包括探头）、热电偶和负压表（包括探头）进行检查维护和校核。

5.3.4 For shutdown for maintenance, the radiation furnace tube must be inspected and tested for such items as appearance inspection and measurement, thickness and hardness measurement, surface metallographic examination, ultrasonic testing, X-ray inspection of welding joints or other nondestructive testing and analysis of scale on the surface of furnace tube. The testing items shall be arranged and implemented by qualified testing units according to the actual situation, and the problems found in the inspection and testing shall be dealt with

in time or preventive measures shall be taken.

停炉检修时，必须进行辐射炉管的检查检测，检测项目主要包括：外观检查及测量；测厚及硬度测量；表面金相检测；超声波检测、焊缝 X 射线拍片检测或其它无损检测；炉管表面垢物分析等。检测项目应根据实际情况安排并落实有资质的检测单位进行，检查检测中发现的问题应及时处理或制定防范措施。

5.3.5 For the heating furnace burning oil, ash removal of the radiant furnace tube shall be arranged during the shutdown for maintenance. Determine whether ash removal is necessary and how to remove ash based on ash accumulation of the flow tube. The necessity of ash removal shall be determined based on the actual conditions for the heating furnace burning gas.

烧油的加热炉在停工检修期间应安排辐射炉管清灰。对流管视积灰程度，决定是否清灰和清灰方法。烧气的加热炉根据情况决定是否需要清灰。

5.3.6 The inspected items shall be accepted according to the relevant rules and regulations.

检修完的项目应按有关规程、规范要求进行检查验收。

6 Inspection and Supervision

检查与监督

The Equipment Management Dept. shall be responsible for the supervision, inspection and assessment of the management and implementation of the heating furnace by the operation department.

机械动力部负责对运行部加热炉管理执行情况进行监督检查考核。

7 Associated Procedures and Records

关联程序和记录

7.1 Associated procedures

关联程序

7.1.1 Heating Furnace Management Procedure (HYBN-T2-07-0024-2018-1)

加热炉管理程序 HYBN-T2-07-0024-2018-1

7.2 Associated records

关联记录

7.2.1 Summary of Efficiency Monitoring and Analysis for Heating Furnace (HYBN-T6-07-0073-001-2018)

加热炉热效率监测汇总表 HYBN-T6-07-0073-001-2018

7.2.2 Summary of Periodic Efficiency Monitoring and Analysis for Heating Furnace

(HYBN-T6-07-0074-001-2018)

加热炉定期炉效监测分析汇总表 HYBN-T6-07-0074-001-2018

8 Supplementary Rules

附则

8.1 This System is under the specific management of the Equipment Management Dept.

本制度由机械动力部归口管理。

8.2 This System is drafted by Equipment Management Dept.

本制度起草部门：机械动力部。

8.3 Equipment Management Dept. is responsible for the interpretation of this System.

本制度解释权归机械动力部拥有。

8.4 Revision, preparation and approval of this System are shown in Table 1:

本制度编报编制和审批情况见表 1:

Table 1 Revision, preparation and approval of document

表 1 文件版本编制和审批情况

1	2018-12-31	Zhang Lei 张磊	Tong Xueyun 童雪云	Xu Ye 徐野	Chen Liancai 陈连财
Revision 版本	Issued date 颁布日期	Prepared by 编制人	Reviewed by 审核人	Authorized by 审定人	Approved by 批准人

9 Appendices

附件

9.1 Requirements for flue gas sampling point

烟气取样点要求

Appendix 1

附件 1

Requirements for Flue Gas Sampling Point**烟气取样点要求**

1 Setting of flue gas sampling point

烟气取样点位置设置

(1) Radiation chamber: for any heating furnace with two or more radiation chambers, each radiation chamber shall be equipped with flue gas sampling points at proper locations to check whether the chambers are provided with the same air supply. No flue gas sampling points shall be provided for the heating furnace with one radiation chamber.

辐射室：对有两个或两个以上辐射室的多室加热炉，每个辐射室的相应位置应安装烟气取样点，以便检查各室供风是否相同，单室可不装；

(2) Point before flue gas enters the convection chamber: Use this point to check the actual situation of air supply required by combustion and control the air flow of the burner (it can be shared if sampling points are available to the radiation chamber);

进对流室前：利用此点检验供给燃烧所需空气量的实际情况，控制燃烧器用风量（辐射室已设置取样点的，可以共用）；

(3) Point after flue gas leaves the convection chamber: Use the excess air coefficient at this point to calculate the thermal efficiency of the heating furnace and check the air leakage of the convection chamber;

出对流室后：利用此点的过剩空气系数计算加热炉的热效率，并检验对流室的漏风情况；

(4) In case the waste heat recovery system is used, the flue gas sampling points shall be set before and after the air preheater or the waste heat boiler, and the flue gas temperature after the air preheater shall be used to calculate the thermal efficiency of the furnace;

采用余热回收系统时，应在空气预热器或余热锅炉前后均装设烟气取样点，利用空气预热器后的烟气温度计算加热炉热效率；

(5) The dew-point temperature sampling point shall be set at the outlet of the last-level heated surface. The sampling point shall be set at the outlet of the convection chamber for the heating furnace without waste heat recovery system and at the outlet of the air preheater or waste heat boiler for the furnace with a waste heat recovery system.

露点温度取样点设置在最后一级受热面出口，对于无余热回收系统的加热炉应设在对流室出口，采用余热回收系统的加热炉设在空气预热器或余热锅炉出口。

2 Size of sampling hole

测孔大小

(1) The flue gas sampling hole shall have a diameter of no less than 20mm;

烟气取样点孔径不小于 20mm;

(2) The dew-point temperature sampling hole shall have an inner diameter of no less than 40mm.

露点温度取样点孔内径不小于 40mm。

3 Precautions for installation of flue gas sampling point

烟气取样点安装注意事项

(1) No air leakage shall occur near the sampling point;

取样点附近不能有漏风;

(2) The sampling point should be set at the narrowest part of the flue duct if possible, where the velocity of flue gas is high enough to achieve thorough mixing of the combustion products;

取样点应尽可能选在烟道的最窄处, 在该处有较高的烟气流速, 促使燃烧产物充分混合;

(3) The sampling point shall extend to the middle of the flue gas flow section. In case of any difficulty, the sampling point shall strength into the flow section for at least 500mm. Multi-point sampling can reduce the measurement error;

取样点最好伸至烟气流通截面的中部, 有困难时, 伸入长度至少在 500 毫米以上, 多点取样可以减少测量误差;

(4) The sampling point for combustion control shall not be placed behind the convection chamber; The sampling point for measuring the thermal efficiency shall be set in the non-eddy area of the stack, that is, not in the turning area.

控制燃烧的取样点不应放在对流室以后; 测定热效率的取样点应放在烟囱内非涡流区, 即不应设在转向区域;

(5) The wide-section flues shall be provided with facilities with multiple sampling points, or sampling with a single tube shall be adopted.

对于宽截面烟道, 应设置多点取样设施, 或采用单管伸缩式取样法。



Hengyi Industries Sdn Bhd
恒逸实业（文莱）有限公司

HYBN-T3-07-0010-2018-1

Special Equipment Management System

特种设备管理制度

Issued Date: Dec. 2018

颁布日期：2018 年 12 月

 HENGYI	Hengyi Industries Sdn Bhd 恒逸实业（文莱）有限公司			
	Special Equipment Management System			
	特种设备管理制度			
Doc No.	HYBN-T3-07-0010-2018-1	Ver No.	1	Page 1 of 22

1 Purpose

目的

This system is hereby formulated in order to standardize the management of special equipment and guarantee safe, steady and long-term operation of special equipment.

为规范公司特种设备的管理，保证特种设备安全、平稳、长周期运行，特制定本制度。

2 Scope of Application

适用范围

The system applies to all involved departments.

本制度适用于各部门。

3 Terms and Definitions

术语和定义

3.1 Special equipment: boilers, pressure vessels, pressure pipes, lifts, hoisting machines, passenger transport cableways, large recreation facilities and special motor vehicles on spot which can endanger personal safety and cause severe injury, including all safety accessories, safety protection devices and associated facilities, generally divided into two categories: pressure-bearing equipment and E&M equipment.

特种设备：是指涉及生命安全、危险性较大的锅炉、压力容器、压力管道、电梯、起重机械、客运索道、大型游乐设施和场内专用机动车辆。特种设备包括其附属的安全附件、安全保护装置和与安全保护装置相关的设施，分为承压类和机电类。

3.2 Boiler: enclosed equipment utilizing varied fuels, power or other energies to heat the contained liquid to specific temperature while bearing specific pressure, including pressure-bearing steam boilers with a volume not less than 30L and pressure-bearing hot-water boilers with outlet water pressure not lower than 0.1MPa (gauge pressure) and rated power not lower than 0.1MPa.

锅炉：是指利用各种燃料、电或者其他能源，将所盛装的液体加热到一定的参数，并承载一定压力的密闭设备。其范围为容积大于或者等于 30L 的承压蒸汽锅炉；出口水压大于或者等于 0.1MPa（表压），且额定功率大于或者等于 0.1MPa 的承压热水锅炉；

3.3 Pressure vessel: an enclosed equipment containing gas or liquid while bearing specific pressure, including fixed vessels containing gas/liquefied gas with the maximum operating

pressure not lower than 0.1MPa (gauge pressure) and liquid with the maximum operating temperature not lower than standard boiling point, the volume not less than 30L and the inner diameter (maximum geometric size of the inner boundary of a non-circular cross section) not less than 150mm as well as gas cylinders containing gas/liquefied gas with nominal operating pressure not lower than 0.2MPa (gauge pressure) and the product of pressure and volume not less than 1.0MPa•L or liquid with standard boiling point no greater than 60°C.

压力容器：是指盛装气体或者液体，承载一定压力的密闭设备，其范围规定为最高工作压力大于或者等于 0.1MPa（表压）的气体、液化气体和最高工作温度高于或者等于标准沸点的液体、容积大于或者等于 30L 且内直径(非圆形截面指截面内边界最大几何尺寸)大于或者等于 150mm 的固定式容器；盛装公称工作压力大于或者等于 0.2MPa（表压），且压力与容积的乘积大于或者等于 1.0MPa•L 的气体、液化气体和标准沸点等于或者低于 60°C 液体的气瓶。

3.4 Pressure pipe: tubular equipment transporting gas or liquid at specific pressure, including pipes with the maximum operating pressure not lower than 0.1MPa (pressure gauge), transporting gas, liquefied gas, steam or inflammable, explosive, toxic and corrosive liquid or liquid with the maximum operating temperature not lower than standard boiling point, with the nominal diameter not less than 50mm; excluding pipes having a nominal diameter less than 150mm and maximum operating pressure lower than 1.6MPa (gauge pressure) that transport non-toxic, non-combustible or non-corrosive gas and pipes constituting the main part of equipment.

压力管道：是指利用一定的压力，用于输送气体或者液体的管状设备，其范围规定为最高工作压力大于或者等于 0.1MPa（表压），介质为气体、液化气体、蒸汽或者可燃、易爆、有毒、有腐蚀性、最高工作温度高于或者等于标准沸点的液体，且公称直径大于或者等于 50mm 的管道。公称直径小于 150mm，且其最高工作压力小于 1.6MPa（表压）的输送无毒、不可燃、无腐蚀性气体的管道和设备本体所属管道除外。

3.5 Gas cylinder: used at normal ambient temperatures (-40~60°C), with a nominal operating pressure not lower than 0.2MPa (gauge pressure) and the product of pressure and volume not lower than 1.0MPa.L, containing gas, liquefied gas and liquid with standard boiling point low higher than 60°C (excluding fire extinguishing gas cylinders only bearing pressure in fire extinguishing and bearing no pressure when standby).

气瓶：是指在正常环境温度（-40~60°C）下使用的、公称工作压力大于或等于 0.2MPa（表压）且压力与容积的乘积大于或等于 1.0MPa.L 的盛装气体、液化气体和标准沸点等于或低于 60°C 的液体的气瓶（不含仅在灭火时承受压力、储存时不承受压力的灭火用气瓶）。

3.6 Lift: power-driven E&M equipment moves upwards, downwards or horizontally to transport people or cargos in form of box moving along a rigid guide rail or step (tread) moving along a fixed line.

电梯：是指动力驱动，利用沿刚性导轨运行的箱体或者沿固定线路运行的梯级（踏步），进行升降或者平行运送人、货物的机电设备。

3.7 Hoisting machine: E&M equipment operating vertically or horizontally to handle heavy

objects, with a rated hoisting capacity not less than 3t (or rated hoisting torque not less than 40t•m for a tower crane, productivity not less than 300t/h for a handling bridge) and hoisting height not less than 2m;

起重机械：是指用于垂直升降或者垂直升降并水平移动重物的机电设备，额定起重量大于或者等于 3t（或额定起重力矩大于或者等于 40t•m 的塔式起重机，或生产率大于或者等于 300t/h 的装卸桥），且提升高度大于或者等于 2m 的起重机；

3.8 Forklift: a self-propelled vehicle hoisting loads to a certain height for stacking via a gantry and a lifting fork, being one of the special motor vehicles for construction sites/plants according to Regulations on Safety Monitoring and Inspection of Special Equipment.

叉车：是指通过门架和货叉将载荷起升到一定高度进行堆垛作业的自行式车辆，是《特种设备安全监察条例》中厂（场）内专用机动车辆中的一种。

4 Management Responsibilities

管理职责

4.1 Specified administrative authority

归口管理部门

4.1.1 Equipment Management Dept. is the specified administrative authority for special equipment management.

机械动力部是特种设备管理的归口管理部门。

4.1.2 Organize compiling machine records of special equipment; examine the use, inspection and routine maintenance of special equipment.

组织编制特种设备台帐；检查特种设备的使用、检验以及日常维保。

4.1.3 Take charge of certification, delayed inspection, shutdown, scrapping and cancelation of special equipment.

负责特种设备取证及延期检验、停用、报废、注销等工作。

4.1.4 Organize preparing and implementing special equipment inspection plans and review schemes; review inspection reports for completeness and accuracy; archive technical documents.

组织编制特种设备检验计划、审查检验方案并组织实施；审查检验报告的完整性和准确性及技术数据统计、归档工作。

4.1.5 Make suggestions on qualification of special equipment inspection organizations; supervise, inspect and coordinate work quality and progress of the inspection organization; review and inspect work quantities;

负责对特种设备检验单位资质提出要求；监督、检查、协调检验单位的工作质量和工作进度；审核检验工程量；

4.1.6 Investigate and handle special equipment-related incidents.

负责特种设备事故调查和处理。

4.2 Coordinated management departments

协同管理部门

4.2.1 The HR Dept. carries out safety and technology education and qualification training for special equipment management and operation personnel as well as issues qualification certificates; re-examines qualification of personnel who have been off their jobs for more than six months, ensuring they are qualified before taking up the jobs.

人力资源部组织特种设备管理、操作和作业人员安全技术教育及资质培训，颁发相应资质证书。离岗六个月以上人员需重新进行资格考核，合格后上岗。

4.2.2 The Scheduling & Dispatch Dept. supervises the implementation of operational and technological parameters of pressure-bearing special equipment; takes part in incident investigation; countersigns applications for delayed inspection of special equipment and lay down monitoring measures; arranges regular inspection of shutdown, idling and replacement of special equipment.

计划调度部负责监督承压类特种设备的操作、工艺指标执行及巡回检查落实情况；参与事故调查；会签特种设备延期检验申请并组织制定监控措施；安排定期检验特种设备的停工和倒空、置换工作。

4.2.3 The HSE Dept. supervises safety of special equipment; organize preparing emergency plans for special equipment incidents; takes part in special equipment incident investigation and handling; countersigns applications for delayed inspection of special equipment.

HSE 管理部负责特种设备安全监督；组织编写特种设备事故应急预案；参与特种设备事故调查和处理；会签特种设备延期检验申请。

4.2.4 The Materials Supply Dept. reviews qualification of manufacturers of special equipment and accessories/elements; purchases, conducts unpacking inspections on, stores and provides quality assurance certificates and supervision certificates for special equipment and accessories/elements; reviews qualification of outsourcers for maintenance and inspection of special equipment and conducts tendering.

物资装备部负责特种设备及配（元）件制造商资质审查；负责特种设备及配（元）件的采购、开箱验收、保管并提供质保资料及监检证明；负责特种设备所需维护保养、检验外协单位资质审查及招标工作。

4.2.5 The GM's Office verifies, archives, copies and issues accompanied and as-built materials of special equipment.

总经理办公室负责特种设备随机与竣工资料核准、归档、复印、发放。

4.3 Executive departments

执行部门

4.3.1 Each operation department shall be the executive body to prepare special equipment records, report verification data of special equipment as well as establish and complete technological documents and data of special equipment;

各运行部为执行部门，负责编制特种设备台帐；上报特种设备取证资料；建立、完善特种设备技术档案和资料。

4.3.2 Use, inspect and examine special equipment; lay down special equipment operating procedures and emergency plans; take part in investigation and handling of special equipment incidents.

负责特种设备使用、检查、检验工作；编写特种设备操作规程、事故应急预案；参与特种设备事故的调查和处理；

4.3.3 Prepare and implement special equipment inspection plans; countersign inspection and re-work plans; safety hand over equipment for inspection and handle problems found in inspection; review and inspect work quantities.

负责编制特种设备检验计划并实施，会签检验、返修方案；负责待检设备安全交出以及检验发现问题的处理；审核检验工程量。

4.3.3 Apply for delayed inspection, shutdown, change, scrapping and cancelation of special equipment; implement monitoring measures for delayed inspection; keep monitoring records.

负责特种设备延期检验、停用、变更、报废、注销等的申请，制定、落实延期检验设备的监控措施，做好监控记录。

4.3.4 The Equipment Maintenance Dept. maintains and repairs special equipment and guarantees safety operation of equipment.

设备检修部负责特种设备维护保养与检修工作，保证特种设备的安全运行。

5 Management Content

管理内容

5.1 Design and type selection

设计与选型

5.1.1 Designers of special equipment shall obtain necessary permits and qualification certificates and conduct designing according to relevant standards and specifications.

特种设备的设计单位应取得相应的许可和资格证书，并按相关标准、规范进行特种设备的设计。

5.1.2 Type selection of special equipment shall be based on reliability, maintainability, operability, environmental protection, energy efficiency and economic effect to determine main parameters of equipment. Do not use any equipment which has been ordered to be eliminated.

特种设备选型需从可靠性、维修性、操作性、环保、节能、经济性等实际情况出发综合考虑后确定特种设备主要参数，严禁选择已明令淘汰的特种设备。

5.2 Manufacture

制造

Manufacturers of special equipment shall obtain corresponding certificates for production or approval and entrust an organization with supervision and inspection authorization to supervise and inspect the manufacturing process of equipment, with supervision and inspection reports presented.

特种设备的制造单位应具有相应生产许可证或安全认证，并委托具有监督检验资质的单位对特种设备的制造过程进行监督检验，出具监督检验报告。

5.3 Purchase

采购

5.3.1 The Materials Supply Dept. entrusts a qualified manufacturer to produce special equipment. Purchased equipment shall comply with technical standards and design drawings. Any modification shall be provided with written approval from the original designer.

物资装备部须委托具有相应资格的制造单位进行特种设备的制造；所采购特种设备应符合特种设备技术标准和设计图样要求；如有修改，需提供原设计单位同意修改的书面材料。

5.3.2 The Materials Supply Dept. entrusts the manufacture of critical special equipment to a third party at the plant.

物资装备部对属于重要设备的特种设备制造过程需委托第三方驻厂监造。

5.4 Delivery and arrival inspections

出、入厂检验

5.4.1 Before delivery, the Materials Supply Dept. will organize delivery inspection, acceptance and witnessing with the attendance of Equipment Management Dept., Operation Dept. and the Supervisor. Problems found shall be immediately solved before delivery. Personnel taking part in inspection, acceptance and witnessing shall sign on report forms, with inspection and acceptance reports prepared and submitted to Equipment Management Dept. for archiving.

特种设备出厂前由物资装备部组织，机械动力部、运行部、监造单位参加进行出厂验收和见证试验，对存在问题及时整改，未整改合格不得出厂。参与验收和见证试验的人员应在验收报告单上签字确认，并编写验收报告交机械动力部存档备案。

5.4.2 Heat exchangers must be provided with official pads and pass pressure test before delivery.

换热设备出厂前必须全部使用正式垫片并试压合格。

5.4.3 The Materials Supply Dept. shall inspect any special equipment arriving at the plant,

including both spot inspection or re-inspection, with the aid of the using department and Equipment Management Dept. Inspection results shall comply with design requirements, Code for Safety and Technical Inspection of Special Equipment, etc. If rework is required, the rework plan must be subject to discussions among design, manufacturing and supervision authorities before implementation.

物资装备部组织对入厂的特种设备进行检验，检验的项目可以采用抽检和复验等方式，使用部门和机械动力部协助；检验结果应符合设计、《特种设备安全技术检查规程》等规定要求。需要返修时，返修方案须经设计、制造、监造等部门共同讨论后实施。

5.4.4 The Materials Supply Dept., upon arrival inspection of special equipment, shall fill out Form of Arrival Quality and Technical Data Acceptance in duplicate, one kept by itself and the other submitted to the GM's office together with accompanied materials.

物资装备部组织特种设备入厂验收时需填写一式两份的“入厂质量及技术资料验收单”，一份由物资装备部留存，一份同随机资料移交总经理办公室留存。

5.5 Materials

资料

5.5.1 The Materials Supply Dept. shall be responsible for completeness of accompanied materials of special equipment, which shall include design documents in duplicate, material quality certificates, product quality certificates and process supervision and inspection reports.

物资装备部对特种设备随机资料的完整性负责，随机资料应包括一式两份的设计文件、材料质量证明书、产品质量合格证明、制造过程监督检验证明等。

5.5.2 Accompanied materials shall be handed over by the Materials Supply Dept. to the GM's Office within one week after arrival inspection. The GM's Office shall verify said materials in one week based on Form of Arrival Quality and Technical Data Acceptance and archive the materials by category, ensure proper storage, copy, issuance and registration of materials.

随机资料由物资装备部在入厂检验合格后的一周内移交总经理办公室；总经理办公室及时根据技术资料验收单在一周内核准技术资料，并分类归档，做好资料保管、复印、发放、登记工作。

5.5.3 Installation contractors of special equipment shall, within 15 days after installation inspection and acceptance, hand complete special equipment installation, supervision and inspection materials over to the GM's Office, with proper handover formalities finished.

特种设备安装单位需在安装验收合格后 15 日内将齐全的特设设备安装和监督检验资料移交总经理办公室，并办理移交手续。

5.6 Installation

安装

5.6.1 Installation, supervision and inspection contractors of pressure-bearing special

equipment shall be qualified for their work; lifts and hoisting machines, after self-inspection, shall be entrusted to an inspection organization for proper supervision and inspection.

承压类特种设备的安装和监督检验单位应具有相应资质；电梯、起重机械在安装自检合格后委托检验单位实施监督检验。

5.6.2 Before site installation or assembly, it is required to check equipment against drawings, damage of equipment and components and completeness of technical materials. The Materials Supply Dept. shall contact with the manufacture for any manufacturing defect or incompleteness of technical materials.

特种设备在现场安装或组装前，需检查实物是否与图样相符、设备及零部件有无损坏、技术资料等是否齐全。如发现制造质量问题或产品技术文件不全，由物资装备部与制造厂联系处理。

5.6.3 After installation of special equipment, Equipment Management Dept. shall organize inspection and acceptance by relevant parties before use.

特种设备安装竣工后，机械动力部组织相关部门验收，验收合格后方可投用。

5.6.4 Equipment Management Dept. shall hand as-built materials to the GM's Office and the using department within 15 days after works are completed. Incomplete materials may be rejected.

机械动力部组织安装单位在工程完工后 15 日内向总经理办公室和使用部门移交内容符合要求的竣工资料，如资料移交不全有权拒绝接收。

5.7 Use registration and change

使用登记与变更

5.7.1 Before use, the using department shall submit materials required for special equipment use registration to Equipment Management Dept. for review. Determine the safety class and date of initial inspection of each set of special equipment. Prepare and issue certificates for use registration.

使用部门在特种设备投用前将特种设备使用登记所需资料报机械动力部审核，合格后确定每台特种设备的安全状况等级和首次检查日期、制作使用登记证并下发。

5.7.2 The using department shall archive special equipment use registration certificates by category and put up the special equipment use sign at eye-catching places for special equipment on site.

使用部门将特种设备使用登记证进行技术归档并将特种设备使用标识悬挂在现场特种设备显著位置。

5.7.3 In case of change in use condition, long-term shutdown or relocation of equipment, the using department shall apply for change registration to Equipment Management Dept. with proper documents.

当特种设备发生使用状况变化、长期停用、移装时，使用部门应持相关资料向机械动力部申请变更登记。

5.7.4 For re-use after shutdown or relocation of equipment, the using department shall apply for use registration to Equipment Management Dept. with proper documents.

特种设备停用后重新启用、移装后由新使用部门持相关资料重新向机械动力部申请使用登记。

5.8 Use and maintenance

使用与维护

5.8.1 The using department shall timely collect technical data and set up records and files for special equipment. Records shall be updated at the end of each year. Files shall include design documents, quality certificates, instructions for use and maintenance, technical data, use registration certificates, regular inspection reports, daily records, etc. and entered into the EM system.

使用部门应及时收集整理特种设备技术资料，建立台帐和档案，台帐每年底更新一次。档案中应包括相关设计文件、质量合格证明、使用维护说明、技术文件资料、使用登记证、定期检验情况、日常使用状况等内容。并录入 EM 系统。

5.8.2 The Equipment Maintenance Dept. shall perform routine maintenance of special equipment. If external aid is required, the department shall apply to Equipment Management Dept. and then select a qualified external organization.

特种设备的日常维护保养由设备检修部负责。需外协时由设备检修部提出，机械动力部同意后由物资装备部确定外协单位。

5.8.3 The using department shall perform routine management and carry out patrol examination and maintenance of special equipment. Record and correct problems found to form a closed-loop management system. Maintain standby or shutdown equipment to ensure its intactness and operability.

使用部门应做好特种设备日常管理，进行巡检、维护，对发现的问题进行记录、整改，形成闭环管理；对备用或停用特种设备，应采取维护保养措施，确保设备完好。

5.8.4 The using department shall lay down specific technical operational codes and job methods to ensure special equipment is always operated in a safe manner. Avoid overpressure, over-temperature and overloaded operation. Design requirements must be satisfied when use conditions change.

使用部门的工艺操作规程和岗位操作法需满足特种设备安全操作要求，杜绝超压、超温、超负荷运行。使用条件改变时，必须满足设计要求。

5.8.5 Implement site marking management on special equipment. Spray equipment tag number on all equipment at the site, ensuring it is consistent with that given in the use certificate.

特种设备实行现场标识管理，现场设备须喷涂设备位号，并与使用证上的设备位号一致。

5.8.6 Pressure vessel

压力容器：

5.8.6.1 Fixed pressure vessels with Class 4 safety rating shall not be used until monitoring measures are proposed and implemented, with the total monitored use not exceeding 3 years; mobile pressure vessels with Class 4 or 5 safety rating or fixed pressure vessels with Class 5 safety rating shall no longer be used.

安全状况等级为 4 级的固定式压力容器，在办理、落实监控措施后方可使用，其累积监控使用时间不得超过 3 年；安全状况等级为 4、5 级的移动式压力容器或安全状况等级为 5 级的固定式压力容器不得继续使用。

5.8.6.2 Pressure vessels with Class 4 or 5 safety rating or those having been used for over 20 years shall not be transferred, sold or remotely installed for use as the same purpose.

安全状况等级为 4、5 级或者使用时间超过 20 年的压力容器不得转让、销售或异地安装仍作压力容器使用。

5.8.6.3 For pressure vessels storing LPG and high-strength steel pressure vessels (those built with materials having a standard tensile strength lower limit $\delta b \geq 540\text{MPa}$), working media shall be regularly subject to corrosive content analysis to properly restrain the content.

介质为液化石油气的储存压力容器及高强钢压力容器（指使用标准抗拉强度下限 $\delta b \geq 540\text{MPa}$ 材料制造的压力容器）应定期对工作介质进行腐蚀介质的含量分析并控制其含量。

5.8.7 Pressure pipe

压力管道：

5.8.7.1 Manage pressure pipes by zone and equipment. Ensure each pipe is properly managed and inspected with management responsibilities clearly divided; strength patrol examination of pipes transmitting inflammable, explosive or toxic media. Lay down emergency plans. Strengthen patrol examination and carry out regular and site-specific thickness measurement for severely corroded pipes for which leak is highly probably and severe damage is foreseeable.

压力管道采用分区域、分装置管理，并将每条管线落实承包检查，做到管理职责明晰，不得存在无人管理现象；对输送可燃、易爆或有毒介质的管道加强巡检，制定事故预案；对腐蚀严重、易发生泄漏且危害严重的管道采取加强巡查、定期、定点测厚等措施。

5.8.7.2 Repair and restore existing industrial pipes that fail the required safety rating. Check if such pipe can be used safely till the next inspection period with the safety evaluation method. Replace pipes of no repair value or can no longer last till the next inspection period.

安全状况等级达不到使用要求的在用工业管道应进行消缺、修复，或采用安全评定方法确认能否安全使用到下一检验周期；对无修复价值或难以维持到下一次检修周期的管道应予更换。

5.8.8 Gas cylinder

气瓶：

Strictly abide by Code for Safety Monitoring of Gas Cylinder for use. Do not weld or change steel stamps or color marks on a gas cylinder. Do not use a gas cylinder overdue for inspection or scrapped. Do not introduce gas from one cylinder to another or directly charge a cylinder with tank truck. Do not dispose residual liquid in a gas cylinder without approval.

气瓶的使用部门应严格按照《气瓶安全监察规程》使用气瓶；不得对气瓶瓶体进行焊接和更改气瓶的钢印或者颜色标记；不得使用超期未检或已报废的气瓶；不得将气瓶内的气体向其他气瓶倒装或直接从罐车对气瓶进行充装；不得自行处理气瓶内的残液。

5.8.9 Lift and hoisting machine

电梯、起重机械：

5.8.9.1 Put up eye-catching safety inspection marks where a lift or hoisting machine is employed. Put up safety warning signs, use rules as well as emergency call numbers of the installation contractor and maintenance contractor at the entrance and exit of each lift. Do not use those expiring the valid period, failing inspections or failing to obtain safety inspection mark.

在用电梯、起重机械须在明显部位贴有安全检验合格标志。电梯出入口明显位置张贴安全警示标志、使用准则、安装单位、维修保养单位以及相应的应急报警电话号码。对于超有效期、检验不合格、未取得安全检验合格标志的禁止使用。

5.8.9.2 The lift operator on shift from using department of lift shall at least take the lift upwards and downwards once to check its condition, perform daily inspection and make record on the daily checklists; Special equipment safety management personnel of using department to perform inspection on lift every month and make record on the monthly checklist.

电梯使用部门当班电梯操作人员每天乘电梯上、下各一次以评估安全运行状况和进行日常检查并在日常检查表上记录；使用部门特种设备安全管理人员每月对电梯进行检查并在月度检查表上记录。

5.8.9.3 When a hoisting machine is operated by an external operator, the operator shall be checked for operation qualification by technical personnel of the using department. Inspect performances of the machine before use. Any problem shall be immediately reported and handled. Strictly abide by operational codes during use. Park the machine at an appointed site after use; disconnect the equipment for maintenance.

外单位使用起重机械时由设备所在部门技术人员确认作业人员相应证书；使用前对起重机械的性能进行检查，发现问题及时反映并处理；使用中严格遵守操作规程；使用完毕停放在指定地点，并停电和进行维护保养。

5.8.9.4 Equipment Management Dept. and the using department shall supervise the maintenance contractor to regularly inspect, maintain and repair lifts and hoisting machines. Safety management personnel of the using department shall sign on and archive maintenance records.

机械动力部和使用部门督促维保单位做好电梯、起重机械定期检查、维护保养及消缺工作。使用部门安全管理人员需对维保记录签字确认并存档。

5.8.10 Forklift

叉车

5.8.10.1 A forklift shall only be used after primary inspection.

叉车在经过首次检验后方可投入使用。

5.8.10.2 The using department shall carry out trial running according to instructions for use and maintenance before using forklift every day. Keep records of said inspection. Carry out self-inspection and maintenance at least once per month by the operator; perform annual inspection thoroughly by safety management personnel or an entrusted professional organization. Keep inspection records for at least 5 years.

使用部门在叉车每天使用前按照使用维护保养说明的要求进行试运检查，并且记录；每月至少进行一次自行检查和维护保养，由作业人员实施；每年进行一次全面检查，由安全管理人员或者委托专业机构实施；检查记录至少保存 5 年。

5.8.10.3 In case of anomalies, eliminate potential risks and record the condition before using a forklift. Include records into technical files.

叉车出现异常情况应在消除隐患后方可使用并且记录，记录存入技术档案。

5.9 Maintenance

检修

5.9.1 The using department shall prepare plans for special equipment maintenance and submit them to Equipment Management Dept. for approval. The latter shall appoint a maintenance contractor if external aid is needed.

使用部门负责编制特种设备检修计划报机械动力部审批；物资装备部负责对需要外协的检修确定检修单位。

5.9.2 The using department shall take charge of site management, tracking of material arrival, maintenance quality acceptance, recording and archiving during maintenance.

使用部门负责检修期间现场管理、跟踪材料到货情况、检修质量验收，并记录、归档。

5.9.3 The using department shall summarize and report equipment file modifications and maintenance records to Equipment Management Dept. in one month after maintenance.

使用部门在检修完成一个月内将设备档案修订和检修总结并报机械动力部。

5.9.4 Equipment Management Dept. shall organize, coordinate and manage comprehensive shutdown maintenance. Organize maintenance coordination meetings; implement preparation for shutdown maintenance, review organization construction design, construction schemes for main works and construction network.

机械动力部负责组织、协调和管理全面停工检修工作。组织召开检修协调会，落实停工检修的准备工作，审定施工组织设计、重大项目的施工方案和确定施工网络。

5.9.5 The maintenance contractor shall prepare construction schemes for main maintenance works, which will be countersigned by the Operation Dept. and Equipment Management Dept. before implementation.

重要检修项目由检修单位编制施工方案，经运行部和机械动力部会签后方可实施。

5.9.6 Equipment Management Dept. shall review qualification for special equipment maintenance of any external organization.

机械动力部负责审查外协单位特种设备检修作业相关资质。

5.10 Refitting and overhaul

改造、重大修理

5.10.1 For refitting and overhaul of special equipment, the using department shall file an application and Equipment Management Dept. will entrust the original designer or a qualified designer for verification and scheme designing, which will be implemented upon approval.

特种设备的改造、重大修理由使用部门提出申请，机械动力部委托原设计单位或具有相应资质的设计单位核算，制定方案，经批准后实施。

5.10.2 Contractors engaged in special equipment refitting or overhaul shall lay down construction schemes and submit them to the person in charge of the Construction Contractor for approval, before submission to the using department, Equipment Management Dept. and Vice Chief Engineer of the Company for countersign.

从事特种设备改造、重大修理的单位应制定施工方案，经施工单位负责人审核批准后再报使用部门、机械动力部、公司副总工程师审核会签。

5.10.3 Refitting or overhaul of special equipment shall be undertaken by a qualified contractor. A qualified supervisor shall be entrusted to supervise and inspect the process of refitting or overhaul and present a supervision and inspection report. The Construction Contractor shall, prior to construction, inform the Supervisor of specific condition and construction scheme for equipment refitting or overhaul in writing. The Supervisor shall implement supervision and inspection during construction and present a report to Equipment Management Dept.. After refitting, main pressure-bearing components of special equipment shall be subject to pressure-withstanding tests.

特种设备的改造、重大修理应由有相应资质的单位承担。并委托具有相应资质的监督检验单位对特种设备改造和修理过程进行监督检验，并出具监督检验报告。施工单位应在施工前将特种设备改造、重大修理情况及施工方案书面告知监督检验单位。监督检验单位在施工过程中实施监督检验，在完工后向机械动力部出具监督检验报告。特种设备主要承压部件改造后须经耐压试验。

5.10.4 Equipment Management Dept. shall organize inspection and acceptance of special equipment after refitting or overhaul before use. The Construction Contractor shall hand technical data over to the using department for archiving within 15 days.

特种设备改造、重大修理完工后由机械动力部组织相关部门参加验收，合格后方可投用。施工单位应在 15 日内将技术资料移交使用部门存入技术档案。

5.10.5 Materials for equipment refitting or overhaul shall be provided with complete quality certificates (including product certificates, material performance and component reports, etc.) and comply with design requirements.

改造、重大修理施工用料应有完整质保资料（包括合格证、材料性能、成分等），并符合设计技术要求。

5.11 Regular inspection

定期检验

5.11.1 The using department of boiler, pressure vessel and pressure pipe shall perform annual online inspection at least once a year and fill out the records. Take measures if any anomaly is found. Report major risks to Equipment Management Dept. The latter will organize the implementation of rectifying measures. Regularly calibrate, inspect or repair safety accessories.

锅炉、压力容器、压力管道使用部门每年至少进行一次年度在线检查并填写记录。检查发现异常情况及时采取措施；重大安全隐患应及时报机械动力部，由机械动力部组织落实整改方案。特种设备的安全附件需定期校验、检修或更换。

5.11.2 The using department shall prepare the special equipment inspection plan of the next year at year end based on use registration or regular inspection report, which will be reviewed by the responsible authority and submitted to Equipment Management Dept. for approval, ensuring regular inspection of equipment. Temporary inspection plans shall be reported to Equipment Management Dept. in writing for approval.

使用部门每年底应根据特种设备使用登记证或定期检验报告编制下年度特种设备检验计划，经主管领导审核后报机械动力部审批，保证特种设备能按期检验，临时追加的检验计划需书面报机械动力部审查后执行。

5.11.3 For special equipment not available for regular inspection in design documents, the using department shall provide a written statement when applying for Use Certificate.

对设计文件注明不能进行定期检验的特种设备，使用部门需在申请办理《使用登记证》时作出书面说明。

5.11.4 For special equipment to be reused after over a year's shutdown, refit and relocated, with different media and possible degradation due to corrosion, exceeding original design conditions and subject to strength calibration or with suspicious safety conditions, thorough inspection and pressure-withstanding pressure must be performed before operation.

对停用一年以上需重新启用的、已经使用过移装来的、介质改变并可能造成腐蚀恶化的、超原设计条件并经强度校核合格的、对安全状况有怀疑的特种设备投用前须进行全面检验和耐压试验。

5.11.5 Equipment Management Dept. shall summarize, review and approval inspection plans. The Materials Supply Dept. shall appoint inspection organizations and materials 2 months in advance of the expiration of the inspection period.

机械动力部对上报的检验计划进行汇总、审核、批准后下达；物资装备部负责在检验期届满前2个月落实检验单位及材料。

5.11.6 The inspection organization shall prepare special equipment inspection schemes and submit them to Equipment Management Dept. for approval based on actual conditions. After preliminary review by Equipment Management Dept., the inspection organization and the using

department are organized to discuss, supplement and complete the plans and schemes before countersigning and approval.

检验单位需根据实际情况编制特种设备检验方案报机械动力部初审，机械动力部初审合格后组织检验单位、使用部门对方案讨论、补充和完善后进行会签、审批。

5.11.7 The inspection organization and personnel engaged in special equipment inspection shall be qualified. Safety measures shall be taken during inspection. Inspection results shall be timely reported to the using department. Any defect shall be immediately informed to Equipment Management Dept. with Form of Inspection Liaison presented. Any major change in an inspection scheme shall be reported to Equipment Management Dept.

从事特种设备检验的检验单位和人员应当取得相应的检验资质和人员资格证。检验过程中落实安全措施；及时将检验完成情况和检验结果通报使用部门；发现超标缺陷及时通知机械动力部并出具检验联络单；检验方案有重大变更时书面报送机械动力部。

5.11.8 The using department shall hand over equipment in safe condition and conduct site disclosure to the inspection organization; during inspection, special persons shall be appointed to coordinate and communicate matters on inspection.

使用部门应将待检设备安全交出并在检验前向检验单位进行现场交底；检验实施期间安排专人负责检验的协调联络。

5.11.9 Equipment Management Dept. shall supervise and examine the entire inspection quality and progress by the inspection organization and assist in handling problems during inspection. Report inspection results to the using department in time.

机械动力部对检验单位的检验质量和进度进行全过程监督、检查，协调处理检验过程中出现的问题，及时将检验情况通报使用部门。

5.11.10 If pressure-withstanding pressures are required in inspection schemes, rework schemes or codes, boilers, pressure vessels and pressure pipes shall be tested as required.

锅炉、压力容器、压力管道经检验合格后，如检验方案、返修方案或规程要求进行耐压试验的应按要求进行。

5.11.11 The inspection organization shall immediately inform Equipment Management Dept. of inspection conclusions. For qualified equipment, the inspection organization may notify Equipment Management Dept. of preliminary inspection conclusions before presenting the inspection report. When finding defects or severe risks of equipment, the inspection organization shall timely inform Equipment Management Dept. for the latter to handle and confirmation by the inspection organization before use.

检验单位需及时将检验结论告知机械动力部。对检验合格的特种设备，检验单位可以在检验报告出具前将检验初步结论通知机械动力部。检验发现设备存在需要处理的缺陷和严重事故隐患时，检验单位应及时将缺陷通知机械动力部，由机械动力部负责处理并经检验单位确认合格方可使用。

5.11.12 The inspection organization shall present the inspection report within 20 working days after inspection is completed and be responsible for accuracy and completeness of the report. If any discontent with the report is presented, Equipment Management Dept. shall

coordinate and handle the situation. The report shall be in triplicate, separately held by the inspection organization, the using department and Equipment Management Dept.

检验单位应在检验确认合格后 20 个工作日内出具检验报告并对报告的准确性和完整性负责。如对检验报告内容有异议，由机械动力部进行协商处理。检验报告一式三份，分别由检验单位、使用部门、机械动力部留存。

5.11.13 Hoisting machines and forklifts shall be inspected before primary operation with “Primary Inspection Report” presented.

起重机械和叉车由检验单位在首次投用前进行检验，并出具“首次检验报告”。

5.11.14 Regular inspection of lifts, hoisting machines and forklifts shall be carried out annually by inspection unit entrusted by Equipment Management Dept. on the basis of qualified maintenance and self-inspection of the using department.

电梯、起重机械、叉车的定期检验在使用部门维护保养和自行检查合格的基础上，每年由机械动力部委托检验单位进行一次检验。

5.12 Delayed inspection

延期检验

5.12.1 Detail lists and monitoring measures are required for special equipment not available for regular inspection by the using department. A written application for delayed inspection shall be filed one month in advance of the expiration of the inspection period. The plan shall be reviewed by the competent authority of the using department and transferred to Scheduling & Dispatch Dept. and HSE Dept. for countersign before submission to Equipment Management Dept. The latter shall review the application and report it to the authority for approval.

对不能按期检验的特种设备由使用部门列出详细清单，并制订监控措施，在检验到期前一个月提出书面延期检验申请，经使用部门主管领导审核后送计划调度部、HSE 管理部会签后报机械动力部。机械动力部对延期检验申请报告审核后报公司主管领导批准。

5.12.2 Reasons must be given for rejecting delayed inspection. Leaderships of the Company shall be informed and the application will be returned to the using department.

不同意延期检验的部门应说明理由，向公司分管领导说明，并将延期检验申请退回原使用部门。

5.12.3 During delayed inspection, the using department shall effectively monitor equipment on a daily basis and keep records accordingly.

特种设备延期检验期间，由使用部门落实有效的监控措施，每天检查并做好记录。

5.13 Rework and turnaround

返修流转

5.13.1 The using department shall report defects found during regular inspection to Equipment Management Dept. via an application for rework. Equipment Management Dept.

reviews the application and entrust reworks to a qualified inspection organization.

特种设备定期检验发现的缺陷由使用部门向机械动力部提交返修申请，机械动力部审核后委托有相应资质的检修单位进行返修。

5.13.2 The inspection organization shall prepare rework schemes and submit them to competent departments for countersign by vessel type and approval procedure. In case of overhaul, Equipment Management Dept. will submit repair schemes to the inspection organization for review.

检修单位应编制返修方案并按容器类别和审批程序报送有关部门会签、审批。涉及重大修理时，由机械动力部将修理方案提交检验单位审查。

5.13.3 The inspection organization shall guarantee inspection quality. Perform self-inspection and then notify the inspection organization for inspection.

检修单位须保证返修质量，返修自检合格后通知检验单位进行检验。

5.13.4 The inspection organization shall submit rework data to the using department and Equipment Management Dept. for archiving within one week after rework.

检修单位返修结束后一周内将返修技术资料交使用部门和机械动力部归档。

5.14 Safety accessories

安全附件

5.14.1 Safety accessories of special equipment shall comply with Code for Safety Monitoring of Special Equipment and other codes and standards.

特种设备的安全附件管理应符合《特种设备安全技术监察规程》等规范标准要求。

5.14.2 Safety accessories of special equipment shall be purchased from authorized suppliers with compliant quality.

特种设备安全附件必须向具有制造许可证单位采购，质量应符合相关标准的规定。

5.14.3 The using department of special equipment shall set up safety accessory records for safety valves, rupture disks, pressure gauges, thermometers, level meters, etc. and update them at year end.

特种设备使用部门应建立安全阀、爆破片、压力表、温度计、液位计等安全附件台账，每年更新一次。

5.14.4 Valves between normally operating boilers, pressure vessels, pressure pipes and other special equipment and operating safe relief devices (safety valve or rupture disk) and on outlet pipes of such safety relief devices shall be fully opened via bypass valves shall be fully closed, with lead seals used and regular inspections carried out.

正常运行的锅炉、压力容器、压力管道等特种设备与投用安全泄放装置（安全阀或爆破片装置）之间和投用安全泄放装置出口管线上的阀门必须全开，副线阀全关，并加铅封且定期检查。

5.14.5 Safety valve

安全阀

5.14.5.1 Manage pressure of safety valve by keeping logs of pressure, one log for each valve. The using department shall fill out basic parameters in the log. The approval column for set pressure shall be confirmed and signed by the head of using department and technical principal.

安全阀定压采用定压本方式管理，每台一本，定压本中有关基本参数由使用部门填写，整定压力的审定栏由使用部门主管人员及技术负责人确认签字。

5.14.5.2 Set pressure of safety valve and designed rupturing pressure of rupture disk shall be determined and set strictly according to design data. Any change shall be submitted to Equipment Management Dept., Scheduling & Dispatch Dept. and HSE Dept. and to company leadership for approval.

安全阀的整定压力、爆破片的设计爆破压力严格按照设计给出的数值进行定压和设定；变更应以书面形式向机械动力部、计划调度部、HSE 管理部申报，经公司分管领导批准。

5.14.5.3 Safety valves shall be calibrated at least once a year. If delay is required, refer to the approval procedure in 5.12. Inspect valves and keep records at least once a month.

安全阀校验每年至少进行一次，如需延期校验，审批程序参照 5.12 执行。并每月至少进行一次检查并进行记录。

5.14.5.4 Safety valves shall be calibrated by professional valve calibrating organizations. Maintenance and calibration personnel shall have the Certificate for Operating Special Equipment.

安全阀校验应由专门从事安全阀校验的单位进行，检修、校验人员应取得《特种设备作业人员证》。

5.14.5.5 The calibration organization shall present a calibration report in duplicate within 15 days after calibration, one held by the inspection organization and the other by the using department.

校验单位在校验合格后 15 日内出具一式二份的校验报告，校验单位、使用部门各一份。

5.14.5.6 Safety valve calibration records shall be filled out and signed by the calibration organization. The using department takes part in pressure setting and sign on the record. After calibration, valves shall be provided with lead seals labels indicating the name of calibration organization, calibration number, tag number of installation equipment, number of safety valve, set pressure and date of next calibration. When safety valves operate normally, technical personnel of the using department shall sign on the pressure log and input calibration results into the EM system.

安全阀校验记录由校验单位填写签字，使用部门参加定压并签字。安全阀校验合格须加铅封并悬挂有校验机构名称、校验编号、安装设备位号、安全阀编号、整定压力和下次校验日期等内容的标牌。安全阀投用正常后由使用部门技术人员在定压本上确认签字并将校验结果录入 EM 系统。

5.14.5.7 Maintain safety valves for off-line calibration vertical and avoid collision during transport.

离线校验的安全阀运输安装过程中应保持垂直并避免碰撞。

5.14.5.8 Install and use new valves after testing; entrust qualified organizations for calibration

if any anomaly occurs during use.

新安全阀经调试后方可安装使用；使用期间出现异常应及时委托校验。

5.14.6 Rupture disk

爆破片

5.14.6.1 Replace rupture disks usually once per 2~3 years, or annually under strict conditions; immediately replace rupture disks exceeding maximum design pressure while not ruptures; replace those within their service years.

爆破片一般 2~3 年更换一次，苛刻条件下使用的应每年更换；对超最大设计压力而未爆破的应立即更换；爆破片规定使用年限的应在使用年限内更换。

5.14.6.2 Install pressure gauges and vent valves when rupture disks and safety valves together. Regularly check indications of pressure gauge and gas and liquid discharge of vent valves to ensure if a rupture disk works normally.

爆破片和安全阀串联使用时两者之间应装压力表和排气阀，通过定期对压力表显示和排气阀排气、排液情况确认爆破片是否正常。

5.14.7 Calibrate, maintain and manage pressure gauges according to regulations of the Company. The using department shall mark a warning line indicating the maximum or minimum operating pressure on the dial. Install lead seals for calibrated pressure gauges. Selection and installation of pressure gauges shall comply with Code for Safety Monitoring of Pressure Vessels.

压力表校验、维护、管理应符合公司有关规定。压力表（含新启用的）由使用部门在刻度盘上标识指示最高或最低工作压力等的警戒线。压力表经校验合格加铅封，选用和安装按《压力容器安全技术监察规程》执行。

5.14.8 Regularly maintain level gauges at an interval depending on actual condition, not exceeding the comprehensive inspection period for pressure vessels. Glass tubes/plates and other level indicators on a pressure vessel shall allow clear vision of level, with maximum and minimum levels marked.

液位计应定期检修，检修周期根据实际情况确定，但不应超过压力容器全面检验周期。压力容器上的玻璃管（板）等液位计应以能看清液位为准，并标识最高和最低安全液位警戒线。

5.14.9 Site thermometers shall be sensitive, reliable, regularly calibrated which the calibration period shall be based on rules of the Company for metering instruments and mark a red warning line indicating the maximum or minimum temperature.

现场温度计应灵敏可靠、定期校验，校验周期应符合公司计量器具的有关规定，并标识最高或最低温度警戒红线。

5.14.10 Fast-opening pressure vessel interlocking devices shall be from reliable suppliers. The device shall operate flexibly, reliably and be maintained regularly based on actual condition by the using department, never exceeding the comprehensive inspection period of pressure vessel.

快开门式压力容器安全连锁装置应选用具有相应资质单位的产品，安全连锁装置应动作灵敏、可

靠并定期检修，周期由使用部门视实际情况确定，但不应超压力容器全面检验周期。

5.14.11 Remove the emergency cut-off device from vessel proper for comprehensive inspection of the vessel for disassembly, inspection, maintenance and adjustment, subject to pressure-withstanding, sealing and emergency cut-off tests.

紧急切断装置在压力容器全面检验时应当从压力容器本体上拆下，进行解体、检验、维修和调整，做耐压、密封、紧急切断等性能试验。

5.15 Scrapping and reuse

报废与启用

5.15.1 Scrapping (out-of-use) of special equipment shall conform to requirements of Rules on Management of Fixed Assets in Kind. Scrapped equipment shall be submitted by the using department to Equipment Management Dept. for cancelling use registration.

特种设备的报废（停用）按照《固定资产实物管理规定》的有关要求执行。报废设备由使用部门向机械动力部申请办理使用登记注销。

5.15.2 Scrapped equipment shall never be transferred or reused for the same purpose and shall be disassembled in a destructive manner for sales as waste equipment and material.

判废的特种设备禁止转让和再作特种设备使用，当作为废旧设备材料销售时，应进行破坏性解体。

5.15.3 The reuse of shutdown special equipment shall be applied by the using department, approved by Equipment Management Dept. with proper inspections performed.

停用特种设备需要重新启用，须由使用部门提申请，经机械动力部批准并安排检验合格。

6 Inspection and Supervision

检查与监督

Equipment Management Dept. shall supervise, examine and inspect the execution of rules on special equipment management.

机械动力部负责对运行部特种设备管理执行情况进行监督检查、考核。

7 Associated Procedures and Records

关联程序和记录

7.1 Associated procedures

关联程序

7.1.1 *Special Procedures for Special Equipment Management* HYBN-T2-07-0025-2018-1

特种设备专业管理程序 HYBN-T2-07-0025-2018-1

7.1.2 *Procedures for Use and Registration of Special Equipment* HYBN-T2-07-0025-2018-1

特种设备使用登记管理程序 HYBN-T2-07-0026-2018-1

7.1.3 *Procedures for Regular Inspection of Special Equipment* HYBN-T2-07-0026-2018-1

特种设备定期检验管理程序 HYBN-T2-07-0027-2018-1

7.1.4 *Procedures for Delayed Inspection of Special Equipment* HYBN-T2-07-0028-2018-1

特种设备延期检验程序 HYBN-T2-07-0028-2018-1

7.1.5 *Procedures for Rework and Turnaround of Special Equipment*

HYBN-T2-07-0029-2018-1

特种设备返修流转管理程序 HYBN-T2-07-0029-2018-1

7.2 Associated records

关联记录

7.2.1 *Form on Equipment Arrival Quality and Technical Data Acceptance*

HYBN-T6-07-0075-001-2018

设备入厂质量及技术资料验收单 HYBN-T6-07-0075-001-2018

7.2.2 *Use Registration for Boiler, Pressure Vessel, Lift, Crane and Forklift*

HYBN-T6-07-0076-001-2018

锅炉、压力容器、电梯、起重机、叉车使用登记表 HYBN-T6-07-0076-001-2018

7.2.3 *Use Registration for Pressure Pipe* HYBN-T6-07-0077-001-2018

压力管道使用登记表 HYBN-T6-07-0077-001-2018

7.2.4 *Summary of Use Registration of Pressure Pipe* HYBN-T6-07-0078-001-2018

压力管道使用登记汇总表 HYBN-T6-07-0078-001-2018

7.2.5 *Form on Application for Safety Valve Calibration* HYBN-T6-07-0079-001-2018

安全阀校验申请单 HYBN-T6-07-0079-001-2018

7.2.6 *Annual Inspection Report of Pressure Vessel* HYBN-T6-07-0080-001-2018

压力容器年度检查报告 HYBN-T6-07-0080-001-2018

7.2.7 *Annual Inspection Report of Pressure Pipe* HYBN-T6-07-0081-001-2018

压力管道年度检查报告 HYBN-T6-07-0081-001-2018

7.2.8 *Form on Application for Special Equipment Inspection* HYBN-T6-07-0082-001-2018

特种设备检验计划申请表 HYBN-T6-07-0082-001-2018

7.2.9 *Form on Application for Delayed Inspection of Special Equipment*

HYBN-T6-07-0083-001-2018

特种设备延期检验申请表 HYBN-T6-07-0083-001-2018

7.2.10 *Form on Application for Defect Repair of Special Equipment*

HYBN-T6-07-0084-001-2018

特种设备缺陷返修申请表 HYBN-T6-07-0084-001-2018

7.2.11 *Form on Application for Scrapping/Shutdown of Special Equipment*

HYBN-T6-07-0085-001-2018

特种设备报废（停用）申请表 HYBN-T6-07-0085-001-2018

7.2.12 *Lift Routine Checklist* HYBN-T6-07-0086-001-2018

电梯日常检查表 HYBN-T6-07-0086-001-2018

7.2.13 *Lift Monthly Checklist* HYBN-T6-07-0087-001-2018

电梯月度检查表 HYBN-T6-07-0087-001-2018

7.2.14 *Form on Approval of Change in Pressure of Safety Valve* HYBN-T6-07-0088-001-2018

安全阀定压值变更审批表 HYBN-T6-07-0088-001-2018

7.2.15 *Annual Inspection Report of Boiler* HYBN-T6-07-0089-001-2018

锅炉年度检查报告 HYBN-T6-07-0089-001-2018

8 Supplementary Rules

附则

8.1 The System is under the jurisdiction of HR Dept.

本制度由机械动力部归口管理。

8.2 The System is drafted by Equipment Management Dept.

本制度起草部门：机械动力部。

8.3 Equipment Management Dept. is responsible for the interpretation of the System.

本制度解释权机械动力部拥有。

8.4 Revision, preparation and approval of the System are shown in table 1:

本制度版本编制和审批情况见表 1:

Table 1 Revision, preparation and approval of document

表 1 文件版本编制和审批情况

1	2018-12-31	Han Jinshan 韩金山	Tong Xueyun 童雪云	Xu Ye 徐野	Chen Liancai 陈连财
Revision 版本	Issued date 颁布日期	Prepared by 编制人	Reviewed by 审核人	Authorized by 审定人	Approved by 批准人



Hengyi Industries Sdn Bhd
恒逸实业（文莱）有限公司

HYBN-T3-07-0011-2018-1

Anti-Corrosion Insulation Management System

防腐保温管理制度

Issued Date: Dec. 2018

颁布日期：2018 年 12 月

 HENGYI	Hengyi Industries Sdn Bhd 恒逸实业（文莱）有限公司			
	Anti-Corrosion Insulation Management System			
	防腐保温管理制度			
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1 Purpose

目的

The system is hereby formulated in order to strengthen the anti-corrosion management of the equipment, frame and pipe in the refining unit system, prevent corrosion leakage of the equipment pipe and corrosion collapse of the frame, and ensure the safe and long-term operation of the unit.

为加强炼油装置系统内设备、框架及管道的防腐蚀管理，预防设备管道腐蚀泄漏、框架腐蚀坍塌，保障装置安全长周期运行，特制订本制度。

2 Scope of Application

适用范围

This System is applicable to all departments of the Company.

本制度适用于公司各部门。

3 Terms and Definitions

术语和定义

Anti-corrosion insulation: refers to the use of various means such as improving the material grade, corrosion monitoring and the application of suitable thermal insulation form and surface coating to prevent corrosion of equipment and pipelines and heat loss during operation.

防腐保温：是指采取各种手段如提高材质等级、腐蚀监测以及采用合适的绝热形式和采用表面涂料等，来防止设备和管线的腐蚀和运行过程中的热损失。

4 Management Responsibilities

管理职责

4.1 Specified administrative authority

归口管理部门

4.1.1 The Equipment Management Dept. is the specified administrative authority of the Company for anti-corrosion insulation.

机械动力部是公司防腐保温的归口管理部门。

4.1.2 It is responsible for the review and release of the anti-corrosion insulation management system, monitoring the implementation and performance of the system, preparing the anti-corrosion insulation work plan of the Company, and establishing a sound anti-corrosion insulation maintenance technical file.

负责防腐保温管理制度的审核和发布，监控制度执行和绩效情况，编制公司防腐保温工作计划，建立健全防腐保温检修技术档案。

4.1.3 The Dept. shall supervise and inspect the quality inspection of the coating and be responsible for the construction management of the Company's fireproof coating.

监督检查涂料质检情况，负责公司防火涂料的施工管理。

4.1.4 It shall organize the supervision, inspection and assessment of the implementation effect of the process anti-corrosion measures.

组织对工艺防腐蚀措施的实施效果进行监督、检查、考核；

4.1.5 The Dept. shall be responsible for the management of the surface color and mark color of the Company's equipment, pipes and steel structures.

负责公司设备、管道、钢结构的表面色及标志色的管理。

4.2 Coordinated administrative authority

协同管理部门

4.2.1 The Scheduling & Dispatch Dept. is responsible for the technical management of process anti-corrosion, and is responsible for the management of equipment, pipes, valves and media names and flow direction mark accuracy in the units and systems.

计划调度部负责工艺防腐蚀的技术管理，负责装置和系统内设备、管道、阀门及介质名称及流向标志准确性的管理。

4.2.2 The HSE Dept. is responsible for the applicability inspection of fireproof coatings, taking part in the review of fireproof coating construction scheme, and participating in the quality acceptance of fireproof coating construction projects.

HSE 管理部负责防火涂料的适用性把关，参与审核防火涂料施工方案，参加防火涂料施工项目的质量验收。

4.2.3 The Materials Supply Dept. is responsible for entrusted inspection of quality of the inbound anti-corrosion insulation materials.

物资装备部负责对所购防腐保温材料的入厂质量委托检验工作。

4.3 Executive departments

执行部门

4.3.1 Each operation department is the executive department.

各运行部门为执行部门。

4.3.1.1 They are responsible for the fixed-point thickness measurement of equipment and

pipes in the operation department; they shall properly operate and organize the production in strict accordance with the operating specifications and anti-corrosion process requirements.

负责所在运行部设备、管道定点测厚工作；严格按照操作规程和防腐蚀工艺要求，正确操作和组织生产。

4.3.1.2 They are responsible for the routine maintenance and inspection of anti-corrosion facilities, corrosion monitoring facilities and thermal insulation facilities, and shall establish and improve the basic files of equipment anti-corrosion insulation.

负责防腐蚀设施、腐蚀监测设施、绝热设施的日常维护和检查工作，建立健全设备防腐保温基础档案。

4.3.1.3 They are responsible for the commission handling of construction, on-site construction management, and quantities review of painting and insulation projects.

负责涂装、保温项目的施工委托办理、现场施工管理、工作量审核等工作。

4.3.1.4 They are responsible for supplying a mark list of equipment, pipes, valves and media flow direction, and maintaining the surface color and mark of equipment, pipes and steel structures in the units and systems.

负责提供设备、管道、阀门及介质流向等标志清单，维护装置和系统内设备、管道、钢结构的表面色及标志。

4.3.2 The Instrument Control Dept. is responsible for the routine maintenance of the on-line corrosion monitoring system.

仪表控制部负责在线腐蚀监测系统的日常维护工作。

4.3.3 The Lab Dept. is responsible for the inbound quality inspection and quality random inspection of anti-corrosion materials such as anti-corrosion coating and agents entrusted by the Materials Supply Dept. and the Equipment Management Dept.

质量检验部负责物资装备部及机械动力部委托的防腐蚀涂料及药剂等防腐材料的入厂质量检验、质量抽检工作。

5 Management Content

管理内容

5.1 Anti-corrosion design

防腐蚀设计

5.1.1 The anti-corrosion design should comprehensively consider various anti-corrosion technical measures (process anti-corrosion, adding anti-corrosion agent, electrochemical protection, anti-corrosion coating, corrosion-resistant material, anti-corrosion lining, etc.), and shall conduct a technical and economic assessment of the selected scheme to achieve economic, effective and feasible purposes.

防腐蚀设计应综合考虑各种防腐蚀技术措施（如工艺防腐蚀、添加防腐蚀药剂、电化学保护、防腐蚀涂料、耐蚀材料、防腐蚀衬里等），对所选择的方案应进行技术经济评价，达到经济、有效、

可行的目的。

5.1.2 When selecting the equipment, the corrosion characteristics, flow conditions, temperature, pressure, stress state of the equipment, impact load and other factors of the process media should be fully considered. Processing units for high sulfur content and high sour value should also be selected according to the *Material Selection Guideline for Design of Major Equipment in Key Units Processing Sour Crude Oil* (SH/T3096), the *Material Selection Guideline for Equipments and Piping in Service in Parts of Units Processing Sour Crude Oil* and the *Material Selection Guideline for Design of Major Piping in Key Units Processing Sour Crude Oil* (SH/T3129).

设备选材时，应充分考虑工艺介质的腐蚀特性、流动状态、温度、压力及设备的应力状况、冲击载荷等因素。高含硫、高酸值原油加工装置还应按 SH/T3096 《加工高含硫原油重点装置主要设备设计选材导则》、《加工高含硫原油部分装置在用设备及管道选材指导意见》和 SH/T3129 《加工高硫原油重点装置主要管道设计选材导则》进行选材。

5.1.3 When designing the structure of the equipment, the influence of the structure on corrosion should be fully considered, and a reasonable structure should be selected to avoid corrosion of the equipment caused by unreasonable design.

在设备结构设计时，应充分考虑结构对腐蚀的影响，选择合理的结构，避免设计不合理造成设备腐蚀。

5.2 Project construction and acceptance

工程施工与验收

5.2.1 The Construction Contractor shall prepare a construction scheme, which shall include construction technical measures under abnormal climatic conditions.

施工单位应编制施工方案，方案中应包含异常气候环境下施工技术措施。

5.2.2 Construction personnel must receive specialized technical training to meet on-site construction techniques and safety requirements; construction machinery and detecting instrument must meet on-site construction requirements.

施工人员须经过专业技术培训，满足现场施工技术及安全要求；施工机具和检测仪器须符合现场施工要求。

5.2.3 Materials used for anti-corrosion construction should be inspected and confirmed to meet design requirements, and the quality should meet national or relevant industry standards. For new materials and new products, in addition to the inbound quality inspection, they should also be checked whether they own the technical appraisal certificate of the relevant department.

检查确认用于防腐蚀施工的材料满足设计要求，质量达到国家或有关行业标准。对新材料、新产品除必须进行入厂质量检验外，还应查验其是否具有相关部门的技术鉴定证书。

5.2.4 The Equipment Management Dept. and the Construction Contractor shall properly organize the construction management of the anti-corrosion project, and strictly implement the

corresponding technical specifications and construction processes to ensure the construction quality and safety.

机械动力部和施工单位要组织好防腐蚀工程的施工管理工作，严格执行相应的技术规范和施工工艺，确保施工质量和安全。

5.2.5 Quality inspection and acceptance of anti-corrosion engineering projects should be strengthened. Each construction working procedure must receive the intermediate quality inspection and those who fail to pass the inspection will not be allowed to enter the next working procedure. After construction completion, a comprehensive quality acceptance is required.

加强防腐蚀工程项目的质量检查和验收。每道施工工序必须经过中间质量检验，检验合格后方可进入下一道工序，施工结束后，要进行全面的质量验收。

5.3 Corrosion inspection

腐蚀检查

5.3.1 The Equipment Management Dept. shall organize and prepare an overall scheme for corrosion inspection. The Operation Dept. shall properly carry out the daily corrosion inspection of the equipment and pipes of the department as well as the corrosion inspection during the shutdown and overhaul of the unit.

机械动力部组织编制腐蚀检查总体方案。运行部开展好本部门设备、管道日常性的腐蚀检查工作及装置停工大修期间的腐蚀检查工作。

5.3.2 The contents and methods of corrosion inspection of equipment and pipes shall be specifically implemented with reference to the *Regulations on Equipment Anti-corrosion Management of Refinery and Chemical Enterprises*.

设备及管道腐蚀检查内容、方法，具体参照《炼化企业设备防腐蚀管理规定》执行。

5.3.3 Writing requirements for the equipment corrosion inspection report:

装置腐蚀检查报告撰写要求：

5.3.3.1 The daily corrosion inspection of the Operation Dept. should be prepared in the monthly equipment report.

运行部日常性的腐蚀检查编制在设备月报中。

5.3.3.2 Within one and a half months after the unit is maintained and put into production, the Operation Dept. shall include the corrosion inspection summary into the shutdown maintenance summary. For example, the specialized inspection team has conducted corrosion inspection and should submit corrosion inspection reports to the Equipment Management Dept. and the Operation Dept.

装置检修投产后的一个半月内，运行部在停工检修总结中应包括腐蚀检查总结，如专业检查队伍已经进行过腐蚀检查，应向机械动力部、运行部提交腐蚀检查报告。

5.3.3.3 The corrosion inspection report of the specialized inspection team shall record the site conditions in a true and complete manner, including texts, forms, pictures and thickness

measurement records. The corrosion inspection report should contain comprehensive analysis and conclusion, with comprehensive analysis on corrosion phenomena, corrosion causes, etc., and recommendations for equipment updating, maintenance items of the next cycle, and process and material anti-corrosion measures. The original of the corrosion inspection report should be stored in the Operation Dept.

专业检查队伍腐蚀检查报告要真实、完整地记录现场情况，包括文字、表格、图片、测厚记录等。腐蚀检查报告应有综合分析和结论，对腐蚀现象、腐蚀原因等作出综合分析，并对设备更新、下周期检修项目、工艺及材料防腐蚀措施等提出建议。腐蚀检查报告原稿存于运行部。

5.4 Thickness measurement management

测厚管理

5.4.1 The range of fixed-point thickness measurement includes equipment and pipes of the production unit that are susceptible to corrosion and scouring, inflammable, combustible, and with toxicity, especially in the locations that are subject to corrosion caused by high temperature sulfur, naphthenic acid and low temperature wet hydrogen sulfide.

定点测厚范围为生产装置易受腐蚀、冲刷、易燃、易爆、剧毒的设备及管道，特别是受高温硫、环烷酸和低温湿硫化氢腐蚀的部位。

5.4.2 The selection, addition, deletion or change in frequency of the thickness measurement point is determined by the Equipment Management Dept. and the Production and Operation Dept.

测厚点的选定、增加、删除或测厚频率的改变由机械动力部和生产运行部共同确定。

5.4.3 The thickness measurement frequency can be divided into 1 month, 3 months, 6 months, one year, two years or one maintenance cycle. The specific thickness measurement frequency can be determined according to the all previous thickness measurement data, the specific location of the site, all previous maintenance and repair conditions, and the process operation parameters.

测厚频率可分为 1 个月、3 个月、6 个月、一年、两年或一个检修周期不等，具体测厚频率可根据历次测厚数据、现场具体位置、历次检维修情况和工艺操作参数来确定。

5.4.4 The Operation Dept. shall draw a three dimensional drawing for the fixed-point thickness measurement. The three dimensional drawing mainly includes the pipe material and specifications, the major equipment to be connected, the media name, the pipe direction and the media flow direction, and the determined thickness measurement points and serial numbers shall be marked.

运行部应绘制专为定点测厚用空视图，空视图主要包括管道材质与规格、连接主要设备、介质名称、管道走向和介质流向等，并标注已确定的测厚点及序号。

5.4.5 For the determined thickness measurement point, the Operation Dept. shall sort the basic parameters (location, material, media, temperature, pressure, original wall thickness) into a form and input it into the EM system. The fixed-point thickness measurement personnel

should be familiar with the process flow, have certain ultrasonic thickness measurement experience, and be relatively permanent.

对已确定的测厚点，运行部应将其基本参数（位置、材质、介质、温度、压力、原始壁厚）整理成表格，输入到 EM 系统中。定点测厚人员应熟悉工艺流程、具有一定的超声波测厚经验，并相对固定。

5.4.6 The expired measuring points shall be measured according to the plan formulated at the beginning of the year, and the thickness measurement data shall be input into the EM system within seven working days after the end of the thickness measurement.

到期的测点按年初制定的计划进行测厚，并在测厚结束后七个工作日内将测厚数据输入到 EM 系统中。

5.4.7 Thickness measurement method and data processing

测厚方法及数据处理

5.4.7.1 The test area of the thick measurement point on the pipeline is the circle center of the thickness measurement area. Each thickness measurement should be repeated twice, with two deviations not exceeding 0.2mm. If an abnormal value is found, the measurement range is to be expanded.

管线上测厚点的测试区域为测厚区域的圆心，每次测厚重复进行两次，两次偏差不超过 0.2mm。如发现异常值时，要扩大测定范围。

5.4.7.2 The high temperature ultrasonic thickness gauge is used as the test instrument with an accuracy of $\pm 0.1\text{mm}$.

测试仪器采用高温超声波测厚仪，精度应达到 $\pm 0.1\text{mm}$ 。

5.4.7.3 Direct contact probes should be adopted, and high temperature probes should be used for measurements at high temperatures ($>100^\circ\text{C}$).

探头采用直接接触式探头，高温下 ($> 100^\circ\text{C}$) 的测量应采用高温探头。

5.4.7.4 A suitable coupling agent should be used, and a high temperature coupling agent should be applied to the thickness measurement at high temperature.

选用合适的耦合剂，高温部位测厚应用高温耦合剂。

5.4.7.5 For measurement at high temperature, the sound velocity of instrument should be corrected. The thickness obtained after the sound velocity correction of the instrument is the actual thickness of the pipeline.

高温下的测量，应对仪器的声速进行校正。仪器声速校正后所得的厚度为管线的实际厚度。

5.5 Management of anti-corrosion coating

防腐涂料管理

5.5.1 Purchase of anti-corrosion coating

防腐涂料的采购

5.5.1.1 The anti-corrosion coating should be purchased based on quality & price within the product range of qualified suppliers of the Materials Supply Dept. to select the appropriate

anti-corrosion coating manufacturer products. The quality indicators of the purchased anti-corrosion coating should meet the technical specifications of anti-corrosion coating.

选购防腐涂料应在物资装备部合格供应商产品范围内比质比价，选择合适的防腐涂料厂家产品。所采购防腐涂料的质量指标应达到防腐涂料技术指标。

5.5.1.2 For one purchase batch of anti-corrosion coating with a quantity of one ton or more, the Materials Supply Dept. shall entrust the Lab Dept. to conduct quality inspection. For one purchase batch of anti-corrosion coating with a quantity of less than one ton, the Materials Supply Dept. shall entrust the Lab Dept. to conduct quality random inspection, and the random inspection frequency shall not be less than 1 time/month.

一个批次采购数量在一吨及以上的防腐涂料，物资装备部应委托质量检验部进行质量检验。一个批次采购数量在一吨以下的防腐涂料，物资装备部应委托质量检验部进行质量抽查，抽查频率均不小于 1 次/月。

5.5.2 Construction of anti-corrosion coating

防腐涂料的施工

5.5.2.1 Safety management during construction shall be carried out in accordance with the requirements of the *Technical Code for Construction safety in Petrochemical Engineering* (SH3505) and the Company's safety management related systems.

施工中的安全管理按 SH3505 《石油化工施工安全技术规程》和公司安全管理有关制度的要求执行。

5.5.2.2 For all kinds of engineering projects in the construction of anti-corrosion coating, the construction quality of derusting, primer and topcoat shall be accepted and confirmed; the derusting quality of overhaul and repair projects shall be jointly inspected and confirmed by the Equipment Management Dept. and the User; the intermediate brushing quality shall be inspected and confirmed by the User; upon completion, the Equipment Management Dept. shall organize relevant departments to carry out the project completion acceptance. All inspection and acceptance results should be included in the *Quality Acceptance Sheet for Coating Anti-corrosion Construction*.

各类工程项目在防腐涂料施工中，除锈、底漆、面漆施工质量应进行质量验收、确认；大修、维修项目的除锈质量由机械动力部、使用单位共同检查确认；中间涂刷质量由使用单位检查确认；工程完工时，由机械动力部组织相关单位进行工程竣工验收。所有的检查与验收都应当填写《涂料防腐施工质量验收单》。

5.5.2.3 For oil tank anti-corrosion, in order to ensure traceability of the anti-corrosion coating used, the Construction Contractor shall carefully fill in the *Record for Coating Anti-corrosion Construction* during the construction process.

对于油罐防腐，为了使所用的防腐涂料具有可追溯性，施工单位在施工过程中应认真填写《涂料防腐施工记录单》。

5.5.2.4 For oil tanks or complete set of units, after construction of anti-corrosion coating, the "Nameplate of Anti-corrosion Works" should be painted in a conspicuous place (see Appendix 1).

对于油罐或成套装置，防腐涂料施工结束后，应在其显眼处涂刷“防腐工程铭牌”（见附件 1）。

5.6 Process anti-corrosion management

工艺防腐管理

Process anti-corrosion management shall be carried out in accordance with the relevant regulations of the Scheduling & Dispatch Dept.

工艺防腐管理按计划调度部有关规定执行。

5.7 Thermal insulation material management

绝热材料管理

5.7.1 Principle for selection

选择原则

5.7.1.1 For thermal insulation materials, materials with small thermal conductivity, low density, low cost and low construction difficulty should be preferred. Under high temperature (low temperature) conditions, composite materials can be selected after comprehensive economic comparison.

绝热材料应优先选用热导率小、密度小、造价低、易于施工的材料制品，在高温（低温）条件下经综合经济比较后可选用复合材料。

5.7.1.2 It is forbidden to use soft or semi-soft materials for insulation of buried pipes.

埋地管道严禁采用软质或半软质材料保温。

5.7.1.3 Generally, 0.5 ~ 0.8mm aluminum skin is used as the outer protective layer for the metal protective layer.

金属保护层一般采用 0.5~0.8mm 铝皮作为外保护层。

5.7.1.4 The detachable box structure should be suitable for valve insulation.

阀门保温宜采用可拆盒式结构。

5.7.1.5 A new insulation material should be on trial first and then gradually promoted.

采用新型保温材料时应先试点，再逐步推广。

5.7.2 Quality evaluation

质量评定

5.7.2.1 In order to ensure the quality of the insulation works and facilitate inspection and repair, the insulation quality should be inspected and evaluated from the insulation thickness, surface temperature and appearance.

为了保证保温工程质量，便于检查和维修，对保温质量应从保温厚度、表面温度和外观情况进行检查和评定。

5.7.2.2 The allowable deviation and inspection method for the installation thickness of the insulation layer are shown in Table 1 below.

绝热层安装厚度的允许偏差和检验方法见下表 1。

Table 1 Installation deviations of insulation material**表 1 绝热材料安装偏差表**

Item 项 目			Allowable deviation 允许偏差	Inspection methods 检验方法	
Thickness 厚度	Embedded layer spread method, bundle-up method, tiling method and pasting method 嵌装层铺法、捆扎法、拼砌法及粘贴法	Insulation layer 保温层	Rigid product 硬质制品	+10mm -5mm	Dimensional inspection 尺寸检查
			Semi-rigid and soft products 半硬质及软质制品	+10%, but not more than +10mm; -5%, but not less than -8mm +10%，但不得大于+10mm；-5%，但不得小于-8mm	Pinprick and ruler metering inspection 针刺、尺量检查
		Cold insulation layer 保冷层	+5mm 0	Pinprick and ruler metering inspection 针刺、尺量检查	
	Filling method, casting method and spraying method 填充法、浇注法及喷涂法	Thermal insulation layer thickness >50mm 绝热层厚度>50mm	+10%	For filling method, measure the distance between the solid layer and the workpiece with a ruler; for casting and spraying methods, pinprick and ruler metering inspection 填充法用尺测量固形层与工件间距检查；浇注及喷涂法针刺、尺量检查	
Thermal insulation layer thickness ≤50mm 绝热层厚度≤50mm		+5mm			

5.7.2.3 Appearance

外观情况

(1) It is strictly forbidden to add fixing parts to the lap joint between the metal protective layer pipe elbow and the metal casing on the straight pipe section as well as the circumferential joint of the metal casing expansion of the straight pipe section.

金属保护层管道弯头与直管段上金属护壳的搭接及直管段金属护壳膨胀的环向接缝部位严禁加置固定件。

(2) The circumferential and longitudinal joints of the metal protective layer of the equipment and pipes must be in a upper-on-lower manner; the circumferential joints of the horizontal pipes

should be lapped along the horizontal direction.

设备及管道金属保护层的环向、纵向接缝必须上搭下，水平管道的环向接缝应顺水搭接。

(3) The appearance of the metal protective layer shall be free of turnup, opening, warped joint or obvious pit, and the outward appearance shall be neat and beautiful.

金属保护层的外观应无翻边、豁口、翘缝或明显凹坑，外表应整齐美观。

(4) The lap joint of the metal protective layers should be even and tight. The lap joint dimension of general position of indoor equipment and pipes should be $\geq 30\text{mm}$; the dimension of expansion joint should be $\geq 50\text{mm}$. The lap joint dimension of general position under open air or humid environment should be $\geq 50\text{mm}$; the dimension of expansion joint should be $\geq 75\text{mm}$; the lap joint dimension of joint position between the elbow and the straight pipe section under the high temperature environment shall be $75\sim 150\text{mm}$; $50\sim 70\text{mm}$ shall be suitable for the low and medium temperature environment; the dimension of the cold insulation lap joint should be $30\sim 50\text{mm}$; the lap joint dimension of the flat wall surface of the equipment should be $\geq 20\text{mm}$.

金属保护层的搭接应均匀严密。室内设备及管道一般部位搭接尺寸应 $\geq 30\text{mm}$ ；膨胀缝部位搭接尺寸应 $\geq 50\text{mm}$ 。露天或潮湿环境一般部位搭接尺寸应 $\geq 50\text{mm}$ ；膨胀缝部位搭接尺寸应 $\geq 75\text{mm}$ ；弯头与直管段接缝部位高温搭接尺寸应搭 $75\sim 150\text{mm}$ ；中、低温搭接尺寸应搭 $50\sim 70\text{mm}$ ；保冷搭接尺寸应搭 $30\sim 50\text{mm}$ ；设备平壁面搭接尺寸应 $\geq 20\text{mm}$ 。

(5) The fixing parts of the metal protective layer should be installed firmly, without looseness and uniform in spacing. The fixed spacing in the straight pipe sections between the metal hold hoop bands for the cold insulation structure is $250\sim 300\text{mm}$; the fixed spacing in the straight pipe section between the self-tapping screws for the insulation structure is $150\sim 200\text{mm}$, and the fixed spacing in the elbow section is determined according to specific conditions; the fixed spacing between the flat walls of the equipment is $\geq 250\text{mm}$.

金属保护层的固定件应安装牢固，无松动，间距均匀一致。保冷结构金属抱箍带固定间距直管段 $250\sim 300\text{mm}$ ；保温结构自攻螺丝固定直管段间距 $150\sim 200\text{mm}$ ，弯头部位固定间距视具体情况确定；设备平壁固定间距 $\geq 250\text{mm}$ 。

(6) The longitudinal joint of the pipe metal protective layer shall be parallel to the pipe axis, and the position shall be $15^\circ\sim 45^\circ$ below the horizontal centerline. When there are obstacles on the side or bottom, it may be moved to within 60° above the horizontal centerline of the pipe.

管道金属保护层的纵向接缝应与管道轴线保持平行，位置宜在水平中心线下方的 $15^\circ\sim 45^\circ$ 处，当侧面或底部有障碍物时，可移至管道水平中心线上方 60° 以内。

(7) The circumferential joint of the pipe metal protective layer shall be perpendicular to the pipe axis; the circumferential joint of the metal protective layer of the equipment and the large-scaled storage tank shall be perpendicular to the longitudinal joint and shall be neat and beautiful.

管道金属保护层的环向接缝应与管道轴线保持垂直；设备及大型贮罐金属保护层的环向接缝应与纵向接缝相互垂直，并应整齐美观。

(8) The metal protective layer branch pipe and the main pipe at the tee joint of the pipeline should be fixed in turnup manner at the intersection, and should be lapped along the horizontal

direction.

管道三通部位金属保护层支管与主管在相交部位宜翻边固定，并应顺水搭接。

5.7.3 Maintenance

维护和检修

5.7.3.1 All departments should regularly check the insulation of equipment and pipes under their jurisdiction.

各部门应定期检查辖区内的设备、管道绝热情况。

5.7.3.2 When the hoisting equipment for construction is installed and maintained, it is strictly forbidden to use the insulation pipeline as the hoisting fulcrum. It is forbidden to walk or tread on the pipeline to damage the insulation material.

安装、检修施工吊装设备严禁利用绝热管线作起吊支点，禁止在管线上行走、践踏、损坏绝热材料。

5.7.3.3 If it is found that the thermal insulation layer is damaged due to temperature changes and corrosion, the defect should be eliminated in time; if the situation is serious, the cause should be analyzed and recorded on file.

如发现因温度变化和腐蚀造成绝热层破坏时，应及时进行消缺，对情况严重的应当分析原因并记录存档。

5.7.3.4 Valves and flanges on exposed parts of general equipment and pipes shall be of detachable thermal insulation structure. The buried thermal insulation pipeline should have good technical properties such as thermal insulation, anti-corrosion, waterproof and high strength, and adopts the form of pipe trench. The pipeline close to the ground should be equipped with a protective layer of rigid waterproof thermal insulation material.

一般设备及管道上裸露部分的阀门、法兰应采用可拆卸式绝热结构。埋地绝热管线，应具备绝热、防腐、防水、强度等良好的技术性能，采用管沟形式。紧挨地面的管线，应采用硬质防水绝热材料保护层。

5.7.3.5 The thermal insulation materials removed due to equipment and pipeline maintenance and emergency repair shall be repaired immediately after completion of the maintenance, which shall not exceed 10 days at the latest. After thermal insulation construction of equipment and pipes, the temperature rise of the outer surface of the protective layer must be lower than 25°C; after cold insulation of the equipment and pipes, the temperature of the outer surface of the protective layer is required to not exceed the dew point temperature.

因设备和管道检修、抢修所拆除的绝热材料，待检修完毕后立即修复，最迟不得超过 10 天。设备、管道经过绝热施工后，其保护层外表面的温升必须低于 25°C；设备、管道经过保冷后，其保护层外表面温度要求不超过露点温度。

5.7.3.6 After the thermal insulation construction is completed, the Equipment Management Dept. shall organize the acceptance.

绝热施工完毕由机械动力部组织验收。

6 Inspection and Supervision

检查与监督

The Equipment Management Dept. shall be responsible for the supervision, inspection and assessment of the management and implementation of the anti-corrosion insulation by the Operation Dept.

机械动力部负责对运行部防腐保温管理执行情况进行监督检查考核。

7 Associated Procedures and Records

关联程序和记录

7.1 Associated procedures

关联程序

7.1.1 Management Procedures for Equipment Anti-corrosion (HYBN-T2-07-0030-2018-1)

设备防腐管理程序 HYBN-T2-07-0030-2018-1

7.1.2 Management Procedures for Equipment Anti-corrosion Inspection

(HYBN-T2-07-0031-2018-1)

设备防腐检查管理程序 HYBN-T2-07-0031-2018-1

7.1.3 Management Procedures for Equipment Anti-corrosion Thickness Measurement

(HYBN-T2-07-0032-2018-1)

设备腐蚀测厚管理程序 HYBN-T2-07-0032-2018-1

7.1.4 Management Procedures for Equipment Anti-corrosion Coating Construction

(HYBN-T2-07-0033-2018-1)

设备防腐涂料施工管理程序 HYBN-T2-07-0033-2018-1

7.1.5 Management Procedures for Equipment Insulation (Cold Insulation)

(HYBN-T2-07-0034-2018-1)

设备保温（冷）管理程序 HYBN-T2-07-0034-2018-1

7.2 Associated records

关联记录

7.2.1 Inspection and Analysis Report for Coating (HYBN-T6-07-0090-001-2018)

涂料检验分析报告 HYBN-T6-07-0090-001-2018

7.2.2 Quality Acceptance Sheet for Anti-corrosion Coating Construction

(HYBN-T6-07-0091-001-2018)

防腐涂料施工质量验收单 HYBN-T6-07-0091-001-2018

7.2.3 Record for Coating Anti-corrosion Construction (HYBN-T6-07-0092-001-2018)

涂料防腐施工记录单 HYBN-T6-07-0092-001-2018

7.2.4 Records for Thickness Measurement (HYBN-T6-07-0093-001-2018)

测厚记录表 HYBN-T6-07-0093-001-2018

8 Supplementary Rules

附则

8.1 This System is under the jurisdiction of Equipment Management Dept.

本制度由机械动力部归口管理。

8.2 This System is drafted by Equipment Management Dept.

本制度起草部门：机械动力部。

8.3 Equipment Management Dept. is responsible for the interpretation of this System.

本制度解释权归机械动力部拥有。

8.4 Revision, preparation and approval of the System are shown in Table 2:

本制度版本编制和审批情况见表 2:

Table 2 Revision, preparation and approval of document

表 2 文件版本编制和审批情况

1	2018-12-31	Zhang Lei 张磊	Tong Xueyun 童雪云	Xu Ye 徐野	Chen Liancai 陈连财
Revision 版本	Issued date 颁布日期	Prepared by 编制人	Reviewed by 审核人	Authorized by 审定人	Approved by 批准人



Hengyi Industries Sdn Bhd
恒逸实业（文莱）有限公司

HYBN-T3-07-0012-2018-1

Real Estate Management System of Fixed Assets

固定资产实物管理制度

Issued Date: Dec. 2018

颁布日期：2018 年 12 月

 HENGYI	Hengyi Industries Sdn Bhd 恒逸实业（文莱）有限公司			
	Real Estate Management System of Fixed Assets			
	固定资产实物管理制度			
Doc No.	HYBN-T3-07-0012-2018-1	Ver No.	1	Page 1 of 14

1 Purpose

目的

The System is hereby formulated in order to standardize the real estate management of fixed assets and to realize the systematism and process-oriented of fixed asset management.

为规范固定资产的实物管理，使固定资产管理实现制度化、流程化，特制订本制度。

2 Scope of Application

适用范围

This System is applicable to all departments of the Company.

本制度适用于本公司各部门。

3 Terms and Definitions

术语和定义

3.1 Fixed assets: refers to tangible assets with all the following characteristics:

固定资产：指同时具有下列特征的有形资产：

3.1.1 Assets holding for production of goods, provision of labor, lease or operation management.

为生产商品、提供劳务、出租或经营管理而持有的。

3.1.2 Making life longer than one fiscal year.

使寿命超过一个会计年度。

3.2 Individual fixed assets: refers to the smallest asset unit directly managed by the enterprise.

An individual fixed asset can function independently, and it consists of a single or multiple devices (or real estates).

单项固定资产：指企业直接管理的最小资产单元，单项固定资产能够独立发挥作用，它由单台或多台设备（或实物）共同组成。

3.3 Asset group: refers to an individual fixed asset combination with independent cash flow and independent management. It can be a refining & petrochemical production plant, or oil, gas & water gathering & transportation facilities, tanks, filling stations, and kinds of assets of similar production plants.

资产组：指具有独立现金流量和独立管理的单项固定资产组合，可以是一套炼化生产装置，或是类同生产装置管理的油气水集输设施类、油罐、加油站，以及资产类别等。

3.4 Production plant: refers to an equipment combination with complex structure and some independent function. The production plant is a complete set of equipment or equipment combination that has a certain production and operation capability and provides services for oil exploitation, refining, processing and product sales in a relatively independent management manner.

生产装置：指结构复杂并具有某种独立功能的设备组合。生产装置是具有一定生产经营能力、相对独立管理的为石油开采、提炼、加工和产品销售提供服务的成套设备或设备组合。

3.5 Equipment: refers to the smallest unit of machines, pipes, systems, instruments and facilities that can be used and managed independently for the production and operation of the enterprise from a real estate perspective.

设备：指从实物角度为企业生产、经营所用的能相对独立使用和管理的最小机器、管道、系统、仪器、设施等单元。

3.6 Master equipment: refers to a device or device group that meets the confirming standards for an individual fixed asset.

主设备：指符合单项固定资产确认条件的设备或设备组。

3.7 Auxiliary equipment: refers to equipment that does not meet the confirming conditions for fixed assets; the equipment should be installed on the master equipment or together with the main equipment to play a role in independent function of the master equipment. For example, for pipeline of the individual fixed asset, the pipeline is the master equipment, and the valve is the auxiliary equipment; for pump of the single fixed asset, the pump body is the master equipment, and the motor is the auxiliary equipment.

附属设备：指不符合固定资产确认条件的设备，并且安装在主设备上，或与主设备共同构成独立发挥主设备作用的设备。例如，单项固定资产管线中的管线为主设备，阀门为附属设备；单项固定资产泵中的泵体为主设备，电机为附属设备。

4 Management Responsibilities

管理职责

4.1 Specified administrative authority

归口管理部门

4.1.1 The Equipment Management Dept. is the real estate administrative department for fixed assets. It is responsible for formulating the real estate management system of fixed assets and participating in the fixed assets management and records establishing.

机械动力部是固定资产实物管理部门，负责制定固定资产实物管理制度，参与固定资产管理和台账建立。

4.1.2 The department shall organize the assets possessors and administrative department of all disciplines to check and confirm the assets of the engineering project.

组织资产所属单位和专业管理部门，对工程项目资产进行核对、确认。

4.1.3 It shall participate in the ownership division of the fixed assets.

参与固定资产的归属划分。

4.1.4 It is responsible for reviewing the change requests for fixed asset master data.

负责审核固定资产主数据变更申请。

4.1.5 It should organize the inventory check and technical evaluation on real estate fixed assets and the allocation of fixed assets.

组织固定资产实物清查盘点、技术鉴定以及固定资产的调拨。

4.2 Coordinated management departments

协同管理部门

4.2.1 The Finance Dept. is responsible for the inventory profit, inventory shortage and depreciation accounting handling of the fixed asset value; it is responsible for maintaining the fixed assets in the ERP system and establishing fixed asset records.

财务管理部负责固定资产价值的盘盈、盘亏、折旧账务处理；负责对固定资产在 ERP 系统中的维护并建立固定资产台账。

4.2.2 The Materials Supply Dept. is responsible for the procurement of real estate fixed assets, in conjunction with the delivery of fixed assets, as well as the annual inventory of warehoused idle equipment.

物资装备部负责实物固定资产的采购，配合固定资产的交付；对闲置入库的设备进行年度盘点。

4.2.3 The Scheduling & Dispatch Dept. is responsible for the idleness and activation approval of the complete set of production plant.

计划调度部负责成套生产装置的闲置、启用审批。

4.2.4 The GM's Office is responsible for the ownership division of the fixed assets.

总经理办公室负责固定资产的归属划分。

4.5 Executive departments

执行部门

4.5.1 Each operation department is the executive department.

各运行部门为执行部门。

4.5.2 The department is responsible for establishing records for real estate fixed assets, implementing the leader-in-charge of real estate assets, participating in the on-site handover acceptance confirmation of new fixed asset real estate, and taking charge of the combination of assets.

负责建立固定资产实物台帐，落实实物资产的管理人，参加新增固定资产实物现场交接验收确认，负责资产的组合工作。

4.5.3 It is responsible for maintenance of the fixed assets of the department and formulating the repair plan for the fixed assets of the department.

负责本单位固定资产的维护保养工作，负责制定本单位固定资产的修理计划。

4.5.4 The department is responsible for idleness and scrapping applications for fixed assets and production plants.

负责提出固定资产、生产装置的闲置、报废申请。

4.5.5 It is responsible for the daily management of fixed asset real estate.

负责固定资产实物的日常管理。

5 Management Content

管理内容

5.1 Principle of ownership division of fixed assets

固定资产归属划分原则

5.1.1 The ownership division of fixed assets shall be based on the principle of combining dependency administration with management of discipline, that is, “the department who uses and manages the assets on a daily basis owns them”.

固定资产划分按照属地管理与专业管理相结合的原则，遵循谁日常使用管理，谁所有。

5.1.2 All fixed assets in the area where the operating plant is located are managed by the operation department of the same location.

运行装置所在区域内的所有固定资产，均归所在运行部管理。

5.1.3 Separately operated substations and fixed assets between the cabinets are managed by the Electrical Operation Dept. and the Instrument Control Dept. respectively.

单独运行的变电所、机柜间固定资产分别归电气运行部、仪控部管理。

5.1.4 System pipeline corridor: the pipeline corridors with the operation plant area are assigned to each operation department for management; the pipeline corridors within the tank farm and eastern and western jetties are assigned to the Port and Storage Department; the pipeline corridors outside the plant boundary area (except for the Port and Storage Department) are assigned to the Utilities Dept.

系统管廊：运行装置内的划归各运行部管理，罐区、东西部码头的系统管廊划归储运部，装置界区以外的除港务储运部外的均划归公用工程部。

5.1.5 Inter-plant roads: the road assets within the plant boundary area of each operation department are managed by each operation department; the roads within the tank farm and the jetty are managed by the Port and Storage Department; other roads are managed by the Utilities Dept.

厂际道路：各运行部装置区域内道路资产归各运行部管理，罐区、码头道路划归港务储运部管理，其它道路均归公用工程部管理。

5.2 Daily management of fixed asset real estate

固定资产实物的日常管理

5.2.1 The Equipment Management Dept. shall organize the fixed assets possessors to establish the *Records for Real Estate Management of Fixed Assets* to record the changes in fixed assets in a timely, accurate and complete manner.

机械动力部应组织固定资产所属单位建立《固定资产实物管理台帐》，及时、准确、完整记录固定资产变动情况。

5.2.2 After the fixed assets adjustment and update, the assets possessors should adjust and check the relevant data in a timely manner.

固定资产调整更新后，资产所属部门应及时调整核对相关数据。

5.2.3 The real estate management of fixed assets of the fixed assets possessors shall be assigned to individual with various responsibilities. When receiving the public fixed assets, registration should be made on the *Registration Form for Equipment Requisition*.

固定资产所属单位的固定资产实物管理应落实责任到人。对于公用固定资产领用时，应在《设备领用登记表》上进行登记。

5.3 Real estate management of new fixed asset

新增固定资产的实物管理

5.3.1 The new fixed assets group shall be divided and combined in accordance with the relevant provisions of the Finance Dept.

新增固定资产组按照财务管理部相关规定划分和组合。

5.3.2 For new fixed assets, the Equipment Management Dept. is responsible for organizing the fixed assets possessors and administrative department of all disciplines to review and confirm them one by one according to the principle of combination. The Finance Dept. and the Materials Supply Dept. will improve the asset value according to the combination list. After the review and confirmation, the official *Delivery List of Fixed Asset Real Estate* will be formulated and submitted to the Finance Dept. The Finance Dept. will create new fixed assets accordingly.

新增固定资产由机械动力部负责组织固定资产所属单位及专业管理部门，按组合原则逐一进行审核确认，财务管理部、物资装备部按照组合清单完善资产价值。经审核确认后，形成正式《固定资产实物交付清单》交财务管理部，财务管理部据此创建新增固定资产。

5.3.3 For fixed assets that are transferred or transformed, the Finance Dept. will improve the fixed assets records based on the data and information of the original value of the assets.

资产转资、改造的固定资产，由财务管理部依据该资产原始价值的数据和信息完善固定资产台账。

5.4 Fixed assets inventory profit

固定资产盘盈

5.4.1 In the case of fixed assets inventory profit, the assets possessors shall be responsible for finding out the reasons for inventory profit and filling out the *Application Form for Inventory*

Profit of Fixed Assets with the relevant profit information attached, and report them to the Equipment Management Dept.

固定资产发生盘盈，由资产所属单位负责查明盘盈原因，并填写《固定资产盘盈申请表》，附上相关的盘盈资料上报机械动力部。

5.5 Internal allocation of fixed assets

固定资产内部调拨

5.5.1 Due to production reasons and needs, the departments in the Company can carry out internal allocation of the fixed assets. During the fixed assets allocation, the consent of the Parties shall be obtained in advance, and the department who receives the assets shall fill out the *Internal Allocation Form for Fixed Assets*. After review of the Equipment Management Dept., the Finance Dept. shall handle the accounting procedures in accordance with the *Internal Allocation Form for Fixed Assets*.

因生产原因需要，公司内部各单位可进行固定资产实物的内部调拨，固定资产进行调拨时须事先征得调出双方同意，由调入部门填写《固定资产内部调拨单》，经机械动力部审核，财务管理部依据《固定资产内部调拨单》办理账务手续。

5.6 Idleness of fixed assets

固定资产的闲置

5.6.1 Due to production transformation, process changes and other reasons, production equipment that is no longer in use for a predictable period of time shall be promptly handled for fixed assets idleness procedures.

因生产改造、工艺变更等原因，在可预期的时间里暂不再使用的生产设备应及时办理固定资产闲置手续。

5.6.2 The Finance Dept. shall perform the accounting handling of idle fixed assets according to the idleness or activation procedures approved by the Equipment Management Dept.

财务管理部依据机械动力部批准的闲置或启用手续进行闲置固定资产的帐务处理。

5.6.3 Idleness of single device

单台设备的闲置

5.6.3.1 The asset possessor must ensure that the idle equipment is in good condition, and fill out the *Application for Idle Fixed Assets*, and handle the idleness procedures after approval of the Equipment Management Dept. If a single device cannot be warehoused due to its large size or other reasons, it should be idle on site.

资产所属单位必须保证闲置设备的完好，并填写《固定资产闲置申请单》，经机械动力部审核同意后办理闲置手续。单台设备因体积大或其它原因而无法入库保管的，应现场闲置。

5.6.3.2 For fixed assets that are idle in warehouse and idle on site, the Materials Supply Dept. and the original user shall be responsible for maintenance, maintaining and establishment of

records for idle equipment.

入库闲置和现场闲置的固定资产分别由物资装备部、原使用单位负责维护、保养，建立闲置设备的台帐。

5.6.3.3 When the idle equipment is re-activated, the asset possessor shall fill out the *Application for Fixed Assets Activation*, and the equipment can be activated only after approval of the Equipment Management Dept.

闲置设备重新启用时，资产所属单位应填写《固定资产启用申请单》，经机械动力部审批同意后方可启用。

5.6.3.4 For idle equipment with an idle period of more than 3 years, the Equipment Management Dept. shall organize various disciplines for technical evaluation and fill out the *Application Form for Technical Evaluation and Scrapping Assessment of Fixed Assets*. The equipment can be activated only after approval of the leaders-in-charge.

闲置设备闲置年限超过 3 年的，需经机械动力部组织各专业进行技术鉴定，填写《固定资产技术鉴定及判废申请表》，经主管领导审批同意方可后启用。

5.6.4 Idleness of production plant

生产装置的闲置

5.6.4.1 If the production plant needs to be turned to idle state for a long period of time due to special reasons, the plant possessor shall fill out the *Application for Idleness of Production Plant* (the operation department is responsible for process handling). After review of the Scheduling & Dispatch Dept. and the Equipment Management Dept. and approval of the deputy leaders-in-charge of the Company, the production plant can be turned to idle state.

因特殊原因需将生产装置处于长期停产的闲置状态，由装置所在单位填写《生产装置闲置申请单》（运行部工艺负责办理），经计划调度部、机械动力部审核，公司分管领导审批同意后，方可将生产装置闲置。

5.6.4.2 The asset possessor shall be responsible for the routine maintenance of the idle production plant.

闲置生产装置由资产所属单位进行日常维护、保养等工作。

5.6.4.3 When the production plant is put into use again, the user shall submit a written application report and prepare an activation scheme for production plant. The plant shall not be put into use until it is countersigned and approved by the Scheduling & Dispatch Dept. and the Equipment Management Dept., and finally approved by the deputy leaders-in-charge of the Company.

当生产装置再次投入使用时，须由使用单位提出书面申请报告并编制生产装置启用方案，经计划调度部、机械动力部会签同意，最后由公司分管领导审批同意后投入使用。

5.6.5 Inspection and annual inventory of idle equipment

闲置设备的检查及年度盘点

5.6.5.1 The Equipment Management Dept. is responsible for inspection of the maintenance situation of idle equipment throughout the Company.

机械动力部负责对全公司范围内的闲置设备的维护、保养等情况进行检查。

5.6.5.2 At the end of each year, inventory check should be conducted for idle fixed assets. For assets that have been idle in warehouse for more than 3 years, the Materials Supply Dept. and the asset possessor shall summarize the assets that are idle in warehouse and idle on site into volumes respectively, and submit them to the Equipment Management Dept. before January 20 of the following year. The Equipment Management Dept. should organize the demonstration on them and propose disposal opinions. The idle fixed assets that have been technically identified as scrapped shall be disposed of in accordance with the fixed assets scrapping process.

每年年末应对闲置的固定资产进行清查盘点，对在库闲置时间超过 3 年的，物资装备部、资产所属部门应分别对在库闲置和现场闲置的资产汇总成册，在次年 1 月 20 日前交机械动力部，由机械动力部组织对其进行论证并提出处置意见。经技术鉴定为报废的闲置固定资产，按固定资产报废流程处理。

5.6.6 Daily management of idle assets

闲置资产的日常管理

5.6.6.1 Idle assets must be in good condition. Special storage requirements shall be organized and implemented by the asset possessor.

闲置资产必须处于完好状态。特殊存放要求由资产所属单位负责组织落实。

5.6.6.2 The manager of idle assets shall perform regular maintenance on idle equipment. For idle equipment, equipment maintenance should be carried out according to the integrity standard; for rotating equipment, lubrication and turning gear conditions should be checked regularly; for static equipment, if there are closed conditions, nitrogen protection or other anti-corrosion measures should be carried out, and record of periodic inspection shall be completed.

闲置资产的管理单位对闲置设备进行定期保养。对闲置的设备应按照完好性标准，做好设备维护保养工作，对于动设备要定期检查润滑和盘车情况；对于静设备有封闭条件的要进行充氮保护或其他防腐措施，并做好定期检查记录。

5.6.6.3 A single idle device shall be marked with “idle equipment”; the complete set of idle devices shall be zoned for isolation with “No Entry”. If available, the equipment should be covered with a plastic cloth to protect it from wind and rain.

单台闲置设备应有“闲置设备”标识；成套装置闲置应划定区域进行隔离并设置禁入标识。有条件的设备应盖上塑料布防风雨。

5.6.6.4 The idle asset possessor should complete a weekly patrol inspection of idle equipment and a special inspection of outdoor storage equipment under special weather conditions, and complete a record of the inspection; the Equipment Management Dept. shall check the maintenance and safekeeping of idle equipment on site and in warehouse every year.

闲置资产所属部门应对闲置设备做好一周一次巡回检查及特殊天气下户外存放设备的专项检查，并做好检查情况记录；机械动力部对现场闲置和仓库闲置设备维护保养、保管情况每年进行检查。

5.7 Inventory shortage of fixed assets

固定资产盘亏

5.7.1 For lost, stolen and unaccounted fixed assets, the original asset possessor should analyze the reasons and identify the responsible person for the inventory shortage, and fill out the *Application Form for Inventory Shortage of Fixed Assets* together with the relevant information and handling opinions to submit to the Equipment Management Dept. for review. The Equipment Management Dept. shall review them and report them to the Finance Dept.

对于丢失、被盗以及无法说明去向等固定资产，原资产所属单位须分析原因、落实盘亏的责任人，同时填写《固定资产盘亏申请表》并附相关的资料及处理意见提交机械动力部审核，经机械动力部审核后报财务管理部。

5.7.2 For the approved inventory shortage assets, the fixed assets possessor shall adjust the real estate assets records in time to ensure that the records match the assets.

对经批准的盘亏资产，固定资产所属单位要及时调整实物资产台帐，确保帐物相符。

5.8 Scrapping of fixed assets

固定资产报废

5.8.1 Approval of assets scrapping assessment and scrapping

资产的判废与报废审批

5.8.1.1 The scrapping of fixed assets should meet at least one of the following conditions:

固定资产报废应至少满足以下条件之一：

(1) The asset has reached the service life and has lost the original use effectiveness with no repair value.

资产预计使用年限已满且丧失原使用效能，无修复价值的。

(2) Assets with backward technology, poor quality, high energy consumption and low efficiency are already out-of-date and are not suitable for continued use, or technical indicators have not met the requirements for use.

技术落后，质量差，耗能高，效率低，已属淘汰且不适于继续使用，或技术指标已达不到使用要求的。

(3) The change or update of technical conditions makes the assets need to be dismantled, or the assets have no transformation value and no use direction.

技术条件改变或更新需拆除的，无改造价值且又无使用去向的。

(4) The asset has been severely damaged and cannot be repaired, or it can be repaired but the cumulative repair cost is close to or exceeds its market value.

严重损坏无法修复的，或虽能修复但累计修理费已接近或超过市场价值的。

(5) The asset has serious defects or security risks and cannot be repaired.

存在严重缺陷或安全隐患且无法修复的。

(6) The asset can not reach the rated performance or the failure rate is high, and the

cumulative annual maintenance cost is more than 70% of the value of similar new equipment.
无法达到额定性能或故障率高并且年检修累计费用达到同类新设备价值 70%以上的。

(7) Assessed by the relevant departments, the equipment does not meet the requirements for safety, environmental protection and energy conservation, and cannot be repaired and utilized.
经有关部门鉴定，设备不符合安全、环保、节能要求，又不能修复利用的。

(8) A structure that has been in disrepair for a long time and the structural strength does not meet the seismic standards and cannot be repaired.

年久失修，结构强度不符合抗震标准，也不能修复的构建筑物。

(9) The assets have reached the scrapping conditions stipulated by relevant standards and regulations.

达到有关标准、法规规定的报废条件的。

5.8.1.2 Prior to the scrapping of important equipment, the Equipment Management Dept. shall take the lead in organizing the establishment of a technical team to conduct the technical evaluation for scrapping; before the scrapping of general equipment, the user shall take the lead in organizing the establishment of a evaluation team to conduct the technical evaluation for scrapping, with the participation of the Equipment Management Dept. The *Application Form for Technical Evaluation and Scrapping Assessment of Fixed Assets* shall be filled out by the asset possessor, and the evaluation team shall sign the evaluation conclusion on the *Application Form for Technical Evaluation and Scrapping Assessment of Fixed Assets*.

重要设备报废前由机械动力部牵头组织成立技术小组，进行判废技术鉴定；一般设备报废前由使用单位牵头组织成立鉴定小组，进行判废技术鉴定，机械动力部参与。《固定资产技术鉴定及判废申请表》由资产所属单位填写，鉴定小组在《固定资产技术鉴定及判废申请表》上签署鉴定结论。

5.8.1.3 After approval of the *Application Form for Technical Evaluation and Scrapping Assessment of Fixed Assets* level by level, the scrapping of fixed assets can take effect, subject to the actual dismantling conditions of the assets. Before dismantling of the fixed assets, it should be confirmed that the alternative assets have been put in place or the assets can be removed without affecting the normal operation of the plant. After the assets are dismantled, the relevant information should be fed back to the Equipment Management Dept., and the dismantled assets will be delivered to the Materials Supply Dept. for storage. After the dismantling, the fixed assets possessor shall inform the Finance Dept. for asset cancel after verification.

固定资产的报废是在《固定资产技术鉴定及判废申请表》经逐级审批之后生效，以资产实际拆除为准。固定资产拆除前应确认替代资产已到位或资产拆除后不影响装置正常运行。资产拆除后将信息反馈给机械动力部，将拆除的资产交物资装备部进行保存。拆除后由固定资产所属部门告知财务管理部，财务管理部办理资产核销。

5.8.1.4 Fixed assets must not be destructively dismantled before they are approved for scrapping.

固定资产在报废批准前一律不得破坏性拆除。

5.8.1.5 Fixed assets that have been dismantled due to scrapping shall not be used any more. Without special reason, the fixed assets may not be retained by the department and shall be stored in the temporary transit warehouse of solid waste. The complete machine that is identified as scrapped fixed assets shall not be used for production. After the approval of the Equipment Management Dept., its accessories may be removed for use.

经报废拆除的固定资产，不得继续使用。没有特殊原因，本部门不允许自行留存，一律存放到固体废物临时中转库。报废固定资产整机不得用于生产，经机械动力部审核同意后可拆配件使用。

5.8.2.6 For fixed assets with fixed scrapping years or service life, if there is no residual value after asset depreciation, the asset administrative authority may inform the Finance Dept. to handle the procedures for asset cancel after verification.

固定资产存在固定报废年限或使用寿命的，经资产折旧后无残余价值的，可由资产管理部门告知财务管理部办理资产核销手续。

5.8.2 Handover and management of scrapped assets

报废资产的移交及管理

5.8.2.1 The asset possessor should complete the fixed assets safekeeping before the handover, and ensure the integrity of the relevant assets to prevent defects. At the same time, the handover list of the asset possessor should correspond to the real estate of the scrapped fixed assets and be confirmed by the Materials Supply Dept.

资产所属部门做好报废固定资产移交之前的保管工作，应确保相关资产的完整，防止缺损。同时资产所属部门的移交清单应与报废固定资产实物对应，并与物资装备部确认。

5.8.2.2 After the fixed assets are scrapped, the asset possessor shall fill out the *Handover List of Fixed Assets and Waste and Old Materials for Disposal*, and hand over them to the Materials Supply Dept. for disposal uniformly after the completion of handling. The Materials Supply Dept. shall do a good job in the safekeeping of the scrapped fixed assets that have been handed over.

固定资产在报废后，应由资产所属部门填写《固定资产、废旧物资待处置移交单》，办理完后统一移交物资装备部处置，物资装备部应做好已移交后的报废固定资产保管工作。

5.8.2.3 When dismantling the fixed assets of the immovable building (structure), the project management department is responsible for the dismantling of the old buildings, and the project management department shall lead the Materials Supply Dept. and relevant departments to formulate a reasonable asset disposal scheme for the relevant waste and old materials. The asset possessor and the project management department shall supervise the Construction Contractor to clean, load and transport the waste and old materials and construction waste materials according to the disposal scheme.

对于不可移动的建（构）筑物固定资产拆除时，由项目管理部门负责对旧建筑物进行拆除，相关废旧材料由项目管理部门牵头物资装备部以及相关部门制定合理的资产处置方案。资产所在部门和项目管理部门应按处置方案，监督施工单位对废旧物资以及建筑垃圾的清理、装车、拉运。

5.8.2.4 After completion of the scrapping procedures for the assets of the engineering equipment, the asset possessor must fill out the *Handover List of Fixed Assets and Waste and*

Old Materials for Disposal. After confirmation by the asset possessor and the Equipment Management Dept., the Materials Supply Dept. shall handle the handover procedures and conduct disposal in accordance with the relevant regulations of the Brunei government.

工程设备资产在报废手续完成后，资产所属单位须填写《固定资产、废旧物资待处置移交单》，经资产所属部门、机械动力部确认后向物资装备部办理移交手续，物资装备部应根据文莱政府有关规定进行处置。

5.8.2.5 For fixed assets that the used equipment needs to be dismantled in large quantities due to plant shutdown overhaul and technical transformation, etc., the Equipment Management Dept. shall lead the relevant department to conduct pre-dismantling confirmation before dismantling them at the plant site. After confirmation, the asset possessor shall fill out the *Handover List of Fixed Assets and Waste and Old Materials for Disposal* and proceed with the disposal in accordance with the maintenance or technical transformation scheme for the maintenance plant uniformly.

对于装置停工大修和技术改造等原因需拆除大批量的废旧设备等固定资产，应由机械动力部牵头相关部门在拆除前在装置现场进行设备拆除前的确认，确认后由资产所属单位填写《固定资产、废旧物资待处置移交单》，按照检修装置检修或技术改造方案统一进行处置。

5.8.2.6 The asset possessor shall be responsible for timely sending the list of scrapped fixed assets finally approved to the Equipment Management Dept. and Materials Supply Dept. The Materials Supply Dept. shall confirm and count the assets listed in the list, proceed with the disposal in time after confirmation, establish the corresponding disposal records for scrapped fixed assets, and submit the disposal records to the Finance Dept. on January 20 every year.

资产所属部门负责将最终获批的报废固定资产清单及时发给机械动力部和物资装备部，由物资装备部根据清单所列的资产进行确认、清点，物资装备部在确认后及时对外进行处置，并建立相应的报废固定资产处置台账，并将处置台账每年 1 月 20 日交财务管理部。

6 Inspection and Supervision

检查与监督

6.1 The Equipment Management Dept. shall be responsible for supervising the whole process management of fixed assets, and notifying the problems and urging them for rectification.

机械动力部对固定资产全过程管理进行监督，并对相关问题进行通报，督促其整改。

6.2 All departments of the Finance Dept. are responsible for supervising the disposal, inventory profit & shortage and allocation of fixed assets, and checking the accounting of fixed assets.

财务管理部各部门对固定资产的处置、盘盈亏、调拨进行监督，负责对固定资产的账务的检查。

7 Associated Procedures and Records

关联程序和记录

7.1 Associated procedures

关联程序

7.1.1 *Procedures for Technical Evaluation and Scrapping Assessment of Fixed Assets* (HYBN-T2-07-0035-2018-1)

固定资产技术鉴定及判废程序 HYBN-T2-07-0035-2018-1

7.1.2 *Procedures for Scrapping of Fixed Assets* (HYBN-T2-07-0036-2018-1)

固定资产报废审批程序 HYBN-T2-07-0036-2018-1

7.1.3 *Procedures for Implementing of Fixed Assets* (HYBN-T2-07-0037-2018-1)

固定资产报废执行程序 HYBN-T2-07-0037-2018-1

7.1.4 *Procedures for Technical Evaluation of Fixed Assets* (HYBN-T2-07-0038-2018-1)

固定资产技术鉴定程序 HYBN-T2-07-0038-2018-1

7.1.5 *Procedures for Delivery and Use Management of Fixed Assets* (HYBN-T2-07-0039-2018-1)

固定资产交付使用管理程序 HYBN-T2-07-0039-2018-1

7.1.6 *Procedures for Allocation Management of Fixed Assets* (HYBN-T2-07-0040-2018-1)

固定资产调拨管理程序 HYBN-T2-07-0040-2018-1

7.1.7 *Procedures for Idleness Management of Fixed Assets* (HYBN-T2-07-0041-2018-1)

固定资产闲置管理程序 HYBN-T2-07-0041-2018-1

7.1.8 *Procedures for Activation Management of Idle Fixed Assets* (HYBN-T2-07-0042-2018-1)

闲置固定资产启用管理程序 HYBN-T2-07-0042-2018-1

7.2 Associated records

关联记录

7.2.1 *Records for Real Estate Management of Fixed Assets* (HYBN-T6-07-0098-001-2018)

固定资产实物管理台帐 HYBN-T6-07-0098-001-2018

7.2.2 *Registration Form for Equipment Requisition* (HYBN-T6-07-0105-001-2018)

设备领用登记表 HYBN-T6-07-0105-001-2018

7.2.3 *Delivery List of Fixed Asset Real Estate* (HYBN-T6-07-0102-001-2018)

固定资产实物交付清单 HYBN-T6-07-0102-001-2018

7.2.4 *Application Form for Inventory Profit of Fixed Assets* (HYBN-T6-07-0103-001-2018)

固定资产盘盈申请表 HYBN-T6-07-0103-001-2018

7.2.5 *Internal Allocation Form for Fixed Assets* (HYBN-T6-07-0104-001-2018)

固定资产内部调拨单 HYBN-T6-07-0104-001-2018

7.2.6 Application for Idleness of Fixed Assets (HYBN-T6-07-0106-001-2018)

固定资产闲置申请单 HYBN-T6-07-0106-001-2018

7.2.7 Application for Activation of Fixed Assets (HYBN-T6-07-0108-001-2018)

固定资产启用申请单 HYBN-T6-07-0108-001-2018

7.2.8 Application for Idleness of Production Plant (HYBN-T6-07-0107-001-2018)

生产装置闲置申请单 HYBN-T6-07-0107-001-2018

7.2.9 Application Form for Inventory Shortage of Fixed Assets (HYBN-T6-07-0101-001-2018)

固定资产盘亏申请表 HYBN-T6-07-0101-001-2018

7.2.10 Application Form for Technical Evaluation and Scrapping Assessment of Fixed Assets (HYBN-T6-07-0099-001-2018)

固定资产技术鉴定及判废申请表 HYBN-T6-07-0099-001-2018

7.2.11 Handover List of Fixed Assets and Waste and Old Materials for Disposal (HYBN-T6-07-0100-001-2018)

固定资产、废旧物资待处置移交单 HYBN-T6-07-0100-001-2018

8 Supplementary Rules**附则**

8.1 This System is under the jurisdiction of Equipment Management Dept.

本制度由机械动力部归口管理。

8.2 This System is drafted by Equipment Management Dept.

本制度起草部门：机械动力部。

8.3 Equipment Management Dept. is responsible for the interpretation of the System.

本制度解释权机械动力部拥有。

8.4 Revision, preparation and approval of this System are shown in Table 1:

本制度版本编制和审批情况见表 1:

Table 1 Preparation and approval of the System**表 1 本制度编制和审批情况**

1	2018-12-31	Dang Zhanjun 档占军	Tong Xueyun 童雪云	Xu Ye 徐野	Chen Liancai 陈连财
Revision 版本	Issued date 颁布日期	Prepared by 编制人	Reviewed by 审核人	Authorized by 审定人	Approved by 批准人



Hengyi Industries Sdn Bhd
恒逸实业（文莱）有限公司

HYBN-T3-07-0013-2018-1

Civil Engineering Management System

土建工程管理制度

Issued Date: Dec. 2018

颁布日期：2018 年 12 月

 HENGYI	Hengyi Industries Sdn Bhd 恒逸实业（文莱）有限公司			
	Civil Engineering Management System 土建工程管理制度			
	Doc No.	HYBN-T3-07-0013-2018-1	Ver No.	1

1 Purpose

目的

The System is hereby formulated in order to standardize the maintenance and repair management of buildings, structures, equipment foundation, roads, floors, fire (water) embankment, rainwater ditches, and pipe corridors and supports of the Company, groundbreaking work and the management of stacked objects on the ground.

为了规范公司建筑物、构筑物、设备基础、道路、地坪、防火（水）堤、雨水沟、管廊管架等维护维修管理、破土作业及地面堆放物管理，特制订本制度。

2 Scope of Application

适用范围

This System applies to all involved departments.

本制度适用于各部门。

3 Terms and Definitions

术语和定义

3.1 Pipe corridor and support: divided into installation pipe corridor and support and system pipe corridor and support. The installation pipe corridor and support refers to the pipe corridor and support inside a certain installation boundary; the system pipe corridor and support refers to the pipe corridor and support outside each installation boundary.

管廊管架：分为装置管廊管架和系统管廊管架。装置管廊管架是指某一装置界区内的管廊管架；系统管廊管架是指各装置界区外的管廊管架。

3.2 Ground-breaking work: including foundation excavation of buildings and structures, laying underground pipelines, laying buried cables, road and ground excavation, greening and transplanting, piling, pier and pole erecting, trench excavation, well digging, drilling, blasting, etc.

破土作业：凡建、构筑物基础开挖、埋设地下管线、敷设埋地电缆、道路和地面开挖、绿化移植、打桩、立墩立杆、开挖沟渠、掘井、钻孔、爆破等均属破土作业。

4 Management Responsibilities

管理职责

4.1 Specified administrative authority

归口管理部门

4.1.1 The Equipment Management Dept. is the specified administrative authority for the construction and maintenance of civil engineering such as buildings, structures, equipment foundation, roads, floors, fire (water) embankment, rainwater ditches, and pipe corridors and supports of the Company, shall be responsible for the maintenance and construction management of civil engineering construction projects, define the real estate jurisdiction of the civil engineering disciplines of each department, formulate management systems, and supervise the implementation of the systems.

机械动力部为公司所属建筑物、构筑物、设备基础、道路、地坪、防火（水）堤、雨水沟、管廊管架等土建工程施工及维护归口管理部门，负责土建施工项目检修施工管理，界定各部门土建专业实物管辖范围，制订管理制度，并监督制度的执行。

4.1.2 It shall organize and formulate the defect repair scheme for the Company's civil engineering real estate, be responsible for the permission approval of the groundbreaking work within the jurisdiction of the Company, and organize the completion acceptance.

组织制定公司土建实物的缺陷修复方案，负责公司管辖区域范围内破土作业的许可审批，并组织竣工验收。

4.2 Coordinated management departments

协同管理部门

4.2.1 HSE Dept. shall be responsible for the safety and fire supervision and inspection at the construction site, promptly put a stop to all kinds of groundbreaking work behaviors against the rules, assess and punish construction contractors or individuals that cause accidents such as casualties, equipment damage, production shutdown, etc. due to violations of groundbreaking work regulations, and urge the operation department to deal with the potential safety hazards of rainwater open ditch to prevent pollution incidents.

HSE 管理部负责施工现场的安全、消防监督检查工作，及时制止各类违章破土作业行为，对因违反破土作业规定，而造成人员伤亡，设备损坏，生产停工等事故的施工单位或个人进行考核及处罚；督促运行部处理雨水明沟安全隐患，防止污染事件发生。

4.2.2 GM's office is responsible for the management of roads and off-site roads outside the areas under the jurisdiction of the each operation department in the production area, including road patrol inspection, cleaning and housekeeping, maintenance coordination and other management work. It is responsible for implementing the greening policy required for construction and participating in the completion acceptance of civil engineering projects.

总经理办公室负责生产区各运行部所辖区域以外道路、厂外道路管理，包括道路巡检、清扫保洁、维修协调等管理工作。负责落实因施工需要的涉绿政策，参加土建工程项目竣工验收。

4.2.3 Electrical Operation Dept., Instrument Control Dept., Utilities Dept., Port and Storage Department, HSE Dept. and GM's office all participate in the permission countersigning of the groundbreaking work.

电气运行部、仪表控制部、公用工程部、港务储运部、HSE 管理部、总经理办公室参与破土作业许可会签工作。

4.3 Executive departments

执行部门

4.3.1 Each department of the Company is the executive department, responsible for the daily inspection, maintenance and repair of the civil engineering facilities and its accessories managed by the department, ensuring its integrity, and establishing and improving the basic information.

公司各部门为执行部门，负责本部门管理的土建设施及其附件的日常检查和维护维修工作，确保完好，建立并完善基础资料。

4.3.2 It is responsible for declaring the repair plan of the civil engineering facilities of the department, completing implementation and coordination of the project; responsible for the construction clarification, quality, safety, schedule and settlement of the project site, and participating in the completion acceptance of civil engineering projects.

负责申报本部门土建设施的修理计划，并做好项目的实施配合；负责项目现场施工交底、质量、安全、进度、结算等管理；参加土建项目的竣工验收。

4.3.3 It is responsible for issuance of the *Groundbreaking Work Permit* in the jurisdiction of the department.

负责本部门辖区内的破土作业许可证的签发。

5 Management Content

管理内容

5.1 Management of buildings, structures and equipment foundations

建筑物、构筑物、设备基础管理

5.1.1 All users shall complete daily maintenance and care of buildings, structures and equipment foundation, carry out regular inspection, and take measures to solve the defects in structure, anti-seismic, anti-corrosion, anti-lightning, rain-proof and other aspects in a timely manner.

各使用部门应做好建筑物、构筑物、设备基础的日常维护和保养，定期进行检查，对结构、抗震、防锈蚀、防雷击、防雨等方面存在的缺陷，要采取措施，及时解决。

5.1.2 Buildings, structures and equipment foundation shall be used in accordance with the design requirements, and additional loads (including bolting and hoisting tools, anchoring points, equipment or pipes supporting vibration) and any removal or opening are strictly prohibited. Where additional loads, openings or partial dismantling are required due to special circumstances, the specific scheme must be proposed, which can only be carried out if the accounting results meet the relevant regulations.

建筑物、构筑物和设备基础要按设计要求进行使用，严禁增加额外负荷(包括栓挂吊装工具、作锚固点、支撑有振动的设备或管道)和任意拆除或开孔，凡因特殊情况需要增加额外负荷、开孔、部分拆除等，必须提出具体方案，核算结果满足相关规定后方可进行。

5.1.3 Without permission, it is not allowed to dismantle and reconstruct buildings, structures and equipment foundation, and it is not permitted to erect work sheds or construct buildings against the rules in the production area. During the overhaul, if the Construction Contractor needs to temporarily set up work sheds, it must be approved by the department of the project and the Equipment Management Dept before construction. After the overhaul, the work sheds should be dismantled as soon as possible.

未经许可，不准拆除和改建建筑物、构筑物和设备基础等设施；不准在生产区域内私自搭棚或建设违章建筑，大修期间施工单位临时搭设工棚需经项目所在部门和机械动力部同意后才可搭设，大修结束后，尽快拆除工棚。

5.2 Management of roads and floors

道路、地坪管理

5.2.1 Roads must meet the requirements for safe passage of transport vehicles and pedestrians. Vehicles are strictly prohibited from overrun and overloaded. No debris shall be piled up in the road against the rules. For unowned or abandoned buildings or domestic garbage piled up in the road, on both sides of the road and on the subgrade slope, the road possessor shall be responsible for cleaning up.

道路必须满足运输车辆、行人的安全通行，严禁车辆超限、超载行驶。道路内不得违章堆放杂物，对于堆放在道路上、道路两侧及路基边坡无主或被遗弃的建筑或生活垃圾，由道路所属部门组织清理。

5.2.2 Road surface (including subgrade slope) should be smooth, without holes or debris; the shoulder, roadside ditch, roadside guardrail and roadside signs of the road should be kept intact. In case of damage, the road possessor shall organize repair in time.

道路路面(包括路基边坡)要求平整、无坑洞、无块石杂物等，道路的路肩、路边沟、路边护栏、路边标志物等要保持完好无损，若出现损坏，道路所属部门应及时组织修复。

5.2.3 When the roads in the production area need to be broken due to construction, the Construction Contractor shall prepare a construction scheme, and the road groundbreaking work can be carried out only after consent with the road possessor and approval of the Equipment Management Dept.

生产区域内道路因施工需要破土时，施工单位须编制施工方案，经道路所属部门同意，报机械动力部批准后方可进行道路破土作业。

5.2.4 Roadblocks and night warning lights shall be provided during road excavation construction, and steel plates complying with strength requirements shall be laid for temporary traffic. If it is needed to occupy the road, the user should go to the HSE Dept. to handle the road-occupying procedures. After the road is broken, it must be restored in time, with a single-layer bidirectional steel mesh applied for reinforced concrete. In the case of quality problems such as subsidence or cracking after restoring, if it is caused by construction reasons, the Construction Contractor shall be ordered to rework; if it is not caused by construction reasons, the road possessor should promptly report to the Equipment Management Dept., which shall lead the relevant departments to formulate preventive and remedial measures.

道路开挖施工期间，应设置路障和夜间警示灯，临时通行应铺设符合强度要求的钢板。需要占道的，应到 HSE 管理部门办理占道手续。道路破土完毕必须及时恢复，钢筋混凝土采用单层双向钢筋网。恢复后若出现沉陷、开裂等质量问题，若是施工原因引起的责令施工单位返工；若非施工原因引起的，道路所属部门应及时向机械动力部反映，由机械动力部牵头相关部门制定防范、补救措施。

5.2.5 For the covers of cable trenches, rainwater (sewage) ditches, networks and communication facilities on the road surface, the asset possessor shall be responsible for daily patrol inspections. If damage is found, temporary warning protection measures should be carried out immediately and repairs should be arranged in time.

道路路面上的电缆沟、雨水（污水）沟、网络、通讯设施等的盖板由资产隶属部门负责日常巡检，发现有损坏应立即设置临时警示防护措施，及时安排进行维修。

5.3 Management of fire (water) embankment

防火（水）堤管理

5.3.1 The fire (water) embankment must be built according to the design drawings and relevant regulations, and the shape and position of the embankment shall not be arbitrarily modified.

防火（水）堤必须按设计图纸及有关规定砌筑，堤的形状及位置不得任意修改。

5.3.2 Fire (water) embankment must remain intact. If it is necessary to break the embankment, the embankment-breaking procedures must be handled and approved by the Equipment Management Dept. before construction. It is strictly forbidden to break the embankment without permission.

防火（水）堤必须保持完整，若需破堤，须办理破堤手续，经机械动力部批准后方可施工，未经批准严禁破堤。

5.3.3 If the fire (water) embankment does need to be broken, it should be restored in time after construction completion, and the Equipment Management Dept. should organize the acceptance of the restoration quality.

确需防火（水）堤开缺口施工的，施工结束后应及时恢复，机械动力部组织对恢复质量进行验收。

5.4 Management of pipe corridors and supports

管廊管架管理

5.4.1 The asset possessor should establish and improve the basic information of the pipe corridors and supports.

资产隶属部门建立并完善管廊管架基础资料。

5.4.2 The pipe corridors and supports and the accessories shall be inspected regularly and recorded. If the pipe corridors and supports are found to be defective, it should be organized and dealt with in time; in the case of abnormalities such as deformation, inclination and damage, the asset possessor of the pipe corridors and supports should perform corresponding emergency treatment and report them to the Equipment Management Dept.

定期巡检管廊管架及其附件，并做好记录。发现管廊管架存在缺陷，应及时组织处理；发生变形、倾斜、破坏等异常时，管廊管架资产隶属部门应作相应的紧急处理并向机械动力部汇报。

5.4.3 The asset possessor shall declare the overhaul and renewal plan of the pipe corridors and supports and the accessories, complete implementation coordination, and participate in the design joint review and completion acceptance.

申报管廊管架及其附件的大修及更新计划，做好实施配合，参加设计会审和竣工验收。

5.5 Management of rainwater open ditch

雨水明沟管理

5.5.1 The possessor of rainwater open ditch should establish and improve the basic information of rainwater open ditch.

雨水明沟所属部门建立并完善雨水明沟基础资料。

5.5.2 The asset possessor shall ensure that the rainwater open ditch and its accessories are in good condition and safe operation. The rainwater open ditch shall be inspected once a week, including the cleaning and dredging of the ditch, and the records shall be completed. The general violations (such as construction of buildings (structures) above the rainwater open ditch, construction pipe or cable trench through the ditch, garbage stacking, equipment discharging, etc.) found during patrol inspections shall be promptly stopped and reported; for serious violations (man-made damage, severe pollution discharging or garbage stacking, etc.), they shall be reported to the Equipment Management Dept. in a timely manner.

保证雨水明沟及其附件完好、安全运行。每周对雨水明沟进行一次检查，包括对雨水沟的清扫、疏通，并作好记录。对巡检中发现的一般侵害行为(如雨水明沟上修建建（构）筑物、施工管道或电缆沟穿过、堆放垃圾、装置排污等) 应及时制止并上报；对严重侵害行为(人为破坏、严重排污或垃圾堆放等)及时汇报机械动力部。

5.5.3 The asset possessor shall declare the overhaul plan of the rainwater open ditch and its

accessories under its jurisdiction, complete implementation coordination, and participate in the design joint review and completion acceptance.

负责申报所辖雨水明沟及其附件的大修计划，做好实施配合，参加设计会审和竣工验收。

5.6 Management of groundbreaking work

破土作业管理

5.6.1 Work permission requirements

作业许可要求

5.6.1.1 Prior to construction of the groundbreaking work, the *Groundbreaking Work Permit* shall be handled. The *Groundbreaking Work Permit* shall be submitted by the Construction Contractor, examined by the department leader of the construction area, countersigned by the relevant department and approved by the Equipment Management Dept.

破土作业施工前应办理《破土作业许可证》，破土作业许可证由施工单位提出申请，经施工区域所在部门领导审批，相关部门会签，机械动力部批准。

5.6.1.2 The countersigning department shall submit specific requirements to the Construction Contractor according to the geological, hydrological, buried pipeline, buried cable, buried optical cable, and survey marking stake conditions in the construction area.

会签部门应根据施工区域地质、水文、埋地管道、埋地电缆、埋地光缆、测量标桩等情况向施工单位提出具体要求。

5.6.1.3 In case of major emergency or other special reasons, the department in the construction area shall organize relevant departments to confirm the safety of the groundbreaking work on site. Thereafter, the Equipment Management Dept. can directly sign and approve the groundbreaking work.

若遇重大紧急情况或其它特殊原因，由施工区域所在部门组织相关部门现场确认破土作业安全，机械动力部在确认破土作业安全后可直接签批破土作业。

5.6.1.4 The *Groundbreaking Work Permit* is valid for up to 10 days each validity period. It can be postponed twice; after that, the *Permit* is required to be re-applied. If it is necessary to handle the extension of the groundbreaking work time, the Construction Contractor must go to the department in the construction area and the Equipment Management Dept. to go through the procedures with the original *Groundbreaking Work Permit*.

《破土作业许可证》有效期：每次最长不超过 10 天。可延期二次，超过二次需重新办理破土作业许可证。办理延长破土作业时间，施工单位须持原《破土作业许可证》到施工区域所在部门和机械动力部办理手续。

5.6.2 Construction management requirements

施工管理要求

5.6.2.1 The Construction Contractor on groundbreaking shall clarify the person in charge of the site safety, be fully responsible for the construction safety, and set up a special person for safety supervision. Before the groundbreaking construction, the review opinions of the countersigning departments shall be implemented one by one.

破土施工单位应明确现场安全负责人，对施工安全全面负责，并设专人进行安全监护。破土施工前，并逐条落实会签部门的审核意见。

5.6.2.2 During the groundbreaking construction, if the excavation of underground passages affects the ground safety or ground activities affect the safety of the basement, the construction site should be set up with fences and warning signs, and warning lights should be set up at night. If it is necessary to block the road, it shall handle the road-blocking procedures with the HSE Dept.

破土施工期间，应在施工现场设置围栏及警告牌，夜间设置警示灯，如挖地下通道而影响地上安全或地面活动影响地下室安全时，如需堵路时应到 HSE 管理部门办理堵路手续。

5.6.2.3 If the Construction Contractor needs to be conduct construction in pits, ditches, troughs, wells and tunnels, the safety management regulations for entering restricted spaces should be strictly enforced to ensure the safety of the operators.

施工单位如需在坑、沟、槽、井、地道内施工，应严格执行进入受限空间作业安全管理规定，确保作业人员安全。

5.6.2.4 Landslides and collapses should be prevented during groundbreaking excavation. Ground and underground drainage should be completed before groundbreaking excavation. During the excavation process, it should be excavated layer by layer from top to bottom, and it is strictly forbidden to use methods of footing hollowing and holes digging. For groundbreaking excavation, observations on sinking and deformation of adjacent buildings (structures), roads and pipelines should be strengthened. For groundbreaking work in rainy seasons, it is necessary to check whether the earthwork slope has cracks, soil falling, support looseness, deformation, etc.

在破土开挖过程中应防止滑坡和塌方。在破土开挖前，应先做好地面和地下排水。开挖过程中应由上至下逐层挖掘，严禁采用挖空底脚和挖洞的方法。破土开挖应加强对邻近建（构）筑物、道路、管道等下沉和变形进行观测。雨期破土作业应重点检查土方边坡是否存在裂纹、落土、支撑松动、变形等情况。

5.6.2.5 In any of the following circumstances, the Construction Contractor shall report the department in the construction area, and the construction may be carried out after approval.

有下列情形之一的，施工单位应报告施工区域所属部门并经审批同意后方可进行。

(1) Roads, pipelines, electricity, communications and other facilities may be damaged;
可能损坏道路、管线、电力、通讯等设施的；

(2) Temporary water supply cut, power outage and interruption of road traffic are required;
需要临时停水、停电、中断道路交通的；

5.6.2.6 During the groundbreaking construction, in the case of the landslide, collapse or other dangerous situation, the Construction Contractor must immediately stop the work and

report to the relevant departments. The construction is prohibited before the dangerous case is eliminated, and the following measures should be taken:

破土施工过程中，出现滑坡、塌方或其它险情，施工单位必须立即停止作业并报告相关部门，险情排除前禁止施工，并采取如下措施：

(1) Evacuate the operators;

撤出作业人员；

(2) Hang out warning signs and night warning lights;

挂出警告牌、夜间警示灯；

(3) Mark out the warning zone and arrange personnel to be on duty.

划出警戒区，安排人员值勤。

5.6.2.7 In the process of groundbreaking construction, if any unidentifiable object is found, the Construction Contractor shall immediately stop the work, do not knock or move the object, and report the Equipment Management Dept. Construction can be carried out until the situation is identified and effective measures are taken.

破土施工过程中，发现不能辨认的物体，施工单位应立即停止作业，不得敲击、移动，并报告机械动力部，待查明情况并采取有效措施后，方可继续施工。

5.6.2.8 For all kinds of works against the rules at the groundbreaking work site, the person who discovered this behavior has the right to stop construction. If the on-site personnel do not comply with the dissuasion, it should immediately report to the Equipment Management Dept. or HSE Dept.

对破土作业现场的各类违章作业，发现人员有权制止施工，对于不听劝阻的立即报告机械动力部或 HSE 管理部处理。

6 Inspection and Supervision

检查与监督

The Equipment Management Dept. shall manage, supervise, inspect and assess the civil engineering of the operation department.

机械动力部负责对运行部土建工程进行管理、监督、检查和考核。

7 Associated Procedures and Records

关联程序和记录

7.1 Associated procedures

关联程序

7.1.1 *Approval Procedure for Groundbreaking Work* (HYBN-T2-07-0043-2018-1)

破土作业审批程序 HYBN-T2-07-0043-2018-1

7.1.2 *Maintenance Management Procedures for Buildings, Structures and Equipment*

Foundation (HYBN-T2-07-0044-2018-1)

建筑物、构筑物、设备基础维修管理程序 HYBN-T2-07-0044-2018-1

7.2 Associated records

关联记录

Groundbreaking Work Permit (HYBN-T6-07-0104-001-2018)

破土作业许可证 HYBN-T6-07-0104-001-2018

8 Supplementary Rules

附则

8.1 This System is under the jurisdiction of Equipment Management Dept.

本制度由机械动力部归口管理。

8.2 This System is drafted by Equipment Management Dept.

本制度起草部门：机械动力部。

8.3 Equipment Management Dept. is responsible for the interpretation of this System.

本制度解释权归机械动力部拥有。

8.4 Revision, preparation and approval of the Regulation are shown in Table 1:

本制度版本编制和审批情况见表 1:

Table 1 Revision, preparation and approval of document

表 1 文件版本编制和审批情况

1	2018-12-31	Hong Yong 洪勇	Tong Xueyun 童雪云	Xu Ye 徐野	Chen Liancai 陈连财
Revision 版本	Issued date 颁布日期	Prepared by 编制人	Reviewed by 审核人	Authorized by 审定人	Approved by 批准人



Hengyi Industries Sdn Bhd
恒逸实业（文莱）有限公司

HYBN-T3-07-0014-2018-1

Equipment Maintenance Management System

设备检修管理制度

Issued Date: Dec. 2018

颁布日期：2018 年 12 月

 HENGYI	Hengyi Industries Sdn Bhd 恒逸实业（文莱）有限公司				
	Equipment Maintenance Management System 设备检修管理制度				
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1 Purpose

目的

The System is hereby formulated in order to enhance equipment maintenance management and strictly enforce equipment maintenance standards and regulations for safe, civilized and high-quality maintenance.

为了加强设备检修施工管理，严格执行设备检修施工标准、规范，做到安全、文明、优质检修，特制订本制度。

2 Scope of Application

适用范围

The System applies to all departments of the Company and outsourcing departments.

本制度适用于各部门及外协部门。

3 Terms and Definitions

术语和定义

3.1 Three Lines: tools, fittings and materials are placed on one line respectively.

三条线：指工具摆放一条线；配件零件摆放一条线；材料摆放一条线。

3.2 Three Non-exposures: lube oil, cleaned machine parts or opened equipment head and pipe mouth shall not be exposed.

三不见天：指润滑油不见天；清洗过的机件不见天；打开设备封头、管线管口不见天。

3.3 Three Non-contacts with Ground: tools, removed parts or sump oil and stained material shall not fall to the ground.

三不落地：指使用工具、量具不落地；拆下来的零件不落地；油污、脏物不落地。

3.4 Five Prohibitions: hot work is not permitted without hot work permit; entry into site is not permitted without wearing helmet; high-altitude work is not permitted without safety belt; use of lifting equipment which has not been inspected is not permitted; work is not permitted in hazardous areas without safety barrier or supervision.

五不准：指没有火票不准动火；不戴安全帽不准进入现场；不系安全带不准高空作业；没有检查过的起重设备不准起吊；危险区没有安全栏杆或无人监护不准作业。

3.5 Prohibition of Five Misuses: do not misuse sledge hammer, alligator wrench and flat

spade; do not dismantle, unload, pull or jack any item without approval; do not fiddle with other equipment; do not break insulation without approval; do not misuse other equipment accessories.

五不乱用：指不乱用大锤、管钳、扁铲；不乱拆、乱卸、乱拉、乱顶；不乱动其它设备；不乱打保温层；不乱用其它设备零附件。

3.6 Four Construction Prohibitions: construction is not permitted in the event of unclear task, situation or drawings; of unsound safety measures; of unclear clarification of quality standard, safety measures and technical measures; and of nonconforming quality of previous step.

四不施工：指任务不清、情况不明、图纸不清楚的不施工；安全措施不健全的不施工；质量标准、安全措施、技术措施交底不清楚的不施工；上道工序质量不合格，下道工序不施工。

3.7 Three Clean Sites: the sites for shutdown, maintenance and startup shall be clean.

三净：指停工场地净；检修场地净；开工场地净。

4 Management Responsibilities

管理职责

4.1 Specified administrative authority

归口管理部门

4.1.1 As the specified administrative authority of equipment maintenance, the Equipment Management Dept. is responsible for enforcing Equipment Maintenance Management System, Code and Standard; developing and amending the Company's Equipment Maintenance Management System and supervising its implementation by departments.

机械动力部是设备检修的归口管理部门，负责执行有关设备检修管理制度、规程和标准；负责制订修订公司设备检修管理制度，并检查监督各部门执行情况。

4.1.2 It is responsible for organizing and coordinating full shut-down maintenance, local shortcoming elimination and major emergency repair; preparing and submitting technical texts for outsourced items to Materials Supply Dept. to determine the Implementation Unit through bidding; liaison and coordination for external work; and approving substitution of insufficient materials.

组织装置全面停工检修、局部消缺、重要突击性抢修的协调管理；负责编制外协项目的技术文本交物资装备部进行招标确定施工单位；负责对外工作的联系与协调；审批缺口材料的代用。

4.1.3 It is responsible for maintenance management, technical clarification, quality check and acceptance of key equipment; and organizing review/audit of maintenance schemes for key equipment or items.

负责重要设备的检修管理及技术交底、质量检查、和验收工作；组织审核（定）重要设备（或项目）检修施工方案。

4.2 Coordinated management departments

协同管理部门

4.2.1 Scheduling & Dispatch Dept. is responsible for arranging and developing overall startup and shutdown network for full and local shut-down maintenance; determining total duration of shut-down maintenance; and organizing startup confirmation after shut-down maintenance.

计划调度部负责安排并编制装置全面、局部消缺停工的开、停工总体网络，确定装置停工检修总工期；组织装置停工检修后的开工确认。

4.2.2 HSE Dept. is responsible for reviewing HSE content in the maintenance scheme and participating in startup confirmation after shut-down maintenance.

HSE 管理部负责审核检修施工方案中 HSE 内容；参与装置停工检修后的开工确认。

4.2.3 Materials Supply Dept. is responsible for purchasing and supplying materials for equipment maintenance, ensuring the quality of purchased materials and procuring external Implementation Units via bidding.

物资装备部负责设备检修物资的采购和供应，确保采购物资的质量；负责外协施工单位的招标工作。

4.3 Executive departments

执行部门

4.3.1 As an executive department, the Operation Dept. is responsible for developing equipment shut-down maintenance, monthly maintenance and emergency repair plans; for maintenance site management, quality control and acceptance for general equipment; for participating in quality acceptance of key equipment maintenance; and for making evaluation comments on quality of equipment maintenance.

运行部为执行部门，负责编制本部门设备停工检修、月度检修、突击性抢修计划；负责本部门检修的现场管理和一般设备的质量控制、质量验收；参加重要设备检修的质量验收工作；对设备检修维修施工质量提出考核意见。

4.3.2 Equipment Maintenance Dept., Electrical Operation Dept. and Instrument Control Dept. (hereinafter called Maintenance Dept.) are responsible for maintenance, repair and obtaining (applying for) spare parts of static and dynamic operating equipment, electrical equipment and instruments respectively; developing equipment maintenance plans under respective purview; keeping maintenance records; and archiving maintenance data.

设备检修部、电气运行部、仪表控制部（以下简称维保部门）分别负责运行装置动静设备、电气设备、仪表设备的检修、维护、备品配件计划（申报）领用；负责职责范围内设备检修、方案的编制，检修记录的录入、检修资料的存档。

5 Management Content

管理内容

5.1 Shut-down maintenance management

停工检修管理

5.1.1 Equipment Management Dept. organizes and coordinates management of full shut-down maintenance; site management is the responsibility of the corresponding department.

机械动力部组织、协调装置全面停工检修管理工作；现场管理工作由所在部门负责。

5.1.2 After issuing the shut-down maintenance plan, the Equipment Management Dept. shall prepare and submit technical text for outsourced items other than maintenance items to be undertaken by the Maintenance Dept. to Materials Supply Dept. to determine the Implementation Unit through bidding; after signing a contract with the Materials Supply Dept., the Implementation Unit shall promptly arrange outsourced item clarification (to be organized by Equipment Management Dept.), and prepare work plan, method statement and fabrication plans for prefabricated parts. The Equipment Management Dept. shall hold maintenance coordination meetings regularly, inspect departments' preparation for shut-down maintenance and audit maintenance organization plan and method statement for key items.

停工检修计划下达后，除由公司维保部门承担的检修项目外，其它需要外协的项目由机械动力部负责编制外协项目的技术文本交物资装备部进行招标，确定施工单位，施工单位在与物资装备部签订施工合同后应及时组织力量安排外协项目交底（交底工作由机械动力部组织）、编制施工计划、施工方案和预制件制作计划。机械动力部应定期组织召开检修协调会，检查各部门停工检修的准备工作，对检修组织计划及重点项目的施工方案进行审核。

5.1.3 Materials Supply Dept. actively mobilizes resources to secure goods for maintenance according to the equipment, materials and spare parts required in the shut-down maintenance plan. The securing of required materials, equipment and spare parts and solutions to gap as well as supply date shall be promptly fed back to the corresponding department and Equipment Management Dept.

物资装备部根据停工检修计划所需的设备、材料、备品配件积极组织力量落实货源，确保检修用料。所需材料、设备、备件的货源落实情况及缺口解决办法、供货日期等信息应及时反馈给项目所在部门和机械动力部。

5.1.4 Two months before shut-down maintenance, the preparatory work shall be done so that: the Implementation Unit for outsourced items has been secured; the contract has been signed; main materials, equipment and spare parts have been secured.

装置停工检修前二个月，准备工作要求做到：外协项目已落实施工单位，施工合同已签订，主要材料、设备、备品配件已落实。

5.1.5 One month before shut-down maintenance, the preparatory work shall be done so that:

a shut-down maintenance leading group is set up to fully lead the shut-down maintenance across the Company; technical construction plan, lifting plan, safety measures and HSE assessment for key items have been approved; Scheduling & Dispatch Dept. has determined system, plant shutdown and startup network; Maintenance Dept. has assigned all maintenance items to crew and completed site clarification.

装置停工检修前一个月，准备工作要求达到：成立公司停工检修领导小组，全面负责装置停工检修领导工作；重点项目的施工技术方案、吊装方案以及安全措施和 HSE 评价已经审定；计划调度部已确定系统、装置停工、开工网络；检修部门已将检修项目全部落实到班组，并进行了现场交底。

5.1.6 Equipment Management Dept. regularly holds maintenance coordination meetings and relevant departments must strictly implement resolutions of these meetings.

机械动力部定期组织召开检修协调会，相关部门必须认真执行协调会决定的事项。

5.2 Monthly and routine maintenance management

月度检修、日常检修管理

5.2.1 Monthly and routine maintenance work in each department shall be carried out by the respective department.

各部门设备月度计划、日常检维修工作由各部门组织实施。

5.2.2 Equipment Management Dept. approves monthly maintenance plans and allocates maintenance items by discipline to the Maintenance Dept.

机械动力部对月度检修计划进行审批，并将维修项目按专业下达给维保部门。

5.2.3 Routine maintenance of equipment shall be commissioned by discipline by each department to the Maintenance Dept.; if outsourcing is needed, the corresponding Operation Dept. shall seek approval from the Equipment Management Dept.

设备日常检维修由各部门按专业自行委托维保部门，如需外协施工，由所在运行部报机械动力部审批。

5.2.4 For local shut-down maintenance/emergency repair, the Operation Dept. shall develop and submit maintenance plans to Equipment Management Dept. for approval before implementation.

装置局部停工检（抢）修项目由运行部编制检修计划，报机械动力部批准后实施。

5.2.5 For a maintenance item costing less than USD1,000, the Operation Dept. shall commission the Maintenance Dept. to do the work; for an item costing more than USD1,000, the Operation Dept. shall present a list of maintenance items for outsourcing 20 days in advance to Equipment Management Dept. for approval.

费用在 1000 美元以下的检修项目由运行部自行委托维保部门施工；费用在 1000 美元以上的项目运行部提前 20 天提出检修项目外协清单，报机械动力部审批后外协。

5.3 Management of equipment maintenance site

设备检修现场管理

5.3.1 Maintenance site management is the responsibility of the department in charge of the equipment.

检修现场管理由设备所在部门负责。

5.3.2 The executive departments (including outsourcing, the same below) must not start maintenance until after receiving maintenance safety permit; in case of hot work, breaking ground, electricity use, entering confined space and high-altitude operation, the Operation Dept. shall go through relevant formalities; in case of relocated or damaged trees and turf, the Operation Dept. shall go through relevant formalities with GM's Office.

施工部门（含外协，下同）必须在接到检修施工安全许可票后方可开始检修；在进行动火、动土、用电、进入受限空间、高处作业时，由运行部办理相关手续；需迁移或损坏的绿化林木、草坪由运行部负责向总经理办公室办理手续。

5.3.3 The executive departments must strictly abide by work disciplines to ensure proper implementation of Three Lines, Three Non-exposures, Three Non-contacts with Ground, Five Prohibitions, Prohibition of Five Misuses, Four Construction Prohibitions and Three Clean Sites.

施工部门必须遵守施工纪律，严格做到“三条线”、“三不见天”、“三不落地”、“五不准”、“五不乱用”、“四不施工”、“三净”。

5.3.4 The executive departments shall take firm blocking measures to prevent foreign material entering the open pipe mouth after equipment disassembly; place maintenance materials and wastes at designated locations; and dispose of the removed equipment, vessel, heat exchanger and pump only after joint confirmation by the department in charge of the equipment and Equipment Management Dept.

施工部门要采取严密牢固的封堵措施，严防设备拆卸后敞开的管口有异物落入；施工用料及检修废料要堆放在指定地点；换下来的设备、容器、整台换热器、机泵等由设备所在部门和机械动力部联合确认后再行处理。

5.3.5 When the plant is started, Equipment Management Dept. must urge the executive departments to appoint personnel to deal with problems arising during startup. The department in charge of the equipment shall directly propose treatment items during operation assurance to the executive departments which must respond promptly; materials needed are the responsibility of the department in charge of the equipment.

装置开工时，机械动力部必须督促施工部门安排保运人员负责处理开工中出现的问题。保运期间的处理项目由装置所在部门直接向施工部门提出，施工部门必须及时给予处理，所需材料由装置所在部门解决。

5.4 Maintenance quality and completion acceptance

检修质量及竣工验收

5.4.1 All departments shall carry out comprehensive quality management during maintenance to ensure clear clarification of items, careful inspection of equipment, compliance of maintenance with the system, compliance with quality standard and complete maintenance records.

各部门在检修全过程中应实施全面质量管理，做到：项目交底清楚、设备检查认真、检修符合制度、质量达到标准、检修技术记录齐全。

5.4.2 After maintenance, handover shall not be carried out unless quality standards are satisfied, maintenance records are kept and health is properly maintained; steam shall not be supplied unless the work item is completed, safety is guaranteed, there is no obvious leakage and health standard is satisfied.

检修结束后必须做到“三不交工”、“四不开汽”。“三不交工”即：不符合质量标准不交工、没有检修记录不交工、卫生规格化不好不交工；“四不开汽”即：工程未完不开汽、安全没保证不开汽、有明显泄漏不开汽、卫生不合格不开汽。

5.4.3 During shut-down overhaul, Equipment Management Dept. shall organize inspection of the executive departments' QA system; each department shall form a quality management team and appoint maintenance assistance personnel to ensure normal operation of the QA system.

装置停工大修期间，机械动力部应组织对施工部门的质量保证体系进行检查，各部门应成立质量管理小组、指定检修配合人员，确保质保体系正常运转。

5.4.4 When supplying raw materials, accessories and equipment, the Materials Supply Dept. shall provide certificates of conformance and quality certificates; substitute materials must be approved by the designer or the corresponding department and go through substitution formalities.

物资装备部在提供原材料、配件、设备时，应同时提供合格证书及质量保证书等资料，代用材料必须经设计人员或项目所在部门同意，并办理代用手续。

5.4.5 The executive departments shall ensure each weld of pressure pipe is recorded, with inspection data available for major welds; the weld and static seal locations on process pipeline are not insulated before pressure test; each piece of equipment is recorded; resetting of maintenance equipment shall be checked and confirmed, with equipment closure sheet completed. Tightening records shall be kept for bolts at special parts with high temperature and high pressure (Tighten with torque wrench with certain sequence and torque, the initial tightening force is controlled at 1/3 of the final value, the second tightening force is controlled at 2/3 of the final value, and the third (final) tightening force is controlled at 100% of the final value).

施工部门要做到压力管道每道焊口有记录，主要焊缝有检验资料；工艺管线在未试压前焊缝及静密封部位不得保温；每台设备有记录，检修设备复位时应做好检查确认并填写设备封闭单；对于

高温高压特殊部位的螺栓要做好紧固记录（按照一定的顺序和扭矩采用扭矩扳手拧紧，第一次螺栓紧固力度控制在最终值的 1/3，第二次螺栓紧固力度控制在最终值的 2/3，第三次（最终）螺栓紧固力度控制在最终值的 100%）。

5.4.6 Equipment management personnel in Operation Dept. must certify acceptance of concealed works and intermediate process on the spot; work in the next step shall not proceed unless the certification formalities for the previous step are complete; the completed work shall be accepted with signature in time.

运行部设备管理人员对隐蔽工程及中间工序的验收必须当场办理签证手续，上道工序签证手续不全不得进行下道工序作业，工程竣工后要及时验收签字。

5.4.7 Within 30 days of completing maintenance, the executive department shall submit three copies of as-built data to the department in charge of the equipment, GM's Office, and Equipment Management Dept. These data include as-built drawings, technical proposal and construction organization; technical records, intermediate process acceptance sheet and concealed work acceptance sheet; equipment unpacking data and closure records; certificates of conformance and quality certificates for equipment, materials, pipe fittings and accessories; physical and chemical inspection data; technical records and inspection reports on lining, pipe fitting and insulation.

施工部门在检修工作完工后 30 天内将竣工资料一式三份，完整地交给设备所在单位、总经理办、机械动力部，资料包括：竣工图纸、施工技术看案、施工组织；施工技术记录、中间工序验收单、隐蔽工程验收单；设备开箱资料、设备封闭记录；设备、材料、管道附件、配件的合格证明书及质量保证书；理化检验资料；衬里、防腐、保温施工技术记录及检验报告。

5.4.8 Handover data for pressure pipe also include model and specifications, material and quantity of pipe, fittings and valve; pipe isometric drawing, weld layout drawing and No.; weld record; physical and chemical inspection data on welding, with weld number consistent with its NDT number; pressure test records for pipe and valve.

压力管道交工资料还应增加下列内容：管道、管件、阀门的型号规格、材质及数量，管道的空视图、焊缝布置图及其编号，焊接记录，焊接理化检验资料，其无损检验编号与焊缝编号相一致，管道及阀门的试压记录等。

5.4.9 After shut-down maintenance and before supplying steam or gas, the Scheduling & Dispatch Dept. shall have handover formalities completed (replaceable by startup confirmation sheet), subject to confirmation with signature by Equipment Management Dept., Scheduling & Dispatch Dept., Operation Dept., HSE Dept. and executive departments.

装置停工检修完工后，在引蒸汽或引瓦斯前由计划调度部组织办理交接手续（可用装置开工确认单代替），由机械动力部、计划调度部、运行部、HSE 管理部、施工部门等签字确认。

5.4.10 Handover conditions for shutdown maintenance: hydraulic or tightness test on equipment and piping demonstrates the maintenance quality meets requirements; non-conforming items have been made good; maintenance records are complete, accurate and confirmed by Production Dept.; insulation and painting has been substantially complete;

scaffolding is substantially removed; construction tools (excluding tools for operation assurance) have been removed from site; the site is clean upon completion.

装置停工检修交工条件：设备及管道水压试验或气密试验合格，工程质量符合要求；检验不合格项目的已返修合格；检修记录齐全、准确并经生产部门确认；保温、油漆已基本完成；脚手架基本拆除；施工机具已撤离现场（保运所需机具除外）；现场已达到工完料尽场地清。

5.4.11 Each department shall prepare and submit a summary of system or plant maintenance to Equipment Management Dept. within 30 days of startup; the Equipment Management Dept. shall prepare and archive shutdown maintenance summary within two months.

各部门应当编写系统或装置检修工作总结，在开工正常后 30 天内上报机械动力部，机械动力部在二个月内编写装置停工检修工作总结并归档。

5.5 Pump maintenance management

机泵检修管理

See Appendix 1.

见附件 1

5.6 Management of *maintenance work permit*

检修施工安全许可票管理

See Appendix 2.

见附件 2

6 Inspection and Supervision

检查与监督

Equipment Management Dept. is responsible for inspecting, supervising and evaluating implementation of the Equipment Maintenance Management System.

机械动力部负责对设备检修管理制度的执行情况进行监督检查并考核。

7 Associated Procedures and Records

关联程序和记录

7.1 Associated procedures

关联程序

7.1.1 Equipment Maintenance Management Procedure HYBN-T2-07-0045-2018-1

设备检修管理程序 HYBN-T2-07-0045-2018-1

7.1.2 Routine Equipment Maintenance Management Procedure HYBN-T2-07-0046-2018-1

设备日常检修管理程序 HYBN-T2-07-0046-2018-1

7.1.3 Procedure for Management of Shutdown Maintenance and Shortcoming Elimination under Local Shutdown HYBN-T2-07-0047-2018-1

装置停工检修及局部停工消缺管理程序 HYBN-T2-07-0047-2018-1

7.1.4 Procedure for Management of Monthly Scheduled Maintenance of Equipment HYBN-T2-07-0048-2018-1

设备月度计划检修管理程序 HYBN-T2-07-0048-2018-1

7.2 Associated records

关联记录

7.2.1 Maintenance Work Permit (Type A) HYBN-T6-07-0106-001-2018

检修施工安全许可票(A类) HYBN-T6-07-0106-001-2018

7.2.2 Maintenance Work Permit (Type B) HYBN-T6-07-0107-001-2018

检修施工安全许可票(B类) HYBN-T6-07-0107-001-2018

7.2.3 Quality Evaluation Sheet for Pump Equipment Maintenance (Installation)

HYBN-T6-07-0108-001-2018

机泵设备检修(安装)质量评定表 HYBN-T6-07-0108-001-2018

7.2.4 Approval Sheet for Holing (Sealing) on Pipe with Pressure HYBN-T6-07-0109-001-2018

管道带压开孔(封堵)审批表 HYBN-T6-07-0109-001-2018

7.2.5 Confirmation Sheet for Startup Conditions of Key Equipment

HYBN-T6-07-0110-001-2018

重要设备开机条件确认单 HYBN-T6-07-0110-001-2018

7.2.6 Acceptance Sheet for Covering/Uncovering Key Equipment

HYBN-T6-07-0111-001-2018

重要设备揭(扣)盖验收单 HYBN-T6-07-0111-001-2018

7.2.7 Maintenance Quality Acceptance Records for Key Static Equipment

HYBN-T6-07-0112-001-2018

重要静设备检修质量验收记录 HYBN-T6-07-0112-001-2018

8 Supplementary Rules**附则**

8.1 The System is under the jurisdiction of Equipment Management Dept.

本制度由机械动力部归口管理。

8.2 The System is drafted by Equipment Management Dept.

本制度起草部门：机械动力部。

8.3 Equipment Management Dept. is responsible for the interpretation of the System.

本制度解释权归机械动力部拥有。

8.4 Revision, preparation and approval of the System are shown in Table 1:

本制度版本编制和审批情况见表 1:

Table 1 Revision, preparation and approval of document

表 1 文件版本编制和审批情况

1	2018-12-31	Mi Jianbin 米建彬	Tong Xueyun 童雪云	Xu Ye 徐野	Chen Liancai 陈连财
Rev. 版本	Issued date 颁布日期	Prepared by 编制人	Reviewed by 审核人	Authorized by 审定人	Approved by 批准人

9 Appendices

附件

Appendix 1 Pump Maintenance Management

附件 1 机泵检修管理

Appendix 2 Management of *Maintenance Work Permit*

附件 2 检修施工安全许可票管理

Appendix 1

附件 1

Pump Maintenance Management 机泵检修管理

1 Work Management

施工管理

1.1 Pump equipment maintenance shall follow the *Code for Equipment Maintenance* and User Instructions where applicable.

机泵设备检修执行《设备维护检修规程》，设备使用说明书有规定，按规定时执行。

1.2 Before overhaul and medium repair of general equipment, the Operation Dept. shall write maintenance details on the permit according to equipment operation conditions and existent problems. If defective pump equipment switches to standby pump equipment, maintenance of the defective pump equipment must not proceed until the standby equipment has operated for more than 2h and is confirmed to be free of anomaly.

一般设备大、中修前，运行部应根据设备的运行情况及存在问题，在许可票上详细填写检修内容。缺陷机泵设备切换到备用机泵设备运行后，备用机泵设备须运行 2 小时以上，并经确认无异常后才能对缺陷机泵设备进行检修。

1.3 Before carrying out key maintenance items for pump equipment, the Operation Dept. shall submit pump maintenance requirements according to pump operation problems to Equipment Management Dept. which will review these requirements before informing Equipment Maintenance Dept.

机泵设备重点项目检修前，运行部应根据机泵运行问题填报机泵检修要求，上报机械动力部，机械动力部审核后下发设备检修部。

1.4 Based on the pump maintenance requirements from the Operation Dept., the Equipment Maintenance Dept. shall prepare maintenance plan, planned network and quality control procedure for internal audit and countersigning by Operation Dept. before submitting them to Equipment Management Dept. and HSE Dept. for review. Method statements for key equipment must be approved by the leader in charge before implementation.

设备检修部根据运行部提交的机泵检修要求，编制检修方案、计划网络和质量控制程序，经内部审核、运行部会签后报机械动力部、HSE 管理部审核。重要设备的施工方案须经公司分管领导批准后执行。

1.5 In case of scheduled maintenance of key equipment where there are more than 5 days between determination of maintenance and its implementation, the Equipment Maintenance Dept. shall prepare maintenance plan and network; in case of sudden failure, relevant personnel of Equipment Maintenance Dept., Operation Dept. and Equipment Management Dept. shall determine the scope, depth, priority and duration of maintenance on site.

重要设备属于计划抢（检）修时，从确定检修到检修实施有 5 天以上时间，设备检修部应编写检

修方案和施工网络；突发性故障应由设备检修部、运行部和机械动力部有关人员现场确定检修范围、检修深度、检修重点和施工工期。

1.6 In case of maintenance of key pump equipment, the Equipment Maintenance Dept. must post on site Method Statement for Key Equipment Maintenance, planned network and quality control procedure and lead maintenance work; maintenance data shall be promptly and accurately put in the maintenance record book and QC sheets to be checked and signed by all levels of management according to their responsibility. In case of maintenance of other pump equipment, Equipment Maintenance Dept. shall promptly and accurately put maintenance data in the maintenance record book for spot check by the Operation Dept. and Equipment Management Dept. After key pump equipment is uncovered and before it is covered again, the Equipment Maintenance Dept. shall complete Acceptance Sheet for Covering/Uncovering Key Equipment and conduct acceptance with Operation Dept. and Equipment Management Dept. Before startup, the Equipment Management Dept. together with Equipment Maintenance Dept., Operation Dept., Electrical Operation Dept. and Instrument Control Dept., shall confirm startup conditions and complete Confirmation Sheet for Startup Conditions of Key Equipment.

重要机泵设备检修时，设备检修部须在检修现场张贴重要设备检修施工方案、计划网络和质量控制程序，并组织检修工作，检修数据应及时准确填写在检修记录本及质量控制程序表中，各级管理人员按各自职责进行检查并签字确认；其它机泵设备检修时，设备检修部应将检修数据及时准确地填写在检修记录本上，运行部、机械动力部进行抽检；重要机泵设备检修揭盖后、扣盖前，设备检修部需填写“重要设备揭（扣）盖验收单”，设备检修部、运行部、机械动力部共同验收确认；开机前，由机械动力部组织设备检修部、运行部、电气运行部、仪表控制部对开机条件进行确认，并填写“重要设备开机条件确认单”。

1.7 When aligning pump equipment, the mounting clearance of discs of the disc coupling shall meet requirements to ensure the pump and motor are not subject to additional axial force; the alignment data and mounting clearance of discs shall be included in maintenance records. After maintenance, the pump equipment shall undergo commissioning for not less than 72h; after maintenance, the motor shall undergo joint commissioning with the pump for not less than 72h, in addition to standalone commissioning.

机泵设备找正时，叠片式联轴器叠片的安装间隙要符合要求，确保泵和电机不受额外轴向力，找正数据和叠片安装间隙要进检修记录。机泵设备检修后试运时间不得少于 72 小时；电机检修后除了进行单试，还应与机泵联合试运，试运时间不少于 72 小时。

2 Acceptance and Quality Assessment after Pump Equipment Maintenance

机泵设备检修后的验收及质量评定

2.1 Basic evaluation standards. Basic evaluation indicators are the requirements that must be satisfied after equipment maintenance (installation); if they are not satisfied, the maintenance shall be considered to be unqualified.

基本评定标准。基本评定指标是设备检修（安装）后必须达到的要求，如达不到基本评定指标，则视为检修不合格。

2.1.1 Maintenance process control and record: the whole process of pump equipment maintenance (installation) shall meet the requirements of relevant systems; the format of maintenance record shall be consistent with the classification in the maintenance code, and contain complete, accurate maintenance data.

检修过程控制及记录：机泵设备检修（安装）的全过程符合有关制度的要求；检修记录格式与检修规程划分类别相符，检修内容和数据齐全、准确。

2.1.2 Site standardization: after maintenance (installation), the pump surface, foundation plate and maintenance area are free of sundries and oil stain; the lube system, sealing oil system, cooling system, tightness, balance header and other auxiliary systems are intact without leakage; accessories such as oil cup, oil leveler, safety shield, valve hand wheel and turning gear are intact; the oil leveler shows clear, normal level; the foundation and base are solid and complete, with anchor bolts and connecting bolts fully and securely tightened; the drain valves are complete and easy to operate; the oil injector for reciprocating pump is intact, with no leakage at the joint, unobstructed injection point and normal injection section. The temperature transducer, vibration-measuring probe and axial displacement probe are normal; the number of aligning gaskets, which shall not be exposed obviously, shall not exceed 3.

现场规格化：检修（安装）后机泵表面、基础台板及检修区域无杂物和油污；润滑系统、封油系统、冷却系统、气体密封、平衡管等辅助系统完好无泄漏；油杯、油标、安全护罩、阀门手轮及盘车机构等附件完好；油标清晰、油位正常；基础、基座坚固完整，地脚螺栓及各部连接螺栓应满扣、齐整、紧固；机体排污、放水阀齐全好用；往复机泵注油器完好，接头不漏油，注油点畅通，注油部位正常。温度计传感器、测振探头、轴位移探头正常；找正用垫片不超过 3 张且不明显外露。

2.1.3 Trial run: operation process parameters of the pump meet requirements; the equipment runs stably without noise, with no obvious anomaly in bearing vibration and temperature or leakage from static seal point.

试运行：机泵运行工艺参数符合要求，设备运转平稳无杂音，轴承振动、温度无明显异常，静密封点无泄漏。

2.2 Vibration evaluation standards. For compressors, steam turbines and other large units equipped with online status monitoring system, the evaluation shall be based on the reading of the sensor, provided the instrument and process operation are normal. The following grades refer only to maintenance; non-conformity, if any, means the maintenance is non-conforming.

振动评定标准。对安装在线状态监测系统的压缩机、汽轮机等大型机组，在仪表及工艺操作正常情况下，以传感器的显示值为判定值。以下评定等级仅指检修行为，如不合格，是指检修不合格。

2.2.1 Good: the vibration value of the unit after maintenance is within 40% of alarm setting;

优良：检修后机组的振动值在设定报警值的 40% 以下；

2.2.2 Acceptable: the vibration value of the unit after maintenance is within a range of 40%~60% of the alarm setting;

合格：检修后机组的振动值在设定报警值的 40%~60% 的区间；

2.2.3 Unacceptable: the vibration value of the unit after maintenance is above 60% of alarm setting, or if:

不合格: 检修后机组的振动值在机组设定报警值的 60%以上, 或有如下情况之一者:

2.2.3.1 The vibration value is $\leq 10\mu\text{m}$ before maintenance and $> 25\mu\text{m}$ after maintenance;

检修前正常振动值 $\leq 10\mu\text{m}$, 检修后的振动值高于 $25\mu\text{m}$;

2.2.3.2 $10\mu\text{m} < \text{normal vibration value before maintenance} \leq 20\mu\text{m}$ and the vibration value after maintenance is $> 38\mu\text{m}$; or

$10\mu\text{m} < \text{检修前正常振动值} \leq 20\mu\text{m}$, 检修后的振动值高于 $38\mu\text{m}$;

2.2.3.3 The normal vibration value before maintenance is $> 20\mu\text{m}$ and the vibration value after maintenance is higher than 190% of the normal value before maintenance.

检修前正常振动值 $> 20\mu\text{m}$, 检修后振动值高于检修前正常值 190%。

The order of priority for the above evaluation: 2.2.3.3, 2.2.3.2, 2.2.3.1 under "Unacceptable", "Unacceptable", "Acceptable" and "Good".

上述判定的优先次序是: 不合格中的 2.2.3.3、2.2.3.2、2.2.3.1、不合格、合格、优良。

2.2.4 For pump equipment with no online status monitoring system, the evaluation criterion is the effective value of vibration severity on bearing pedestal and based on maximum vibration test value. Measurement shall be made using a hand-held instrument with 10~1000 Hz bandpass frequency to record vibration velocity in root-mean-square.

对没有安装在线状态监测系统的机泵设备以测量轴承座上的振动烈度有效值为判定标准, 以测试振动的最大值为判定值。测试仪表使用手持式测量仪器, 带通频率为 10~1000 Hz, 记录的振速为均方根值。

2.2.4.1 Vibration evaluation criteria are as follows:

振动评定标准如下:

(1) Good: type I pump: effective vibration velocity $\leq 0.71\text{mm/s}$; type II pump: effective vibration velocity $\leq 1.12\text{mm/s}$; type III pump: effective vibration velocity $\leq 1.8\text{mm/s}$; type IV pump: effective vibration velocity $\leq 2.8\text{mm/s}$.

优良: I 类机泵: 机泵振速有效值 $\leq 0.71\text{mm/s}$; II 类机泵: 机泵振速有效值 $\leq 1.12\text{mm/s}$; III 类机泵: 机泵振速有效值 $\leq 1.8\text{mm/s}$; IV 类机泵: 机泵振速有效值 $\leq 2.8\text{mm/s}$ 。

(2) Acceptable: type I pump: effective vibration velocity $\leq 1.8\text{mm/s}$; type II pump: effective vibration velocity $\leq 2.8\text{mm/s}$; type III pump: effective vibration velocity $\leq 4.5\text{mm/s}$; type IV pump: effective vibration velocity $\leq 7.1\text{mm/s}$.

合格: I 类机泵: 机泵振速有效值 $\leq 1.8\text{mm/s}$; II 类机泵: 机泵振速有效值 $\leq 2.8\text{mm/s}$; III 类机泵: 机泵振速有效值 $\leq 4.5\text{mm/s}$; IV 类机泵: 机泵振速有效值 $\leq 7.1\text{mm/s}$ 。

(3) Unacceptable: pumps with effective vibration velocity exceeding the acceptable range.

不合格: 超过合格指标的为不合格。

1) Rotating machinery is divided into four categories: I - small rotating machinery such as motor below 15kW; II - medium rotating machinery mounted on rigid foundation with a power under 300kW; III - large rotating machinery, with rigid supporting system; IV - large rotating machinery,

with flexible supporting system;

旋转机械分为如下四类：I—小型转机如 15kW 以下的电机；II—安装在刚性基础上的中型转机功率 300kW 以下；III—大型转机，机器——支承系统为刚性状态；IV—大型转机，机器——支承系统为挠性支承状态；

2) The vibration criteria for non-rotating machinery are subject to the manufacturer's requirements.

非旋转机械的振动合格标准按制造厂提供要求执行。

2.3 Seal leakage evaluation criteria

密封泄漏评定标准

2.3.1 Mechanical seal for centrifugal pump: light oil < 10 drops/min, heavy oil < 5 drops/min; packing seal for centrifugal pump: light oil < 20 drops/min, heavy oil < 10 drops/min; mechanical seal for screw and gear pumps < 5 drops/min; packing seal for screw and gear pumps < 10 drops/min; packing seal for steam reciprocating pump: light oil < 20 drops/min, heavy oil < 10 drops/min; packing seal for electric reciprocating pump < 20 drops/min; packing seal for electric reciprocating metering pump < 3 drops/min;

离心泵机械密封：轻质油<10 滴/min，重质油<5 滴/min；离心泵填料密封：轻质油<20 滴/min，重质油<10 滴/min；螺杆、齿轮泵机械密封<5 滴/min；螺杆、齿轮泵填料密封<10 滴/min；蒸汽往复泵填料密封，轻质油<20 滴/min，重质油<10 滴/min；电动往复泵，填料密封<20 滴/min；电动往复计量泵，填料密封<3 滴/min；

2.3.2 Mechanical and packing seal leakage for water medium shall be evaluated in accordance with the criteria for light oil.

介质是水的机械密封和填料密封泄漏标准参照轻油执行。

2.4 Bearing temperature evaluation criteria

轴承温度评定标准

2.4.1 It is acceptable if ruling out the effect of medium or high ambient temperature and under the worst operating condition: for forced lubrication system, the temperature rise of lube oil at bearing outlet is not higher than 28°C, the temperature of lube oil at bearing outlet not higher than 71°C and the temperature of bearing metal lower than 93°C; for oil ring lubrication or splash lubrication system, the temperature rise of shell at the mounting position of bearing is not higher than 39°C (or oil bath temperature is lower than 82°C); the manufacturer's design requirements are met.

合格标准，排除介质或环境高温影响，在最不利的运转条件下：对于强制润滑系统，轴承出口润滑油的温升不应超过 28°C，轴承出口润滑油温不应超过 71°C，轴承金属的温度应小于 93°C；对于油环润滑或飞溅润滑系统，轴承安装部位壳体的温升不应超过 39°C，（或油池温度应低于 82°C）；符合制造厂设计要求。

2.4.2 It is unacceptable if the conformity criteria cannot be met, with the effect of medium or environment ruled out.

不合格标准，在排除介质或环境影响的情况下，达不到合格标准的，视为不合格。

2.5 Process performance indicators: it is deemed acceptable if the pressure, flow, temperature and other process parameters of the repaired (installed) pump equipment satisfy, during commissioning, process requirements in the Operating Procedures developed by Production Division.

工艺技术指标：检修（安装）后的机泵设备，试运中压力、流量、温度等工艺参数符合生产处制定的“工艺操作规程”中工艺要求，视为合格。

2.6 Special quality indicator: for special pumps, refer to the manufacturer's relevant requirements.

专用质量指标：对于特殊机泵，参照制造厂的有关要求执行。

2.7 Maintenance quality evaluation

检修质量评定

2.7.1 The maintenance (installation) quality is rated "good" if after maintenance (installation) of the pump equipment, its basic evaluation indicators are acceptable, vibration is good, seal leakage is acceptable, bearing temperature is acceptable and process performance indicators are acceptable. For non-rotating machinery (such as reciprocating pump) and special rotating machinery (such as air-cooling fan, cooling tower fan and Roots blower) which cannot be rated "good" by vibration indicator (or vibration cannot be measured), the assessor shall take holistic approach to their evaluation for "good", provided other indicators are acceptable. For example, the maintenance quality can be rated "good" if packing leakage, temperature and process indicators, considered essential, greatly improve after maintenance, compared with past normal operation of the equipment. The improved indicators shall be given under "General Evaluation Comment".

优良。机泵设备检修（安装）后，满足：基本评定指标合格、振动评定标准达到优良、密封泄漏评定标准合格、轴承温度评定标准合格、工艺技术指标合格的设备，检修（安装）质量评为优良。在对非旋转机械及如往复机泵、特殊旋转机械如空冷风机、凉水塔风机和罗茨风机等无法以振动指标（或无法测振）评优良的设备，由评定人员在其它各项指标合格的基础上，进行综合评优，如可以比较以往设备正常时运行情况，对填料泄漏、温度及工艺指标等认为较重要的指标在检修后明显改观，检修质量可评为优良。同时在“综合评定意见”栏中注明改观指标情况。

2.7.2 The maintenance (installation) quality is rated "acceptable" if after maintenance (installation) of the pump equipment, its basic evaluation indicators are acceptable, vibration is acceptable, seal leakage is acceptable, bearing temperature is acceptable and process performance indicators are acceptable. In evaluating leakage, if the leakage varies around the conformity limit, the evaluation can be postponed 1-3 days until the leakage becomes stable before taking the higher value for evaluation.

合格，机泵设备检修（安装）后，满足：基本评定指标合格、振动评定标准合格、密封泄漏评定标准合格、轴承温度评定标准合格、工艺技术指标合格的设备，检修（安装）质量评为合格。对泄漏评定时，当漏量在合格指标界限左右变动时，评定时间可往后延 1~3 天，待漏量稳定后取高值予以评定。

2.7.3 The maintenance (installation) quality is rated "unacceptable" if after maintenance (installation) of the pump equipment, any of its basic evaluation criteria, vibration criteria, seal leakage criteria, bearing temperature criteria and process performance indicators is unacceptable.

不合格，机泵设备检修（安装）后，其基本评定标准、振动评定标准、密封泄漏评定标准、轴承温度评定标准、工艺技术指标中有任何一项不合格的设备，检修（安装）质量评为不合格。

2.8 Evaluation

评定

2.8.1 After pump maintenance (installation), its maintenance (installation) quality shall be rated "good", "acceptable" or "unacceptable" based on the above conditions and criteria.

对机泵检修（安装）后，依据上述条件和标准，应对其检修（安装）质量分“优良”、“合格”、“不合格”三档予以综合评定。

2.8.2 To evaluate the maintenance of pumps as a result of high vibration or with high vibration before maintenance (at or above zone C), the Operation Dept. shall measure the vibration with maintenance personnel before shutdown, analyze the causes of vibration before maintenance and take targeted measures and enhance quality control during maintenance to reduce vibration after maintenance. It is deemed unacceptable if the vibration after maintenance is not lower than before maintenance (taking the average of 3 records in EM system during normal operation just before maintenance). For pumps whose vibration is in or above zone C, as measured by the Maintenance Dept. during routine patrol inspection, the Maintenance Dept. and Operation Dept. shall reach agreement on a monthly basis to record the vibration value in the EM system.

对于因振动大引起的检修或检修前振动较大（振动在 C 区及以上）的机泵评定，运行部应在停机前通知检修人员一起测振，在检修前进行振动原因分析，检修中要有针对性地采取措施，同时加强检修时质量控制，力争检修后振动有所下降。如检修后振动比检修前（以检修前最近的正常运行时 EM 系统中 3 次记录的平均值）未下降则视为不合格。检修部门平时巡检测振结果振动值在 C 区及 C 区以上运行的机泵，每月与运行部定期对接，双方取得一致意见后由运行上报在每月 EM 系统中。

2.8.3 With regard to the disposal of unacceptable pumps, the interested parties shall identify the causes; the user department may ask the Maintenance Dept. for rework or rectification; the reworked or rectified pump cannot be rated "good", with "reworked or rectified" put down under "General Evaluation Comment"; in case of any rework due to poor maintenance quality, the maintenance quality shall be rated "unacceptable".

对于按指标评定为不合格机泵的处置。有关各方要分析原因，使用部门可要求检修单位返修或整改，返修或整改后的机泵不能评优良，并在“综合评定意见”栏中注明“返修或整改”，如因检修质量引起的第二次返修一律评为“不合格”。

2.8.4 Acceptance on deviation. In addition to post-maintenance evaluation indicators, emphasis shall also be placed on the trend of development after maintenance compared with

past normal operation data of the equipment. The trend moving in a good direction shall be affirmed (accepted on deviation). Where the vibration is reduced after maintenance but evaluated as "unacceptable" due to historical reasons and the evaluation result is "unacceptable", the equipment shall be put into operation, after putting down "accepted on deviation" under "General Evaluation Comment". Equipment Management Dept. shall contact the manufacturer and Installation Dept. to handle "unacceptable" pumps which are newly installed and put into use as part of capital construction or technical renovation. For any other "unacceptable" pumps which cannot be remedied immediately and is urgently needed in production, the Operation Dept. shall accept them on deviation, putting down "needed in production" under "General Evaluation Comment" on the evaluation form; in addition, this information shall be indicated in the summary of Equipment Management Dept. at the end of a month.

让步接收。在实施评定过程中，除了检修后的评定指标外，也应重视检修后评定指标与设备历史正常运行数据相比的变化趋势，如趋势向好的方向发展应予以肯定（让步接收）。对因历史原因采取措施后振动有所下降，但按振动评定指标仍不合格，评定结果为“不合格”，在评定表“综合评定意见”栏注明“让步接收”后投运。对基建、技改新安装投用的评定为“不合格”的机泵，机械动力部要联系厂家、安装部门进行处理。对其它所有最终评定为不合格的机泵，如生产需要一时无法处理而需马上投用的，在评定表“综合评定意见”栏注明“生产需要”，运行部让步接收投用，同时在月底上报机械动力部的汇总表中注明。

2.8.5 Pumps exempt from evaluation. Where process and equipment technicians of the Operation Dept. and technicians of Maintenance Dept. have agreed, after analysis, that the high vibration of equipment and frequent maintenance are caused by non-conforming process conditions, the equipment may be temporarily exempt from evaluation. Relevant departments must carefully identify the causes and improve process or equipment (including updating) so that actual operation parameters are acceptable or better.

不作评定机泵。经运行部工艺、设备技术员、检修部门技术员等一起分析，达成设备振动较大且检修频繁是由于工艺条件不符等原因引起的共识，可暂时不作评定。有关部门要认真分析原因，通过改进工艺或设备（包括更新）使实际运行的评定参数达到（合格或以上）评定指标。

2.8.6 Quality defect of spare parts. In addition to visual and dimensional inspections, the Maintenance Dept. shall coordinate with relevant departments, as necessary, to conduct physical and chemical inspections on key positions of some spare parts; for spare parts with quality defects (to be presented by Maintenance Dept. and confirmed before assembly with equipment technicians of Operation Dept.) that must be used during production, the Operation Dept. and Maintenance Dept. shall reach consensus before assembly; the effect of the quality of this spare part on the corresponding maintenance quality indicator is ignored (this indicator is treated as "acceptable"); other indicators are evaluated as usual; the quality shall not be rated "good" in principle.

备件质量问题。检修部门对机泵备件除了目测和尺寸检查外，必要时与有关部门协商对一些备件

重点部位安排理化检验，对于备件质量存在的问题（检修部门提出并与运行部设备员在装配前确认），有时为了生产必须使用，运行部和检修部门应在装配前协商达成共识，该备件质量对相关某项检修质量指标影响不计（该项指标按合格处理），其它指标按常规进行检修质量评定，原则上不能评优良。

2.9 Within 120h of starting operation following maintenance, the final maintenance quality of pump equipment shall be completed. For general equipment, the equipment technicians of Operation Dept. shall conduct the evaluation together with technicians of the Maintenance Dept.; for key equipment, the Equipment Management Dept., Operation Dept. and executive departments shall conduct the evaluation according to evaluation criteria. Final evaluation requires the pump to run under rated conditions wherever possible; evaluation items shall be confirmed by relevant personnel.

最终评定,机泵设备检修投运 120 小时内，完成检修质量评定，其中一般设备由运行部设备员根据评定标准与检修部门技术员一起进行检修质量的评定；重要设备由机械动力部、运行部和施工部门共同根据评定标准进行检修质量的评定。最终评定要求机泵尽可能运行在额定工况下，有关人员对于评定项目进行最终确认。

2.10 Implementation of evaluation. Initial and final evaluation may concur. The equipment technician of Operation Dept. attaches the assessment form to the permit for equipment maintenance when the permit is issued. The Maintenance Dept. conducts pre-acceptance initial evaluation when the permit is returned. The operator shall notify the shift foreman or chief repairman of Maintenance Dept. to conduct pump test initial evaluation. Equipment technicians of Operation Dept. shall notify technicians of Maintenance Dept. according to equipment operation status (and also Equipment Management Dept. for key equipment) to conduct final evaluation. The evaluation shall be conducted on the site of equipment. After being signed, the assessment form for maintenance quality is collected and kept by the Operation Dept.

评定工作的操作。初评和最终评可一起进行，由运行部设备员在设备检修开许可票时同时把评定表附在许可票后面，检修部门在检修作业许可票交回时进行预验收初评，试泵初评由操作人员通知检修部门班长或主修，最终评定由运行部设备员根据设备投用情况通知检修部门技术员（重要设备同时通知机械动力部），评定人员在设备现场进行评定，检修质量评定签字后评定表由运行部负责回收保管。

Appendix 2

附件 2

Management of *Maintenance Work Permit* 检修施工安全许可票管理

1 The *Maintenance Work Permit* shall be issued by whoever is in charge of the equipment to be maintained.

现场检修作业施工遵循设备谁管理谁开具《检修施工安全许可票》的原则。

2 The *Maintenance Work Permit* is a must for maintenance of all equipment, piping, valve, pipe fittings, electrical device, instrument and structures in a production plant.

生产装置内设备、管道、阀门、管道配件、电气、仪表和构筑物等各类检修施工作业，均必须办理《检修施工安全许可票》。

3 The maintenance Implementation Unit must obtain the *Maintenance Work Permit* before carryout out maintenance on site; maintenance work is not permitted without valid *Maintenance Work Permit*. The format of the *Maintenance Work Permit* is attached hereto.

检修施工单位必须到装置办理《检修施工安全许可票》后方可进行现场检修施工，无有效《检修施工安全许可票》严禁检修施工。《检修施工安全许可票》格式见附件。

4 The *Maintenance Work Permit* is divided into two types (A and B). Type A shall be obtained by technicians while Type B by crew members.

《检修施工安全许可票》分为：“A类”和“B类”。“A类票”由技术人员负责办理，“B类票”由班组人员负责办理。

4.1 Type A permit is for scheduled work, non-scheduled work, high-risk work and routine defect remedying that requires effective work arrangement; and for work not covered by Type B permit. It is applicable to:

“A类”票划分的原则：计划性工作；非常规性作业、高风险作业；需进行有效的施工安排的日常缺陷处理；“B类”票外的作业。适用范围：

4.1.1 Scheduled maintenance items (including monthly maintenance, shut-down maintenance, technical measure and renovation items);

计划检修项目（含月度计划检修、装置停工检修、技措及技改项目）；

4.1.2 Minor routine outsourced maintenance;

日常零星外委检修；

4.1.3 Maintenance work involving hot work;

需动火的检修作业；

4.1.4 Work involving unconventional treatment means such as blocking and holing with pressure;

带压封堵、带压开孔等非常规处理手段的作业；

4.1.5 Items involving groundbreaking and entry into confined space;

需要破土和进入受限空间作业的项目；

4.1.6 Other items where technicians are responsible for clarification and management;
其它由技术人员负责交底、管理的项目；

4.1.7 Other unspecified items.

分类中还未明确的项目。

4.2 Type B permit is for work that is urgently needed in production yet not serious; easy to do; and of low risk. It is applicable to:

“B类”票划分的原则：生产紧急但还不重大；简单易行；低风险作业。适用范围：

4.2.1 Urgent pump maintenance (emergency repair) affecting plant safety and green production;

影响装置安全、环保生产的紧急的机泵检（抢）修；

4.2.2 Leakage treatment and unblocking of equipment that can be handed over, with an impact on plant safety and green production;

影响装置安全、环保生产的可交出的设备泄漏处理、清堵处理；

4.2.3 Fault treatment during operation of safety accessories and measuring instruments, only if they can be handed over for such treatment;

安全附件、测量器具运行过程中的故障处理，限于可交出情况下；

4.2.4 Maintenance work during operation of lifting equipment;

起重设备运行过程的维保内容；

4.2.5 Treatment of tightness leakage point for equipment;

装置设备气密的泄漏点处理；

4.2.6 Low risk maintenance of electric device and instruments;

电气、仪表相应的低风险检修工作；

4.2.7 Other simple work items, i.e. those not involving hot work, groundbreaking or entry into confined space;

其他简单施工项目，即不需动火、破土、不进入受限空间的施工项目；

4.2.8 Other plant hand-over cooperation measures and work with clear instructions or scheme;

其他有明确指令或方案的装置交出配合措施和施工作业；

4.2.9 Scaffolding, civil works, heat/cold insulation and corrosion protection supporting the above work.

配合上述施工作业的架子、土建、保温保冷及防腐作业。

5 Obtaining of *Maintenance Work Permit*

《检修施工安全许可票》的办理。

5.1 The user department needs to insert its code in the record number on the *Maintenance Work Permit*, the record number is HYBN-T6-____-0106-____-2018 for Type A permit and HYBN-T6- ____-0107____-2018 for Type B permit; the code of user department, as assigned in Appendix I, shall be inserted in the first blank space; the flow record number shall be placed in the second blank space.

使用单位需填写《检修施工安全许可票》记录编号中使用单位代码，记录编号分别为：

“A类票”，HYBN-T6-__-0106-__-2018，“B类票” HYBN-T6-__-0107 __-2018，第一空格为使用单位代码，代码分配详见附件一；第二空格为流水记录号。

5.2 Roles and responsibilities of persons obtaining Type A permit: the "maintenance content" and columns above it are filled in by technicians (such as static and dynamic electric instrument technicians and process technicians) and personnel above them; the drafter of maintenance content (new pipeline, pipeline relocation, technical renovation and blind plate assembly/disassembly are the responsibility of process technicians) is responsible for its accuracy, leading the permit obtaining process and site clarification of maintenance content. Safety measures and precautions are inserted by process technicians (or electrical and instrument technicians) by ticking "□"; they are responsible for the completeness and applicability of safety measures and precautions. Safety measures, precautions and maintenance content are reviewed by personnel whose authority is above the drafter of safety measures and precautions; such personnel are responsible for the feasibility of safety measures, precautions and maintenance content. Safety measures are implemented by operators of Operation Dept. (or electrical and instrument operators) arranged by the production team leader; they are responsible for the accuracy and authenticity of implementation. Precautions are implemented by the maintenance director who is also responsible for implementation of safety measures by the Implementation Unit and authenticity of the outcome. The *Maintenance Work Permit* is issued by the production team leader on duty, who is also responsible for verification of implementation of safety measures and suitability of maintenance timing.

“A类票”办票人员分工及职责：“检修内容”栏及以上各栏内容：技术员（动静电仪等专业技术人员、工艺技术员等）及技术员以上人员负责填写此项内容，检修内容编制人（新增管线、管线改接、技术改造、盲板拆装等作业由工艺技术员负责）对检修内容的准确性负责，同时负责办票过程的牵头工作和检修内容的现场交底。安全措施及注意事项：工艺员（电气、仪表等专业为技术员）负责此项内容的填写（在“□”内打“√”确定所需内容）并对安全措施及注意事项的完整性、适用性负责。安全措施及注意事项和检修内容的审核：权职高于“安全措施及注意事项制定人”的人员负责审核此项内容并对安全措施及注意事项和检修内容的可行性负责。安全措施的落实：装置生产班长安排的运行部操作人员（或电气、仪表专业操作员）负责落实安全措施并对落实结果的准确性、真实性负责。注意事项的落实：检修负责人负责落实注意事项和需施工方落实的安全措施并对落实结果的真实负责。《检修施工安全许可票》的签发：当班装置生产班长负责《检修施工安全许可票》的签发并对安全措施落实结果的核实和检修时间的适宜性负责。

5.3 Roles and responsibilities of persons obtaining Type B permit: the "maintenance content" and columns above it are filled in by indoor operators and personnel above them (or electrical and instrument team leader and operator), who are responsible for the accuracy of maintenance content and leading the process of obtaining the permit. Safety measures and precautions are inserted by indoor operators and personnel above them (or electrical and

instrument team leaders) by ticking “□”; they are responsible for the completeness and applicability of safety measures and precautions. Safety measures are implemented by operators of Operation Dept. (or electrical and instrument operators) arranged by the production team leader; they are responsible for the accuracy and authenticity of implementation and site clarification of maintenance content. Precautions are implemented by the maintenance director who is also responsible for implementation of safety measures by the Implementation Unit and authenticity of the outcome. The *Maintenance Work Permit* is issued by the production team leader on duty, who is also responsible for verification of implementation of safety measures and suitability of maintenance timing.

“B 类票”办票人员分工及职责：“检修内容”栏及以上各栏内容：内操及以上岗位人员（或电气、仪表专业班长、操作员）负责此项内容的填写并对检修内容的准确性负责，同时负责办票过程的牵头工作。安全措施及注意事项：内操及以上岗位人员（或电气、仪表专业班长）负责此项内容的填写（在“□”内打“√”确定所需内容）并对安全措施及注意事项的完整性、适用性负责。安全措施的落实：装置生产班长安排的运行部操作人员（或电气、仪表专业班长、操作员）负责落实安全措施并对落实结果的准确性、真实性负责，同时负责检修内容的现场交底工作。注意事项的落实：检修负责人负责落实注意事项和需施工方落实的安全措施并对落实结果的真实负责。《检修施工安全许可票》的签发：当班装置生产班长负责《检修施工安全许可票》的签发并对安全措施落实结果的核实和检修时间的适宜性负责。

5.4 For *Maintenance Work Permit* (Type A or B) obtained by the Electrical Operation Dept. and Instrument Control Dept., the "relevant unit" is Production Operation Dept and "Implementation Unit" is Electrical Operation Dept. or Instrument Control Dept., subject to countersigning by Production Operation Dept. Type A permit needs to be countersigned by process technician at the "signature by relevant unit"; Type B permit needs to be countersigned by the chief operator on duty or above at the "signature by relevant unit"; after the permit is issued by the production team leader on duty, the Electrical Operation Dept. and Instrument Control Dept. shall carry out and accept the maintenance work.

由电气运行部、仪表控制部负责办理的《检修施工安全许可票》（A 类或 B 类），“相关单位”为生产运行部，“施工单位”为电气运行部或仪表控制部，并经生产运行部会签，其中“A 类票”需在“相关单位人员签名”处由工艺技术员会签，“B 类票”需在“相关单位人员签名”处由当班装置主操以上会签，当班装置生产班长签发后，由电气运行部、仪表控制部组织实施并施工验收。

5.5 The Production and Operation Department shall be responsible for handling the "Maintenance Work Safety Permit" for the production equipment that needs to be repaired due to instrument failure. The "working unit" shall be the instrument control department. The "Maintenance Work Safety Permit" issued by the Instrument Control Department is responsible for the regular maintenance and repair of instruments or the instrument maintenance and repair in the instrument cabinet room and the instrument maintenance and repair in the non-installation area. The "working unit" is the instrument control department and the "Relevant

unit" is the production and operation department.

因生产装置内仪表故障需要检修，由生产运行部负责办理的《检修施工安全许可票》，“施工单位”为仪表控制部；仪表定期维护保养或仪表机柜间仪表检修及非装置区仪表检修，由仪表控制部负责办理的《检修施工安全许可票》，“施工单位”为仪表控制部，“相关单位”为生产运行部。

5.6 Where site equipment needs to be shut down due to maintenance of electrical equipment in the substation, the Electrical Operation Dept. shall obtain the appropriate Electrical Work Permit which goes into effect once countersigned by production team leader or above; maintenance of power transmission and distribution facilities at the substation shall follow relevant electrical systems.

因变电所内电气设备检修涉及到现场设备需要退出备用的，由电气运行部办理相应的电气工作票，经生产装置当班班长以上会签后生效；变配电站等输配电设施的检修，执行电气专业相关制度。

6 If maintenance items are related to upstream and downstream production plant, safety measures shall also include the requirements and signature of the team leader or process technician of such plant, who is responsible for implementation of these safety measures.

检修施工项目与上、下游生产装置有关联时，安全措施中还应包括上、下游生产装置的生产班长或工艺技术人员的要求和签字并负责落实好所需的安全措施。

7 Maintenance acceptance: where the maintenance is not completed within scheduled time for maintenance, the production team leader shall sign the *Maintenance Work Permit* and repeat the process of obtaining the permit; after maintenance, the maintenance director shall conduct self-inspection and sign the Permit before handover for commissioning; after equipment maintenance work ends, the production team leader (or professionals) shall examine and accept the maintenance quality and site sanitation.

检修施工验收：未在计划检修时间内完成检修时由装置生产班长在《检修施工安全许可票》上签名后并按原程序重新办票；检修结束经检修负责人自检合格并在“许可票”上签字后方可交付试运行；设备检修施工结束后，装置生产班长（或专业人员）对检修施工质量和现场卫生情况进行验收。

8 The validity period of *Maintenance Work Permit* (i.e. scheduled time for maintenance) is as follows:

《检修施工安全许可票》的有效期限（即计划检修时间）分三类：

8.1 During production, the *Maintenance Work Permit* is typically valid for not more than 24h or 5 days when necessary.

在生产期间，《检修施工安全许可票》有效期一般不超过 24 小时，确实需要的最长不超过 5 天。

8.2 During shut-down maintenance, the *Maintenance Work Permit* may be valid from equipment handover for maintenance to the end of maintenance.

在装置停工检修期间，《检修施工安全许可票》的有效期可从设备交出检修至设备检修结束。

8.3 During production, the *Maintenance Work Permit* for equipment pipe prefabrication, civil works, insulation, scaffolding and painting not closely related to the production process is valid

for not more than 15 days.

在生产期间对于与生产过程关系不密切的设备管道预制、土建施工、保温、架子、油漆的《检修施工安全许可票》有效期不超过 15 天。

9 During the night, weekends and holidays, the maintenance content on the *Maintenance Work Permit* that should be inserted by technicians shall be done by the person on duty; in emergencies where the normal formalities would take such a long time that affects production, the person on duty shall ask for instructions from the department head and go through the process for Type B permit, as instructed.

夜间、双休日、节假日《检修施工安全许可票》，原属于技术人员填写检修内容的由各单位值班人员组织办理；对于特别紧急，确因办理时间而影响生产时，由值班人员请示部门主管领导后按 B 票程序办理。

10 The *Maintenance Work Permit* is made in two copies and must be fully completed and signed by relevant responsible individuals. The first copy is kept by the permit issuer as part of plant handover; the second copy is kept by the Implementation Unit. For a permit issued by the Instrument Control Dept. and Electrical Operation Dept., the first copy, once signed by the team leader, is kept at the plant while the second copy is given to the Instrument Control Dept. and Electrical Operation Dept. After successful self-inspection following maintenance, the Implementation Unit notifies the team leader on duty of Production Operation Dept. for site acceptance; after successful acceptance, the maintenance director signs each copy of the *Maintenance Work Permit* and delivers it for commissioning (where the maintenance is carried out by the Instrument Control Dept. and Electrical Operation Dept., the Instrument Control Dept. and Electrical Operation Dept. shall perform acceptance of maintenance and deliver the permit to Production Operation Dept. for commissioning). After maintenance content is completed and accepted, the production team leader signs each copy of the *Maintenance Work Permit*. The first copy of the signed *Maintenance Work Permit* is returned to the permit issuer for safekeeping while the second one is kept by the Implementation Unit. For a permit issued by the Instrument Control Dept. and Electrical Operation Dept., both the first and second copies shall be returned, after maintenance, to the Instrument Control Dept. and Electrical Operation Dept. for safekeeping. If the Implementation Unit fails to sign the *Maintenance Work Permit* after completing maintenance, the maintenance work may be deemed to be not accepted. Where the maintenance quality and sanitation on work site fail to pass acceptance, the department in charge of the equipment makes evaluation comment and the Equipment Management Dept. evaluates the Implementation Unit as specified.

《检修施工安全许可票》一式二份，内容必须填写齐全，各有关责任人确认签字。第一联留办票方，作为生产装置工作交接内容；第二联由施工单位保存；由仪表控制部、电气运行部开具的施工作业票，装置班长签发后第一联留生产装置，第二联交付给仪表控制部、电气运行部。施工单位待检修结束自检合格后，通知生产运行部当班班长现场验收，验收合格后检修负责人在各联《检修施工安全许可票》上签字，并交付试运行（仪表控制部、电气运行部组织施工的则由仪表控制

部、电气运行部验收合格后交付生产运行部试运行)。检修施工内容完工验收合格后装置生产班长在各联《检修施工安全许可票》上签字。签字后的《检修施工安全许可票》第一联返回给办票方保存,第二联由施工单位留底,其中由仪表控制部、电气运行部开具的施工作业票,施工完成后第一第二联均交还给仪表控制部、电气运行部保存。施工单位检修结束后,未在《检修施工安全许可票》最后栏签字的,可视作检修工作未经验收处理。检修施工质量和检修施工场地卫生经验收不合格的,设备所在单位提出考核意见,机械动力部按规定对施工单位进行考核。

11 If the Implementation Unit needs to do hot work or enter the tower or tank after handover of the maintenance item, relevant provisions in the applicable systems shall be followed.

检修项目交出后,施工单位如需进行动火或进塔入罐作业的,按照相关制度中的有关条款执行。

12 During production, maintenance of each piece of equipment requires a separate *Maintenance Work Permit*. Execution of painting, insulation, scaffolding and civil works, however, may require a *Maintenance Work Permit* by small areas.

装置生产期间,每一台设备检修,都要分别办理《检修施工安全许可票》,但油漆、保温、脚手架、土建的施工可按小区域范围内办理《检修施工安全许可票》。

13 During shut-down overhaul (from confirmed handover for maintenance to handover for production after maintenance), the Production Operation Dept. shall make careful preparations by specifying the content and requirements in advance on the *Maintenance Work Permit* for scheduled items and appointing technicians, production team leader or program director familiar with the system process for site handover and confirmation. For maintenance items with similar conditions, maintenance content, requirements and safety measures and on the same platform in the same framework or in the same area, one *Maintenance Work Permit* suffices, adopting the more stringent operating parameters.

装置停工大修期间(经确认交付检修开始至检修结束确认交付生产为止),生产运行部要认真做好准备,对计划项目要提前做好《检修施工安全许可票》各项内容和要求的填写工作,并指派熟悉系统流程的技术人员、生产班长或项目负责人负责现场的交出和确认工作。对工况相似、检修内容和要求相似以及安全措施相似,且在同一框架内同层平台或同一区域的检修项目,可用同一张《检修施工安全许可票》,其操作参数按较苛刻的条件填写。

14 The Implementation Unit must carry out work in strict accordance with the maintenance content, requirements and scope of work specified in the *Maintenance Work Permit*, implement precautions in applicable maintenance specifications and permit and safety measures to be taken by the Implementation Unit; value self-protection; and in case of doubt, notify relevant personnel to come to the site for confirmation. For items involving continuous work in multiple trades and cross work by multiple work teams, the Implementation Unit shall develop written safe work requirements.

施工单位必须严格按照《检修施工安全许可票》的检修内容、要求和作业范围进行施工,在施工过程中要严格执行有关安全检修规程及许可票上的检修注意事项和需施工方落实的安全措施,重视自我保护,对有疑问的问题应通知所属单位有关人员到现场再次确认。对于多工种连续作业、多作业组交叉作业的项目,施工单位内部应制定书面安全作业要求。

15 Production Operation Dept. and other departments are entitled to inspect on site the *Maintenance Work Permit* held by the Implementation Unit and individuals; and order the unit or individuals who do not have *Maintenance Work Permit* or fail to carry out work as required by *Maintenance Work Permit* to suspend work immediately and hold them financially accountable. 各部门和生产运行部有权对现场施工单位和个人进行《检修施工安全许可票》检查，对无《检修施工安全许可票》或未按《检修施工安全许可票》要求进行施工的单位和个人，应责令其立即停止施工，并视情况分别进行经济责任制考核。

16 All departments shall have a register for *Maintenance Work Permit*, require the team leader on duty to register each and every *Maintenance Work Permit* and appoint special persons to collect and archive these permits by month; the *Maintenance Work Permit* shall be saved for 6 months (including the current month).

各部门应建立《检修施工安全许可票》登记本，要求生产装置的当班班长登记每一张《检修施工安全许可票》，并指定专人按月收集整理归档，《检修施工安全许可票》保存期为6个月（含当月）。

Schedule**Department Code Assignment**

附表

部门代码分配表

Department 部门名称	Department code 部门代码	Department 部门名称	Department code 部门代码	Department 部门名称	Department code 部门代码
Board of Directors Office 董事会办公室	00	GM's Office 总经办办公室	01	HR Dept. 人力资源部	02
Finance Dept. 财务管理部	03	Commercial Dept. 商务部	04	Materials Procurement Dept. 物资采购部	05
Scheduling & Dispatch Dept. 计划调度部	06	Equipment Management Dept. 机械动力部	07	HSE Dept. HSE 管理部	08
Hengyi Industries International PTE LTD 恒逸实业国际有限 公司	09	Refining Dept. #1 炼油一部	10	Refining Dept. #2 炼油二部	11
Refining Dept. #3 炼油三部	12	Refining Dept. #4 炼油四部	13	Power Dept. 热电部	14

Port & Storage Dept. 港务储运部	15	Utilities Dept. 公用工程部	16	Lab Dept. 质量检验部	17
Electrical Operation Dept. 电气运行部	18	Instrument Control Dept. 仪表控制部	19	Equipment Maintenance Dept. 设备检修部	20



Hengyi Industries Sdn Bhd
恒逸实业（文莱）有限公司

HYBN-T3-07-0015-2018-1

Management System for Equipment Repair, Update Plan and Cost

设备修理、更新计划和费用使用管理制度

Issued Date: Dec. 2018

颁布日期：2018 年 12 月

 HENGYI	Hengyi Industries Sdn Bhd 恒逸实业（文莱）有限公司			
	Management System for Equipment Repair, Update Plan and Cost 设备修理、更新计划和费用使用管理制度			
	Doc No.	HYBN-T3-07-0015-2018-1	Ver No.	1

1 Purpose

目的

The System is hereby formulated to further strengthen the plan management of equipment repair and item update, regulate the use of repair costs and update funds, improve the planning, rationality, scientific nature and economical efficiency of equipment repair and item update, to effectively control the repair costs and update funds of fixed assets and maximize the service efficiency.

为进一步加强设备修理和更新项目的计划管理，规范修理费、更新资金的使用，提高设备修理、更新项目的计划性、合理性、科学性和经济性，使固定资产修理费和更新资金得到有效控制和使用效率的最大化，特制订本制度。

2 Scope of Application

适用范围

The System is applicable to all departments of the Company.

本制度适用于公司各部门。

3 Terms and Definitions

术语和定义

N/A.

无。

4 Management Responsibilities

管理职责

4.1 Specified administrative authority

归口管理部门

4.1.1 Equipment Management Dept. is the specified management department for equipment repair, plan update and repair cost.

机械动力部是设备修理、更新计划和修理费用归口管理部门。

4.1.1.1 It is responsible for reviewing repairs and item updates, organize the preparation,

reporting and release of various repairs and update plans.

负责审核修理、更新项目，组织编制、上报及下达各类修理、更新计划。

4.1.1.2 It is responsible for the management of the Company's repair and update plans and the follow-up, supervision and inspection of plan implementation.

负责公司修理、更新计划的管理和计划实施的跟踪、监督、检查。

4.1.1.3 It is responsible for organizing technical waste evaluation for important equipment and reviewing updated equipment selection; participating in the technical waste evaluation of general equipment and approving updated equipment selection (except commissioned design items); implementing the maintenance and repair costs of information infrastructure; and incorporating the update item of information equipment into the Company's equipment update plan.

组织重要设备判废技术鉴定和更新设备选型的审核；参与一般设备的判废技术鉴定和更新设备选型的审批（委托设计项目除外）；负责落实信息基础设施维护、维修费用；负责将信息设备更新项目纳入公司设备更新计划。

4.1.1.4 It is responsible for the use management of repair and update expenses; analyzing and releasing the control index of annual repair cost of each department; and checking the use of costs.

负责修理、更新费用的使用管理；分解和下达各部门的年度修理费控制指标，检查费用的使用情况。

4.2 Coordinated management departments

协同管理部门

4.2.1 Finance Dept. is responsible for raising and balancing funds according to the control index of annual repair cost of the Company, providing monthly repair cost entry, and supervising the expense. It is responsible for the accounting and statistics of repair costs and recording expenses in accordance with the audit list of settlement in time; providing the breakdown table of actual payments of repair cost and update expense and analysis of usage.

财务管理部根据公司年度修理费用指标，负责筹措和平衡资金，每月提供修理费入帐情况，监督费用的开支情况。负责修理费的核算和统计，按结算审核单及时入账；提供修理费、更新费的实际支付明细表及使用情况的分析。

4.2.2 Materials Supply Dept. is responsible for the procurement and supply of materials needed for repair and update, and participates in the technical waste evaluation of equipment.

物资装备部负责修理、更新所需物资的采购和供应，参与设备的判废技术鉴定工作。

4.3 Executive departments

执行部门

4.3.1 Relevant departments and operation departments of the Company are the executive

departments.

公司各相关部门和运行部为执行部门。

4.3.1.1 They are responsible for reporting all kinds of repair and update items, implementing and tracking the planned items.

负责上报各类修理、更新项目，做好计划项目的实施和跟踪管理工作。

4.3.1.2 They are responsible for managing the repair costs and update expenses, controlling the usage according to the index issued by the Company, and reporting the budget statement of repair costs in time.

负责修理费、更新费的使用管理工作，按公司下达的指标控制使用,及时上报修理费的预算报表。

5 Management Content

管理内容

5.1 Plan management

计划管理

5.1.1 Repair plan is divided into annual repair plan, equipment shutdown & maintenance plan and monthly maintenance plan.

修理计划分为年度修理计划、装置停工检修计划和月度检修计划。

5.1.1.1 Reporting scope of annual repair plan: see Appendix 1 for details.

年度修理计划申报范围：详见附件 1。

(1) Reporting, planning and approval procedures of annual repair items.

年度修理项目的申报、计划编制、审批程序。

1) Each department is responsible for organizing the reporting of annual repair items of the department. After review and verification by the leader, the department shall submit the application form and summary table of the next year's repair items to the Equipment Management Dept. before the end of July each year. Each discipline of Equipment Management Dept. shall conduct preliminary review on the necessity of the report items and the accuracy of the cost and put forward preliminary review opinions.

各部门负责组织本部门年度修理项目的申报，经主管领导审核后，在每年 7 月底前向机械动力部上报下一年度修理项目申请表和汇总表，机械动力部各专业对申报项目必要性、费用的准确性进行初审，提出初审意见。

2) The Equipment Management Dept. shall complete the preparation of the first draft of the plan before the end of September, and organize the communication and joint review of all departments before mid October. The Equipment Management Dept. shall adjust the plan according to the opinions from the joint review, compile the annual repair cost plan and submit it to the leaders of the Equipment Management Dept. for review.

机械动力部在 9 月底前完成计划初审稿的编制工作，10 月中旬前组织各部门进行对接和会审。根据会审意见调整计划，编制年度修理费用计划报机械动力部分管领导审核。

3) The annual repair cost plan shall be submitted to the Assistant Deputy Chief Engineer and Division *Deputy General Manager* of the Company for review and the CEO for approval.

年度修理费用计划报公司协管副总师、分管副总经理审核和 CEO 审批。

4) The annual repair cost plan approved by the CEO of the Company shall be sent to relevant departments before the end of December and compiled into the annual repair cost budget.

经公司 CEO 审批后的年度修理费用计划，在 12 月底前发至各有关部门，并编入年度修理费用预算。

(2) Reporting scope and procedure of annual urgent repair items.

年度修理急批项目申报范围和程序。

1) Reporting scope of annual repair items: for the equipment damage caused by sudden production accidents and items fall within the reporting scope in Appendix 1, the annual repair items can be reported for urgent approval. Urgent items are limited to productive repair items, but non-productive repair items that the Company decides are in urgent need of implementation can also be reported.

年度修理项目的申报范围：因生产突发性事故，造成的设备损坏且属于附件 1 申报范围内的项目，可申报急批年度修理项目。急批项目限于生产性修理项目，但对于公司决定确实急需实施的非生产性修理项目也可申报。

2) The department where the item is located shall be responsible for filling in the annual repair application form for the urgent items, and submit it to the Equipment Management Dept. after being reviewed by the leader. After being examined by the leader of the Equipment Management Dept., it shall be submitted to the Assistant Deputy Chief Engineer, Division *Deputy General Manager* for review and the CEO for approval.

急批项目由项目所在部门负责填报年度修理申请表，主管领导审核后报机械动力部，经机械动力部领导审核后，报公司协管副总师、分管副总经理审核和 CEO 审批。

(3) Report procedure of annual repair carry-over items.

年度修理结转项目申报程序。

Items not completed in the current year, the department in charge of the items shall submit the item carry-over application before the end of January of the next year, and the application shall be summarized by the Equipment Management Dept. and approved by the department leader, and then sent to relevant departments.

当年未完成项目，由项目所在部门在次年 1 月底前提出项目结转申请，由机械动力部汇总并经部领导审批后，发至各相关部门。

5.1.1.2 Equipment shutdown & maintenance plan

装置停工检修计划

(1) The preparation scope of shutdown maintenance plan: any overhaul items that must be implemented during the shutdown maintenance of the device, as well as update projects, maintenance projects and technical transformation projects involving construction and installation shall be included in the equipment shutdown & maintenance plan.

停工检修计划的编制范围：凡必须在装置停工检修期间实施的大修理项目、涉及施工安装的更新

项目、维修项目、技术改造项目等应列入装置停工检修计划。

(2) Reporting, planning and approval procedures of shutdown maintenance items.

停工检修项目的申报、计划编制、审批程序。

Each operation department shall be responsible for the preparation of the shutdown maintenance plan for devices of the department, and report to the Equipment Management Dept. four months before the equipment shutdown & maintenance after being reviewed by the department leader.

各运行部负责本部门装置的停工检修计划的编制，经部门领导审核后，在装置停工检修前四个月前上报机械动力部。

(3) The Equipment Management Dept. shall organize the review, balance and adjust item content, and prepare the final draft of equipment shutdown & maintenance plan. After review by the leader of the Equipment Management Dept., the plan shall be submitted to the Assistant Deputy Chief Engineer and Division Deputy General Manager for review and the CEO for approval, and shall be distributed to relevant departments three months before device shutdown.

机械动力部组织进行审核、平衡调整项目内容，并编制装置停工检修计划最终稿，经机械动力部领导审核后，报公司协管副总师、分管副总经理审核和 CEO 审批，在装置停工前三个月分发至各有关部门。

(4) Adjustment and supplement of shutdown maintenance plan should be made one month prior to device shutdown, and a supplementary plan should be prepared; within three days after handing over the maintenance, additional to the shutdown maintenance plan should be made according to device inspection, and an additional plan should be prepared; in addition, it is allowed to modify the maintenance content and add maintenance items in the form of project change or additional application form and engineering contact list. The maintenance materials for adjusted and added items shall be proposed by the department of items and solved jointly with the Materials Supply Dept.; for the additional items with great maintenance difficulty and tight maintenance time, the reporting can only be made after the confirmation by the Equipment Management Dept., operation department and Equipment Maintenance Dept., and the implementation of the required materials and spare parts.

装置停工前一个月应对停工检修计划进行一次调整和补充，编制补充计划；检修交出三天内根据设备打开检查情况，对停工检修计划进行一次追加，并编制追加计划；此外，还允许以项目变更或追加申请表及工程联系单的形式，调整检修内容、追加检修项目。对调整、追加项目的检修用料由项目所在部门提出，会同物资装备部解决；对检修难度大、检修时间紧的追加项目，在机械动力部、运行部、检修部门三方确认，并落实所需材料、备件，方可申报。

(5) Shutdown maintenance plans must be uniformly numbered, and the source of cost should be clearly and respectively filled in as per annual repair item, update item, maintenance item, and technical transformation item.

停工检修计划必须统一编号，费用来源应按年度修理项目、更新项目、维修项目、技术改造项目分别填写清楚。

5.1.1.3 Monthly maintenance plan

月度检修计划

(1) Preparation scope of monthly maintenance plan:

月度检修计划的编制范围:

1) The monthly maintenance plan shall be prepared and reported before the 22nd of each month based on the operating cycle of production device and the technical status of equipment.

月度检修计划以生产装置的运行周期和设备的技术状况为依据，每月 22 日前编制上报。

2) The annual repair items that can be carried out during device operation, update items involving construction and installation, technical transformation items, repair items and maintenance items, can be included in the monthly maintenance plan, but the complete set of construction drawings must be delivered the same time of reporting the monthly maintenance plan, and provided that the required equipment, materials and accessories have been implemented.

装置运行期间可实施的年度修理项目、涉及施工安装更新项目、技术改造项目、维修项目及维护项目等可列入月度检修计划，但必须在上报月度检修计划的同时交付整套施工图纸，且在所需设备、材料、配件均已落实。

3) The annual repair items, update items and technical transformation items listed in the monthly maintenance plan shall be marked with their respective approval No., and the expenses shall be paid separately according to the approval No. of the item.

列入月度检修计划中的年度修理项目、更新项目、技术改造项目应注明各自的审批号，其费用按项目审批号分别支付。

(2) Reporting, planning and approval procedures of monthly equipment maintenance items: the monthly maintenance plan shall be organized and reviewed by the Equipment Management Dept., and then compiled and summarized in a unified manner, and submitted to department leader, Assistant Deputy Chief Engineer and Division Deputy General Manager of the Company for review and the CEO for approval. The plan shall be completed and distributed to relevant departments before the end of the month for implementation. All departments shall report the plan implementation of the current month before the 27th of the said month.

月度设备检修项目的申报、计划的编制、审批程序：月度检修计划由机械动力部负责组织进行审核后，统一编制、汇总，报部门领导审核、公司协管副总师和分管副总经理审核、CEO 审批，在月底前完成并分发至有关部门实施。各部门于每月 27 日前上报本月计划完成情况。

5.1.2 Update plan

更新计划

5.1.2.1 Reporting scope of update items: equipment that meets one of the following conditions may be reported for update.

更新项目的申报范围：满足下列条件之一的设备，可申请更新。

(1) The item has reached the service life, has lost the effectiveness and has no repair value.

使用年限已满，丧失使用效能，无修复价值的。

(2) The item has lost its original use value due to the change of production conditions.

因生产条件改变，已丧失原有使用价值的。

(3) The item hasn't reached the service life but lack of accessories and cannot be repaired.

使用年限未满，但缺乏配件无法修复使用的。

(4) The fixed assets are damaged and have no use value after repair.

固定资产毁损，无修复使用价值的。

(5) After verification, the technical performance still cannot meet the production requirements after overhaul.

经论证，大修理后技术性能仍不能满足生产要求的。

(6) The accuracy and technical performance can be restored after overhaul, but update is a more economic and reasonable choice.

大修理后，虽能恢复精度和技术性能，但更新更为经济合理的。

(7) Items that are eliminated due to outdated technology.

因技术落后淘汰的。

(8) Items fail to meet the requirements of safety and environmental protection and fail to meet the requirements after repair.

不符合安全环保要求且修复后也无法达到使用要求的。

(9) Other items that meet the update requirements.

其它符合更新要求的。

5.1.2.2 Waste evaluation of equipment should be implemented as per the *Fixed Assets Management System*.

设备判废鉴定，按照《固定资产实物管理制度》执行。

5.1.2.3 Reporting, planning and approval procedures of equipment update.

设备更新项目申报、计划编制、审批程序。

(1) Each department shall, according to the equipment status, propose its own item update plan, and report the equipment item update application form, summary form and equipment waste evaluation form of the next year to the Equipment Management Dept. before the end of July every year. For update of important equipment, the technical and economic verification report, risk evaluation form and update plan must be attached; and the technical evaluation of the attached shall be organized by the Equipment Management Dept.

各部门根据设备状况，提出本部门更新项目计划，在每年7月底前向机械动力部上报下一年度的设备更新项目申请表、汇总表及设备判废鉴定表。对重要设备的更新，还必须附上技术经济论证报告、风险评估表、更新方案，由机械动力部组织进行技术鉴定。

(2) The Equipment Management Dept. shall organize the preliminary review of the necessity and feasibility of the update of waste equipment, and review the items approved and new equipment selection, and put forward opinions of preliminary review; the Equipment Management Dept. shall prepare and complete the preliminary review draft of the update plan before the end of September, organize the communication and joint review among various project departments before mid October, adjust the update plan according to the joint review opinions, summarize and prepare the annual update plan of the Company, and submit it to the

department leaders for review.

机械动力部组织对判废设备更新的必要性、可行性进行初审，并对立项和新设备选型审查，提出初审意见；机械动力部在 9 月底前编制完成更新计划初审稿，10 月中旬前组织各项目部门进行对接和会审，根据会审意见调整更新计划，汇总、编制公司年度更新计划，报部门领导审核。

(3) After the approval by the CEO, the annual update plan of the Company should be uniformly numbered by the Equipment Management Dept. and sent to all departments.

公司年度更新计划经公司 CEO 审批后由机械动力部统一编号，发至各部门。

(4) The preparation and approval procedures of urgent update items and unfinished item carry-over plans should be carried out with reference to relevant provisions in 5.1.1.1.

更新急批项目和未完项目结转计划编制、审批程序参照 5.1.1.1 中相关条款执行。

5.3 Plan implementation management

计划实施管理

5.3.1 Construction management division:

施工管理分工：

5.3.1.1 The Equipment Management Dept. is responsible for organizing the construction management of the Company's annual repair items and equipment update items.

机械动力部负责组织公司年度修理项目和设备更新项目的施工管理。

5.3.1.2 The operation department is responsible for the construction management of the department's annual repair items, shutdown maintenance, monthly maintenance plan and sporadic maintenance items.

运行部负责本部门年度修理项目、停工检修、月度检修计划、零星维修项目的施工管理。

5.3.1.3 Update items that do not involve installation and construction shall be implemented by departments in charge of the items.

不涉及安装施工的更新项目，由项目所属部门负责实施。

5.3.2 Progress control and assessment of plan implementation

计划实施的进度控制和考核

5.3.2.1 The repair and update items shall be managed by the project leader, who should track and manage the whole process from the organization of project implementation, equipment selection and technical negotiation, contract execution, project progress, quality, cost control, project settlement expediting, project quantity review, etc. and has the right to conduct assessment on responsible persons or departments.

修理、更新项目实行项目负责人管理制，从项目实施的组织、设备选型和技术谈判、合同签订、项目的进度、质量、费用控制、工程结算书催交、工程量复核等进行全过程跟踪管理，有权对责任人或责任部门进行考核。

5.3.2.2 For items with delayed schedule, the project leader shall explain the reasons and put forward assessment opinions on relevant responsible departments or persons, and submit them to the Equipment Management Dept.

对进度延期的项目，由项目负责人说明原因，并对有关责任部门或责任人提出考核意见，提交机械动力部。

5.3.2.3 Each project department shall report the implementation of the monthly maintenance plan and shutdown maintenance plan to the Equipment Management Dept., provide reasons for unfinished items, and the Equipment Management Dept. shall put forward assessment opinions on relevant responsible departments or persons.

各项目部门将月度检修计划和停工检修计划完成情况报机械动力部，对未完工项目要说明原因，由机械动力部提出对有关责任部门或责任人考核意见。

5.3.3 The Materials Supply Dept. shall place orders according to the planned equipment, materials and spare parts listed in the repair and update items and their drawings, organize the supply of goods, deliver materials timely, and provide the order/arrival information of equipment and important materials to the project department and the Equipment Management Dept. on a monthly basis.

物资装备部要根据修理、更新项目及其图纸所列设备、材料、备品配件计划进行订货，组织货源，及时发料，并按月向项目部门和机械动力部提供设备、重要材料订货/到货信息。

5.3.4 Repair and update items needed to be outsourced should be implemented as per the *Equipment Maintenance Management System*.

对于需要外委施工的修理、更新项目，参照《设备检修管理制度》执行。

5.4 Use management of repair cost

修理费用使用管理

5.4.1 The repair cost shall be used based on the principle of "repair must be made when it's a necessity; items must be repaired when required; items must be used sparingly", and the review and approval procedures shall be strictly followed.

修理费用使用本着“应修必修、修必修好、节约使用”的原则，严格履行审批程序。

5.4.2 The Equipment Management Dept. shall strengthen the review of repair plans and the budget control of repair costs.

机械动力部应当加强修理计划的审核和修理费用的预算控制。

5.4.3 Daily maintenance, repair related repair costs should be settled normally by the work order.

日常维修、抢修相关的修理费用按工单正常结算。

5.4.4 The repair cost shall, in principle, be used for the maintenance and repair of in-use equipment (including ancillary facilities) incorporated in fixed assets management.

修理费原则上使用于纳入固定资产管理的在用设备（含附属设施）维护和修理。

5.4.5 Device (equipment) maintenance, equipment pickling, alkaline cleaning, high pressure water cleaning and other project costs can be paid by the repair cost.

装置（设备）检修，对设备进行酸洗、碱洗、高压水清洗等工程项目费用可由修理费列支。

5.4.6 Catalyst regeneration, reagent change, standard gas for analysis and calibration, and

tank cleaning expenses are not included in the repair cost.

催化剂再生、换剂、分析标定用的标准气等以及油罐清罐费用，不在修理费中列支。

5.4.7 Project that is not of repair property, such as costs resulted from afforestation, environmental sanitation and advertisement are not included in the repair cost.

非修理性质的项目，如：绿化、环境卫生、广告宣传等所发生的费用不在修理费中列支。

5.4.8 Preparation, declaration and approval procedure of annual and monthly repair cost budget are the same as those of the repair plan.

年度、月度修理费预算编制、申报、审批程序同修理计划。

6 Inspection and Supervision

检查与监督

The Equipment Management Dept. shall be responsible for the supervision, inspection and assessment on the implementation of equipment repair, update plan and the management system of cost use.

机械动力部负责对设备修理、更新计划和费用使用管理制度的执行情况进行监督检查并考核

7 Associated Procedures and Records

关联程序和记录

7.1 Associated procedures

关联程序

7.1.1 Annual Cost Approval Procedures HYBN-T2-07-0049-2018-1

年度费用审批程序 HYBN-T2-07-0049-2018-1

7.1.2 Approval and Management Procedures of Maintenance and Repair Items

HYBN-T2-07-0050-2018-1

检维修项目审批管理程序 HYBN-T2-07-0050-2018-1

7.1.3 Approval Procedures of Equipment Update Plan HYBN-T2-07-0051-2018-1

设备更新计划审批程序 HYBN-T2-07-0051-2018-1

7.1.4 Confirmation Procedures of Repair Cost and Project Quantity

HYBN-T2-07-0052-2018-1

修理费工程量确认程序 HYBN-T2-07-0052-2018-1

7.2 Associated records

关联记录

7.2.1 Application Form of Equipment Update Items HYBN-T6-07-0113-001-2018

设备更新项目申请表 HYBN-T6-07-0113-001-2018

7.2.2 Summery Table of Annual Equipment Update Items HYBN-T6-07-0114-001-2018

年设备更新项目汇总表 HYBN-T6-07-0114-001-2018

7.2.3 Application Form of Annual Repair Items HYBN-T6-07-0115-001-2018

年度修理项目申请表 HYBN-T6-07-0115-001-2018

7.2.4 Summery Table of Annual Repair Items HYBN-T6-07-0116-001-2018

年度修理项目汇总表 HYBN-T6-07-0116-001-2018

7.2.5 Shutdown Maintenance Plan HYBN-T6-07-0117-001-2018

停工检修计划 HYBN-T6-07-0117-001-2018

7.2.6 Monthly Equipment Maintenance Plan HYBN-T6-07-0118-001-2018

月度设备检修计划 HYBN-T6-07-0118-001-2018

7.2.7 Application Form for Change of Equipment Repair and Update Item

HYBN-T6-07-0119-001-2018

设备修理、更新项目变更申请表 HYBN-T6-07-0119-001-2018

7.2.8 Application Form for Change or Addition of Items in the Maintenance Plan

HYBN-T6-07-0120-001-2018

检修计划项目变更或追加申请表 HYBN-T6-07-0120-001-2018

8 Supplementary Rules

附则

8.1 The System is under the specific management of the Equipment Management Dept.

本制度由机械动力部归口管理。

8.2 The System is drafted by Equipment Management Dept.

本制度起草部门：机械动力部。

8.3 Equipment Management Dept. is responsible for the interpretation of the System.

本制度解释权归机械动力部拥有。

8.4 Revision, preparation and approval of the System are shown in Table 1:

本制度版本编制和审批情况见表 1:

Table 1 Revision, preparation and approval of document

表 1 文件版本编制和审批情况

1	2018-12-31	Mi Jianbin 米建彬	Tong Xueyun 童雪云	Xu Ye 徐野	Chen Liancai 陈连财
Revision 版本	Issued date 颁布日期	Prepared by 编制人	Reviewed by 审核人	Authorized by 审定人	Approved by 批准人

9 Appendices

附件

Appendix 1 Reporting Scope of Annual Repair Items

附件 1 年度修理项目申报范围

Appendix 2 Application Scope of Repair Cost

附件 2 修理费使用范围

Appendix 1

附件 1

Reporting Scope of Annual Repair Items 年度修理项目申报范围

Any item meeting the following conditions can be listed as the annual repair item:

具备下列条件者，均可列为年度修理项目：

1 Columns

塔类

When the diameter is less than DN1000mm, half of the column trays or more should be replaced.

直径 DN1000mm 以下，塔盘更换在一半及以上。

Replacement of column trays when the diameter is DN1000~DN2000mm: for carbon steel, 10 layers or more; stainless steel, 5 layers or more.

直径 DN1000~DN2000mm 塔盘更换：碳钢的 10 层及以上、不锈钢的 5 层及以上。

Replacement of column trays when the diameter is DN2000~DN3000mm: for carbon steel, 5 layers or more; stainless steel, 2 layers or more.

直径 DN2000~DN3000mm 塔盘更换：碳钢的 5 层及以上、不锈钢的 2 层及以上。

Replacement of column trays when the diameter over DN3000mm: for carbon steel, 3 layers or more; stainless steel, 1 layer or more.

直径 DN3000mm 以上塔盘更换：碳钢的 3 层及以上、不锈钢的 1 层及以上。

Demisters or packing should be completely replaced, using the column maintenance cost.

破沫网或填料全部更换；塔体检修费用。

2 Vaporizer, Heater

汽化器、加热器

Maintenance of individual items such as shell, cyclone separator, dipleg, distribution tube and slide valve.

壳体、旋风分离器、料腿、分布管、滑阀等单项检修。

3 Reactor

反应器

Maintenance of individual items such as scaling basket, grating and distribution plate.

结垢篮、格栅网、分配盘等单项检修。

4 Boiler, Fuel Furnace, Heating Furnace

锅炉、燃料炉、加热炉

Maintenance of furnace tube, air preheater, economizer, superheater, refractory bricks, alloy hanger, oil bend, burner and pattern plate.

炉管、空气预热器、省煤器、过热器、耐火砖、合金吊挂、油弯头、燃烧器、花板等检修

5 Heat Exchanger, Cooler, Reboiler

换热器、冷却器、重沸器

Replacement of core, header; replacement of individual high-pressure alloy steel bolt.

更换芯子、管箱；单台高压合金钢螺栓更换。

6 Equipment lining

设备衬里

Maintenance of thermal insulation lining and stainless steel lining.

隔热衬里、不锈钢衬里的检修。

7 Oil Tank, Storage Tank

油罐、贮罐

Tank bottom and tank top should be replaced completely; coiled tube and central drain pipe of Heater should be replaced completely; the entire sealing tape should be replaced; partial tank wall and bottom should be replaced.

罐底、罐顶全部更换；加热器盘管、中央排水管全部更换；密封胶带整条更换；更换部分罐壁和罐底。

8 Pressure vessel and Pressure pipe inspection

压力容器、压力管道检测

Overall inspection of Boiler, pressure vessels and pressure pipeline.

锅炉、压力容器、压力管道全面检验。

9 Individual pipeline

单项管线

Replacement of pipeline of DN 250, 100m or more.

DN 250、100m 及以上管道更换。

10 Replacement and Maintenance of Valves

阀门更换和检修

PN≥1MPa DN≥400mm

PN≥1.6Mpa DN≥200mm

PN≥2.5Mpa DN≥150mm

PN≥4Mpa DN≥100mm

Replacement and maintenance of individual valves.

以及单台阀门更换、检修。

11 Instrument

仪表

Individual replacement of production instruments and their accessory equipment.

生产用仪表及其附属设备单台更换。

12 Cables and electrical equipment

电缆、电器设备

Individual power, control cables should be all replaces.

电力、控制电缆单根一次更换。

Motor with 75 kW or above, power transformer with rewound coils, and 200 kW motor or above

for overhaul.

75 千瓦及以上电机，动力变压器线圈重绕者，及 200 千瓦及以上电机大修者。

Overhaul of important electrical equipment.

重要类电气设备的大修。

13 Rotating equipment

转动设备

Overhaul of important rotary equipment and rotating equipment with the prime mover power greater than or equal to 500KW.

重要动设备以及原动机功率大于等于 500KW 转动设备的大修。

14 Water Cooling Tower

凉水塔

More than half of the water collector, packing layer, nozzle to be replaced.

更换收水器、填料层、喷头在二分之一以上。

Replacement of blower reducer.

更换风机减速箱。

15 Plants, rooms and structures

厂房、房屋和构筑物

Overall renovation of waterproof layer of the roof.

屋顶防水层全部翻修。

The interior wall, exterior wall and floor of houses and structures should be completely renovated (excluding coating), reinforced, surface finished (excluding separate whitewashing) and all doors and windows should be replaced; public roads, floors, walls, slopes and other fixed assets should be renovated; protective strings for berths should be completely replaced.

房屋、构筑物内壁、外壁、地坪全部翻修（不包括涂料）、加固、粉面（不包括单独刷白）、门窗全部更换者；属固定资产的公用道路、地坪、围墙、护坡等翻修；泊位护弦全部更换。

16 Anti-corrosion and thermal insulation

防腐、保温

Anti-corrosion, painting and thermal insulation of the whole equipment, pipelines and components of the device or system; anti-corrosion, painting and thermal insulation of tanks.

装置或系统整体设备、管线、构件的防腐、油漆、保温；油罐的防腐、保温。

17 Conveying equipment, driving and crushing equipment

输送设备、行车、破碎设备

Replacing belts of conveying equipment, driving and crushing equipment.

更换皮带输送设备、行车、破碎设备。

Appendix 2

附件 2

Application Scope of Repair Cost 修理费使用范围

Table 2 Application Scope of Repair Cost

表 2 修理费使用范围

Equipment classification 设备类别	Contents included in repair cost 修理费用列支内容	Contents not included in repair cost 不属修理费用列支内容
1 Industrial Furnace 工业炉	Partial replacement of furnace tubes; repair, replacement and furnace efficiency test of components such as furnace lining, economizer, burner, soot blower, flue and furnace wall. 炉管局部更换、炉衬、省煤器、燃烧器、吹灰器、烟道、炉壁板等部件修理、更换及炉效测试。	Material upgrade required by the process; replacement of all furnace tubes; replacement of complete set of steam drum, preheater, induced draft fan and blower or replacement of parts required by technical transformation. 因工艺需要进行的材质升级及全部炉管更换、汽包、预热器、引风机、鼓风机整台更换或因技术改造需要对零部件更换。
2 Columns 塔类	Repair and replacement of column internals, accessories, partial column body. 塔内件、塔附件、局部塔体修补更换等。	Replacement of all column internals and modification of internals (including packing); internals and accessories to be technical transformed due to process requirements. 全部塔内件更换及塔内部件（含填料）改型，因工艺需要进行技术改造更换的内件、附件。
3 Storage Tank 储罐	Partial replacement and repair of tank top plate, base plate and wall; replacement and repair of internals and accessories. 罐顶板、底板、壁板局部更换、修复，内构件及附件更换修复等。	Addition of new components such as secondary seal, floating plate, dehydration device, heater composing of individual equipment, and tank cleaning fee. 增加二次密封、新增浮盘等新部件以及脱水装置、构成单台设备的加热器、清罐费等。
4 Reactor 反应器	Replacement and repair of partial internals and safety accessories; repair of reactor wall; replacement of lining. 部分内构件和安全附件更换修理、器壁修补、衬里更换等。	Replacement of complete set of individual equipment constituting fixed assets. 构成固定资产的单台设备整台更换。
5 Cool-heat-exchangers 冷热交换器类		
5.1 Heat Exchanger 热交换器	Repair and replacement of tube bundle, tube header and floating head; repair and cleaning of	Replacement of shell; upgrade of materials and modification of tube bundle due to process

	partial drum. 管束、管箱、浮头修复更换，局部筒体修补及清理等。	technology requirements. 壳体更换及因工艺技术要求材质升级、管束改型等。
5.2 Air Cooler 空冷器	Repair and replacement of air cooler tube bundle, blower. 空冷器管束、风机修理更换。	Replacement of plate and membrane-type air cooler. 板式及膜式空冷更换。
6 Vessels 容器	Replacement and repair of partial internals and safety accessories; repair of reactor wall; replacement of lining. 部分内构件和安全附件更换修理、器壁修补、衬里更换等。	Replacement of complete set or upgrade of materials due to process requirements. 整台更换或因工艺要求的材质升级。
7 Separating, drying and mixing equipment 分离、干燥及搅拌设备	Equipment maintenance; replacement and repair of parts and components. 设备检修及零部件更换、修理等。	Replacement and modification of internals and auxiliary equipment that alone constitute the fixed assets. 单独构成固定资产的内构件及附属设备更换、改造。
8 Rotating equipment (including compressor, blower, refrigerator, pump, steam turbine, etc.) 转动设备（包括压缩机、风机、冷冻机、泵、汽轮机等）	Overhauls, medium repairs and minor repairs as well as parts replacement as per relevant technical specification. 按有关技术规程进行的大、中、小修及零部件更换等。	1 Replacement of single pieces (set) such as rotor, partition and shell with a value of more than USD 400,000; technical transformation required by the process. 单件（套）价值超过 40 万美元以上的转子、隔板、壳体等更换、因工艺需要进行技术改造。 2 Replacement of complete set of large units (pumps), if the attached system has a piece of equipment with an independent role, such as rotating equipment, vessels, cooler (with diameter of 500 mm or more) and other single equipment in the lubricating oil system, sealing oil system and cooling system. 成套的大型机组（泵），若其附属系统中具有独立作用的设备，如润滑油系统、密封油系统和冷却系统中的转动设备、容器及直径 500 毫米及以上冷却器等单台设备的整台更换。
9 Vacuum production and application equipment 真空获得及应用设备	Overhauls, medium repairs and minor repairs as well as parts replacement as per relevant technical specification. 按有关技术规程进行的大、中、小修及零部件更换等。	Replacement of complete sets. 整台更换。
10 Process pipeline, long distance pipeline 工艺管线、长输管线	Repair or partial replacement of pipeline, flange, bend and valves as per the original specification. 按原规格修复或局部更换管线、法兰、弯头、阀门等。	Replacement of valves constituting the fixed assets; material upgrade, diameter expansion and addition of pipeline due to process requirements.

		构成固定资产的阀门更换、因工艺要求管线材质升级、扩径、新增等。
11 Conveying, packaging equipment 输送、包装设备	Overhauls, medium repairs and minor repairs as well as parts replacement as per relevant technical specification. 按有关技术规程进行的大、中、小修及零部件更换等。	Replacement of complete sets and equipment that constitutes a single unit (set) of fixed assets. 整台更换及构成单台(套)固定资产的设备更换。
12 Hoisting equipment 起重设备	Overhauls, medium repairs and minor repairs, parts replacement as well as equipment detection and evidence collection as per relevant technical specification. 按有关技术规程进行的大、中、小修, 零部件更换及设备的检测、取证等。	Replacement of complete set of traveling bridge and equipment that constitutes a single unit (set) of fixed assets. 整台更换行车桥架及构成单台(套)固定资产的设备更换。
13 Boiler 锅炉	Maintenance as per relevant technical specification; repair and replacement of economizer, preheater, water cooler wall tube, flue, burner, furnace lining, electrode field, soot blower and other accessories. 按有关技术规程进行的检修, 省煤器、预热器、水冷器壁管、烟道、燃烧器、炉衬、电极场、吹灰器及其他附件的修理及更换。	Complete set replacement of equipment constituting the fixed assets and has an independent role in the boiler auxiliary system, such as steam drum, deaerator, fan, pump, and heater. 锅炉附属系统中具有独立作用、可构成固定资产的设备, 如汽包、除氧器、风机、机泵、加热器等整台更换。
14 Electrical equipment 电气设备		
14.1 Generator 发电机	Overhauls, medium repairs and minor repairs as well as replacement of components such as stators, rotors and exciter windings as per relevant technical specification. 按有关技术规程进行的大、中、小修及定子、转子及励磁机绕组等部件修复。	Replacement of stators and rotors. 定子、转子更换。
14.2 Motor 电动机	Overhauls, medium repairs and minor repairs as per relevant technical specification; complete set replacement of motors with 100KW power or less; repair, replacement or other maintenance of components such as stators, rotors, exciter windings and end covers. 按有关技术规程进行的大、中、小修, 功率在 100KW 及以下电机的整体更换, 定子、转子及励磁机绕组、端盖等部件修复、更换及其他修理等。	Replacement of motors with power more than 100KW. 功率大于 100KW 的电机更换。
14.3 Power transformation and distribution equipment		

变配电设备		
14.3.1 Transformer, arc suppression coil 变压器、消弧线圈	Repair, replacement and maintenance and test of windings and iron cores. 绕组、铁芯修复、更换及按有关规程进行的检修、试验等。	Replacement of transformers with the input voltage no less than 6KV; capacity increase of various types of transformers. 输入电压 6KV 及以上的变压器更换及各类变压器增容。
14.3.2 Distribution cabinet (high-voltage switch cabinet, low-voltage switch cabinet, load switch, protection screen, compensating cabinet, control cabinet and other transformation and distribution equipment) 配电柜（高压开关柜、低压开关柜、负荷开关、保护屏、补偿柜、控制柜及其他变配电设备）	设备内部元器件更换、按有关规程进行的检修、试验等。 Replacement of equipment internal components and parts; maintenance and tests as per relevant procedures.	整台更换。 Replacement of complete sets.
14.3.3 Electric and electronic equipment (rectifier, frequency converter, UPS, excitation cabinet or excitation device, voltage regulator or voltage stabilizer, charger or fast charger) 电力电子设备（整流器、变频调速器、不间断电源、励磁柜或励磁装置、调压器或稳压器、充电器或充电机）	Replacement of equipment internal components and parts; replacement, inspection and test of various boards; complete set replacement of variable-frequency governor with the power less than 100KW. 设备内部元器件更换，各种板卡更换，检查、试验及小于 100KW 的变频调速器整台更换等。	Replacement of complete sets (including variable-frequency governors with the power more than 100KW). 整台更换（包括大于 100KW 的变频调速器）。
14.3.4 Electric reactor and non - cabinet capacitor and transformer with voltage of 35KV or above 电抗器及电压在 35KV 及以上的非柜装式电容器、互感器	Replacement or repair of parts and components. 元器件更换或修理。	Replacement of complete sets. 整台更换。
14.4 Power transmission line, distribution line, communication line 输电线路、配电线路、通讯线路	Inspection, repair or partial replacement of ancillary facilities. 附属设施的检查、修理或局部更换。	Replacement of entire line. 整条线路更换。
15 Control system 控制系统		

<p>15.1 Complete set dedicated control system of DCS, ESD, PLC and other units DCS、ESD、PLC、及其他机组成套专用控制系统</p>	<p>Cleaning, inspection, repair, spot check and performance test of the entire system as per relevant procedures; repair or replacement of cards and terminals. 按有关规程对整套系统进行清洗、检查、修理、点检、性能测试；卡件、终端修理或更换等。</p>	<p>Replacement of entire system, software upgrade and additions of new hardware equipment. 系统整体更换、软件升级和新增硬件设备等。</p>
<p>15.2 Status monitoring system of unit, speed control system of steam turbine, gas alarm system, on-line analysis instrument system 机组状态监测系统、汽轮机调速控制系统、气体报警系统、在线分析仪表系统</p>	<p>Cleaning, inspection, repair and spot check as per relevant procedures; replacement of partial components. 按有关规程进行清洗、检查、修理、点检、及对局部部件更换。</p>	<p>Replacement or upgrade of entire system; replacing mechanical governor with electronic governor. 系统整体更换或升级；机械式调速器更换为电子调速器。</p>
<p>15.3 Industrial television monitoring system, fire alarm system, patrol inspection management system 工业电视监控系统、火灾消防报警系统、巡检管理系统</p>	<p>Cleaning, inspection, repair and spot check as per relevant procedures; replacement of partial components. 按有关规程进行清洗、检查、修理、点检、及对局部部件更换。</p>	<p>Replacement or upgrade of entire system. 系统整体更换或升级。</p>
<p>16 Instruments and meters 仪器、仪表</p>		
<p>16.1 Temperature measurement components such as temperature transmitter, thermocouple and resistance thermometer of primary measuring components; pressure transmitter, differential pressure transmitter, liquid level transmitter, flow transmitter; various throttle, pressure tapping units, zirconia analyzer 一次检测部件中的温度变送器、热电偶、热电阻温度计等各种测温元件；压力变送器、差压变送器、液位变送器、流量变送器；各种节流、取压单元、氧化锆分析仪等</p>	<p>Replacement and repair of single set. 单台更换、修理。</p>	<p>Replacement, modification and upgrade of entire set of instrument within the device. 装置内整套仪表更换、改型升级。</p>
<p>16.2 Regulator, display instrument, recorder, alarm, safety barrier, power supply, converter and all kinds of auxiliary</p>	<p>Replacement and repair of single set. 单台更换、修理。</p>	<p>Replacement, modification and upgrade of entire set of instrument within the device. 装置内整套仪表更换、改型升级。</p>

instruments of the secondary instrument 二次仪表中的调节器、显示器、记录仪、报警器、安全栅、电源、转换器及各类辅助仪表		
16.3 Measuring instrument 计量仪表	Calibration, inspection; replacement and repair of components. 标定、检查及部件更换、修理。	Replacement of measuring instruments with accuracy of 0.2 or above or with special calibration requirements. 实际使用精度要求在 0.2 级及其以上,或需特殊检定要求的计量仪表更换。
16.4 Regulating valve, locator, solenoid valve and other accessories 调节阀、定位器、电磁阀及其他附件	Replacement and repair of single piece. 单件更换、修理等。	Replacement of complete sets with individual fixed asset No. 有单独固定资产号的整台更换。
16.5 Slide valve, plug valve for catalytic cracking; high temperature butterfly valve at flue gas turbine inlet; high pressure interlock valve for hydrocracking; and other high-temperature special control valves 催化裂化用滑阀、塞阀、烟机入口高温蝶阀、加氢裂化高压联锁阀及其他高温高压特殊控制阀	Partial replacement and repair. 局部更换、修理。	Replacement of complete sets. 整台更换。
16.6 Other instruments (chemical examination instruments, medical instruments, environmental monitoring instruments, experimental instruments, measuring instruments, online analyzer, etc.) 其他各类仪器(化验仪器、医疗仪器、环境监测仪器、实验仪器、测量仪器、在线分析仪等)	Replacement and repair of parts and components. 零部件更换、修理。	Complete set replacement of instruments with the unit price over USD 4,000. 单价超过4000美元的仪器整台更换。
17 Buildings, structures, roads 建筑物、构筑物、道路	Repair or renovation on the original base of buildings, structures (including stack, flare, pipe rack, retaining wall, slope and wall, fire bank), roads. 建筑物、构筑物(包括烟囱、火炬、管廊、挡土墙、护坡及围墙、	Demolition and rebuild of, and storey increase, floor area expansion, decoration, indoor system (such as air conditioning system network system) addition in buildings; road widening, upgrade and addition. 建筑物推倒重建、增加层数、扩大

	防火堤等)、道路在原有基础上进行修理或修缮。	建筑面积、装饰装潢、新增室内系统如空调系统、网络系统;道路拓宽、提高等级、新增等。
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Hengyi Industries Sdn Bhd
恒逸实业（文莱）有限公司

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Technical Improvement Measures Management System

技改技措项目施工管理制度

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 HENGYI	Hengyi Industries Sdn Bhd 恒逸实业（文莱）有限公司			
	Technical Improvement Measures Management System 技改技措项目施工管理制度			
	Doc No.	HYBN-T3-07-0016-2018-1	Ver No.	1

1 Purpose

目的

The system is hereby formulated to strengthen the management of technical improvement measures and ensure the smooth implementation of technical improvement measures.

为加强技改技措项目施工管理，确保技改技措项目顺利实施，特制订本制度。

2 Scope of Application

适用范围

The system is applicable to technical improvement measures projects managed by the Equipment Management Dept. and implemented by Operation Departments.

本制度适用于机械动力部负责管理，运行部实施的技改技措项目。

3 Terms and Definitions

术语和定义

Technical improvement measures projects: refer to technical improvement projects (hereinafter referred to as “the projects”) reported by all Operation Departments of the Company.

技改技措项目：是指公司各运行部申报的技改技措项目，以下简称项目。

4 Management Responsibilities

管理职责

4.1 Specified administrative authority

归口管理部门

4.1.1 The Equipment Management Dept. is the specified administrative authority of the Company for project construction.

机械动力部是公司项目施工的归口管理部门。

4.1.1.1 It participates in the review of preliminary design scheme and detailed design scheme of the projects; participates in technical exchange of equipment of design projects; and organizes technical exchanges and sign technical appendices based on the supplier information provided by the Materials Supply Dept.

参加项目初步设计方案、详细设计方案审查；参加设计项目的设备技术交流，根据物资装备部提供的供货商情况，组织技术交流，签订技术附件。

4.1.1.2 It is responsible for signing the technical appendices of the construction contracts and HSE management of the projects, and coordinating and handling disputes and argues arise from the implementation of the construction contracts of the Project.

负责签订项目施工合同技术附件和 HSE 管理技术附件，协调和处理项目施工合同履行中的争议和纠纷。

4.1.1.3 It is responsible for the construction management of the projects, the control of security, quality, schedule and investment during project construction, and the organization of project completion acceptance and equipment commissioning. It is responsible for verifying and reviewing the quantities in the project statements and labor statements, and cancelling projects after verification.

负责项目的施工管理，做好项目施工中的安全、质量、进度和投资控制，组织项目竣工验收和设备投用工作。负责项目结算和劳务结算单的工程量审核，项目结算和劳务结算单的复审，并核销项目。

4.1.1.4 It is responsible for inspecting the construction qualification of project contractors.

负责项目承包商的施工资质审查。

4.2 Coordinated management departments

协同管理部门

4.2.1 The Scheduling & Dispatch Dept. is responsible for project approval of the projects, handling design commission of the projects, confirming design schedule, organizing design review, participating in the coordination of issues occurred during project implementation, and countersigning the construction contracts of project works.

计划调度部负责项目的立项审批，办理项目的设计委托，确定设计进度，组织设计审查；参与协调项目实施过程中出现的问题；会签项目工程施工合同。

4.2.2 The HSE Dept. is responsible for verifying the safety qualification of contractors, countersigning the construction contracts of project works, implementing, supervising and inspecting safety measures for construction on site and participating in the interim hand-over and take-over acceptance.

HSE 管理部负责审查承包商安全资质，会签工程项目施工合同；落实现场施工安全措施并监督检查；参加中交验收。

4.2.3 The Finance Dept. is responsible for the settlement of project cost.

财务管理部负责项目费用结算。

4.3 Executive departments

执行部门

4.3.1 Each operation department is the executive department.

各运行部门为执行部门。

4.3.1.1 They are responsible for determining works and projects for commission design and handling application procedures for project approval.

负责确定需要委托设计的工程项目，办理立项申请手续。

4.3.1.2 They are responsible for confirming the design schedule of projects, participating in review of design schemes, participating in technical exchanges and countersigning of technical appendices, and attending the unboxing and checking of significant goods upon ex-warehouse. They are responsible for countersigning project construction contracts, verifying project construction schemes, and attending on-site construction disclosure and project coordination meetings.

参与确定项目设计进度，参加设计方案审查，参加技术交流和附件会签工作；参加重要出库物资的开箱清点工作。参与项目施工合同会签，审核项目施工方案，参加现场施工交底和项目协调会。

4.3.1.3 They are responsible for the safety handover of construction areas, which should have the conditions for hot work, columns and tanks.

负责施工区域的安全交出，具备动火、进塔、入罐条件。

4.3.1.4 They are responsible for providing the Level II safety education to contractors, filling out the *Maintenance Construction Safety Permit* and *Hot Work Permit*, approving Level II and Level III hot works, and designating hot work supervisors.

负责承包商二级安全教育，填写《检修施工安全许可票》和《用火作业许可证》，负责审批二级、三级用火，落实动火监护人。

4.3.1.5 They are responsible for supervising project construction safety, tracking, urging and assisting the control of quality and schedule, and attending completion acceptance of works.

负责项目施工安全监督，跟踪督促并协助做好质量、进度的控制工作，参加工程竣工验收。

4.3.1.6 They are responsible for verifying project quantities of their respective departments, and have the right to assess contractors directly.

负责本部门项目工程量审核；对承包商有直接考核权。

4.3.2 The Electrical Operation Dept. and Instrument Control Dept. participate in the review of project design review, technical exchanges and countersigning of technical appendices, and are responsible for implementing work related to their respective discipline during project implementation.

电气运行部、仪表控制部参与项目的设计方案审查，技术交流和附件的会签工作；负责做好项目实施过程中本专业相关工作。

5 Management Content

管理内容

5.1 The projects are adopted with the responsibility system of person in charge of projects.

The Equipment Management Dept. will assign professionals as person in charge of projects. The person in charge of projects should take the lead in implementation of project construction plan arrangement, materials and accessories, control of planned cost, tracking of construction schedule, management of project quality and settlement. The person in charge of project must complete each and every work within the specified time.

项目采用项目负责人制。机械动力部指定专业人员为项目负责人。从项目实施计划的安排、材料配件的落实、计划费用的控制、施工进度跟踪、项目质量的管理到结算均由项目负责人牵头落实，项目负责人必须在规定的时间内完成每项工作。

5.2 The Equipment Management Dept. organizes personnel related to contractors and departments in charge of the projects to conduct construction disclosure on the project site.

机械动力部组织施工承包商、项目所属部门的有关人员，到项目现场进行施工交底。

5.3 Contractors collect the required equipment and materials according to the design material list, equipment list and material preparation list.

施工承包商根据设计材料表和设备表、备料单领取所需的设备和材料。

5.4 The Procurement Management Dept. organizes and issues materials according to the contents of the design material list, equipment list and material preparation list, and meanwhile provides equipment qualification certificates and material warranties that meet archiving requirements.

物资装备部按照设计材料表和设备表、备料单的内容组织发放物资，同时提供符合资料归档要求的设备合格证和材料质保书。

5.5 Contractors shall prepare project construction plans and schedule networks as required, identify hazards and major environmental factors of projects, and formulate corresponding HSE measures and environmental factor evaluations. The construction plan shall be verified by the contractor of the project, the department in charge of the project and the Equipment Management Dept., and countersigned by the Scheduling & Dispatch Dept. and the HSE Dept.; 承包商应按要求编制项目施工方案和进度网络，并对项目进行危害和重大环境因素识别，制订相应的 HSE 措施和环境因素评价。施工方案实行承包商、项目所属部门、机械动力部三级审核并经计划调度部、HSE 管理部会签；

5.6 The HSE Dept. shall timely provide safety education for project construction personnel, and handle passes for construction personnel to enter and exit the production area and the permit for construction vehicles to enter the Company's fire-forbidden areas.

HSE 管理部应及时做好项目施工人员的安全教育，办理施工人员进出生产区的出入证和施工车辆进入公司禁火区的通行证。

5.7 Upon establishment of construction conditions, contractors shall fill in the project commencement report in time and submit it to the Equipment Management Dept. for approval before commencement.

施工条件具备后，承包商应及时填写工程项目开工报告，送机械动力部审批后方可开工。

5.8 For projects that need to be urgently implemented due to reasons such as production, the department in charge of the project shall handle the application for urgent project construction.

因生产等原因需要紧急实施的项目，由项目所属部门办理紧急项目施工申请。

5.9 The department in charge of the project shall properly conduct system isolation, pipeline purging, vessel ventilation and other work in the construction area so that it is conditioned to allow the operation of hot works, columns and tanks. The contractor shall properly conducting coordination work such as installing and removing blind plates or opening and closing manholes.

项目所属部门做好施工区域的系统隔离、管道吹扫、容器通风等工作，具备动火、进塔、入罐等条件，承包商要做好装拆盲板或开关人孔等配合工作。

5.10 Contractors shall, according to the needs of the project, handle *the Maintenance Construction Safety Permit, Hot Work Permit, Permit for Temporary Electricity Operation, Groundbreaking Work Permit and Radiography Testing Permit, etc.*

承包商应根据项目需要，办理《检修施工安全许可票》、《用火作业许可证》、《临时用电作业许可证》、《破土作业许可证》和《射线探伤作业票》等。

5.11 When design modification needs to be made during construction, the Equipment Management Dept. shall coordinate with the Scheduling & Dispatch Dept. to inform the design organization of the design changes.

施工过程中需要修改设计时，由机械动力部协调计划调度部通知设计单位出设计变更。

5.12 Prior to concealment of concealed works, the contractor shall fill in the record of concealed works, which shall be sealed after being inspected and confirmed by the department in charge of the project and the Equipment Management Dept.

隐蔽工程隐蔽前，由承包商填写隐蔽工程记录，经项目所属部门和机械动力部检查、确认后方可封闭。

5.13 The department in charge of the project shall be responsible for filling in the *Pipeline Hot Tapping Approval Form* and handling approval procedures for pipeline hot tapping and plugging works. The contractor shall prepare the construction plan for pipeline hot tapping after receiving the effective *Pipeline Hot Tapping Approval Form*.

管道带压开孔、带压封堵作业，由项目所在部门负责填写《管道带压开孔审批表》并办理审批手续。承包商在收到生效的《管道带压开孔审批表》后，应编写管道带压开孔施工方案。

5.14 If on-site service of supplier is needed during the construction, the Equipment Management Dept. shall fill in the "Supplier Contact List for On-Site Service" and notify the Procurement Management Dept., which shall urge the supplier to provide after-sales service timely.

施工中需要供货商现场服务的，由机械动力部填写“供应商现场服务工作联系单”通知物资装备部，物资装备部要督促供货商及时做好售后服务工作。

5.15 When it is necessary to confirm quantities on site, the contractor shall fill in the engineering contact form to confirm the quantities, and send it to the department in charge of the project and the Equipment Management Dept. for review and confirmation.

需要现场工程量确认时，由承包商填写工程联系单办理工程量确认，送项目所属部门和机械动力部审核、确认。

5.16 The Equipment Management Dept. organizes and holds the construction coordination meeting according to the needs of the project to coordinate the problems encountered in the management of safety, quality and schedule.

机械动力部根据项目需要组织召开施工协调会，协调安全、质量、进度管理中遇到的问题。

5.17 After the completion of the project and the self-inspection of which is qualified, the contractor can submit the application of completed project handover to the Equipment Management Dept., and the Equipment Management Dept. shall organize the department in charge of the project and the contractor to conduct the completion acceptance.

项目完工且自检合格后，承包商方可向机械动力部提出交工申请，由机械动力部组织项目所属部门、承包商进行竣工验收。

5.18 The contractor shall prepare the technical documents of completed project handover to be submitted to the Equipment Management Dept. in triplicate.

承包商应编制提交机械动力部的交工技术文件，要求一式三份。

6 Inspection and Supervision

检查与监督

The Equipment Management Dept. shall be responsible for the supervision, inspection and assessment of the construction management of the projects of technical improvement measures.

机械动力部负责对技改技措项目施工管理执行情况进行监督检查考核。

7 Associated Procedures and Records

关联程序和记录

7.1 Associated procedures

关联程序

7.1.1 Management Procedures for Technical Improvement Measures

HYBN-T2-07-0053-2018-1

技改技措施工管理程序 HYBN-T2-07-0053-2018-1

7.2 Associated records

关联记录

7.2.1 Supplier Contact List for On-Site Service HYBN-T6-07-0121-001-2018

供应商现场服务联系单 HYBN-T6-07-0121-001-2018

8 Supplementary Rules

附则

8.1 The System is under the jurisdiction of Equipment Management Dept.

本制度由机械动力部归口管理。

8.2 The System is drafted by Equipment Management Dept.

本制度起草部门：机械动力部。

8.3 Equipment Management Dept. is responsible for the interpretation of the System.

本制度解释权归机械动力部拥有。

8.4 Preparation and approval of the System are shown in Table 1:

本制度编制和审批情况见表 1:

Table 1 Revision, preparation and approval of document

表 1 文件版本编制和审批情况

1	2018-12-31	Mi Jianbin 米健彬	Tong Xueyun 童雪云	Xu Ye 徐野	Chen Liancai 陈连财
Revision 版本	Issued date 颁布日期	Prepared by 编制人	Reviewed by 审核人	Authorized by 审定	Approved by 批准人





Hengyi Industries Sdn Bhd
恒逸实业（文莱）有限公司

HYBN-T3-07-0017-2018-1

Electrical Equipment and Operation Management System

电气设备及运行管理制度

Issued Date: Dec. 2018

颁布日期：2018 年 12 月

 HENGYI	Hengyi Industries Sdn Bhd 恒逸实业（文莱）有限公司				
	Electrical Equipment and Operation Management System 电气设备及运行管理制度				
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1 Purpose

目的

The System aims is hereby formulated in order to enhance the management on the maintenance and troubleshooting for the electrical devices as well as the operation of the substation of the Company, thus ensuring a safe, stable and long-term operation of the electrical power system and the electrical devices of production units.

为了加强公司电气设备维护、检修及变配电所运行管理，保证电力系统和各生产装置电气设备的安全、稳定、长周期运行，特制定本制度。

2 Scope of Application

适用范围

The System is applicable to the electrical management in all departments of the Company and in the contractors who are responsible for the maintenance and troubleshooting of the production units.

本制度适用公司所属各部门及负责生产装置维护检修的各承包商的电气管理。

3 Terms and Definitions

术语和定义

3.1 Temporary power supply: the temporary power supply facilities used in production, maintenance, construction or urgent repair.

临时用电：指因生产、检修、施工或抢修而接的临时用电设施。

3.2 “Three-three plus Two-five” system: it refers to “Three permits”(work permit, operation permit and temporary electricity utilization permit), “Three diagrams”(primary system diagram, secondary circuit diagram and cable routing diagram), “Three periodical activities”(periodical maintenance, periodical test and periodical cleaning); “Five regulations” (maintenance regulation, test regulation, operation regulation, safety regulation and accident handling regulation), “Five records”(maintenance record, test record, operation shift record, accident record and equipment defect record).

三三二五制是指：三票（工作票、操作票、临时用电票），三图（一次系统图、二次回路图、电缆走向图），三定（定期检修、定期试验、定期清扫），五规程（检修规程、试验规程、运行规

程、安全规程、事故处理规程），五记录（检修记录、试验记录、运行值班记录、事故记录、设备缺陷记录）。

3.3 Emergency power supply device: black-start generator set and EPS power unit.

事故电源设备：黑启动发电机组和 EPS 电源装置。

4 Management Responsibilities

管理职责

4.1 Specified administrative authority

归口管理部门

4.1.1 Be responsible for the specified management of the Company's electrical equipment, organizing to develop electrical equipment management system, organizing to formulate and review electrical equipment, maintenance and overhaul technical specifications and standards and fault handling plans, and monitoring their implementation.

负责公司电气设备的归口管理，负责组织制定电气设备管理制度，组织编制、审核电气设备、维护、检修等技术规程和标准、故障处理预案，并监督执行。

4.1.2 Be responsible for the Company's electrical equipment management, as well as organizing to solve the important and complex technical issues of the electrical equipment.

负责全公司电气设备管理；负责组织处理电气设备的重大、复杂技术问题。

4.1.3 Be responsible for managing, coordinating and monitoring the lightning and static electricity protection efforts.

负责防雷防静电的管理协调和工作监督。

4.1.4 Be responsible for reviewing the update, upgrade, scrapping, overhaul schedule, spare parts plan, and overhaul and emergency repair schemes of electrical equipment.

负责审核电气设备的更新、改造、报废、检修计划及备品备件计划；审核电气设备检修和抢修方案。

4.1.5 Be responsible for organizing to investigate, analyze and respond to severe accidents of electrical equipment.

负责组织重大电气设备事故的调查、分析和处理。

4.1.6 Be responsible for approving and managing the outsourcing of electrical works and equipment repair.

负责电气工作和设备修理外委审批和外委工作管理。

4.1.7 Be responsible for organizing to prepare the electrical equipment records according to the Company's equipment management system.

负责按公司设备管理制度组织编制电气设备台帐。

4.2 Coordinated management departments

协同管理部门

4.2.1 Materials Supply Dept. is responsible for the purchase and quality assurance of the electrical equipment, as well as providing the technical documents and data related to the electrical equipment purchased.

物资装备部负责电气设备的采购及其质量保证；提供所采购的电气设备技术文件和资料。

4.2.2 HSE Dept. is involved in the safety and environmental protection management throughout the operation of electrical equipment.

HSE 管理部参加电气设备运行的全过程中有关安全、环保工作的管理。

4.3 Executive departments

执行部门

4.3.1 Equipment Operation Departments

各装置运行部门

4.3.1.1 Be responsible for the routine use and management of the electrical equipment and lightning and static electricity protection facilities inside the battery limit of the department itself.

负责本部门界区内电气设备、防雷、防静电设施的日常使用管理。

4.3.1.2 Be involved in the type selection and acceptance of main electrical equipment inside the battery limit, as well as routine patrol inspection for motors (including operating column) and lighting fixtures.

参与界区内主要电气设备的选型、验收；定期巡检电动机（含操作柱）、照明灯具。

4.3.2 Lab Dept.

质量检验部

Be responsible for the outsourcing of the analysis and test of transformer oil and sulfur hexafluoride gas.

负责变压器油、六氟化硫气体的分析检测外委。

4.3.3 Electrical Operation Dept.

电气运行部

4.3.3.1 Electrical Operation Dept. is an executive department for electrical equipment, operation and power dispatching. Meanwhile, it undertakes the professional management of the Company's electrical operation and power dispatching.

电气运行部是电气设备、运行及电力调度的执行部门，同时负责全公司电气运行及电力调度的专业管理。

(1) Be responsible for preparing the electrical specification, fault handling plan and operating specification.

负责编制电气操作规程、故障处理预案及运行规程。

(2) Be responsible for the Company's power transmission, distribution and transformation operation and management, as well as voltage control of power generation done by the Power Dept. and its electrical operation management.

负责全公司输电、配电、变电操作和运行管理；负责热电部发电电压控制和电气运行管理。

(3) Be responsible for technology, operation, safety, maintenance and field management of the Company's electrical equipment.

负责全公司电气设备的技术、运行、安全、维护和现场管理。

(4) Be responsible for formulating the maintenance and update schedules of electrical equipment, as well as implementing the update, maintenance and repair work.

负责编制电气设备各类修理、更新计划，负责实施更新和检维修作业。

(5) Be responsible for selection and technical exchange of electrical equipment, signing and receipt acceptance of technical appendixes, and exchange on new electrical products and technologies.

负责电气设备的选型、技术交流，负责技术附件的签订和收货验收。负责电气新产品、新技术的交流。

(6) Be responsible for managing the basic technical data of electrical equipment, and generating and completing the electrical equipment records and data.

负责电气基础技术资料的管理，建立完善电气设备台帐、资料。

(7) Be responsible for relay protection technologies, valuing, inspection and operation maintenance, as well as lightning and static electricity protection.

负责继电保护技术、定值、检验和运行维护；负责防雷、防静电工作。

(8) Be responsible for management of the dispatching of the Company's electric power system.

负责公司电力系统调度管理。

(9) Be responsible for relationship and coordination between the Company's power grid management and the government electric power department (corporation).

负责公司电网管理及政府电力部门（公司）的工作联系与协调。

(10) Be responsible for approving temporary power supply, as well as operating, maintaining, inspecting and managing temporary electric equipment.

负责临时用电的审批和临时用电设备的运行、维护、检查和管理。

(11) Be responsible for dealing with the field electrical failures, as well as participating in the investigation, analysis and handling severe electrical equipment and operation accidents.

负责现场电气故障的处理；参与重大电气设备和运行事故的调查、分析和处理。

(12) Be responsible for applying the outsourcing of electrical works and equipment repair and maintenance.

负责电气工作和电气设备修理设备检修外委申请。

5 Management Content

管理内容

5.1 Electrical operation management

电气运行管理

5.1.1 Basic requirements

基本要求

5.1.1.1 Strengthen management on the operation of electrical power system, to ensure a safe, reliable and economic operation of these systems as well as a safe and smooth production of the units.

加强电力系统运行管理，确保电力系统安全可靠和经济运行，实现装置的安全平稳生产。

5.1.1.2 Based on the principles of Unified Dispatching and Level-to-Level Administration, establish an operation management organization to develop a complete, appropriate operation and dispatching regulation.

依据“统一调度、分级管理”的原则，设立运行管理机构，制定、完善有关的运行、调度规程。

5.1.1.3 The electrical equipment shall be safe and reliable, and systems shall operate in a stable and economic manner.

电气设备安全、可靠，系统运行稳定、经济。

5.1.1.4 Both the name and serial number of electrical equipment shall be satisfactory.

电气设备命名、编号符合双重要求。

5.1.1.5 The electrical power system shall be with miniaturized unit, automated dispatching and networked communication.

电力系统实现保护装置微机化、调度自动化、通讯网络化。

5.2.1.6 For the electrical power system dispatching and communication, at least two different types of reliable communication devices in good conditions shall be provided, along with voice recording equipment; the electrical power dispatching and operation positions must be provided with recording telephones.

电力系统调度通讯至少有两种以上不同方式的通讯装置，并配备录音设备，保证完好可靠；电力调度岗位及电气运行岗位必须配备录音电话。

5.2.1.7 The remote control and monitoring device and mimic board of the electrical power system shall provide accurate data and correct signal.

电力系统远动监控装置和模拟屏必须保证数据准确，信号正确。

5.1.2 Power supply quality management

供电质量管理

5.1.2.1 Switch the equipment such as arc suppression coil and compensation capacitor promptly, with changes in the operation mode of power grid.

根据电网运行方式的变化，及时做好消弧线圈、补偿电容等设备的投切。

5.1.2.2 Establish measures to improve the power supply of system, and regulate frequency and voltage appropriately when necessary.

制定提高系统供电质量的措施，做好频率、电压的调整工作。

5.1.2.3 Identify the voltage monitoring and control point according to the characteristics of power grid, and take appropriate technical actions in accordance with specified allowable voltage deviation, to ensure the supply voltage is up to standard.

根据电网特点，确定电压监视控制点，按电压允许偏差值的有关规定，合理采取技术措施，确保供电电压符合标准。

5.1.2.4 Based on the actual conditions of power grid, include the harmonic control in the management on normal system operation, and take scientific and effective technical actions to keep the harmonic content conform to *GB/T 14549 Quality of Electrical Energy Supply – Harmonics in Public Supply Network*.

根据电网的实际状况，把谐波治理工作纳入系统正常运行管理，采取科学有效的技术措施，使谐波含量符合《电能质量公用电网谐波》（GB/T 14549）的要求。

5.1.2.5 The generator set shall incorporate advanced automation technologies with time, to ensure the frequency is stable in the isolated grid operation.

发电机组应随着自动化技术的发展，采取先进技术，确保电网孤网运行时的频率稳定。

5.1.3 Power generation/supply and energy saving management

发/供用电及节能管理

5.1.3.1 Electrical Operation Dept. assists Scheduling & Dispatch Dept. in establishing the annual and monthly power generation/supply plan according to the Company's annual and monthly production plan as well as the power consumption quota of products.

根据公司年度、月度生产计划和各种产品的耗电定额，电气运行部协助计划调度部编制年度、月度发/供用电计划。

5.1.3.2 Electrical Operation Dept. reviews the electricity bill from meter reading, makes an electricity consumption report for current month based on charged electricity quantity and meter reading, receives and reviews the bill from purchased electricity, and then forwards to Finance Dept. for settlement.

电气运行部负责审核抄表结算电费单，每月根据收费电量和抄表电量编制当月用电量报表；负责接收外购电收费单据，审核后转财务管理部结算。

5.1.3.3 Electrical Operation Dept. reports the actual electricity consumption of last month and unit electricity consumption of products to Scheduling & Dispatch Dept. by 2nd of every month.
电气运行部每月 2 日前将上月实际用电量、产品用电单耗等上报计划调度部。

5.1.3.4 Temporary power supply is subject to Clause 5.4.2.

临时用电按 5.4.2 条执行。

5.1.3.5 Electrical Operation Dept. shall establish energy saving measures specific to electrical equipment, thus to reduce the electricity consumption and increase the Company's benefits.

电气运行部应制订电气设备的节能措施，降低电耗，提高企业经济效益。

5.1.3.6 Under the premise that the grid safety and power supply quality are secured, fully utilize existing equipment, and take technical actions such as appropriate and economic operation, system reactive power optimization, load allocation and enhanced line loss management, to reduce the system loss.

保证电网安全和供电质量基础上，充分利用现有设备，通过合理安排经济运行方式、优化系统无功、调配负载、加强线损管理等技术措施，降低系统损耗。

5.1.3.7 Optimize the reactive power of generator according to the distribution of reactive power flow; based on the combination of local compensation and centralized compensation, deploy the static and dynamic reactive power compensators properly, and switch and stop the reactive power compensators promptly, to improve their operation and reduce electric energy loss.

根据无功潮流分布情况，优化发电机无功出力，按就地补偿和集中补偿相结合的原则，合理配置静态和动态无功补偿装置，及时投、停无功补偿设备，提高其运行水平，降低电能损耗。

5.1.3.8 Proactively promote proven, efficient and energy-efficient electrical equipment, and employ lasted technologies, processes, equipment and materials, to make the electrical equipment less energy consumed.

积极推广成熟的高效节能电力设备，采用新技术、新工艺、新设备、新材料，降低用电设备的能耗。

5.1.3.9 Electrical Operation Dept. shall make analysis on economic operation monthly, develop corrective measures and plans against any problem, and report these measures and plans to Equipment Management Dept.

电气运行部应进行月度经济运行分析，对存在的问题制定整改措施和计划，同时上报机械动力部。

(1) Illumination shall be provided by efficient and energy-efficient LED lamps and with energy-efficient control devices.

装置照明宜采用 LED 高效节能灯具及节能控制装置。

(2) Transformer used shall be efficient and low-consumption.

选用高效低耗型变压器。

(3) Applicable AC frequency converter shall be used.

合理选用交流变频调速装置。

5.1.3.10 System harmonics shall be governed effectively to reduce harmonics loss.

有效治理系统谐波，降低谐波损耗等。

5.1.4 Electrical power system and accident handling and management

电力系统及事故处理管理

5.1.4.1 Define the operation mode of electrical power system, as follows:

编制电力系统的运行方式，内容如下：

(1) According to the calculations in terms of system stability, flow and short circuit, define the normal and special operation modes; relay protection and automatic device setting schemes; and low-cycle (low-voltage) load shedding scheme.

按系统稳定、潮流、短路计算结果，确定系统正常运行方式、特殊运行方式；系统继电保护及自动装置整定方案；低周（低压）减载方案

(2) Annual dispatching plan, primary equipment maintenance schedule, and newly-built and expanded equipment operation schedule.

月度调度计划、主要设备检修进度表、新建、改扩建设备投运进度表。

(3) The highest (lowest) voltage level of system, and the voltage deviation at the voltage monitoring point.

系统最高（低）时的电压水平，电压监控点的电压偏差值。

(4) Severe accident anticipation and emergency response.

重大事故预想和应急处理措施。

(5) Proposed system improvements and test plans.

系统改进意见和试验计划。

5.1.4.2 Prepare the relay protection and automatic equipment configuration schemes and protection configuration diagrams, conduct setting calculations, submit for approval, issue them after approval, and oversee their implementation.

编制继电保护和自动装置的配置方案、保护配置图，定值计算、送审、下达，并监督执行。

5.1.4.3 Based on the principle of “Integration of Management and Control”, improve the construction of power dispatching information network and database.

按“管控一体化”原则，完善电力调度信息网和数据库的建设工作。

5.1.4.4 Prepare load balancing schemes, oversee the implementation of power utilization plan, and develop and implement strictly the power rationing and low-cycle load shedding or quick load shedding schemes based on the requirements of production units.

编制负荷平衡方案，监督计划用电的执行，依据生产装置的要求，制订限电拉路顺序及低周减载或负荷快速联切方案并严格执行；

5.1.4.5 The dispatching automation system of electrical power system shall be provided with 4 remote capabilities (remote signaling, metering, control and adjustment), and the unattended substation shall be equipped with television monitoring system.

电力系统调度自动化系统应具备“四遥”（遥信、遥测、遥控、邀调）功能，无人值守变电站应安装电视监控系统。

5.1.4.6 Accident handling principle

事故处理原则

(1) Prevent the accident from spread promptly, eliminate the causes of the accident, and remove the threat to person and equipment.

迅速限制事故发展，消除事故根源并解除对人身和设备安全的威胁。

(2) As a top priority, always assure the service power of power station in every way possible. 用一切可能的方法，首先保证电站厂用电。

(3) Recover the power supply for the units in blackout as quickly as possible. 尽快对已停电的装置恢复供电。

(4) Adjust the operation mode of the electrical power system, to recover its normal operation mode as quickly as possible.

调整电力系统运行方式，尽快恢复其正常运行方式。

5.1.4.7 Accident handling procedure

事故处理程序

(1) When an accident occurs, the field operator on duty shall handle according to specific regulations and report it to the power dispatcher timely.

事故发生后，现场值班人员应按有关规程处理并及时向电力调度汇报。

(2) The power dispatcher shall make correct judgment according to the accident conditions, deal with it promptly, and report to the superior and Scheduling & Dispatch Dept.

电力调度根据事故现象，正确判断，迅速处理，并汇报主管领导及生产调度。

(3) In case of a severe system accident, it is necessary to organize involved personnel to analyze the accident and establish countermeasures.

重大系统事故，要组织有关人员分析，制定相应的反事故措施。

5.1.5 Management of five-prevention of high-voltage electrical equipment

高压电气设备“五防”管理

5.1.5.1 Any HV electrical equipment that has a risk of misoperation, shall be provided with an anti-misoperation device that is required to prevent the following (five-prevention):

能引起误操作的高压电气设备，均应装设防误装置，防误装置应能实现下述“五个”功能（简称“五防”）：

(1) Accidental ON/OFF of breaker.

防止误分、误合断路器。

(2) On-load turnon/turnoff of isolation switch.

防止带负荷拉、合隔离开关。

(3) Hot-line layout (connection) of grounding wire (grounding knife-switch).

防止带电装设（合）接地线（接地刀闸）。

(4) Closing the circuit breaker (isolation switch) together with grounding wire (grounding knife-switch).

防止带接地线（接地刀闸）合断路器（隔离开关）。

(5) Accidental access to charging interval.

防止误入带电间隔。

5.1.5.2 HV switch cabinet operated shall have “five-prevention” functions.

在运的高压开关柜必须具有“五防”功能。

5.1.5.3 Anti-misoperation device operated shall not be unlocked without permission. Any unlocking necessary for solving device defect or accident shall be approved by the person in charge, recorded and recovered to normal states afterwards.

任何人不准擅自对运行中的防误装置解锁。如因装置缺陷或事故处理等确需解锁操作时，必须经分管领导同意，并作记录，事后应及时恢复正常状态。

5.1.5.4 The power supply required for the device shall be separated from the relay protection of equipment and the power supply of control circuit.

装置要求所用电源应与设备的继电保护、控制回路的电源分开。

5.1.5.5 The device shall be protected against dust, foreign matters, rust and blockage. For the outdoor anti-misoperation devices, waterproof and moistureproof measures shall be taken.

装置应做到防尘、防异物、防锈、不卡涩，户外的防误装置应有防水、防潮措施。

5.1.5.6 Defensive measures for power transformation and distribution room against small animals

变配电室防小动物管理

(1) Cable trench outlet and other holes of the power transformation and distribution room shall be sealed.

变配电室必须对电缆沟口及其它孔、洞进行封堵处理。

(2) Windows and doors of the power transformation and distribution room shall be made of non-combustible materials, in good condition and closed tightly. The windows shall be equipped with wire net against small animals, and the doors shall be opened outwards and equipped with at least 50cm high rat guard.

变配电室门窗应采用非燃材料，保持完好，关闭严密，窗户应装设防止小动物的护网，门应向外开启，并加设高度不低于 50 厘米的防鼠板。

(3) When tapping on the wall of power transformation and distribution room as well as switch cabinet test and overhaul are necessary during construction, provisional measures against entry of small animals shall be taken timely, and such holes shall be sealed immediately at the end of construction.

因施工需要在变配电室墙开孔、洞和进行开关柜试验、检修作业时，要及时采取防小动物进入的临时措施，施工结束所开孔、洞应及时封堵。

(4) Interval, protective net and door of the electrical equipment shall be in good condition.

电气设备的间隔、护网、门应保持完好。

(5) For HV switch cabinet in service, its door shall be closed and the cable holes at the bottom shall be sealed.

高低压开关柜的门在运行中必须关闭，其底部的电缆孔洞必须封堵。

(6) The bus of newly-built power transformation and distribution room and switch cabinet shall be sealed bus duct or isolated bus.

新建变、配电室和开关柜的母线应采用封闭母线槽或绝缘母线。

(7) The door shall be kept closed behind any person in and out of the power transformation and distribution room.

人员出入变配电室，必须随手关门。

5.1.6 Management of relay protection and automatic safety device

继电保护和安全自动装置管理

5.1.6.1 Relay protection is subject to Centralized Leadership and Level-to-Level Management.

继电保护实行“统一领导、分级管理”。

5.1.6.2 Relay protection shall be undertaken by the person with appropriate professional skills. Sole-duty or part-time duty personnel shall be designated to the calculation of relay protection setting value, and such personnel shall be kept relatively stable.

继电保护工作应由具有一定专业技术水平的人员承担。继电保护定值计算应设专职或兼职人员，并保持人员相对稳定。

5.1.6.3 Main relay protection and automatic safety devices (hereafter referred to as "protection device") include: monitoring device for the functions such as data acquisition and processing, remote control and communication; protection device of the equipment; automatic reclosing, standby equipment, and automatic and quick switching devices (fast switching device, quick load shedding device) of reserve power; system stability control device; auto-starting device of motor; automatic adjustment of excitation, automatic self-synchronization and quasi-synchronization of generator, automatic load reduction by frequency, oscillation or prediction (load shedding, generator shedding, disconnection, etc.), microcomputer "five prevention" device, fault wave recorder and other automatic devices to secure the system; and connection control and protection, automatic safety device secondary circuit and components.

继电保护和安全自动装置（以下简称保护装置）主要包括：完成数据采集和处理、遥控和通信等功能的监控装置；设备的保护装置；自动重合闸、备用设备及备用电源自投装置、快切装置（备用电源快速切换装置、负荷快速联切装置）；系统稳定控制装置；电动机自启动装置；自动调整励磁、发电机自同期与准同期、按频率自动减负荷、振荡或预测（切负荷、切机、解列等）、微机“五防”装置、故障录波装置及其它保证系统安全的自动装置等；连接控制与保护、安全自动装置二次回路与元件。

5.1.6.4 Enhance management shall be implemented for relay protection and automatic safety device. The relay protection setting values shall be calculated in accordance with relevant national and industrial regulations and requirements, and managed in a closed loop. Actions of

the relay protection and automatic safety device shall be evaluated and analyzed periodically, to improve the management.

加强继电保护和安全自动装置管理，继电保护定值计算应符合国家、行业相关规范和要求，定值管理实行闭环管理。定期开展继电保护和安全自动装置动作评价、分析工作，提高管理水平。

5.1.6.5 Relay protection and automatic safety device shall be technologically advanced, proven, reliable, and integrated of management and control.

继电保护和安全自动装置应选用技术先进、成熟可靠的产品，并具备“管控一体化”功能。

5.1.6.6 Microcomputer protection and automatic device shall have functions of fault and operation recording and export, clock, clock synchronization and automatic detection.

微机保护及自动装置应具有故障、操作记录及输出功能、时钟及时钟同步功能，装置自动检测功能。

5.1.6.7 10KV and above line and 10KV power supply tie line of plant substation shall be provided with fiber-optical longitudinal differential protection.

10 千伏及以上线路和装置变电所的 10 千伏电源联络线应装设光纤纵差保护。

5.1.6.8 Generator, 66KV line and transformer shall be provided with special fault wave recorder with clock and clock synchronization functions.

发电机、66 千伏线路及变压器应设置具有时钟及时钟同步功能的专用故障录波器。

5.1.6.9 The monitoring device of substation shall be provided with UPS.

变电站监控装置应配置不间断电源。

5.1.6.10 Inspection periods and items of protection device shall conform to relevant national and industrial regulations and requirements.

保护装置的检验周期、检验项目应按国家、行业的相关规范和要求执行。

5.1.6.11 For any work on the protection device and secondary circuit, records shall be made in the work permit and secondary safety measure work permit.

保护装置及二次回路上工作，必须填写工作票和二次工作安全措施票。

5.1.6.12 The protection device qualified in inspection shall be encrypted and password information shall be filed in written form in Electrical Operation Dept. The operating personnel shall accept the relay protection after its completion, to inspect that the removed wires, elements and marks are return to original positions and pressing plate and test handover records are clear. The device shall only be put into operation after acceptance.

保护装置检验合格后应加密，密码资料在电气运行部书面备案。在继电保护工作完毕后，运行人员应进行验收，如检查拆动的接线、元件、标志是否恢复正常，压板位置、试验交接记录所写内容是否清楚等，验收合格后方可投入运行。

5.1.6.13 When the protection device is put into operation at the first time or changed, the operator shall check the setting value and relevant precautions with the on-duty power dispatcher prior to the device operation.

保护装置在新投入或经过变更时，运行人员必须和当值电力调度员进行整定值及有关注意事项的核对，无误后方可投入运行。

5.1.6.14 Clocks of remote control, monitoring, relay protection and automatic safety devices and fault wave recorders shall be accurate and consistent.

远动、监控、继电保护、安全自动装置及故障录波等装置时钟应准确、一致。

5.1.7 Management of safety appliance

电气安全用具管理

5.1.7.1 Before use, the insulating safety appliance shall be inspected visually for any crack, scratch, blur, hole, breakage and other exterior injury as well as clean surface. After use, the appliance shall be stored in accordance with the following requirements:

绝缘安全用具使用前，应进行外观检查，外表有无裂纹、划痕、毛刺、孔洞、断裂等外伤，并检查表面是否清洁，使用后应正确保管，保管方法要求如下：

(1) Storage place shall be dry and ventilated, and insulating rod shall be suspended or placed on a holder, without contact with wall.

存放在干燥通风的场所，绝缘杆应悬挂或架在支架上，不应与墙面接触。

(2) Insulating gloves shall be stored in a closed cabinet and separated from other tools and instruments.

绝缘手套应存放在密闭的橱内，并与其他工具仪表分别存放。

(3) Insulating boots shall be stored in a cabinet and not used as ordinary rain boots.

绝缘靴应存放在橱内，不应作为一般雨鞋使用。

5.1.7.2 Electroscope is a safety appliance to check if there is no voltage on the electrical equipment. HV electroscope shall be stored in a dampproof box in a dry place.

验电器是检验电器设备是否确无电压的一种安全用具，高压验电器应存在防潮的匣内，并放在干燥的地方。

5.1.7.3 Grounding wire is the most direct measure to protect the personnel from electric shock. It shall be numbered and stored in a specified place; the storage place number shall be consistent with the wire number.

接地线是保证工作人员免遭触电伤害最直接的保护措施，接地线应分别编号，并存放在规定位置，放置位置编号应与接地线编号一致。

5.1.7.4 Signboards draw the personnel's attention to safe work and procedure compliant operation; its surface shall be kept clean and complete.

标示牌提醒工作人员注意安全施工及按规程进行操作，应保持表面清洁完整。

5.1.7.5 Main safety appliances for aerial work include lifting board, ladder, climber, safety belt, waist strap and helmet.

高空作业安全用具主要包括升降板、梯子、脚扣、安全带、腰绳、安全帽等。

5.1.7.6 In addition to proper use and storage, the safety appliance shall be tested regularly and the test cycle and standards shall conform to *Work Regulations of Electrical Procedures*.

对安全用具除正确使用、妥善保管外，还应定期进行试验，试验周期和标准应遵守《电力安全工作规程》有关规定。

5.2 Management of electrical equipment

电气设备管理

Electrical equipment shall be managed in accordance with relevant regulations and requirements specified by Equipment Management Dept. for equipment management.

电气设备管理应当执行机械动力部设备管理的相关规定及要求。

5.2.1 Generator

发电机

5.2.1.1 Generator set shall be inspected routinely and regularly by permanent staff to eliminate potential operation risks and defects promptly, and be maintained specially.

对机组进行定人、定时巡检，及时消除运行隐患和缺陷，并开展“特护”活动。

5.2.1.2 Overhaul shall be scheduled according to the cycle and items specified in regulations, and a complete technical file for generator overhaul shall be created.

按规程规定的周期、项目安排检修，建立健全发电机检修技术档案。

5.2.1.3 Measures shall be taken to guarantee a safe and stable isolated grid operation of generator.

应制定发电机孤网运行安全、稳定措施。

5.2.1.4 Operational safety and precautions of generator set:

发电机组操作安全和注意事项:

(1) Prior to operation and maintenance of generator set, the generator user manual shall be read and understood.

使用及维护发电机组前，必须阅读并理解发电机组用户手册。

(2) Generator set shall be operated and maintained by specially trained personnel who have knowledge of safety precautions and operation & maintenance procedures.

发电机组须由受过专项培训的人员维护操作，维护操作人员必须掌握安全预防措施及操作维护程序。

(3) Maintenance and operation personnel shall not start the generator set when it is in an abnormal state.

维护操作人员不得在机组异常情况下开机。

(4) Generator set shall be shut down before cleaning, maintenance and repair by the maintenance and operation personnel.

维护操作人员对机组清洁、维护、修理时，必须在停机状况下进行。

5.2.2 Transformer

变压器

5.2.2.1 Substations with first order and second order load shall be equipped with 2 or (if technical economy allows) more transformers. When one of them is switched off, capacities of other transformers shall meet first order and second order load.

一、二级负荷的变电站（所）应装设 2 台变压器，当技术经济比较合理时，可装设 2 台以上变压器。当断开 1 台时，其余变压器的容量应能满足一、二级负荷。

5.2.2.2 Oil-immersed power transformer shall be provided with fire-fighting equipment and emergency oil discharge facilities according to the specifications. Chromatographic analysis shall be carried out at least every six months for 66 KV or 8000 KVA and above oil-immersed power transformer, at least every year for 800 ~ 8000 KVA; at least every two years for below 800 KVA; and after the outlet (or near zone) short circuit. When any abnormality is found, tracking and analysis shall be enhanced.

油浸电力变压器应按规范设置消防设施和事故排油设施。油浸电力变压器色谱分析，66 千伏或 8000 千伏安及以上每半年分析一次；800~8000 千伏安的每年至少分析一次；800 千伏安以下每两年至少分析一次；出口（或近区）短路后应分析一次，发现异常加大跟踪分析力度。

5.2.2.3 In the event of an accident, the emergency overload capability of transformer is permitted, and the overload value shall be in accordance with the specification or manufacturer's regulations.

在事故情况下，允许使用变压器的事事故过负荷能力。其过负荷的数值应按规范或制造厂的规定执行。

5.2.2.4 Transformer shall be operated, maintained and tested according to the requirements of the manufacturer.

变压器要按制造厂使用要求进行运行、维护、试验等。

5.2.2.5 Reactor, transformer, arc suppression coil, capacitor and other equipment shall also be subject to the above provision.

电抗器、互感器、消弧线圈、电容器等设备参照上述条款执行。

5.2.2.6 Capacitance current shall meet the actual needs of the system in different operation modes, and have a wide range of adjustment considering the future development of system; the device shall have a stable performance and reliable operation when the system is either normal or failed.

必须满足系统不同运行方式下电容电流的实际需要，并考虑今后系统的发展，应具有较宽的调整范围；系统正常和故障情况下装置的性能稳定、动作可靠。

5.2.3 Motor

电动机

5.2.3.1 Under the grid voltage that conforms to relevant regulations, the motor shall operate at the rated capacity.

在电网电压符合相关规定时，电动机应保证额定容量运行。

5.2.3.2 The motor in operation shall be checked for its sound, running current, running voltage, temperature rise, vibration, exciting current (for synchronous motor) and commutator (for DC motor). Important motors shall be monitored for their condition; items such as partial discharge of winding, insulation and bearing temperature of high-voltage motors shall be detected; and the monitoring results shall be recorded for analysis, so as to guide the motor maintenance.

对运行中的电动机应检查其声音、运行电流、运行电压、温升、振动和同步电动机的励磁电流及直流电动机的换向器。重要电机应进行状态监测，检测高压电动机绕组局部放电、绝缘、轴承温度等项目，并把监测结果记入台帐进行分析，指导电动机检修。

5.2.3.3 Allowable temperature of the motor bearing shall conform to the specifications provided by the manufacturer, or not exceed (if manufacturer's specifications unavailable): for sliding bearing, 80°C (oil outlet flow temperature shall not greater than 65°C); for rolling bearing, 95°C. Lubricating oil and grease for the motor bearing shall match the bearing operating temperature and rotation speed.

电动机轴承允许温度，应遵守制造厂的规定，无制造厂规定时，应遵照以下规定：对于滑动轴承，不得超过 80°C，出油温度不应高于 65°C；对于滚动轴承，不得超过 95°C；电动机轴承用的润滑油、脂，应符合轴承运行温度及转速的要求。

5.2.3.4 Allowable temperature rise of motor shall be subject to Table 1.

电动机允许温升参照表 1 执行。

Table 1 Allowable temperature rise of motor

表 1 电动机允许温升表

Insulation grade 绝缘材料等级	A	E	B	F	H	C
Allowable temperature of insulation °C 绝缘材料允许温度°C	105	120	130	155	180	Above 180 180 以上
Allowable temperature rise of motor K 电机的允许温升 K	60	75	80	105	125	125

5.2.3.5 The motor shall be filled with lubricating oil regularly according to its running condition, and lubrication records shall be established.

根据电动机运行状况定期注油，并建立润滑台帐。

5.2.3.6 Stand-by motor shall be inspected periodically to ensure it is in good standby state.

备用电动机应定期检查，确保处于完好备用状态。

5.2.4 Electric power line

电力线路

5.2.4.1 66KV power cable shall be operated and managed according to relevant specifications and the following requirements. The single-core power cable shall not have an eddy current loop, the grounding wires at the middle connection shall be cross-connected, and grounding shall be done through the voltage protector earth box. To facilitate testes, removable connection device shall be provided between the cable terminal and the transformer of GIS power cable transformer unit circuit. For preventive test of the power cable of GIS power cable transformer unit circuit, insulation test of outer sheath shall be carried out only, rather than main insulation voltage-withstand test.

按相关规范做好 66 千伏电力电缆的运行管理，还应遵循的要求：单芯电力电缆不得存在涡流回路，中间接头处接地线应进行交叉互联，经过电压保护器接地箱接地；GIS 电力电缆线路变压器组回路的电缆终端头与变压器之间，宜装设可拆卸的连接装置，便于试验；GIS 电力电缆线路变压器组回路的电力电缆的预防性试验，一般不做主绝缘耐压试验，只做外护套绝缘检测试验。

5.2.4.2 Power line shall be provided with visible marks in accordance with regulations (including at the cable head). Any construction organization shall not work in the power line protection area without approval.

电力线路应按规范要求设置明显的标志设施（包括电缆头位置）。在电力线路防护区内动土，施工单位必须按规定提前办理动土许可手续。

5.2.4.3 Line inspection shall be enhanced. The operating line shall be inspected at least once a month and inspection shall be recorded. In case of typhoon, rainstorm, abnormality, fault trip and other events, the line shall be inspected specially, and preparation shall be made to prevent accidents. Induced voltage and current of outer cable sheath, cable tray, grounding box, cable trench, drainage well, and etc shall be checked periodically.

加强线路巡视工作。每月对运行线路至少进行 1 次定期巡视，并做好记录；遇台风、暴雨、线路异常、故障跳闸等情况，需对线路进行特殊巡视，并做好预防事故的准备；定期检查电力电缆外护套感应电压、电流，电缆桥架、接地箱、电缆沟及排水井等。

5.2.4.4 Analysis on line operation shall be strengthened. The running condition of line, the defects of equipment and the causes of line faults and trip shall be analyzed carefully and relevant preventive measures shall be taken.

加强线路运行分析。对线路运行状况、设备存在缺陷以及所发生的线路故障及跳闸事故原因进行认真分析，并制定防范措施。

5.2.5 High-voltage switchgear

高压开关设备

5.2.5.1 Measures to prevent accidents and improve technologies shall be taken, according to the accidents, faults, operation and overhauls of switchgear as well as the checking computation results of breaking short-circuit current of breaker. Earthing knife-switch shall not be installed on the power supply side of 66KV and 10KV metal armored incoming switch cabinet.

根据开关类设备的事故、故障、运行、检修情况以及断路器开断短路电流的核对验算结果，制定反事故措施和技术改进措施。66 千伏、10 千伏金属铠装式进线开关柜电源侧不得装设接地刀闸。

5.2.5.2 Newly installed switchgear shall receive commissioning test before operation, and operating switchgear shall receive preventive test according to regulations. Preventive test shall be carried out on the newly installed substation bus in a year, on the operating bus according to regulations. Imported equipment shall be operated, maintained and tested according to the manufacturer's requirements.

新安装的开关设备，投运前必须进行交接试验，运行中的开关设备应按规定进行预防性试验；新安装变电站（所）的母线，一年内应进行预防性试验，运行中的母线应按规定进行预防性试验。对引进设备要按照制造厂使用要求进行运行、维护、试验等。

5.2.5.3 Main items of GIS commissioning and acceptance include visual inspection, electrical test, gas test, mechanical test and data archiving.

GIS 交接验收项目主要包括：外观检查、电气试验、气体试验、机械试验、资料归档等。

5.2.5.4 Although minor and major repair of GIS is generally every 4 years and every 15 years respectively, they shall be carried out according to the overhaul cycle of production unit or the manufacture's recommendations.

GIS 小修一般为 4 年 1 次，大修 15 年 1 次，宜结合生产装置停车检修周期或按制造厂建议进行小修或大修。

5.2.5.5 Plan of the gas cell structure of GIS shall be available and posted on the wall. GIS distribution room shall be provided with good natural and forcible ventilation facilities. Online monitoring device of SF6 gas and oxygen content shall meet relevant national standards, and the operation position shall be equipped with portable SF6 leakage detector.

GIS 应有气室结构平面图，并上墙。GIS 配电室内应装设良好的自然通风和强迫通风设施。SF6 气体及氧含量在线监测装置应符合国家相关标准，运行岗位应配置便携式 SF6 泄漏检测仪。

5.2.6 UPS

UPS 电源系统

5.2.6.1 UPS shall be provided in the power supply system for the process control instrument of production plant.

生产装置过程控制仪表电源的供电系统应配置 UPS。

5.2.6.2 UPS shall operate in a good environment, where temperature of $(25\pm 5)^{\circ}\text{C}$ and relative humidity of 40%-70% are recommended, necessary moistureproof and dustproof measures shall be taken and air conditioning equipment with a capability of dehumidification shall be provided.

UPS 应具备良好的运行环境，运行环境温度以 $(25\pm 5)^{\circ}\text{C}$ 、相对湿度 40%-70% 为宜，并采取必要的防潮、防尘措施，装设带有除湿功能的空调设备。

5.2.6.3 The Electrical Operation Dept. shall establish UPS operation & maintenance regulations and fault response plan, and continuously improve the ability to deal with sudden failures.

电气运行部编制 UPS 的操作、维护管理规定、故障应急预案，不断提高处理突发故障的能力。

5.2.6.4 UPS operation personnel shall have appropriate expertise, operate and manage the UPS in accordance with regulations, inspect the UPS periodically, and record abnormal situations timely.

UPS 运行操作人员应具备 UPS 专业知识，做好 UPS 运行管理，按规定进行各项操作，定期进行巡视检查，发现异常情况及时记录。

5.2.6.5 The UPS battery shall receive an on-line internal resistance test every three months, as well as capacity inspection and activation, charging and discharging tests once a year.

UPS 电池应每 3 个月进行 1 次内阻在线检测，每年进行 1 次容量检查及活化充、放电试验。

5.2.7 Frequency converter

变频调速装置

5.2.7.1 Length of the power cable of high-voltage frequency converter shall conform to the manufacturing specification.

高压变频器电源电缆的长度应符合制造说明书的要求。

5.2.7.2 The personnel operating the frequency converter shall have appropriate expertise, inspect the frequency converter periodically, and record abnormal situations timely.

变频调速装置运行操作人员应具备相应专业知识，定期进行巡视检查，发现异常情况应及时记录。

5.2.7.3 Technical personnel shall analyze the operation regularly, and take preventive measures against the problems (if any) to ensure safe operation.

技术人员应定期进行运行分析，针对存在的问题及时采取预防措施确保安全运行。

5.2.7.4 Measures to improve harmonic control and shielding shall be taken considering the nonlinear characteristics of the frequency converter, in order to: ensure that the harmonic component of frequency converter connected to the bus system meet national standards; reduce the harmonic pollution of power system and interference to adjacent equipment; and identify the "electronic groove" of bearing caused by high frequency shaft current of motor resulting from the frequency converter harmonic.

根据变频器非线性特点，应考虑完善谐波治理和屏蔽措施，确保变频器接入母线系统谐波分量满足国标要求，减少对电源系统的谐波污染和对相邻设备的干扰，拟制定变频器谐波导致电动机高频轴电流造成轴承的“电子刻槽”现象。

5.2.8 Emergency power supply

事故电源设备

5.2.8.1 The operation and maintenance procedures of emergency power unit shall be established, and observed by the operation and maintenance personnel.

编制事故电源设备的运行维护规程。设备操作、维护人员必须遵守设备运行维护规程。

5.2.8.2 The emergency power unit shall be inspected periodically, and abnormal situations (if any) shall be recorded and solved timely.

定期对事故电源装置进行巡视检查，发现异常情况应及时记录、处理。

5.2.8.3 The emergency power supply shall be isolated from the mains reliably, without asynchronous paralleling with the mains.

事故电源必须与市电系统可靠隔离，严禁同市电系统非同期并列。

5.2.8.4 At least 2 generator commissioning shall be carried out every month and be recorded. Monthly at least 2 generator test runs shall be carried out and recorded.

5.2.9 DC power unit

直流电源设备

5.2.9.1 The DC system is generally equipped with two buses; the DC network shall adopt radiation power supply, and be provided with appropriate fuse or DC breaker.

直流系统一般设置两段母线，直流网络宜采用辐射供电方式，并应配置合适的熔断器或直流断路器。

5.2.9.2 Each battery set in the DC system shall be provided with a microcomputer monitoring device, and its signal shall be available for uploading.

直流系统中宜按每组蓄电池组设置一套微机监控装置，其信号应能上传。

5.2.9.3 The DC system shall be provided with battery sets with appropriate capacity; the battery shall receive an on-line internal resistance test every three months, as well as capacity inspection and activation, charging and discharging tests once a year.

直流系统应配置容量合适的蓄电池组，电池应每 3 个月进行 1 次内阻在线检测，每年进行 1 次容量检查及活化充、放电试验。

5.2.9.4 The battery should operate under an ambient temperature of $(25\pm 5)^{\circ}\text{C}$.

蓄电池的运行环境温度以 $(25\pm 5)^{\circ}\text{C}$ 为宜。

5.2.9.5 Two sets of modular high-frequency switching power unit should be used as the rectification charging equipment of DC power supply, and operation and maintenance regulations of DC power unit should be established.

直流电源的整流充电设备一般宜选用两套模块组合式高频开关电源装置，并编制直流电源设备的运行维护规定。

5.2.9.6 The DC power supply shall be inspected periodically, and abnormal situations (if any) shall be recorded and solved timely.

定期对直流电源进行巡视检查，发现异常情况应及时记录、处理。

5.2.10 Lighting equipment

照明设备

5.2.10.1 Lighting equipment shall be inspected and maintained regularly to ensure it is in good condition and meet the needs of field work.

定期检查维护照明设备，保证照明设备状况良好，满足现场工作需要。

5.2.10.2 The maintenance of lighting equipment shall strictly follow relevant provisions, with safety measures taken. In the flammable and explosive places, lamps shall not be replaced on live line.

照明设备的检修应严格遵守有关规定，做好安全措施，在易燃易爆场所禁止带电更换灯具。

5.2.10.3 In the event of blackout of normal lighting power supply, emergency lighting shall be able to switch on automatically.

当正常照明电源失电时，事故照明应能自动投入。

5.2.10.4 Other electrical loads shall not access the emergency lighting circuit.

在事故照明回路中不得接入其他用电负荷。

5.2.10.5 The safety lighting shall be managed in accordance with relevant work safety, supervision and management system of Sinopec.

安全照明管理按照中国石化安全生产监督管理制度的有关规定执行。

5.2.10.6 The aviation obstruction signal light of tower, stack and other high-rise buildings shall comply with the provisions of the aviation department, and the protection signal light of port, wharf and other structures shall comply with the regulations of the maritime authority.

塔、烟囱等高建筑物的航空障碍信号灯，应符合航空部门的规定，港口、码头等建构筑物的防护信号灯应符合海事局部门的规范。

5.2.11 Integrated automation network communication system

综合自动化网络通讯系统

5.2.11.1 The management level of the integrated automation system shall have an extensive communication protocol library that contains both international and domestic standard protocols, enabling reliable communication with the power grid dispatching automation system as well as with the common intelligent equipment in the field.

综合自动化系统管理层应具有包括国际国内标准规约在内的较丰富的通讯规约库，向上既能与电网调度自动化系统实现可靠的通讯，向下又能与现场常用智能设备实现可靠的通讯。

5.2.11.2 The integrated automation system shall be configured fully considering the informatization requirement of electrical systems, and generally shall have the following functions:

综合自动化系统的配置方案应充分考虑电气系统信息化发展需要，通常应具备以下功能：

(1) Status monitoring of all equipment of substation;

变电站（所）内所有设备的状态监视；

(2) Operating parameter measurement of key equipment;

重要设备运行参数的测量;

(3) Required equipment remote control;

必要的设备遥控;

(4) Linkage and interlocking of the equipment in the substation and between substations;

变电站(所)内及站(所)间设备的联动和闭锁

(5) Statistics, analysis and printing of operating data and information;

运行数据及信息的统计、分析、打印;

(6) Forwarding the substation internal data to the plant-wide power monitoring rooms.

变电站(所)内数据向全厂电力监控室转发功能。

5.2.11.3 In addition to common electrical equipment and protection devices, the integrated automation system shall monitor equipment according to actual field situation, such as fault wave recorder, on-line detector, DC unit, low current earthing device, arc suppression coil automatic compensator, UPS device, and AC frequency converter.

综合自动化系统所监视设备的范围除了常规的电力设备和保护装置外,还应根据现场实际情况,包括故障录波装置、在线检测装置、直流装置、小电流接地选线装置、消弧线圈自动补偿装置、UPS装置、交流变频调速装置等在内的设备。

5.2.11.4 The microcomputer protection device shall have functions and protection characteristics that meet the field needs, with high reliability, rapidity and accuracy, stable performance, and capabilities of anti-interference, fault recording, fault wave recording and GPS time synchronization, so as to meet the requirements of operation monitoring, fault handling, commissioning test and data communication.

微机保护装置的功能和保护特性应满足现场需要,具有较高的可靠性、速动性和精确性,性能稳定,抗干扰能力强,具有故障记录、故障录波和GPS对时功能,满足运行监视、故障处理、调试试验和数据通讯的需要。

5.2.11.5 A reliable network communication structure with data transmission speed that meets the operational requirements shall be used according to the actual situation. For important substations, redundant system shall be applied.

应根据实际情况,采用可靠的、数据传输速度满足运行需要的网络通讯结构,重要的变电站应采用冗余系统。

5.2.12 Management of explosion-proof electrical equipment

防爆电气设备管理

5.2.12.1 Management of explosion-proof electrical equipment shall be normalized in strict accordance with existing national standards and specifications.

根据现行的防爆电气设备国家标准和规范要求,严格规范防爆电气设备管理工作。

5.2.12.2 The explosion-proof electrical equipment engineering shall be designed in accordance with existing national standards and specifications.

防爆电气设备工程的设计应符合现行的国家标准和规范要求。

5.2.12.3 Selection of electrical equipment for the places with an explosion risk

爆炸危险场所的电气设备选型

(1) Safe, reliable, cost-effective and applicable explosion-proof electrical equipment shall be selected.

防爆电气设备的选型原则是安全可靠，经济合理。

(2) The explosion-proof electrical equipment that meets the requirement of explosion-proof structure in the explosion hazard place shall be selected.

根据爆炸危险场所区域等级对电气设备防爆结构的要求选择相应的电气设备。

(3) The level and category of the explosion-proof electrical equipment selected shall not be below that of the explosive substances in the place. If there are two or above explosive substances, the higher level and category shall take precedence.

选用防爆电气设备的级别和组别，不应低于该区域内爆炸性物质的级别和组别。当存在两种以上爆炸性物质时，应按危险程度较高的级别和组别来选用。

(4) The electrical equipment and lines in the explosion dangerous places shall also match the chemical, mechanical, climatic, windy, dusty and other environmental conditions in the surrounding.

爆炸危险场所内的电气设备和线路，应同时符合周围环境中化学、机械、气候、风沙等不同环境条件对电气设备的要求。

5.2.12.4 The engineering installation, supervision and construction acceptance of explosion-proof electrical equipment shall follow the construction and acceptance specifications of electrical equipment in explosion hazard environment.

防爆电气设备的工程安装、监理与施工验收应遵循爆炸危险环境电气装置施工及验收规范。

5.2.12.5 The explosion-proof electrical equipment shall be operated and maintained in accordance with *Electrical Safety Regulations for Explosive Hazardous Areas*, and the conformity shall be inspected regularly.

防爆电气设备的运行与维护应按《中华人民共和国爆炸危险场所电气安全规程》规定执行，并定期检查执行情况。

5.2.12.6 The explosion-proof electrical equipment shall be overhauled in accordance with *GB3836.13 Maintenance of Electrical Equipment in Explosive Gas Environment* and relevant regulations, and by the personnel who have been trained in explosion-proof electrical equipment.

防爆电气设备的检修按《爆炸性气体环境用电气设备的检修》（GB3836.13）和有关规定执行，防爆电气设备的检修人员应经过防爆电气设备知识的培训。

5.3 Management of power dispatching

电力调度管理

5.3.1 Dispatching management

调度管理内容

5.3.1.1 The power dispatcher shall follow the command of production scheduler and balance the electric power according to the instruction of production planning and production scheduling. For adjustment of power load, the chief of duty shall follow the command of power dispatcher and adjust the operation of boiler and steam turbine according to the requirement of power balance. When the change in heat engine system may affect the generation load and cause power shortage, the shift supervisor shall report timely to the power dispatcher who then report to the production scheduler for taking measures. Any instruction from the Brunei power grid dispatcher to the power dispatcher shall be implemented unconditionally and immediately. If there is an obvious mistake in or doubt about the instruction, the power dispatcher shall immediately report to the specific leader in Electrical Operation Dept. and implement the instruction after review and approval.

电力调度服从生产调度指挥，根据生产计划和生产调度的指令，做好电力平衡；调整电力负荷时，值长服从电力调度指挥，根据电力平衡要求，调整锅炉汽机运行；热机系统发生变化，可能影响发电负荷、电力不足时，值长及时向电力调度汇报，电力调度向生产调度汇报，采取措施；电力调度接到文莱电网调度指令时，原则上应无条件立即执行，当指令明显错误或存在重大疑问时，电力调度应当立即汇报电气运行部分管领导，经审核批准后执行。

5.3.1.2 The power dispatcher is responsible for organizing and directing the operation, load balancing, relay protection configuration, remote communication and accident handling of electrical power system;

电力调度负责组织指挥电力系统的运行操作、负荷平衡、继电保护配置、远动通讯、事故处理等；

5.3.1.3 The main responsibilities of the power dispatcher include: execute the operation mode of this system; manage the operation of the equipment within the jurisdiction; command the system accident handling, investigate and analyze accidents, and take measures to improve the safe and economic operation of the system; manage the operation of relay protection, automatic devices, communication and remote control equipment within the jurisdiction; supervise the implementation of planned electricity consumption and participate in the preparation of load balancing schemes; participate in the formulation and implementation of power rationing and low-cycle (low load) shedding schemes; communicate the operation command of the external system;

电力调度的主要职责包括：执行本系统的运行方式；对调度管辖设备进行操作管理；指挥系统事故处理，调查分析事故，制定提高系统安全经济运行的措施；管辖范围的继电保护、自动装置、通讯和远动设备的运行管理；监督计划用电的执行情况，参与编制负荷平衡方案；参与制订并执行限电拉路顺序及低周（低压）减载方案；转达外系统的操作命令；

5.3.1.4 Manage the load of the electrical power system: strictly control the load limit of each operation department according to the power distribution plan of the electrical power system; according to the characteristics of the electrical power system and the requirements of the

production units, formulate and implement the power rationing measures strictly under the organization of the Scheduling & Dispatch Dept.; always be informed of operating parameters and load changes of the electrical power system, and organize load adjustment.

负责电力系统的负荷管理：依据电力系统的电力分配计划，严格控制各运行部的负荷限额；依据电力系统特点及生产装置的要求，在计划调度部的组织下，制订限电措施并严格执行；应随时掌握电力系统的运行参数及负荷变动情况，组织进行负荷调整。

5.3.2 Management of dispatching operation

调度操作管理

5.3.2.1 The equipment within the jurisdiction shall be dispatched as directed; for the equipment within the jurisdiction of Brunei power grid dispatcher, the power dispatcher shall contact the Brunei power grid dispatcher;

调度管辖设备的操作，必须按调度命令执行；文莱电网调度管辖设备，由电力调度负责与文莱电网调度联系；

5.3.2.2 Dispatching shall be implemented in accordance with relevant procedures (advance notice, repetition, implementation, reporting and acknowledgement) and recorded, with correct terms used.

调度操作应执行预告、命令、复诵、执行、汇报、确认的程序，并做好录音，正确使用调度术语；

5.3.2.3 With the change in power grid operation mode, the electrical operation team leader shall report the on-off status of arc suppression, filtering, compensation capacitor and other equipment in time.

根据电网运行方式变化，要求电气运行班长及时汇报消弧、滤波、补偿电容等设备的投切情况。

5.3.2.4 Be responsible for issuing the operating instructions of electrical equipment within the jurisdiction and commanding the adjustment of generator output, system voltage, system power factor and etc.

负责管辖电力设备操作指令的下达和指挥发电机出力、系统电压、系统功率因数等的调整。

5.3.2.5 Direct the handling of electrical system accidents.

指挥电力系统事故处理。

5.3.2.6 1000 KW or above pump shall be started only when the electrical operation personnel on duty who receives a notification from the operation department submits a request to the power dispatcher and the power dispatcher grants the request.

1000 千瓦及以上机泵启动前由运行部通知电气运行值班人员，由电气运行值班人员向电力调度申请并经同意后才能启动。

5.4 Management of electrical equipment maintenance and overhaul

电气设备维护与检修管理

5.4.1 Requirements for management of electrical equipment maintenance and overhaul

电气设备维护与检修管理内容

5.4.1.1 Be informed of the construction and installation of the electrical equipment on the site.
了解、熟悉、掌握建设期间现场相关电气设备的施工安装。

5.4.1.2 Supervise the installation quality, three inspections and four determinations, commissioning and operation of the electrical equipment during construction, to lay a better foundation for subsequent electrical equipment maintenance.

建设期间监督相关电气设备的安装质量、三查四定、调试投用，为今后更好进行电气设备维护打基础。

5.4.1.3 Be responsible for the professional maintenance, repair, servicing and inspection of the electrical equipment in relevant region, to ensure the safe, stable, long-time, full and optimal operation of the equipment.

负责相应区域电气设备专业的维护、维修、保养、巡检，保证设备的安、稳、长、满、优运行。

5.4.1.4 As directed by the Client's electric team leader, perform the power outage and power transmission of low-voltage distribution (single circuit).

根据委托人电气班长的指令，执行低压配电（单一回路）的停送电操作任务。

5.4.1.5 Maintenance of protection devices

保护装置的维护

(1) For the work on protection devices and secondary circuits, available work permit shall be provided;

有关保护装置及二次回路的工作必须有工作票；

(2) Before work on the protection devices and secondary circuits, the operator shall review the work permit and safety measures of the relay protection personnel, and shall take effective actions to prevent any possible misoperation of the protection devices caused by any work.

在保护装置及二次回路上工作前，运行人员必须审查继电保护工作人员的工作票及其安全措施，凡可能引起保护装置误动作的一切工作，运行人员必须采取防止保护装置可能误动作的有效措施；

(3) The operator shall inspect the protection device and its secondary circuit periodically; report the abnormality (if any) to the power dispatcher and the personnel concerned; adjust the specified allowable load current or curve for the protection device; monitor the load flow of electrical equipment or line; communicate the abnormality that may induce misoperation of protection devices to the relay protection department and the personnel concerned within the jurisdiction; in the event of emergency, deactivate the protection device and then make an immediate report; record the defect or abnormality (if any) of the protection device and secondary circuit, and notify and urge the department concerned to eliminate and handle such defect or abnormality.

运行人员必须对保护装置及其二次回路进行定期巡视。如发现异常，应及时汇报电气调度员和有关人员；按保护装置整定所规定的允许负荷电流或允许负荷曲线，对电气设备或线路的负荷潮流

进行监视。如发现可能使保护装置误动的异常情况时，应及时与继电保护部门联系，并按管辖范围的划分向有关人员汇报。紧急情况下，可先行将保护装置停用，事后立即汇报。发现保护装置及二次回路存在缺陷及不正常情况，应做出记录，通知及督促有关部门消除及处理；

(4) For the signal of relay protection action, it must be confirmed by the on-duty team leader and the personnel on duty, restored after accurate recording and reported to relevant departments in time according to the division of the jurisdiction;

对继电保护动作时的信号，必须经值班长与值班人员共同确认，准确记录后，方可复归，并按管辖范围的划分及时向有关部门汇报；

(5) Under normal circumstances, the voltage transformer and line side voltage transformer (or voltage extraction device) of the substation are not allowed to exit the operation. When exiting the operation, the impact on the protection device should be fully considered, the consent from the competent department of relay protection should be obtained, and preventive measures should be taken;

正常情况下，变电所的电压互感器和线路侧电压互感器（或电压抽取装置）不允许退出运行，必须退出运行时应充分考虑到其对保护装置的影响，并征得继电保护主管部门的同意，采取防范措施；

(6) In order to avoid misoperation of electronic equipment such as comprehensive relay protection and microcomputer protection device due to electromagnetic signal interference, it is strictly prohibited to use walkie-talkies, mobile phones and other electronic devices within 2m of such equipment when operating. Cooling and dust prevention measures should be set up in the operation site; and the installation location of such equipment must be set up with obvious warning signs;

为避免综合继电保护、微机保护装置等电子设备受电磁信号的干扰而发生误动作，在该类设备运行时，其周围 2m 内严禁使用对讲机、手机等电子器具，运行场所应设置降温、防尘措施；该类设备的装设地点必须有明显的警示标识；

(7) Regular inspection of grounding protection, bus protection, voltage protection and automatic device of the main system should be carried out before the rainy season. The inspection plan of other protective devices should be reasonably arranged according to the characteristics of seasons, load conditions and in conjunction with the maintenance or cleaning of primary equipment;

主系统的接地保护、母线保护、电压保护和自动装置的定检应在雨季前进行。其它保护装置应根据季节特点、负荷情况并结合一次设备的检修或清扫合理安排检验计划；

(8) When allowed by the production device, the protection device should be used regularly for the close-open test of circuit breaker and automatic switching test of incoming lines and section (bus tie) switch to verify the correctness of protection action;

生产装置许可的情况下，应定期利用保护装置进行一次断路器分合闸试验、进线、分段（母联）开关的分合闸自动投切试验，以检验保护动作的正确性；

(9) If the protection device cannot be inspected regularly according to the regulations due to the limitation of continuous operation of the production equipment, it must be reported to the leader in charge for approval.

因生产装置连续运行限制，不能按照规程规定周期进行检验的保护装置，必须报请本单位分管领导批准。

5.4.2 Management of temporary power supply

临时用电管理

5.4.2.1 Where temporary power is required for construction or other reasons, the permit for temporary power supply must be obtained.

凡在施工或其它原因需临时用电者，一律办理临时用电票。

5.4.2.2 See "Regulations on Management of Temporary Power Supply" for the handling procedures for temporary power supply permit and the safety technology for temporary power supply.

临时用电票办理程序及临时用电安全技术见“临时用电安全管理规定”

5.4.2.3 Management requirement for temporary power supply:

临时用电管理要求：

(1) The power supply and shutdown of refining plant area and other explosion hazardous areas should be carried out according to the "Hot Work Permit". At the end of each day, all temporary power supply should be disconnected and the substation switched out. The substation will supply power after seeing the "Hot Work Permit" every day, and other operations should be supplied after seeing the power permit. Explosion-proof power supply, electrical equipment and tools conforming to the explosion-proof grade must be used in explosion hazardous areas;

炼油装置区及其它爆炸危险场所的送、停电按“用火作业许可证”动火时间执行。每天用电结束，应断开一切临时电源，变电所拉闸。变电所每天见“用火作业许可证”送电，其它用电作业见用电票送电。爆炸危险场所必须使用符合防爆等级的防爆电源、用电设备及工具；

(2) The validity period of the temporary power supply permit should not exceed half a month. If the permit is continued to be used beyond the specified period, the user should go through the formalities according to the temporary power supply procedures in advance;

临时用电票有效期不超过半个月，超期继续使用，须提前按临时用电办理程序办理手续；

(3) Organizations using temporary power supply should not change the location and content of power use, and are not allowed to arbitrarily increase the power consumption. Once such situation occurs, power supplied to the organization should be immediately cut off;

临时用电单位不得变更用电地点和内容，禁止任意增加用电负荷，一旦发生此类现象，供电单位应立即停止供电；

(4) Only operators with electrician certificates are allowed to install temporary power lines. Unauthorized access to temporary power supply is strictly prohibited, and electrical faults should be removed by personnel of electrical discipline;

安装临时用电线路的作业人员，必须具有电工操作证方可作业。严禁擅自接用临时电源，电气故障应由电气专业人员排除；

(5) Management personnel of the Equipment Management Dept., Electrical Operation Dept. and HSE Dept. have the right to manage power users and the obligation to supervise the safe power use within their jurisdictions;

机械动力部、电气运行部和 HSE 管理部管理人员有权对用电者进行管理，有义务监察所辖范围内的安全用电；

(6) Special personnel should be responsible for the maintenance and management of temporary power supply facilities. Daily patrol inspections must be carried out, and inspection records and treatment notices of hidden dangers must be established to ensure the temporary power supply facilities are in good conditions. Pause of temporary power supply should be conducted by disconnecting power supply at the connection point;

临时供电设施的维护、管理，要落实专人负责。每日必须进行巡回检查，建立检查记录和隐患处理通知单，确保临时供电设施完好。临时电源暂停使用时，应在接入点处切断电源；

(7) For temporary power supply by other organizations, the on-duty personnel of the Electrical Operation Dept. should be responsible for specifying the power supply. Organizations using the power supply must strictly implement these regulations. For power users who violate the management regulations, the on-duty personnel of the Electrical Operation Dept. should report to the Electrical Operation Dept. and Scheduling & Dispatch Dept. in time, and the electrical personnel of the Electrical Operation Dept. have the right to cancel their power use qualification; when the circumstances are serious, they should be handed over to the relevant department of the Company for punishment;

外单位临时用电，由电气运行部电气值班人员负责指定电源，用电单位必须严格执行本规定，对违反管理规定的用电者，电气值班人员应及时汇报恒逸电气调度，电气运行部电气人员有权取消其用电资格，情节严重的，交公司有关部门给予处罚；

(8) Temporary power supply: when the temporary power supply is completed, the user should timely notify the electrical personnel on duty, and the electrician should remove the temporary power line, and the non-electrical personnel of the user should not remove it without permission. After the completion of power use by other organizations, the temporary power lines should be removed, and the electrical personnel on duty should be notified for inspection and acceptance.

临时用电：临时用电结束后，使用单位应及时通知电气值班人员，由电工拆除临时用电线路，使用单位非电气作业人员不得私自拆除。外单位用电结束后，拆除临时用电线路，应通知电气值班人员，检查验收。

5.4.3 Test management

试验管理

5.4.3.1 Before the new substation is put into operation, the test items and standards should be in accordance with the electrical equipment handover test standards of electrical installation projects. Maintenance and electrical test of the substation in operation should be conducted according to the preventive test procedures of electrical equipment. For electrical equipment

that cannot be regularly repaired or tested as required due to long-period operation of devices, technical evaluation of its operation status should be organized. The technical evaluation should be carried out in combination with comprehensive factors such as the status monitoring of electrical equipment, technical status and service life of equipment, conditions of previous maintenance, cleaning and tests, equipment operation environment, load, system configuration and operation mode; the policy of "safety first and prevention first" should be continuously complied with. The evaluation results should include whether it is possible to extend the maintenance, test cycle, extend the period of safety precautions and extend time. After being reviewed by the Equipment Management Dept., it should be submitted to the leader in charge for approval. The number of equipment for delayed maintenance and test as well as extended time should be determined based on the principle of strict control. The extended time should not exceed one year at most, and any abnormality occurred during the extended period should be dealt with immediately. Cleaning work should take the pollution situation of the site into consideration, shortening the cleaning cycle to the possible extent. If the electrical equipment needs to be repaired and tested on schedule after evaluation and confirmation, conditions must be created to arrange the maintenance and test.

新建变电所投运前，试验项目和标准按电气装置安装工程电气设备交接试验标准。已投运变电所检修和电气试验按电气设备预防性试验规程执行。由于装置长周期运行原因确实无法按规定周期进行检修、试验的电气设备，应组织对其运行状况进行技术评估。技术评估应结合电气设备状态监测、设备的技术状况和使用年限、以往检修、清扫、试验情况、设备运行环境、负荷以及系统配置及运行方式等综合因素进行，要坚持“安全第一、预防为主”的方针。评估结果应包括是否可以延长检修、试验周期、延期期间的安全保障措施及延长时间，机械动力部审查后，交分管领导批准。确定延期检修、试验设备数量及延长时间均应坚持从严控制原则，延长时间最长不超过一年，延期期间出现异常应立即处理。清扫工作应结合现场污秽情况，尽量缩短清扫周期。如经过评估确认需按期检修、试验的电气设备，必须创造条件安排检修、试验。

5.4.3.2 Management of electrical test.

电气试验管理。

(1) The Electrical Operation Dept. should establish the equipment preventive test records and files for the whole process, which should be complete, continuous and practical. The results of each test should be compared with the results of previous tests of the equipment, and the comprehensive evaluation should be made after a comprehensive analysis is conducted according to change rules and trends, with reference to relevant test regulations; and the preventive test records should be filled in. The test reports should be classified and bound into a book (each book should specify the test category, procedure based, test equipment model, etc.), which should be included in the "preventive test file". The testing organization should submit the pre-test summary to the Equipment Management Dept. within one month after the preventive test is finished, and submit the lightning protection & grounding and static test summary to the Equipment Management Dept. before April 15 every year.

电气运行部要建立全过程的设备预防性试验台帐、档案，做到完整、连续、符合实际。每次试验

结果应与该设备历次试验结果相比较，参照相关的试验规程，根据变化规律和趋势，进行全面分析后做出综合评价，填入预防性试验台帐。并将试验报告单分类装订成册（每册应写明试验类别、依据的规程、试验设备型号等），归入“预防性试验档案”中。试验单位在预防性试验结束后一个月将预试总结报机械动力部，防雷接地、静电测试总结在每年4月15日前报机械动力部。

1) The test report is the evidence of test results, so the testing organization must establish a strict verification and review system, to ensure the reliability of data;

试验结果的证据是试验报告单，试验单位必须建立严格的校对、审核责任制度，做到数据可靠；

2) The test report must be signed or sealed by two qualified personnel and signed or sealed by the special person in charge of supervising the preventive test of the testing organization;

试验报告单必须要有两名有试验资格的人员签字或盖章，并有试验单位预防性试验监督专责人签字或盖章；

3) In addition to correctly recording the test data, the test report should also record the nameplate and main technical parameters of the tested equipment, temperature and humidity during the test, weather conditions and subtle phenomena or changes that can possibly explain poor insulation during the test;

试验报告单除应正确记录试验数据外，还应记录被试设备的铭牌及主要技术参数、试验时的温度和湿度、天气状况和试验中可观察到的细微的、有可能说明绝缘不良的现象或变化情况；

4) In addition to the written report, an electronic version valid for the current period should also be provided;

试验报告单除有书面报告单外还应有当期有效的电子版；

5) The handover test report shall be kept permanently, and the preventive test report shall be kept for at least two test cycles;

交接试验报告单应永久保留，预防性试验报告单应至少保留两个试验周期；

6) The testing organization must establish a management system for the maintenance and use of test equipment and instruments.

试验单位必须建立试验设备和仪器仪表的维护保养和使用管理制度。

5.4.4 Management of grounded and neutral connected devices

接地与接零装置管理

5.4.4.1 Grounding and neutral connection of electrical equipment is an important measure to ensure personal and equipment safety. The range of grounding and neutral connection is as follows:

电气设备的接地与接零是保证人身和设备安全的重要措施。接地与接零范围如下：

(1) Bases and enclosures of motors, transformers, switches and other electrical equipment.

电机、变压器、开关及其他电气设备的底座和外壳。

(2) Metal frame of indoor and outdoor power distribution devices, and metal bars and metal doors close to live parts.

室内、外配电装置的金属架构及靠近带电部分的金属遮栏、金属门。

(3) Metal pipes for indoor and outdoor wiring.

室内、外配线的金属管。

(4) Transmission devices of electrical equipment, such as the operating mechanism of switch.

电气设备的传动装置，如开关的操动机构等。

(5) Frames of switchboard, control console, etc.

配电盘与控制操作台等的框架。

(6) The secondary winding of current transformers and voltage transformers.

电流互感器、电压互感器的二次绕组。

(7) Shell of cable boxes and metal sheath of cables.

电缆接线盒的外壳及电缆的金属外皮。

(8) Metal structures for overhead lines.

架空线路的金属杆塔。

5.4.4.2 Steel frameworks of buildings and installations should be well grounded against lightning, and facilities such as industrial pipelines, storage tanks and warehouses should have reliable anti-static grounding devices.

建筑物、装置钢构架应有完好的防雷接地，工业管道、储罐、料仓等设施应有可靠的防静电接地装置。

5.4.4.3 For easy inspection and detection, the connection between lightning protection / anti-static downlead and grounding device can be adopted with connecting clamp and connected with stainless steel screws according to the specific situation, or connected by welding.

为方便检查检测，防雷防静电引下线与接地装置的连接根据具体情况可以采用断接卡并用不锈钢螺丝连接，或采用焊接连接。

5.4.4.4 The secondary circuit and anti-interference grounding should be implemented in accordance with the key implementation requirements of relay protection specified in the 25 *Major Anti-Accident Measures of State Power Grid Corporation*.

二次回路及抗干扰接地按照《国家电网公司二十五项电网重大反事故措施》继电保护专业重点实施要求执行。

5.4.4.5 Safety inspection contents of grounding device:

接地装置的安全检查内容：

(1) Conditions of the contact between the grounding downlead and each connection point should be checked, to see whether there is any damage, fracture or corrosion.

检查接地线引下线和各连接点的接触是否良好，有无损伤、折断和腐蚀现象。

(2) For soil zones containing heavy acid, alkali, salt or metal minerals and rocks and other chemical components, regular spot checks should be carried out on the excavated ground under the grounding device to observe the corrosion of the grounding body.

对含有重酸、碱、盐或金属矿岩等化学成分的土壤地带，应定期对接地装置的地下部分挖开地面进行抽查，观察接地体腐蚀情况。

(3) The variation of grounding resistance measured should be check and analyzed to see if it conforms to relevant regulations.

检查分析所测量的接地电阻值变化情况，是否符合有关规定要求。

(4) After each time of maintenance, intactness of the contact between the grounding lead and the electrical equipment and grounding network should be checked. Repairs should be made in time when looseness or dislocation occurs.

设备每次检修后，应检查接地线与电气设备及接地网的接触情况是否完好，如有松动脱落现象应及时补修。

5.4.4.6 Inspection and detection period of grounding devices:

接地装置的检查、检测周期：

(1) The grounding network of the substation should be inspected once a year.

变电所的接地网每年检查一次。

(2) Grounding and zero lines of the production equipment should be inspected once or twice a year according to the operating conditions.

生产装置现场的接地线及零线根据运行情况，每年应检查 1~2 次。

(3) Grounding leads of various lightning protection devices should be inspected once a year before the rainy season.

各种防雷装置的接地线每年雨季前检查一次。

(4) For grounding devices in corrosive soil, the local ground generally should be excavated once every 5 ~ 6 years for inspection according to the operation after installation.

对有腐蚀性土壤的接地装置，安装后应根据运行情况一般每 5~6 年挖开局部地面检查一次。

(5) For Class I structures, lightning protection and anti-static facilities for flammable and combustible liquid tanks, combustible gas tanks, oil depots, gas depots, hazardous chemicals depots, gas supply stations, gas stations, tanker terminals and filling racks should be inspected twice a year, the first time from March 1 to April 15, and the second time from September 1 to October 15.

对第一类建（构）筑物，易燃可燃液体贮罐、可燃气体贮罐、油库、气库、危险化学品库、供气站、加油站、油码头、装油台等防雷防静电设施，每年检测两次，时间：第一次 3 月 1 日~4 月 15 日，第二次 9 月 1 日~10 月 15 日。

(6) lightning protection and anti-static facilities for Class I structures should be inspected once a year from March 1st to April 15.

对第二、三类建（构）筑物防雷防静电设施，每年检测一次，时间：3 月 1 日~4 月 15 日。

5.4.5 Management of electrical fire fighting

电气消防管理

5.4.5.1 Electrical fire fighting management must be carried out in accordance with relevant safe production procedures and regulations issued and formulated by the State, and the

operation maintenance, maintenance management and personnel training of equipment should be strengthened.

电气消防管理必须按国家颁发、制定的有关安全生产规程、制度执行，加强设备的运行维护、检修管理和人员培训。

5.4.5.2 The design and construction of new construction, reconstruction and expansion works or projects should meet the requirements of relevant state regulations on fire fighting, and can only be put into operation after passing the commissioning acceptance. For equipment already in operation, temporary measures should be taken if it does not comply with relevant fire fighting provisions and rectification should be made within a limited period of time.

凡新建、改扩建工程或项目的设计、施工应符合国家有关消防规定的要求，并经调试验收合格后方可投入运行。对已经投运的设备，若不符合有关消防规定的应采取临时措施并限期整改。

5.4.5.3 The passageways and roads inside and outside the substation should be kept unblocked.

变电所内、外的通道、道路应保持畅通。

5.4.5.4 Equipment or the site should be equipped with necessary fire fighting facilities and qualified respiratory protective devices as required. Fire fighting facilities on site should not be used for other purposes.

设备或场所应配置必要的消防设施，并根据需要配备合格的呼吸保护器。现场消防设施不得移作他用。

5.4.5.5 Sundries and other articles should not be piled up around the fire fighting facilities on site.

现场消防设施周围不得堆放杂物和其他物品。

5.4.5.6 The automatic fire alarm or fixed fire extinguishing apparatus should be kept in good condition and conform to design and technical regulations.

保持火灾自动报警装置或固定灭火装置完好，并使其符合设计技术规定。

5.4.5.7 When the work is interrupted or finished, the site should be cleaned and inspected to eliminate hidden fire hazard.

工作间断或结束时应清理和检查现场，消除火险隐患。

5.4.5.8 It is strictly prohibited to be stored inflammable and explosive materials in the substation.

变电所内严禁存放易燃易爆物品。

5.4.5.9 Telephone numbers of the fire department should be set up at a striking position of the substation.

变电所在醒目位置悬挂火警电话号码。

5.4.5.10 When fire occurs on electrical equipment, it should be reported to the on-duty person in charge and the power dispatching department; the power supply of relevant equipment should be cut off immediately, and emergency isolation and stop measures should be taken.

电气设备发生火灾时应报告值班负责人和电力调度部门，并立即将有关设备的电源切断，采取紧急隔停措施。

5.4.5.11 Electric shock should be avoided when putting out fire on electrical equipment.

在电气设备上灭火时应防止触电。

5.4.5.12 When fire occurs on electrical equipment, it is prohibited to use conductive fire extinguishing agent to put out the fire. It is prohibited to use dry powder extinguisher and dry sand to put out fire in case of fire in rotating motors. Operation and maintenance personnel should master the application methods of common fire fighting equipment.

电气设备发生火灾时，严禁使用能导电的灭火剂进行灭火。旋转电机发生火灾时，禁止使用干粉灭火器和干砂直接灭火。运行维护人员应掌握常用灭火器材使用方法。

5.4.5.13 Fire prevention measures for cables are: sealing, blocking, coating, isolating, packaging, etc. Specifics should be carried out in accordance with the *Acceptance Standards for Design and Construction of Fire Prevention Measures for Cables* currently in effect.

电缆防火措施有：封、堵、涂、隔、包等。具体执行现行《电缆防火措施设计和施工验收标准》。

5.4.6 Management of overvoltage protection and anti-pollution flashover

防过电压、防污闪管理

5.4.6.1 Lightning damage is very destructive to production and personal safety. Harm to electrical equipment by direct lightning strike, lightning counterattack and induced lightning overvoltage should be given full attention during design and operation and effective preventive measures should be taken.

雷害对生产和人身安全危害很大，设计和运行中应充分重视直接雷击、雷电反击和感应雷电过电压对电气设备的危害并采取有效预防措施。

5.4.6.2 Electronic equipment has low tolerance to overvoltage. Comprehensive protective measures such as shunt, voltage sharing, shielding, grounding, protection (clamping) should be taken to prevent electronic equipment from being struck by indirect lightning.

电子设备对过电压的承受能力很低，应有综合防护措施，如分流、均压、屏蔽、接地、保护（箝位）等，防止电子设备遭感应雷击。

5.4.6.3 Lightning conductors should be installed along all 66 KV and above overhead lines for critical loads.

供重要负荷的 66 千伏及以上架空线路应沿全线架设避雷线。

5.4.6.4 Pollution flashover is seasonal and regional, so measures must be taken to prevent insulation flashover accidents of outdoor power equipment, and monitoring and analysis of pollution should be strengthened.

污闪具有很强的季节性和区域性，必须采取措施预防户外电力设备绝缘闪络事故发生，对污秽情况应加强监测分析。

5.4.6.5 The anti-pollution flashover ability should be improved and anti-pollution flashover measures should be taken at locations with serious pollution issues.

污秽较严重地区要提高防污闪能力，采取防污闪措施。

5.4.6.6 For the neutral ungrounded system or arc suppression coil grounding system, effective measures should be actively taken to prevent internal overvoltage. When the capacitance current of single-phase ground fault exceeds the allowable value specified in the regulation, arc suppression coils (automatic compensation device for arc suppression coils should be used) and other technical measures should be adopted. The arc suppression coil grounding system should be operated in over-compensation mode, and the over-compensation value should meet the requirements of regulations.

对于中性点不接地或消弧线圈接地系统，要积极采取有效措施，防止内部过电压。当单相接地故障电容电流超过规程规定的允许值，应采用消弧线圈（宜采用消弧线圈自动补偿装置）等技术措施。消弧线圈接地系统应采用过补偿方式运行，过补偿值应符合规程要求。

5.4.6.7 In order to avoid resonance overvoltage in the power system, the capacitor voltage transformer or the electromagnetic voltage transformer with higher excitation saturation point should be used for 66 KV and above, and the electromagnetic voltage transformer with higher excitation saturation point should be used for 35 KV and below.

为避免电力系统产生谐振过电压，66 千伏及以上应选用电容式电压互感器或励磁性能饱和点较高的电磁式电压互感器，35 千伏及以下应选用励磁性能饱和点较高的电磁式电压互感器。

5.4.6.8 In the neutral ungrounded system of the same voltage class, the number of neutral ground of the voltage transformer should be reduced to avoid resonance.

同一电压等级中性点不接地系统中应减少电压互感器中性点接地的数量，以免发生谐振。

5.4.6.9 To prevent ferromagnetic resonance of the voltage transformer, resonance suppressing resistors should be connected in series between the neutral point of the voltage transformer and the ground, or other special technical measures should be adopted, such as connecting the microcomputer resonance suppressing device to the secondary open triangle winding of the voltage transformer.

防止电压互感器铁磁谐振，宜在电压互感器中性点与地之间串接消谐电阻，或采用其他专门的技术措施，如在电压互感器二次开口三角形绕组中接入微机消谐装置。

5.4.6.10 Zinc oxide arrester should be correctly chosen; its rated voltage and continuous operating voltage should meet the requirements of regulations. Tests on lightning arresters should be strengthened and online detection technology should be actively developed in accordance with the requirements of regulations.

正确选用氧化锌避雷器，其额定电压和持续运行电压应符合规程要求。应根据规程要求，加强对避雷器的试验，积极开展在线检测技术。

5.4.7 Defect treatment of electrical equipment

电气设备缺陷处理

5.4.7.1 If defects are found on the electrical equipment, the operator should contact the electrical maintenance personnel in time and fill in the maintenance work permit, and leave the defects to the electrical maintenance personnel for handling after taking safety measures.

发现电气设备缺陷，操作人员应及时联系电气维护人员并填写维修作业票，落实安全措施后交电气维护人员处理。

5.4.7.2 After receiving the maintenance work permit, the maintenance personnel shall eliminate the defects in time, sign on the record for confirmation, feed back the handling results to the leader in charge, and keep the record in the technical document of equipment in time. 维护人员接到维修作业票后，应及时消除缺陷，在记录上签字确认，将处理结果反馈给主管领导，并及时记录在设备技术档案中。

5.4.7.3 The defect record of electrical equipment should be established, containing content such as equipment defect description, discovered by, date of discovery and elimination], which should be filled in timely and accurately.

建立电气设备缺陷记录，必须有设备缺陷内容、发现人、发现及消除日期等内容，做到及时准确填写。

5.4.7.4 For defects that cannot be eliminated at the moment due to the lack of conditions (such as the need to stop equipment operation of, stop the main system, etc.), the maintenance organization should propose a plan to eliminate the defects, which should approved and coordinated by the Equipment Management Dept. to eliminate the defects, and the operation and maintenance department should take measures to prevent the expansion of defects.

对因条件不具备（如需停运设备、倒停主系统等）一时不能消除的缺陷，检修单位应提出消除缺陷的计划，机械动力部审批，协调安排消除缺陷，同时运行维护部门应做好防止缺陷扩大的措施。

5.4.7.5 Hidden electrical hazards should be timely managed in accordance with the requirements of relevant anti-accident measures of the power industry and the treatment scheme for hidden electrical hazards.

电气隐患按照电力行业有关反事故措施要求和电气隐患治理方案，及时安排治理。

5.4.8 Management of electrical equipment renewal and scrapping

电气设备的更新和报废管理

5.4.8.1 Renewal of electrical equipment should be carried out in a planned and focused manner in accordance with the safe power supply and development planning of the Enterprise. 电气设备更新应当按照企业的安全供电和发展规划，有计划、有重点地进行。

5.4.8.2 Renewal of electrical equipment should be implemented in accordance with the management measures for equipment renewal.

电气设备更新按设备更新管理办法执行。

5.4.8.3 The management of electrical equipment scrapping should be implemented in accordance with the management measures for fixed assets.

电气设备报废管理按固定资产管理办法执行。

5.4.8.4 Renewal provisions for electrical equipment

电气设备更新规定

(1) Electrical equipment deemed obsolete by the State should be renewed in a timely manner.

国家明令淘汰的电气设备应及时更新。

(2) The service life of substation and distribution equipment is 15 ~ 20 years.

变配电设备运行寿命 15~20 年。

(3) The service life of microcomputer protection and monitoring equipment is 10 ~ 15 years.

微机保护及监控设备运行寿命 10~15 年。

(4) The service life of overhead power lines is 20 ~ 25 years, and that of power cable lines is 15 ~ 20 years.

架空电力线路运行寿命 20~25 年，电力电缆线路寿命 15~20 年。

(5) The service life of power electronic equipment is 8 ~ 10 years.

电力电子设备运行寿命 8~10 年。

(6) Related equipment should be comprehensively evaluated according to the accident situation, service life, load rate, operating environment and other factors, which should be the main basis for renovation.

相关设备应根据事故情况、运行年限、负荷率、运行环境等因素进行综合评价，作为更新改造的主要依据。

5.4.9 Management of technical materials

技术资料管理

5.4.9.1 Materials to be kept by the Equipment Management Dept.

机械动力部需保存的资料

(1) Design documents and materials of the main substation, records of key equipment.

主变电站的设计文件、资料，关键设备台帐。

(2) Accident analysis and handling report of key equipment.

关键设备事故分析处理报告。

(3) Plans of regular electrical repairs, regular tests and regular cleaning, as well as evaluation reports of delays.

电气定期检修、定期试验、定期清扫计划及延期评估报告。

(4) Equipment overhaul and renewal plan.

设备大修、更新计划。

(5) Operation summary of equipment (monthly, semi-annual, annual).

设备工作总结（月度、半年、年度）。

(6) Notice of fixed relay protection value, record and evaluation of relay protection actions.

继电保护定值通知单、继电保护动作记录及评价。

(7) Emergency Plan.

事故应急预案。

5.4.9.2 The Electrical Operation Dept. should have the following technical data and drawings:

电气运行部应具备下列各项技术资料和图纸：

- (1) Records of all power supply and transformation equipment and equipment files.
所有输变电设施设备台帐和设备档案。
- (2) Simulation diagram of primary electrical system, diagram of cable or overhead line route, and secondary connection diagram.
电气一次系统模拟图，电缆或架空线路走向图，二次接线图。
- (3) Maintenance work permit, switching operation permit, and temporary power supply permit.
检修工作票，倒闸操作票，临时用电票。
- (4) "Five regulations" of electrical discipline.
电气“五规程”。
- (5) Records such as the *Duty Record* and *Equipment Defect Record*.
《运行值班记录》、《设备缺陷记录》等记录。
- (6) Plans of regular electrical repairs, regular tests and regular cleaning, as well as evaluation reports of delays.
电气定期检修、定期试验、定期清扫计划及延期评估报告。
- (7) Equipment overhaul and renewal plan.
设备大修、更新计划。
- (8) Test report of electrical equipment.
电气设备试验报告。
- (9) Operation summary of equipment (monthly, semi-annual, annual).
设备工作总结（月度、半年、年度）。
- (10) Emergency Plan.
事故应急预案。
- (11) Notice of fixed relay protection value (including the calculation sheet), record and evaluation of relay protection actions, system impedance diagram, short circuit capacity table of system.
继电保护定值通知单（包括计算书）、继电保护动作记录及评价、系统阻抗图、系统短路容量表。
- (12) Statistical statement of electric quantity.
电量统计报表

6 Inspection and Supervision

检查与监督

The Equipment Management Dept. should inspect the management of electrical equipment in each operation department and assess situations where the System is being violated.

机械动力部对各运行部的电气设备管理情况进行检查，对违反本制度的进行考核。

7 Associated Procedures and Records

关联程序和记录

7.1 Associated procedures

关联程序

7.1.1 *Handling Procedures for Abnormalities and Accidents of Electrical Equipment*

HYBN-T2-07-0055-2018

电气设备异常及事故处理程序 HYBN-T2-07-0055-2018

7.1.2 *Maintenance and Repair Procedures for Electrical Equipment*

HYBN-T2-07-0056-2018

电气设备检维修程序 HYBN-T2-07-0056-2018

7.2 Associated records

关联记录

N/A.

无。

8 Supplementary Rules**附则**

8.1 The System is under the jurisdiction of Equipment Management Dept.

本制度由机械动力部归口管理。

8.2 The System is drafted by Equipment Management Dept.

本制度起草部门：机械动力部。

8.3 Equipment Management Dept. is responsible for the interpretation of the System.

本制度解释权归机械动力部拥有。

8.4 Revision, preparation and approval of the System are shown in Table 2:

本制度版本编制和审批情况见表 2:

Table 2 Revision, preparation and approval of document**表 2 文件版本编制和审批情况**

1	2018-12-31	Zhou Xuelin, Guo Chonghuo 周雪林、郭崇伙	Tong Xueyun, Wang Dongsheng 童雪云、王东生	Xu Ye 徐野	Chen Liancai 陈连财
Revision 版本	Issued date 颁布日期	Prepared by 编制人	Reviewed by 审核人	Authorized by 审定人	Approved by 批准人



Hengyi Industries Sdn Bhd
恒逸实业（文莱）有限公司

HYBN-T3-07-0018-2018-1

Management System for Instrument & Automation System

仪表及自动化系统管理制度

Issued Date: Dec. 2018

颁布日期：2018 年 12 月

 HENGYI	Hengyi Industries SdnBhd 恒逸实业（文莱）有限公司			
	Management System for Instrument & Automation System 仪表及自动化系统管理制度			
	Doc No.	HYBN-T3-07-0018-2018-1	Ver No.	1

1 Purpose

目的

The System is hereby formulated in order to standardize the management of instrument and automatic system, define the management responsibilities of each department and guarantee the safe, stable and long-term operation of instrument and automatic system.

为规范仪表及自动化系统的管理，明确各部门管理指责，确保仪表及自动化系统安全、平稳、长周期运行，特制定本制度。

2 Scope of Application

适用范围

The System is applicable to all departments of the Company.

本制度适用于公司各部门。

3 Terms and Definitions

术语和定义

3.1 Instrumentation: it refers to all kinds of measuring instruments used in production devices, such as conventional instruments for measuring temperature, pressure, flow rate and liquid level, the special instruments for measuring vibration, displacement, rotation speed and current, as well as online analysis instrument and regulating valves. According to the management function, it can be classified into measuring instrument, safety instrument and environmental protection instrument.

仪表设备：是指生产装置所使用的各类检测仪表，如温度、压力、流量、液位等测量的常规仪表，以及振动、位移、转速、电流等测量的特殊仪表和在线分析仪表、调节阀等，按管理功能又分为计量仪表、安全仪表和环保仪表等。

3.2 Automatic system: it refers to the system that realizes automatic control of temperature, pressure, flow rate, material level and other process parameters in the process of production and operation as controlled objects, such as DCS, CCS and PLC.

自动化系统：是指生产运行过程中，对温度、压力、流量、物位等过程参量作为被控对象，实现自动化控制的系统，如 DCS、CCS、PLC 等系统。

3.3 Point inspection of automatic system: it refers to the complete overhaul of the system represented by DCS as per the basic unit of I/O channels (points), including the cleaning,

inspection and testing of each component.

自动化系统点检：是指以 DCS 为代表按 I/O 通道（点数）为基本单位，对系统的全面检修，包括各部件的清扫、检查、测试等。

3.4 Online analysis instruments: it refers to the instruments installed on the devices in the field, which are capable of automatically measuring, analyzing and indicating the components of raw materials, finished products, semi-finished products and intermediate products continuously, including mainly online quality analysis instrument and online environmental analysis instrument, where the latter refers to the online analysis instrument used for monitoring discharged waste water and exhaust gas.

在线分析仪表：是指安装在装置现场能够自动对原料、成品、半成品、中间产品的组份进行连续测量、分析、指示的仪表，主要包括在线质量分析仪表和在线环保分析仪表。其中在线环保分析仪表是指用于外排废水、废气监测的在线分析仪表。

3.5 Safety and environmental instrument: it refers to safety instrument of combustible (toxic) gas detection alarm, radioactive instrument, emergency stop system and fire/gas protection systems (FGS), and environmental instrument of ammonia-nitrogen analyzer, COD and CEMS.

安全环保仪表：是指可燃（有毒）气体检测报警仪、放射性仪表、紧急停车系统、火/气保护系统（FGS）等安全仪表，以及氨氮分析仪、COD、CEMS 等环保监测仪表。

3.6 Instrumentation operation is classified into major instrument operation and general instrument operation. Major instrument operation refers to the operation which may cause the device to shut down or seriously affect the operation of the device, such as the operation of important control loop, important interlock loop, system power supply and control system, the operation when one must wear the gas mask and the operation when the toxic, explosive and flammable medium cannot be isolated. All instrument operations except major instrument operation are general instrument operations.

仪表作业分为重大仪表作业和一般仪表作业两级。重大仪表作业是指在仪表作业时，可能造成装置停工或严重影响装置运行的作业，如重要控制回路、重要联锁回路、系统电源、控制系统等作业，以及必须带防毒面具的作业、无法隔离的有毒、闪爆、易燃介质的作业等。除重大作业以外的均为一般仪表作业。

4 Management Responsibilities

管理职责

4.1 Specified administrative authority

归口管理部门

4.1.1 Equipment Management Dept. is the specified administrative authority for instrument and automatic system, and shall be responsible for preparing (revising) systems related to the instrument and automatic system.

机械动力部是仪表及自动化系统归口管理部门，负责制(修)订仪表及自动化系统管理制度。

4.1.2 Equipment Management Dept. shall be responsible for reviewing the overhaul and updating plans for the instrument and automatic system, organizing the implementation and organizing the quality inspection and completion acceptance of major equipment overhaul and equipment shutdown and maintenance.

负责审核仪表及自动化系统检修、更新计划，并组织实施；组织重要设备大修、装置停工检修的质量检查、竣工验收。

4.1.3 Equipment Management Dept. shall be responsible for reviewing the updating, waste evaluation, overhaul (transformation) plan of important instrument and automatic system, and shall be responsible for the technical exchange of repair, update and technical transformation projects, as well as the signing of technical appendix.

负责重要仪表及自动化系统更新判废鉴定、检修（改造）方案的审核；负责修理、更新和技术改造项目的技术交流，以及技术附件签署。

4.1.4 Equipment Management Dept. shall organize to prepare the spare parts list and reserve quota of instrument and automatic system and be responsible for surveying, replacing and plan approval of spare parts.

组织编制仪表及自动化系统备品配件明细表及年度储备定额；负责备品配件测绘、替代以及计划审定。

4.1.5 The Equipment Management Dept. shall organize to prepare the inspection and approval plans of fixed combustible (toxic) gas detection alarm, heating furnace zirconia and environmental instrument and organize the plan implementation.

组织编制公司固定式可燃（有毒）气体检测报警仪、加热炉氧化锆、环保仪表等检验计划，审定检验方案，并组织实施。

4.1.6 Equipment Management Dept. shall be responsible for the accidents investigation, handling, summary and reporting of instrument and automatic system, and organize the establishment of the instrumentation defect management records and organize the rectification of major equipment defects.

负责仪表及自动化系统的事故调查、处理及统计上报工作；组织建立仪表设备缺陷管理台帐并组织设备重大缺陷整改。

4.1.7 Equipment Management Dept. shall organize the archiving and management of the completion data of the project instrument for equipment shutdown overhaul, annual repair and equipment updating, and organize the establishment of the technical files of the instrumentation.

组织做好装置停工大修和年度修理、设备更新等项目仪表竣工资料的存档管理工作；组织建立仪表设备技术档案。

4.1.8 Equipment Management Dept. shall check and supervise the inspection and maintenance of instrumentation and the work of the outsourced unit according to the contract requirements.

检查、督促仪表设备检维修工作以及外协单位按合同要求应做好的工作。

4.2 Coordinated management departments

协同管理部门

4.2.1 Scheduling & Dispatch Dept. shall be responsible for approving instrument changes (including the software changes of control system) due to production process and technology.

计划调度部负责因生产工艺、技术原因引起的仪表变更（含控制系统软件变更）的审批。

4.2.2 HSE Dept. shall participate in the management of safety and environmental instruments, be responsible for the approval of the changes of combustible (toxic) gas alarm and other safety and environmental instruments, and be responsible for the professional management of radiation protection of radioactive instruments. In addition, HSE Dept. shall organize the transfer, protection, isolation and marking of radioactive sources of instruments, and organize to review the configuration of safety and environmental instrument of production equipment.

HSE 管理部参与装置安全、环保仪表的管理；负责可燃（有毒）气体报警仪等安全环保仪表变更的审批；负责放射性仪表射线防护的专业管理，组织仪表放射源的转移、防护、隔离、标识等工作；组织生产装置安全、环保仪表配置的审查。

4.3 Executive departments

执行部门

4.3.1 Instrument Control Dept. is the executive department for the management of instrument and automatic system.

仪表控制部是仪表及自动化系统管理的执行部门。

4.3.1.1 Instrument Control Dept. shall be responsible for the daily management of operation, maintenance and fault handling of instrument and automatic system; shall be responsible for the establishment of instrument/ equipment records, archives and full instrumentation contracting system.

负责全厂仪表及自动化系统运行维护、保养、故障处理等日常管理工作；负责建立仪表设备台帐、档案以及全员仪表设备承包体系。

4.3.1.2 Instrument Control Dept. shall organize the waste evaluation, updating and type selection of general instrumentation; participate in the waste evaluation of important instrumentation; participate in the design review and equipment type selection of technical transformation project; be responsible for developing emergency plans for instrumentation maintenance, verification procedures and instrument failures.

组织一般仪表设备的判废鉴定和更新选型，参与重要仪表设备的判废工作；参与技术改造项目的设计审查、设备选型；负责制定仪表设备检修、校验规程以及仪表故障的应急预案。

4.3.1.3 Instrument Control Dept. shall be responsible for on-site instrumentation construction

management; be responsible for preparing and reporting the maintenance plan, technical transformation project plan, renovation and transformation plan, annual maintenance plan and the upgrading plans for all kinds of process control computer system and advanced control system.

负责现场仪表施工管理；负责编制、上报各装置仪表的检修计划、技术改造项目计划、更新改造计划、年度修理计划、各类过程控制计算机系统及先进控制系统升级计划。

4.3.1.4 Instrument Control Dept. shall be responsible for the training of instrument technicians and instrument operators, and assist in the instrumentation training of production equipment operators.

负责仪表技术人员和仪表工的培训，协助做好生产装置操作人员的仪表培训工作。

4.3.2 The Electrical Operation Dept. shall be responsible for the upstream power supply management of instrument and automatic system; and be responsible for the management of video monitoring system of the department.

电气运行部负责仪表及自动化系统上游供电管理；负责本部门视频监控系统管理。

4.3.3 Production & Operation Dept. is the user department of instrument and automatic system and shall be responsible for filling the applications for instrument changes (including the software changes of control system) due to production process and technology.

生产运行部是仪表及自动化系统的使用部门，负责提出因生产工艺、技术原因引起的仪表变更（含控制系统软件变更）的申请。

5 Management Content

管理内容

5.1 Management of fundamental data

基础资料管理

5.1.1 The instrument and equipment shall establish and perfect the fundamental data such as the equipment records, archives, design data, instructions, random data, verification records, inspection and maintenance procedures, and establish the technical status table, equipment defect records and change records of instrument and automatic system during operation.

仪表设备应建立和健全设备台帐、档案、设计资料、说明书、随机资料、校验记录、检维修规程等基础资料，运行过程中还应建立仪表及自动化系统技术状况表、设备缺陷台帐、变更记录等。

5.1.2 Control system files shall be established for automatic systems, such as DCS, SIS, CCS and PLC. The files shall include:

自动化系统如 DCS、SIS、CCS、PLC 等应建立控制系统档案，档案应包括：

5.1.2.1 Configuration data of the system hardware and software, the plans of cabinet and control room, power distribution drawings, system wiring drawings, route diagrams of incoming and outgoing cables, configuration data and complex circuit configuration description,

acceptance data, the original data of hardware and software and maintenance manual.

系统硬件及软件的配置资料、机柜及控制室平面图、供电分配图、系统接线图、进出电缆走向图、组态资料及复杂回路组态说明、验收资料、软硬件原版资料和保养手册等。

5.1.2.2 The detection report, point inspection report, fault handling record, analysis report and change record of system grounding resistance.

系统接地电阻检测报告、点检报告、故障处理记录及其分析报告、变更记录等。

5.1.2.3 System spare parts records, and incoming and outgoing spare parts records.

系统备品配件台帐及进、出备品配件记录。

5.2 Prophase management

前期管理

5.2.1 The instrument selection should follow the *Code for the Design of Instrument Selection* (SH3005), and the attention shall be paid to the selection of explosion-proof instruments and the adoption of lightning protection measures.

仪表选型应遵循《石油化工自动化仪表选型设计规范》(SH3005), 应重视防爆型仪表的选型和防雷措施的采取。

5.2.2 The construction of instrumentation must be carried out in accordance with the design requirements and the *Technical Specification for Construction of Instrumentation Engineering in Petrochemical Industry* (SH/T3521). The construction unit of instrumentation must have corresponding construction qualifications and a sound engineering quality assurance system.

仪表设备施工必须按设计要求及《石油化工仪表工程施工技术规程》(SH/T3521)进行, 仪表设备施工单位必须具有相应的施工资质和健全的工程质量保证体系。

5.2.3 The construction and acceptance of instrumentation must be carried out in accordance with the relevant standards, regulations and requirements in the *Code for Construction and Quality Acceptance of Automation Instrumentation Engineering* (GB50093) and the completion data shall be complete.

仪表设备施工验收要按《自动化仪表工程施工及质量验收规范》(GB50093)中的相关标准、规定、要求执行, 做到竣工资料齐全。

5.2.4 Before the instrumentation is put into operation, the Instrument Control Dept. shall draw up the relevant regulations according to the characteristics of the equipment, carry out technical training and exercise the accident plan.

仪表设备投用前, 仪表控制部应根据设备的特点编制相关规程, 开展技术培训、事故预案演练等工作。

5.3 Use, maintenance and services

使用及维护保养

5.3.1 The instrumentation shall be verified, inspected, confirmed and compared according to the corresponding verification, inspection, confirmation and comparison procedures; the corresponding verification form, inspection and confirmation form and comparison record shall be filled in. Only the qualified instrument and equipment can be put into operation, which shall be maintained at least once in each production cycle.

仪表设备应按仪表校验、检查确认、比对等规程进行相应的校验、检查确认和比对，并填写相应校验单或检查确认单及比对记录，合格后方可使用，每生产周期至少进行一次。

5.3.2 Before the instrumentation is put into operation, the instrument maintenance personnel must implement a comprehensive inspection of each instrument and confirm the zero position and measurement range. The circuit must pass the joint calibration before putting into operation and the instrumentation must be calibrated after failure repair.

仪表设备投运前，仪表维护人员必须对每台仪表进行全面检查，并对零位、量程等进行确认，回路投用前必须经过联校，仪表设备故障修复后必须进行校准。

5.3.3 For the mechanical parameters such as the vibration and displacement of the unit, it is necessary to conduct the probe characteristic test and the loop joint calibration test. The circuit test for the rotation speed probe of the unit shall be implemented with rotation speed table, and the displacer and pressure switch shall be inspected with medium or actual signal.

对于机组振动、位移等机械量参数，需要做探头特性试验及回路联校试验，机组转速探头需要用实际转速台做回路试验，沉筒、压力开关要用介质或实际信号进行校验。

5.3.4 The important instrumentation listed in the company, such as the systems of DCS, SIS and CCS, must be spot inspected during the shutdown and maintenance. Processing plans must be written in advance for the fault handling of important equipment.

对列入公司重要仪表设备，如 DCS、SIS、CCS 等系统，装置停工检修期间必须进行点检。重要设备的故障处理，必须事先编写处理方案。

5.3.5 The maintenance of important instrumentation shall be carried out by special personnel, and the maintenance of general instrumentation shall be subject to specific area of responsibility. In the event of failure of important instrument or key equipment, it shall be reported and dealt with step by step in time.

重要仪表设备的维护实行专人负责，一般仪表设备的维护实行专区分片负责；重要仪表或关键设备发生故障时，应及时逐级报告和处理。

5.3.6 The designation of the front and rear circuit of the instrument panel and power switch shall be marked clearly and in order. The regular maintenance plan shall be prepared and organized for implementation according to the operation status of each instrument.

对仪表盘前、盘后回路的名称及电源开关进行标识，做到标识清晰、整齐。根据每台仪表运行状况，编制定期保养计划并组织实施。

5.3.7 The grounding resistance of the control system (such as DCS, SIS and PLC) and the instrument cable bridge shall be tested comprehensively every year and the test records shall be maintained.

每年应对 DCS、SIS、PLC 等控制系统及仪表电缆桥架的接地电阻，进行一次全面测试，并保存测试记录。

5.3.8 The common defect records and major defect records of instrumentation shall be established in accordance with the requirements of *Management System of Equipment Defect and Fault* of the company.

按公司《设备缺陷及故障管理制度》要求，建立仪表设备一般缺陷台帐和重大缺陷台帐。

5.3.9 The *Instrument Change Order* shall be filled in if there is modification or displacement of instrument or change of control plan. The Instrument Control Dept. shall be responsible for the concrete implementation after the approval of specified administrative authority.

发生仪表修改、移位、控制方案改变等，需填写《仪表变更单》，归口管理部门批准后，由仪表控制部负责具体实施。

5.4 Grading management of operation

作业的分级管理

5.4.1 Major instrumentation operation must have two or more personnel, one of who must be the chief repairman and above of instrument, and when necessary, maintenance engineer and safety officer shall confirm on site.

重大仪表作业必须有两人及以上人员作业，其中一名必须为仪表主修及以上人员，必要时维护工程师、安全员等到现场确认。

5.4.2 The implementation plan shall be prepared for major instrument operation. For operation with high risk, the operation scheme shall be countersigned by the Operation Dept. and approved by the company competent department. For operation with relatively low risk, the operation scheme shall be countersigned by Production & Operation Dept. and approved by the leader of Instrument Control Dept.

重大仪表作业需编写仪表重大作业实施方案，风险等级高的作业，作业方案需经运行部会签、公司主管部门批准；风险相对较低的作业，作业方案需经生产运行部会签，仪表控制部部长批准。

5.4.3 For general instrument operations, all instrument operations require two or more operators except those which have no direct impact on production or personal safety.

一般仪表作业，除对生产无直接影响或个人安全无影响的仪表作业可一人作业外，其他仪表作业均需要两人及以上作业。

5.4.4 The instrument inspection and maintenance shall be subject to the operation permit system, and shall be carried out in accordance with the management regulations on maintenance construction safety permit of the Company in the *Management System of Equipment Maintenance*.

仪表检维修实行作业票许可制度，按照公司《设备检修管理制度》中检修施工安全许可票管理规定执行。

5.5 Power supply and air sources management

电源及气源管理

5.5.1 Instrument Control Dept. shall periodically perform patrol inspection on the parts of the instrument power supply system, check the operation of power box, power distributor, switch and fuse and solve the problem found in time. When satisfying the hardware conditions, the power fault alarm function should be set.

仪表控制部应定期对仪表供电系统的各部位进行巡回检查，检查电源箱、电源分配器、开关、熔断器等部件运行情况，发现问题及时处理。在硬件条件具备时，应设置电源故障报警功能。

5.5.2 The marking of switch, power distributor and terminal strip in the power supply system must be accurate and clear, and the drawing data of power supply system shall be complete.

供电系统中的开关、电源分配器、供电端子排的标识必须准确清晰，供电系统图纸资料要齐全。

5.5.3 The instrument power switch of the instrument panel (cabinet) shall keep at least 10% backup circuit. It is strictly prohibited to supply power to non-instrument load from instrument power supply and to overlap temporary load from instrument power supply.

仪表盘（柜）的仪表供电开关宜留有至少 10% 备用回路。严禁从仪表电源上向非仪表负载供电，严禁从仪表电源上搭接临时负载。

5.5.4 The power supply of DCS, SIS and CCS systems and the 24VDC power supply system of the important equipment shall be provided by independent dual-circuit power supply, where UPS power supply shall be adopted in at least one circuit.

DCS、SIS、CCS 系统及重要装置的 24VDC 供电系统的供电应采用双路独立供电方式，其中至少一路采用 UPS 电源。

5.5.5 The power of the instrument interlocking system shall be supplied separately from that of other instruments.

仪表联锁系统电源应采用与其他仪表的电源分开供电。

5.5.6 The fuse shall be replaced in strict accordance with the capacity of the original fuse, and the capacity of the fuse shall not be changed without authorization.

更换熔断器时，要严格按照原熔断器的容量更换，不得擅自变更熔断器的容量。

5.5.7 The third circuit power supply for the inspection and maintenance of instrumentation shall be set up in the cabinets of the instrument control system for lighting the cabinets and other auxiliary power supply.

仪表控制系统机柜间应设立仪表设备检维修用的第三路电源，用于机柜的照明及其它辅助用电。

5.5.8 The instrument air source shall be dedicated and the purified air shall not contain flammable, explosive, toxic, harmful and corrosive gases (or steam). The dew point of the air source under normal operating pressure shall be -20°C .

仪表气源应专线专用，净化后的气体中不应含有易燃、易爆、有毒、有害及腐蚀性气体（或蒸汽），在正常操作压力下的气源露点为 -20°C 。

5.5.9 The instrument air supply system (van, valve, pipeline, oil eliminator, filter, pressure

relief valve and pressure gauge) shall be inspected periodically.

应定期对仪表供气系统（风罐、阀门、管线、除油器、过滤器、减压阀、压力表等）进行检查。

5.6 Management of online analysis instrument

在线分析仪表管理

5.6.1 The reliability, maintainability, applicability and economy shall be considered in the design and type selection of online analysis instruments. Priority should be given to products produced by ISO 9001 system certified enterprises or products conforming to international standards.

在线分析仪表设计选型应考虑可靠性、维修性、适用性、经济性等特点，优先选用 ISO 9001 体系认证企业生产的产品或符合国际标准的产品。

5.6.2 For the type of online analysis instruments, try to select the instrument adopting the same or similar principles of laboratory testing instruments of the Company.

在线分析仪表选型尽量选择与公司实验室检测仪器原理相同或相近仪表。

5.6.3 For online analysis instruments that are no longer required due to changes in the process flow or monitoring requirements of the plant, Production & Operation Dept. shall be responsible for the application of changes, Equipment Management Dept. shall be responsible for the approval and Instrument Control Dept. shall be responsible for the implementation.

因装置工艺流程发生变化或监控要求发生变化而不再需要使用的在线分析仪表，生产运行部提出变更申请，机械动力部审批，仪表控制部负责实施。

5.6.4 Instrument Control Dept. shall, according to the characteristics and operating environment of all kinds of online analysis instruments, formulate the detailed rules on regular maintenance of all kinds of instruments and stipulate the maintenance cycle, operation method and precaution.

仪表控制部应根据各类在线分析仪表特点及使用环境，制订各类仪表定期保养细则，规定保养周期、操作方法、注意事项。

5.6.5 Online analysis instruments shall be verified at least once per production cycle and the verification records shall be filled out in time. New instruments or instruments after fault repair shall be verified (or compared) and qualified before putting into operation.

在线分析仪表至少每个生产周期校验一次，并及时填写校验记录。对于新投用的或故障修复后的仪表，在投用前必须校验（或比对）合格方可投用。

5.6.6 For online analysis instruments that are not qualified or cannot be verified, the instrument inspection or confirmation method may be adopted and the corresponding records shall be filled in to ensure the normal operation of the instrument.

对于不具备条件或无法校验的在线分析仪表，可采用仪表检查或确认的方法进行，并填写相应记录，确保仪表正常运行。

5.6.7 The verification of online analysis instruments must be carried out with qualified and

valid standard instrument or standard sample (air). The newly purchased standard sample (air) shall be verified and qualified before adoption. In the verification, the standard sample (air) can be used as sample and the corresponding instrument parameters can be adopted for analysis and verification.

在线分析仪表校验必须使用合格、有效的标准仪器或标样（气）校验。新采购的标样（气）需进行验证合格后才能使用，验证方法可把标样（气）当作样品，采用对应仪表的参数进行分析验证。

5.7 Management of Safety and Environmental Instrument

安全及环保仪表的管理

5.7.1 The radioactive instrument shall be approved by the HSE Dept. of the Company before use. Warning signs shall be set up on the spot, and the protective screen shall meet the field radiation protection requirements.

放射仪表使用前必须经公司 HSE 管理部批准。放射仪表现场需设置警示标记，防护屏设置必须达到现场射线的防护要求。

5.7.2 The installation, dismantling and commissioning of radioactive sources of instruments shall be entrusted by the Equipment Management Dept. to the units with the qualification of inspection and repair of radioactive sources, and the Instrument Control Dept. shall cooperate accordingly. It is forbidden to install or dismantle without authorization. And the corresponding records shall be established for each demolition and installation.

仪表放射源的安装、拆除和调试，应由机械动力部组织委托具有放射源检修资质的单位负责，仪表控制部做好相应配合工作，严禁私自进行安装、拆除，每次拆除、安装均要建立相应台账。

5.7.3 The maintenance personnel of radioactive instruments shall receive special training and obtain the training certificate before performing the maintenance, overhaul and calibration of radioactive instruments. Protective equipment and monitoring instruments shall be equipped during the operation.

放射仪表的维护人员需经专门培训，并取得培训合格证书后，方能进行放射仪表的维护、检修和校准工作，作业期间需配备防护用品和监测仪器。

5.7.4 When shutdown is required due to the failure of the safety and environmental instrument for more than 48 hours, the Approval Form for the Suspension (Use) of Safety and Environmental Instrument shall be filled in, countersigned by the Production & Operation Dept. and submitted to the HSE Dept. for approval. In case of weekends and holidays, the approval procedures should be handled within two working days.

安全环保仪表故障超过 48 小时需停用时，必须办理《安全环保仪表停用（启用）审批单》，经所在生产运行部会签，报 HSE 管理部审批，遇双休日、节假日可在上班后两天内补办审批手续。

5.7.5 Flammable (toxic) gas alarms and fire/gas alarm systems (FGS) shall be verified semi-annually, ammonia-nitrogen analyzer, chemical oxygen demand (COD) analyzer, chimney CEMS and other inspection instruments shall be checked annually. The corresponding

instrument verification form shall be filled in after verification.

可燃(有毒)气体报警仪、火/气报警系统(FGS)应每半年校验一次,氨氮分析仪、化学氧量(COD)分析仪、烟囱 CEMS 等检测仪表应每年校验一次,校验后应填写相应的仪表校验单。

5.8 Management of automatic system and system cabinet

自动化系统及系统机柜间管理

5.8.1 The routine management of automatic system mainly includes the routine maintenance and inspection of the operating state of the system power supply and hardware devices such as host and controller, the intact condition of the peripheral equipment such as fans in each cabinet, and the temperature, humidity, sound and light alarm of the machine room.

自动化系统日常管理主要包括对系统供电、主机/控制器等硬件设备的运行状态、各机柜的风扇等外围设备的完好状况、机房的温度、湿度、声光报警等进行日常检查和维护。

5.8.2 If any hardware anomaly or fault is found in the control system, the maintenance personnel shall deal with it in time and record the fault phenomena, causes, handling methods and results. According to the actual operating of the equipment, the maintenance personnel shall develop the fault emergency plan for each control system.

发现控制系统的硬件异常或故障,维护人员应及时进行处理,对故障现象、原因、处理方法及结果做好登记。根据装置实际运行情况,制定每套控制系统的故障应急预案。

5.8.3 The software of control system includes system software and application software, which shall be properly saved in remote dual backup manner, and the backup media shall be indicated with software description, backup data and backup person. After modification, the software shall be backed up in time.

控制系统的软件包括系统软件和应用软件要妥善保存,做到双备份且异地保存,备份介质要注明软件名称、备份日期、备份人等,软件修改后,应及时备份。

5.8.4 To prevent virus infection, the use of unrelated software on the control system shall be strictly prohibited, and operations unrelated to the maintenance of the control system shall also be prohibited. The password or the key of keylock switch of control system shall be kept by designated person. The isolation measures shall be taken between control system and information management system with firewall added.

为防止病毒感染,严禁在控制系统上使用无关的软件,也不得进行与控制系统维护无关的操作。控制系统的密码或键锁开关的钥匙要由专人保管,控制系统与信息管理系统间必须采取隔离措施,增设防火墙。

5.8.5 In principle, the maintenance of control system shall be carried out synchronously with the shutdown and maintenance of the plant, and the point inspection or dust cleaning of the system shall be performed in accordance with the system operation status and specific situation. Maintenance shall be carried out in accordance with the requirements of *Petro-Chemical Equipment Maintenance Technology* (SHS07001~07009). And good

preparation before maintenance, process quality control, inspection and acceptance and maintenance record filing shall be performed.

控制系统的检修原则上随装置停工检修同步进行，根据系统运行现状和具体情况，进行系统点检或清灰；检修应按《石油化工设备维护检修规程》（SHS07001~07009）要求进行，做好检修前的准备、过程质量控制、检修验收及检修记录归档等工作。

5.8.6 The inspection shall include system grounding and cable connection inspection, insulation inspection between different grounding electrodes, and resistance value inspection of grounding resistance (connection resistance); and include cleaning dust inside the equipment and on the plug board, power supply system inspection and confirmation (including various power supply voltage tests), redundant system switching test, I/O card spot check test, system diagnostic test, network check and test.

检修内容应包括系统接地及电缆连接检查，不同接地极之间的绝缘检查，接地电阻（连接电阻）阻值检查；清扫设备内部及插板上的灰尘、供电系统检查确认（包括各种电源电压测试）、冗余系统切换试验、I/O卡抽检测试、系统诊断测试、网络检查及测试等。

5.8.7 The hardware technical performance of the control system after overhaul shall meet the factory technical standards. The system software and application software shall run normally and meet the design performance, and the man-machine interface shall work normally.

控制系统检修后的硬件技术性能应达到出厂时技术标准，系统软件、应用软件运行正常并达到设计指标，人机界面工作正常。

5.8.8 Facilities against small animals shall be provided between the inlet of cabinet and the cable channel, the fire-fighting facilities in the cabinet shall be fully equipped and the corresponding equipment shall not be used for other purposes.

机柜间入口及电缆通道要有防小动物设施，机柜间内消防设施要配备齐全，相应设备不得挪为他用。

5.8.9 The electrostatic discharge device or electrostatic discharge bracelet shall be provided between the cabinets, and the body static electricity shall be released before operation; during operation of the device, the use of mobile communication tools shall be restricted or controlled within the cabinet.

机柜间应设置静电释放装置或放置静电释放手环，作业前需释放身体静电；在装置运行期间，机柜间内应限制或控制使用移动通讯工具。

5.8.10 The environment of the cabinet shall meet and comply with the design requirements of control system. The temperature shall be controlled between 10°C ~ 30°C, the humidity shall be controlled at 20% ~ 80% relative humidity and the cabinet shall be clean and free of dust.

机柜间环境必须符合和满足控制系统设计规定的要求，温度控制在 10°C~30°C，湿度控制在 20%~80%相对湿度，机柜间清洁无尘。

5.8.11 The load of data path and various calculation parts (such as controller, operation station and engineer workstation) during normal operation of the system shall not exceed 70% of the available resources (such as memory and data transfer rate).

系统正常运行期间，数据通路和各个计算部分（如控制器、操作站、工程师工作站等）的负载不能超过可用资源（如存贮器、数据传送速度等）的 70%。

5.9 Video monitoring system management

视频监控系统管理

5.9.1 Allocation principle of video monitoring system

视频监控系统的设置原则

5.9.1.1 In principle, the distribution of video monitoring camera shall be put forward by the User Dept., and Equipment Management Dept. shall make review comments of the distribution demand. The video equipment shall adopt HD digital system with pan-tilt (ball machine with rotation function) which shall be based on 360° rotation full monitoring. According to the principle of full monitoring and distribution, device area shall be preferably 50×50m matrix in plane. The maximum distance of the device area other than the panoramic video facility shall be recommended to no more than 150m.

视频监控的摄像头布点原则上由使用部门提出，机械动力部对布点需求提出审核意见。视频设备应采用高清数字式系统，宜带云台（球机需带旋转功能），云台以 360° 旋转全监控为基准。按全监控布点原则，装置区以平面 50×50m 矩阵为宜，除全景视频设施外装置区最远距离建议不大于 150m。

5.9.1.2 The production equipment shall be set up according to furnace area, pump area, heat exchange area, tank farm and large unit area. In principle, the overlapping area shall not be repeatedly set, and for large unit area, focus on monitoring the key compressor area which affects the normal operation of the equipment.

生产装置应按炉区、泵区、换热区、罐区、大机组区等设置，原则上交叉重叠区域不重复设置，大机组区应对影响装置正常运行的关键压缩机组区域进行重点监控。

5.9.1.3 Panoramic monitoring of the device can be a single device or multiple devices. The principle is to see the whole picture of the device and reduce repeated arrangement. The high-altitude inspection site and regional monitoring point shall be considered as a whole.

装置全景监控可以是单个装置，也可以是多个装置，以看清装置全貌、减少重复布置为原则，高空巡检部位与区域监控点应统筹考虑。

5.9.1.4 Video monitoring points shall be set in the instrument cabinet room, electrical distribution room, transformer room and important equipment area.

装置仪表机柜间、电气配电室、变压器室和重要设备区域应设置视频监控点。

5.9.1.5 For inter-plant pipeline, focus on monitoring the locations which are inconvenient for the personnel to reach for inspection. The principle shall be key distribution and distribution along the pipeline and the distribution distance along the pipeline can be longer than 150m. The motor truck scale and rail scale used for metering in and out of the plant shall be provided with HD camera and supporting video acquisition system to monitor the weighing process in

real time.

厂际管道应重点监控人员巡检不便到达的点位，采取重点加沿线布设原则，沿线布设可大于 150 米。用于进出厂计量的汽车衡和轨道衡，应设置高清晰摄像头及配套视频采集系统，实时监控称量过程。

5.9.1.6 Video monitoring system shall be set up in hazards areas, such as chemicals storage sites, centralized storage sites for radioactive sources, temporary or permanent solid waste stacking sites.

对危险区域应设置视频监控系统，如储存化学品场所、放射源集中放置点以及临时或永久性固废堆场等。

5.9.2 Maintenance of video monitoring system

视频监控系统的维护保养

5.9.2.1 The site camera shall be firmly installed, the wiring shall be standardized and tidy and the surface body shall be clean. The front glass of the camera shall be clean and free from dirt, the pan-tilt shall rotate flexibly and the junction box and threading groove shall be sealed well, as well as the screws shall not be corroded or loosened.

现场摄像头安装牢固，接线规范、整齐，表体清洁，摄像头前端玻璃清洁无污，云台转动灵活，接线盒及穿线槽密封良好，螺丝不锈蚀、松动。

5.9.2.2 The monitor shall display normally in the operating room, the image shall be clear without disturbance, and the screen shall be clean without damage. The buttons shall be flexible and the data in the display shall be correct. The power switch and wiring inside the operation panel shall be orderly and firmly installed, and the internal fan shall rotate normally.

操作室内监视器显示正常，图像清晰无干扰，屏幕清洁无破损，各按键动作灵活，显示屏各数据指示正确。操作台内部电源开关和布线有序、安装牢固，内部风扇转动正常。

5.9.2.3 The system equipment identification shall be clear, the indicator lamp of each equipment shall be normal and the recording equipment shall operate normally. The recorded image content shall be clear and complete.

系统设备标识清楚，各设备指示灯指示正常，录像设备运行正常，录制的图像内容清晰、完整。

5.9.3 Use of video monitoring image information

视频监控图像信息的使用

5.9.3.1 Production & Operation Dept. shall be responsible for the use and management of the industrial TV monitoring system, conduct the operation training of the video monitoring system and formulate the relevant operation regulations of the video monitoring system.

生产运行部负责工业电视监控系统的使用管理，做好视频监控系统的操作培训，制定视频监控系统有关操作规程。

5.9.3.2 The authority of video monitoring system can be divided into two categories according to the calling mode: accessing and operating. Only the real-time and historical video images can be accessed in accessing while controls such as focusing and rotating field camera equipment are allowed in operating.

视频监控系统权限按调用方式分调阅和操作两类，调阅只能查看实时和历史视频图像，操作允许对现场摄像设备进行调焦、转动等控制。

5.9.3.3 If the video monitoring image information is required by any department or individual of the Company for business, the *Application Form for Use the Video Monitoring Image Information* shall be filled in and approved by the competent department. After that, the information shall be operated and provided by the relevant professional and technical personnel.

公司部门及个人因业务需要视频监控图像信息的，需填写《视频监控图像信息使用申请表》，经主管部门审核后，由相关专业技术人员操作、提供。

5.9.3.4 As required by accident investigation, the investigation team shall send the information to the competent department of video monitoring in the form of meeting instructions and emails. After approved by the competent department, the professional technical personnel shall be notified to operate and provide the information.

因事故调查需要，调查小组以会议指令、邮件等形式下达给视频监控主管部门，经主管部门审核后，通知专业技术人员操作、提供。

6 Inspection and Supervision

监督检查

Equipment Management Dept. shall be responsible for supervising the whole process management of the company's instrument and automatic system and incorporating the same into performance management for which regular inspection and assessment shall be carried out.

机械动力部负责对公司仪表及自动化系统全过程管理情况进行监督，并纳入公司绩效管理，定期进行检查和考核。

7 Associated Procedures and Records

关联程序和记录

7.1 Associated procedures

关联程序

7.1.1 *Instrument Change Management Procedures* HYBN-T2-07-0057-2018-1

仪表变更管理程序 HYBN-T2-07-0057-2018-1

7.1.2 *Suspension (Use) Procedure for Safety and Environmental Instrument*

HYBN-T2-07-0058-2018-1

安全环保仪表停（启）用程序 HYBN-T2-07-0058-2018-1

7.1.3 *Instrument Inspection and Verification Procedures* HYBN-T2-07-0059-2018-1

仪表检查校验程序 HYBN-T2-07-0059-2018-1

7.1.4 *Approval Procedure of Use the Video Monitoring Image Information*

HYBN-T2-07-0060-2018-1

视频监控图像信息使用审批程序 HYBN-T2-07-0060-2018-1

7.2 Associated records

关联记录

7.2.1 *Instrument Change Order* HYBN-T6-07-0122-001-2018

仪表变更单 HYBN-T6-07-0122-001-2018

7.2.2 Operational Status Form of Instrument and Automatic System

HYBN-T6-07-0123-001-2018

仪表及自动化系统运行状况表 HYBN-T6-07-0123-001-2018

7.2.3 *Approval Form of Suspension (Use) for Safety and Environmental Instrument*

HYBN-T6-07-0124-001-2018

安全环保仪表停（启）用审批单 HYBN-T6-07-0124-001-2018

7.2.4 *Instrument Verification Form* HYBN-T6-07-0125-001-2018

仪表校验单 HYBN-T6-07-0125-001-2018

7.2.5 Instrument Inspection and Confirmation Form HYBN-T6-07-0126-001-2018

仪表检查确认单 HYBN-T6-07-0126-001-2018

7.2.6 Instrument Comparison and Confirmation Form HYBN-T6-07-0127-001-2018

仪表比对确认单 HYBN-T6-07-0127-001-2018

7.2.7 Application Form of Video Monitoring Image Information HYBN-T6-07-0128-001-2018

视频监控图像信息使用申请表 HYBN-T6-07-0128-001-2018

7.2.8 Test Records of Instrument Grounding Resistance HYBN-T6-07-0129-001-2018

仪表接地电阻测试记录 HYBN-T6-07-0129-001-2018

8 Supplementary Rules

附则

8.1 The System is under the jurisdiction of Equipment Management Dept.

本制度由机械动力部归口管理。

8.2 The System is drafted by Equipment Management Dept.

本制度起草部门：机械动力部。

8.3 Equipment Management Dept. is responsible for the interpretation of the System.

本制度解释权归机械动力部拥有。

8.4 Revision, preparation and approval of the System are shown in Table 1:

本制度版本编制和审批情况见表 1:

Table 1 Revision, preparation and approval of document

表 1 文件版本编制和审批情况

1	2018-12-31	Lian Yongqing 练永青	Tong Xueyun 童雪云	Xu Ye 徐野	Chen Liancai 陈连财
Revision 版本	Issued date 颁布日期	Prepared by 编制人	Reviewed by 审核人	Authorized by 审定人	Reviewed by 审核人



Hengyi Industries Sdn Bhd
恒逸实业（文莱）有限公司

HYBN-T3-07-0019-2018-1

Management System for Interlock Protection

联锁保护系统管理制度

Issued Date: Dec. 2018

颁布日期：2018 年 12 月

 HENGYI	Hengyi Industries SdnBhd 恒逸实业（文莱）有限公司				
	Management System for Interlock Protection				
	联锁保护系统管理制度				
Doc No.	HYBN-T3-07-0019-2018-1	Ver No.	1	Page1 of 10	

1 Purpose

目的

The System is hereby formulated to ensure the safe operation of production equipments, and normalize the commissioning, change, removal, maintenance and other work of interlock protection system.

为确保生产装置（或系统）安全运行，规范联锁保护系统的投用、变更、切除以及维护检修等工作，特制定本制度。

2 Scope of Application

适用范围

The System is applicable to the management of interlock protection systems of all production equipments.

本制度适用于各生产装置联锁保护系统管理。

3 Terms and Definitions

术语和定义

3.1 Interlocking protection system: refers to the protection system that automatically converts the production process to a safe state in order to prevent or reduce the occurrence of hazardous events when operating variables exceed the preset limits or when equipment fails.

联锁保护系统：是指在装置生产过程中，当操作变量超过预设定的限值或设备发生突发故障时，为防止或减少危险事件发生，使生产过程自动转移到安全状态的保护系统。

3.2 Interlock change: refers to the change of logic or value of the original interlock protection system due to the change of production or process technology, including changes such as addition, removal, recovery and cancellation of interlock circuits.

联锁变更：是指因生产或工艺技术改变，需要对原联锁保护系统逻辑或数值进行的变更，包括对联锁回路的增加、切除、恢复、取消等变更。

3.3 Interlock is composed of equipment interlock and process interlock. Equipment interlock refers to the interlock protection circuit that protects the safe operation of units, pumps and other equipment and their accessories; process interlock refers to the interlock protection circuits other than the equipment interlock circuit in production equipments.

联锁分为设备联锁和工艺联锁。设备联锁是指保护机组、泵等设备及其附件本体安全运行的联锁

保护回路；工艺联锁指生产装置除设备联锁回路以外的其它联锁保护回路。

3.4 Interlock pre-alarm: refers to the alarm set before the interlock value is reached and the interlock action is made.

联锁预报警：是指联锁值还未到达、联锁动作之前的提前设置的报警。

4 Management Responsibilities

管理职责

4.1 Specified administrative authority

归口管理部门

4.1.1 The Equipment Management Dept. is the specified administrative authority for interlock protection system of production equipments, and is responsible for preparing and revising systems related to the interlock protection system and supervising the implementation.

机械动力部是生产装置联锁保护系统的归口管理部门，负责编制与修订联锁保护系统相关制度并监督执行。

4.1.2 It is responsible for the technical management of the interlock protection system, technical review of changes, and approval of equipment interlock changes.

负责公司联锁保护系统的技术管理、变更的技术审查、设备联锁变更的审批。

4.1.3 It is responsible for organizing relevant departments such as the production operation department, Instrument Control Dept. and Electrical Operation Dept. to confirm the interlock circuits prior to commissioning.

组织生产运行部、仪表控制部、电气运行部等相关部门对联锁回路进行投用前确认。

4.2 Coordinated management departments

协同管理部门

4.2.1 The Scheduling & Dispatch Dept. is responsible for organizing relevant departments to confirm the process interlock prior to commissioning; approving interlock changes due to units production and process technology; and attending the technical review and countersigning regarding the interlock protection system.

计划调度部负责组织相关部门对工艺联锁进行投用前确认；负责因装置生产及工艺技术原因引起的联锁变更的审批；参与对联锁保护系统的技术审查以及会签。

4.2.2 The HSE Dept. is responsible for attending the technical review and countersigning regarding the interlock protection system, as well as the interlock confirmation work prior to commencement.

HSE 管理部参与联锁保护系统的技术审查以及会签，以及开工前的联锁确认工作。

4.3 Executive departments

执行部门

4.3.1 As the executive department of instrument interlock changes, the Instrument Control Dept. is responsible for the maintenance and comprehensive management of the interlock protection system of instruments; the establishment of the interlock protection system records, files, and the update of interlock logic diagrams; and attending the technical review and confirmation of the interlock protection system.

仪表控制部负责仪表联锁保护系统的维护维修和综合管理，是仪表联锁变更的执行部门；负责建立联锁保护系统台账、档案，以及联锁逻辑图的更新；参加联锁保护系统的技术审查与确认

4.3.2 All production operation departments are the executive departments of the interlock protection system; and are responsible for the use management of the interlock protection system, attending the technical review and countersigning of the interlock protection system, and applying for changes (including commissioning, modification, addition, removal, etc.) in the interlock protection system.

各生产运行部是联锁保护系统的执行部门，负责联锁保护系统的使用管理；参加联锁保护系统的技术审查以及会签；负责提出联锁保护系统变更（包括投用、修改、增加、切除等）的申请。

4.3.3 As the executive department of electrical interlock changes, the Electrical Operation Dept. is responsible for the maintenance and repair of the electrical circuits of the interlock protection system, data filing of the electrical circuits of the interlock system, and attending the technical review and confirmation of the interlock protection system.

电气运行部负责联锁保护系统电气回路的维护维修，是电气联锁变更的执行部门，负责联锁系统电气回路的资料归档，参加联锁保护系统的技术审查与确认。

5 Management Content

管理内容

5.1 Management of interlock values, interlock pre-alarm values and interlock logic diagrams
联锁值、联锁预报警值及联锁逻辑图的管理

5.1.1 The interlock values, interlock pre-alarm values and interlock logic diagrams of the new units should comply with the design data. Once the units are put into operation, the interlock values, interlock pre-alarm values and interlock logic diagrams will be organized into volumes by process personnel and technicians of production operation departments in accordance with materials such as technical specifications and design data of units, and sent to the Scheduling & Dispatch Dept. and Equipment Management Dept. for approval within one month after the normal commencement of the units before implementation; the interlock logic diagrams will be organized by technicians of the Instrument Control Dept. and Electrical Operation Dept. in

accordance with materials such as the design data and software configuration data, reported to the Equipment Management Dept. within one month after the normal commencement of the units, and uniformly distributed by the Equipment Management Dept.

新装置的联锁值、联锁预报警值及联锁逻辑图以设计资料为准。装置开工后，联锁值、联锁预报警值由生产运行部工艺、设备技术人员根据技术规程、装置设计资料等负责整理成册，在开工正常 1 个月内报计划调度部、机械动力部核准后执行；联锁逻辑图由仪表控制部、电气运行部技术人员根据设计资料、软件组态资料负责整理，在装置开工正常后 1 个月内报机械动力部，由机械动力部统一下发。

5.1.2 The interlock values and interlock pre-alarm values are reviewed once per production cycle. Within one month before each shutdown & maintenance, the production operation department will fill in and submit the "List of Interlock Values and Interlock Pre-Alarm Values" of the unit's next production cycle; the list for process interlock will be submitted to the Scheduling & Dispatch Dept. for approval; the list for equipment interlock will be submitted to the Equipment Management Dept. for approval (when there is any change in the interlock values, interlock change procedures must be handled); the approved "List of Interlock Values and Interlock Pre-Alarm Values" will be distributed respectively by the Scheduling & Dispatch Dept. to the production operation department, Instrument Control Dept. and Electrical Operation Dept.

联锁值及联锁预报警值每一个生产周期审核一次。在每次停工检修前一个月内，由生产运行部按照实际使用的联锁值及联锁预报警值，填报装置下一生产周期的《联锁值及联锁预报警值清单》，工艺联锁报计划调度部审核，设备联锁报机械动力部审核（如联锁值发生变更，必须办理联锁变更手续），审核确认后的《联锁值及联锁预报警值清单》分别由计划调度部和机械动力部下发给生产运行部、仪表控制部、电气运行部。

5.2 Use management of interlock protection system

联锁保护系统的使用管理

5.2.1 Interlock equipment of production equipments must be kept in good condition, and all interlock protection circuits must be put into use except for the removal approved according to the procedure. Spare interlock units and equipment must be in the same good condition as the in-service interlock equipment of the operation units.

生产装置的联锁设备必须保持完好，联锁保护回路除按程序批准切除外，必须全部投用。联锁备用单元和设备必须与运行装置投用联锁一样处于完好状态。

5.2.2 After maintenance, the interlock protection system of production equipments, new units and newly added circuits must be confirmed by field tests prior to commencement or commissioning, to confirm the accuracy of interlock values, and the correctness and reliability of interlock actions. For temporary device maintenance involving change of interlock circuits, the field test must be carried out as well prior to the operation of the said interlock circuits. Field

tests are also required before the interlock protection system, which has been removed for a long time, can be put back into operation.

检修后的生产装置、新装置、新增回路的联锁保护系统，必须在开工前或投运前进行现场试验确认，确认联锁值的准确性、联锁动作的正确性、可靠性。对临时安排检修装置，涉及联锁回路动改的，在该联锁回路投运前也须进行现场试验确认。长期切除的联锁保护系统恢复投用之前，也须进行现场试验确认。

5.2.3 Test and confirmation of process interlock will be organized by the Scheduling & Dispatch Dept.; and test and confirmation of equipment interlock will be organized by the Equipment Management Dept. For interlock confirmation, the production operation department will operate the test, and the Instrument Control Dept. and Electrical Operation Dept. will assign technicians to attend the test. Once the interlock is confirmed, all departments attended the test will sign the "Interlock Confirmation Sheet". The signed "Interlock Confirmation Sheet" will be uniformly distributed by the Scheduling & Dispatch Dept. or Equipment Management Dept. to the attending departments such as the production operation department, Instrument Control Dept. and Electrical Operation Dept., and properly kept by all departments.

工艺联锁的试验确认由计划调度部组织，设备联锁的试验确认由机械动力部组织。联锁确认时由生产运行部操作试验，仪表控制部、电气运行部派技术人员参加，联锁确认完成后参加部门在《联锁确认单》上签字，签字后的《联锁确认单》由计划调度部或机械动力部统一下发给生产运行部、仪表控制部、电气运行部等参加部门，各部门应统一保存。

5.2.4 The Scheduling & Dispatch Dept. and Equipment Management Dept. are responsible for coordinating and solving issues occurred during interlock confirmation.

计划调度部、机械动力部负责协调解决联锁确认过程中遇到的问题。

5.2.5 Switches (including soft switches in the operation station) and buttons, in front of the operation panel, of the interlock system of production equipments should be operated by operation personnel; switched and buttons behind the panel should all be operated by personnel of instrument and electrical disciplines.

生产装置联锁系统的盘前开关(包括操作站内软开关)、按钮由操作人员操作；盘后开关、按钮均由仪表、电气专业人员操作。

5.3 Change management of interlock protection system

联锁保护系统的使用管理

5.3.1 When any change needs to be made with interlock value, interlock pre-alarm value, interlock condition, interlock method and interlock logic, interlock change procedures must be taken care of, and corresponding prevention methods should be made for when removing interlock protection system.

联锁值、联锁预报警值、联锁条件、联锁方式及联锁逻辑等需要变更时，必须办理联锁变更手续，切除联锁保护系统时应制订相应的防范措施。

5.3.2 Interlock change should be applied by the production operation department. When any change is required due to instrument or electrical reasons, the Instrument Control Dept. and Electrical Operation Dept. should respectively contract the production operation department, and the production operation department will fill in and submit the "Interlock Change Order" in accordance with the information passed.

联锁变更由生产运行部负责提出申请。因仪表、电气等原因需变更时，分别由仪表控制部、电气运行部负责联系生产运行部，由生产运行部根据信息传递内容填报《联锁变更单》。

5.3.3 Approval procedure of interlock change: the production operation department will fill in and submit the "Interlock Change Order", along with the before and after logic diagrams of the interlock to be changed (except removal, recovery), and evaluate the risk of change content; the order will be countersigned by the Instrument Control Dept. or Electrical Operation Dept. and sent to the leader of the Company for approval after being verified by discipline competent departments in charge (according to the process or equipment interlock).

联锁的变更审批程序：生产运行部填报《联锁变更单》，并附上所变更联锁（切除、恢复除外）变更前后的逻辑图，及对所变更内容的风险进行评价，经仪表控制部或电气运行部会签，（按工艺或设备联锁分）交专业主管部门审核后，报公司主管领导批准。

5.3.4 The Instrument Control Dept., Electrical Operation Dept. and production operation department will implement interlock change as per the approval opinion of interlock change.

When change implementation is completed, the Instrument Control Dept. and Electrical Operation Dept. will revise relevant diagram pages in the interlock logic diagram volume.

仪表控制部、电气运行部、生产运行部根据联锁变更的审批意见，实施联锁变更。变更实施完成后，仪表控制部、电气运行部应对联锁逻辑图集中相关图页进行修订。

5.3.5 Removal and operation recovery of interlock under special circumstances

特殊情况下联锁的切除、恢复投运。

5.3.5.1 For interlocked needs to be temporarily removed at startup and shutdown, the removal should be directly carried out by the production team leader on duty, with the cooperation from instrument and electrical personnel, and the records must be properly kept.

When commissioning conditions are established, the production team leader should propose or restore the operation.

在开、停工时需要临时切除的联锁，由当班生产班长直接执行，需要时由仪表、电气人员配合实施，并作好记录。投运条件具备后，由生产班长负责提出或恢复投运。

5.3.5.2 When interlock removal is temporarily required due to abnormality of production equipments or in case of emergency (such as instrument malfunction), relevant prevention measures should be proposed by the team leader on duty and agreed by unit technicians and leader of the production operation department; the team leader on duty (or personnel of instrument or electrical disciplines notified) should remove the interlock directly after the prevention measures as taken. When the unit is restored to normal, the team leader on duty should propose and timely implement interlock restoration after being agreed by the unit

technicians and leader of the production operation department.

在生产装置发生异常或在紧急情况下（如仪表失灵等）需暂时切除联锁时，由当班班长提出，经装置技术人员、生产运行部主管领导同意，提出相应的防范措施并得到落实后，由当班操作班长直接执行（或通知仪表、电气专业人员执行）。装置恢复正常后，由当班班长请示装置技术人员、生产运行部主管领导同意后，及时恢复联锁。

5.3.5.3 When the instrument and electrical equipment maintenance personnel need to temporarily remove the interlock when conducting work related to interlock such as regular maintenance and fault handling, the instrument and electrical equipment maintenance personnel shall propose to the on-duty team, and the interlock can be removed only after the approval and implementation of prevention measures. Instrument interlock work permit and electrical work permit system must be strictly complied with during operation. Operation must be resumed after being confirmed by instrument, electrical equipment maintenance personnel and the on-duty team leader.

仪表、电气设备维护人员进行定期保养、故障处理等与联锁有关的作业需临时切除联锁时，由仪表、电气设备维护人员向当班操作班组提出申请，审批完成并落实防范措施后方可切除联锁。作业时必须严格执行仪表联锁作业票、电气作业票制度。恢复投用前必须经仪表、电气设备维护人员及当班操作班长共同确认，完成后恢复投用。

5.3.6 During the production period, no matter what the reason is, if the interlock removal time exceeds 48 hours, the approval procedures for interlock change must be completed in time; if it's during weekends and holidays, then the approval procedures should be handled on the first working day after the change.

生产期间不论何种原因，联锁切除时间超过 48 小时的，必须及时办理联锁变更审批手续，双休日、节假日在变更后首个工作日补办审批手续。

5.3.7 In the first quarter of each year, the Scheduling & Dispatch Dept., together with the Equipment Management Dept., should organize all production operation departments, Instrument Control Dept., Electrical Operation Dept. and other relevant departments to review interlock circuit removed for a long time and "Interlock Change Order"s unable to be implemented due to lack of conditions, and put forward safety measures and review opinions.

计划调度部联合机械动力部在每年第一季度组织各生产运行部、仪表控制部、电气运行部等相关职能部门，对长期切除的联锁回路以及暂时无条件实施的《联锁变更单》组织进行评审，提出安全措施和评审意见。

5.4 Maintenance and repair management of interlock protection system

联锁保护系统的维护、检修管理

5.4.1 Instrument and equipment used in the interlock protection system shall be repaired, calibrated and rated along with equipment shutdown and maintenance. When repairing the interlock protection system, new components, instruments and equipment for replacement

must be used after strict inspections and tests.

联锁保护系统所用仪表设备应随装置停工检修进行检修、校准、标定。在联锁保护系统检修时，新更换的部件、仪表、设备必须经过严格检验、试验之后方可使用。

5.4.2 During equipment shutdown and maintenance, all terminals in the interlock circuits must be inspected, tightened and confirmed, and the interlocking instruments should be single and joint calibrated.

装置停工期间必须对联锁回路中的所有接线端子进行检查紧固确认，并对联锁仪表进行单校、联校。

5.4.3 Fault handling and maintenance work of interlock protection system must be supervised by special personnel. Maintenance personnel must check the operation status of the interlock protection system every day and properly keep the written record. If any problem is found, it shall be dealt with timely and defect record should be properly made.

联锁保护系统故障处理、维护作业，必须专人监护。维护人员必须每天检查联锁保护系统运行状态，并做好书面记录，发现问题应及时处理，做好缺陷登记。

5.4.4 Interlock fault handling of important equipment should first be provided with a handling scheme, which should be prepared by the Instrument Control Dept. or Electrical Operation Dept., countersigned by the production operation department and approved by the discipline competent department.

重要设备的联锁故障处理，事先必须编写处理方案，方案由仪表控制部或电气运行部编写，生产运行部会签，专业主管部门审批。

5.4.5 Equipment of interlock protection system should be provided with clear warning signs. Emergency stop button should be equipped with a protective cover.

联锁保护系统的设备要设立明显的警示标识。紧急停车按钮，应设有按钮防护罩。

5.4.6 System software and application software of interlock protection system should be provided with two backups properly kept in different locations. Software backup should indicate the software name, revision, modification date and modified by whom, and relevant modification and design data should be archived.

联锁保护系统的系统软件和应用软件至少有两套备份，并异地妥善保管。软件备份要注明软件名称、版本、修改日期、修改人，并将有关修改设计资料存档。

5.4.7 Data such as equipment records, interlock schematic diagrams / logic diagrams, wiring diagrams, change orders, confirmation sheets, list of interlock values and interlock pre-alarm values should be timely collected and archived and kept for at least two production cycles, among which the interlock change orders should be kept for a longer period of time.

联锁保护系统的设备台帐、联锁原理图/逻辑图、接线图、变更单、确认单、联锁值及联锁预报警值清单等资料要及时整理归档，并至少保存二个生产周期，其中联锁变更单需长期保存。

5.4.8 Continuous measuring instruments should be used instead of switching instruments in interlock protection system.

联锁保护系统宜采用连续测量仪表代替开关类仪表。

6 Inspection and Supervision

监督检查

The Equipment Management Dept. is responsible for supervising the management of the Company's interlock protection system and incorporating the same into performance management for regular inspection and examination.

机械动力部负责对公司仪表及自动化系统全过程管理情况进行监督，并纳入公司绩效管理，定期进行检查和考核。

7 Associated Procedures and Records

关联程序和记录

7.1 Associated procedures

关联程序

7.1.1 *Interlock Change Management Procedures* HYBN-T2-07-0062-2018-1

联锁变更管理程序 HYBN-T2-07-0062-2018-1

7.1.2 *Management Procedures for Interlock Pre-Alarm Values and Interlock Values*

HYBN-T2-07-0063-2018-1

联锁预报警值及联锁值管理程序 HYBN-T2-07-0063-2018-1

7.1.3 *Interlock Confirmation Management Procedures* HYBN-T2-07-0064-2018-1

联锁确认管理程序 HYBN-T2-07-0064-2018-1

7.2 Associated records

关联记录

7.2.1 *Interlock Change Order* HYBN-T6-07-0130-001-2018

联锁变更单 HYBN-T6-07-0130-001-2018

7.2.2 *List of Interlock Pre-Alarm Values and Interlock Values* HYBN-T6-07-0131-001-2018

联锁预报警值及联锁值清单 HYBN-T6-07-0131-001-2018

7.2.3 *Interlock Confirmation Sheet* HYBN-T6-07-0132-001-2018

联锁确认表 HYBN-T6-07-0132-001-2018

8 Supplementary Rules

附则

8.1 The System is under the jurisdiction of Equipment Management Dept.

本制度由机械动力部归口管理。

8.2 The System is drafted by Equipment Management Dept.

本制度起草部门：机械动力部。

8.3 Equipment Management Dept. is responsible for the interpretation of the System.

本制度解释权归机械动力部拥有。

8.4 Revision, preparation and approval of the System are shown in Table 1:

本制度版本编制和审批情况见表 1:

Table 1 Revision, preparation and approval of document

表 1 文件版本编制和审批情况

1	2018-12-31	Lian Yongqing 练永青	Tong Xueyun 童雪云	Xu Ye 徐野	Chen Liancai 陈连财
Revision 版本	Issued date 颁布日期	Prepared by 编制人	Reviewed by 审核人	Authorized by 审定人	Reviewed by 审核人



Hengyi Industries Sdn Bhd
恒逸实业（文莱）有限公司

HYBN-T3-07-0020-2018-1

Measuring Equipment Traceability Management Regulation

测量设备量值溯源管理制度

Issued Date: Dec. 2018

颁布日期：2018 年 12 月

 HENGYI	Hengyi Industries Sdn Bhd 恒逸实业（文莱）有限公司			
	Measuring Equipment Traceability Management Regulation 测量设备量值溯源管理制度			
Doc No.	HYBN-T3-07-0020-2018-1	Ver No.	1	Page 1 of 10

1 Purpose

目的

The Regulations are hereby formulated for the traceability management of measuring equipment to ensure that the measuring equipment meets the expected use requirements.

对测量设备进行量值溯源管理，确保测量设备符合预期的使用要求，特制定本制度。

2 Scope of Application

适用范围

The Regulations are applicable to the departments managing and using the measuring equipment.

本制度适用于管理和使用测量设备的部门。

3 Terms and Definitions

术语和定义

3.1 Measurement: refers to the activities to realize unified units and accurate and reliable measurements.

计量：指实现单位统一、量值准确可靠的活动。

3.2 Measuring equipment (measuring equipment, instruments and meters): refers to the measuring instruments, software, measuring standards, reference materials or auxiliary instruments and machineries necessary in the measuring process to realize production process control, safety and environmental protection, devices & materials, product quality and trade handover, or their combination.

测量设备（计量设备、计量器具、仪器仪表）：指为实现生产过程控制、安全环保、装置物料、产品质量、贸易交接等方面测量过程所必需的测量仪器、软件、测量标准、标准物质、辅助器械或它们的组合。

3.3 Measuring standard (reference standard of measurement and standard of measurement): refers to the material measure, measuring instrument, reference substance or measuring system used as the reference to define, realize, save and reproduce the unit of a quantity or one or multiple measured values. It is the general designation of reference standards of measurement and standards of measurement.

测量标准(计量基准、计量标准)：指为了定义、实现、保存、复现量的单位或一个（多个）量值，

用作参考的实物量具、测量仪器、参考物质或测量系统。它是计量基准和计量标准的统称。

3.4 The highest measuring standard (of an enterprise): the measuring standard established by an enterprise for its internal use according to its own production and business needs. The instruments for measurement standard shall be responsible for the verification or calibration of the instruments and meters within the scope of their capability. To guarantee the accuracy and reliability, the instruments shall be sent to a qualified calibration institution for traceability in a regular manner, in addition to strict operation and daily maintenance in accordance with the operating procedures.

（企业）最高计量标准：企业根据自身生产和经营的需要而建立的供本企业内部使用的计量标准，该计量标准器具承担其所能开展的仪器仪表的检定或校准。为确保计量标准器具的准确可靠，除严格按操作规程进行操作和日常维护外，需定期送至有资质的校准机构进行量值溯源。

3.5 Traceability (dissemination): A property of the result of a measurement or the value of a standard whereby it can be related to stated references (usually national or international standards) through an unbroken chain of comparisons all having stated uncertainties. Dissemination is reverse to traceability.

量值溯源（量值传递）：通过一条具有规定不确定度的不间断的比较链，使测量结果或测量标准的值能够与规定的参考标准（通常是国家计量基准或国际计量基准）联系起来特性，称为量值溯源，它的逆过程称为量值传递。

3.6 Verification: The activities in which the error of the indication value of the measuring equipment meets the specified requirements as determined by the legal measuring department or the legal authorized organization in accordance with the verification regulations and through experiments. In China, verification is generally an activity of national legal measurement.

检定：由法制计量部门或法定授权组织按照检定规程，通过实验，提供证明来确定测量设备的示值误差满足规定要求的活动。在中国，“检定”一般是国家法制计量的活动。

3.7 Calibration: a set of operations that establish, under specified conditions, the relationship between values of quantities indicated by a measuring instrument or measuring system or values represented by a material measure or a reference material, and the corresponding values realized by standards. The calibration results may be used to assess the indication error of the measuring equipment, measuring system or material measure, or to assign values to marks on any scale. The term "verification" is not available in international standards, and calibration activities are generally carried out. Therefore, the later activities involving verification shall be called "calibration".

校准：在规定条件下，为确定测量设备或测量系统的示值、实物量具或标准物质所代表的值，与相对应的被测量的已知值之间关系的一组操作。校准结果可用于评定测量设备、测量系统或实物量具的示值误差，或给任何标尺上的标记赋值。国际标准中无“检定”一词，一般执行的都是校准活动。因此，对以后涉及到检定工作内容的活动，一律称为“校准”。

3.8 Intermediate check: the operation performed to verify whether the measuring standard, reference material and measuring instrument remain in their original status in accordance with specified procedures.

期间核查：根据规定程序，为了确定计量标准、标准物质或其他测量仪器是否保持其原有状态而进行的操作。

3.9 Comparison: the process of comparing the reproduced values of the same measuring instrument with the same accuracy level or within a specified range of uncertainty under specified conditions.

比对：在规定条件下，对相同准确度等级或指定不确定度范围的同种测量仪器复现的量值之间比较的过程。

3.10 Metrological confirmation: a set of operations required to ensure that measuring equipment conforms to the requirements for its intended use. Metrological confirmation generally includes metrological verification/calibration, debugging (adjustment), testing, comparison, inspection, metrological certification, metrological status identification and record confirmation.

计量确认：指为确保测量设备处于满足预期使用要求的状态所需要的一组操作。计量确认一般可包括：测量设备的计量检定/校准、调试(校)、测试、比对、检查、计量验证、计量状态标识、确认记录等。

4 Management Responsibilities

管理职责

4.1 Specified administrative authority

归口管理部门

The Equipment Management Dept. is the specified administrative authority for measuring equipment traceability management, which shall be responsible for planning and establishing the highest measuring standard and its traceability system of the Company, and developing the measuring equipment classification standards and calibration cycle principles. Also, the department shall assist relevant departments to develop a reasonable measuring equipment calibration cycle and be responsible for the examination and approval of the Company's measuring equipment calibration plan. In addition, it shall be responsible for the dissemination and traceability of measuring equipment, for the technical review of measuring equipment involved in trade handover in engineering projects and for the promotion and application of new metrological technologies and equipment.

机械动力部是测量设备量值溯源的归口管理部门，负责策划和建立公司最高计量标准及其量值溯源体系；负责制定测量设备分类标准和校准周期原则，并协助各相关部门制定合理的测量设备校准周期；负责审批公司测量设备校准计划；开展测量设备的量值传递和量值溯源工作；负责工程项目中涉及贸易交接测量设备的技术审查；负责计量新技术、新设备的推广应用。

4.2 Coordinated management departments

协同管理部门

4.2.1 The Scheduling & Dispatch Dept. shall be responsible for confirming and coordinating the availability of on-site conditions for the measuring equipment traceability.

计划调度部负责确认和协调测量设备开展量值溯源时具备的现场条件。

4.2.2 The HSE Dept. shall be responsible for developing the calibration plan of portable combustible and toxic gas alarm.

HSE 管理部负责提出便携式可燃及有毒气体报警仪的校准计划。

4.2.3 IT Dept. shall be responsible for the construction, maintenance, authority configuration and technical support of the metrological calibration information transmission network of the Company.

信息部负责公司计量校准信息传输网络的建设、维护、权限配置并提供技术支持。

4.3 Executive departments

执行部门

4.3.1 The operation department, as the executive department, shall be responsible for reasonably determining the calibration cycle of the measuring equipment of the department in accordance with the calibration cycle principle, declaring the calibration plan of the measuring equipment of the department, and cooperating to complete the traceability of the department. The Electrical Operation Dept., the Instrument Control Dept. and the Lab Dept. shall be responsible for the management of self-calibration measuring equipment.

运行部为执行部门，负责按校准周期原则合理确定本部门测量设备的校准周期；负责本部门测量设备校准计划的申报，配合完成本部门测量设备的量值溯源工作；电气运行部、仪表控制部和质量检验部负责本部门自行校准测量设备的管理。

4.3.2 The Electrical Operation Dept. and the Instrument Control Dept. shall maintain and inspect the measuring equipment involved in trade handover by coordinating with calibration and intermediate check, and make and keep relevant records.

电气运行部和仪表控制部对贸易交接测量设备的维护、巡检，配合校准和期间核查等制定相关制度，并设置和保留相关记录。

4.3.3 The Equipment Maintenance Dept. shall provide auxiliary equipment such as vehicles required by the measuring equipment in the process of dissemination and traceability, and assist in operation.

设备检修部提供测量设备在量值传递和量值溯源过程中所需车辆等辅助设备，并协助操作。

5 Management Content

管理内容

5.1 Classification of measuring equipment

测量设备的分类

5.1.1 The Company's measuring equipment is divided into important equipment and common equipment.

公司测量设备分为重要测量设备和普通测量设备。

5.1.2 Important measuring equipment refers to the measuring equipment used for dissemination, product quality analysis, safety and environmental protection, trade settlement and comparison.

重要测量设备是指用于量值传递、产品质量化验分析、安全环保、贸易结算及其比对用的测量设备。

5.1.3 Common measuring equipment refers to the measuring equipment used for production process control or monitoring, devices & materials, laboratory analysis and other purposes in the production process.

普通测量设备是指用于生产过程控制或监视、装置物料、生产过程中化验分析以及其他用途的测量设备。

5.2 Calibration of measuring equipment

测量设备的校准

5.2.1 The measuring equipment shall be calibrated in case of maintenance and in a regular manner. The calibration during maintenance is mainly for the measuring equipment that cannot be disassembled on the continuously running device or cannot be calibrated in normal times. The regular calibration is mainly for the measuring equipment that can be disassembled in normal times and does not affect its operation during the calibration.

测量设备的校准周期实行检修期校准和固定周期校准。检修期校准主要针对连续运转装置上无法拆卸或平时无法开展校准的测量设备，可在设备检修时进行校准；固定周期校准针对平时能够拆卸且进行校准时不影响使用的测量设备，可按确定的校准周期进行校准。

5.2.2 The calibration cycle shall be determined for the measuring equipment that requires regular calibration by following the principles below:

按固定周期进行校准的测量设备，确定校准周期的原则如下：

5.2.2.1 The calibration cycle can be specified as 6~12 months for measuring equipment which is frequently used or needs to ensure measuring accuracy;

对使用频次较高或需要确保准确度的测量设备，校准周期可规定为 6~12 个月；

5.2.2.2 The calibration cycle can be determined as 24~36 months for measuring equipment with stable performance or requiring low accuracies;

对计量性能稳定或准确度要求不高的测量设备，校准周期可规定为 24~36 个月；

5.2.2.3 The measuring equipment, which only plays an indicative role for non-production non-key parts or requires low accuracies or is consumable or used as a tool, can be calibrated only before its first use or daily calibrated to confirm its accuracy through comparison rather than specifying the calibration cycle.

对非生产关键部位仅起指示作用的、或准确度无严格要求的、或低值易耗的、或作为工具使用的测量设备，可实行首次使用前一次性校准或日常采用比对的办法确定其准确性，不再规定校准周期。

5.2.3 The measuring equipment, which is found or suspected to fail to meet the accuracy requirement in the calibration cycle, shall be calibrated in advance.

当发现或怀疑测量设备在校准周期内的准确性不能满足使用要求时，应提前进行校准。

5.2.4 The calibration cycle of important equipment shall be generally not more than 12 months, unless otherwise specified by the government of Brunei or the client.

重要设备的校准周期一般最长不超过 12 个月，文莱政府和客户有具体要求的除外。

5.2.5 The department using or managing the important measuring equipment shall organize to implement intermediate check during the effective calibration cycle, in addition to regular calibration, to ensure the accuracy of the measuring equipment.

为保证测量设备的准确性，对重要测量设备除进行定期校准外，管理或使用部门应根据实际使用情况，在校准有效间隔内组织开展期间核查工作。

5.2.6 the intermediate check cycle of important equipment shall not exceed 6 months if the calibration cycle is 12 months, and not exceed 3 months when the calibration cycle is 6 months.当重要设备校准周期为 12 个月时，期间核查时间最长不应超过 6 个月；当校准周期为 6 个月时，期间核查时间最长不应超过 3 个月。

5.2.7 The intermediate check can be performed through re-calibration or comparison, depending on the metrological performance of the measuring equipment.

期间核查可采用重新校准、比对等方式，根据测量设备的计量性能情况开展。

5.3 Management requirements

管理要求

5.3.1 In principle, all measuring equipment shall be calibrated to be qualified before installation and use, and calibration certificates shall be provided for the measuring equipment for a new project before put into service. The measuring equipment in use shall be metrological confirmed according to the actual situation to ensure the accuracy.

原则上所有测量设备在安装和使用前都应校准合格，新建项目的测量设备投用前应提供校准合格证明；使用中的测量设备根据实际情况开展计量确认，以保证测量准确。

5.3.2 The relevant departments can propose the calibration requirements and plans of measuring equipment according to the actual needs, and the Equipment Management Dept. shall organize internal or external calibration.

各相关部门可根据实际工作需要，提出测量设备的校准需求和校准计划，由机械动力部组织进行内部或外部校准。

5.3.3 The standards and supporting equipment used for dissemination shall be properly kept by designated personnel and the corresponding management regulations shall be provided.

用于量值传递用的标准及其配套设备应由专人妥善保管，并制定相应的管理制度。

5.3.4 The departments managing, maintaining or using all kinds of important measuring equipment shall formulate standard operating procedures (SOP), and properly use, maintain and calibrate the equipment and carry out intermediate check by strictly following the requirements of SOP.

对各类重要测量设备，管理和维护使用部门须制定标准操作规程（SOP），并严格按 SOP 的要求正确使用、维护、校准和开展期间核查工作。

5.3.5 The Electrical Operation Dept., the Instrument Control Dept. and the Lab Dept. shall formulate calibration operation specifications and conduct self-calibration according to the specifications for self-calibrated measuring equipment.

电气运行部、仪表控制部和质量检验部对自行校准的测量设备，应制定校准操作规范，并按规范要求开展自校工作。

5.3.6 The maintenance department shall not carry out routine maintenance and change activities such as range modification and resetting for the measuring equipment involved in trade handover until the activities are accepted by the relevant technicians and metrological personnel. For some changes, the department shall determine whether re-calibration is necessary.

维护部门对贸易交接的测量设备进行量程修改、清零等日常维护和改动时，须经相关技术人员和计量人员确认后方能进行改动；有些改动需判定是否需要进行再校准。

5.3.7 The measuring equipment shall be clearly marked. In case any inaccuracy or failure is found, the measuring equipment shall be replaced immediately. If necessary, the previous measured results shall be retroactively confirmed.

测量设备应标识清晰，若发现测量设备不准或故障，应当及时更换，如有必要则对以往的测量结果进行追溯确认。

5.3.8 For measuring equipment with requirements for environmental conditions, the environmental conditions shall be controlled by such measures as provision of air conditioners or temperature and humidity meters.

对环境条件有要求的的测量设备，应对环境条件进行控制，如加装空调，温湿度计等。

6 Inspection and Supervision

检查与监督

The Equipment Management Dept. shall be responsible for the inspection and supervision of the implementation of the Regulations, and give assessment opinions.

机械动力部负责对本制度执行情况进行检查、监督，并提出考核意见。

7 Associated Procedures and Records

关联程序及记录

7.1 Associated procedures

关联程序

Measuring Equipment Traceability Management Procedures (HYBN-T2-07-0065-2018-1)

测量设备量值溯源管理程序 HYBN-T2-07-0065-2018-1

7.2 Associated records

关联记录

7.2.1 Measuring Equipment Calibration Accounts (HYBN-T6-07-0133-001-2018)

测量设备校准台账 HYBN-T6-07-0133-001-2018

7.2.2 Measuring Equipment Calibration Plan

测量设备校准计划

7.2.3 Measuring Equipment Calibration Records

测量设备校准记录

7.2.3.1 Shipping flowmeters Calibration Records (HYBN-T6-07-0134-001-2018)

装船流量计校准记录 HYBN-T6-07-0134-001-2018

7.2.3.2 Loading flowmeters Calibration Records (HYBN-T6-07-0135-001-2018)

装车流量计校准记录 HYBN-T6-07-0135-001-2018

7.2.3.3 Calibration Records of Standard Weight of Electronic Belt Scale
(HYBN-T6-07-0136-001-2018)

电子皮带秤标准砝码校准记录 HYBN-T6-07-0136-001-2018

7.2.3.4 Calibration Records of Electromagnetic Hanging Weight of Electronic Belt Scale
(HYBN-T6-07-0137-001-2018)

电子皮带秤电磁挂码校准记录 HYBN-T6-07-0137-001-2018

7.2.3.5 Physical Calibration Records of Electronic Belt Scale (HYBN-T6-07-0138-001-2018)

电子皮带秤实物校准记录 HYBN-T6-07-0138-001-2018

7.2.3.6 Rationed Packing Scale Calibration Records (HYBN-T6-07-0139-001-2018)

定量包装秤校准记录 HYBN-T6-07-0139-001-2018

7.2.3.7 Intermediate Check Records of Electronic Truck Scale (HYBN-T6-07-0140-001-2018)

电子汽车衡期间核查记录 HYBN-T6-07-0140-001-2018

7.2.3.8 Pressure Gauge Calibration Records (HYBN-T6-07-0141-001-2018)

压力表校准记录 HYBN-T6-07-0141-001-2018

7.2.3.9 Calibration Records of Pressure Gauge with Electric Contact
(HYBN-T6-07-0142-001-2018)

电接点压力表校准记录 HYBN-T6-07-0142-001-2018

7.2.3.10 Glass Container Calibration Records (HYBN-T6-07-0143-001-2018)

玻璃量器校准记录 HYBN-T6-07-0143-001-2018

7.2.3.11 Bimetallic Thermometer Calibration Records (HYBN-T6-07-0144-001-2018)

双金属温度计校准记录 HYBN-T6-07-0144-001-2018

- 7.2.3.12 Working Thermocouple Calibration Records (HYBN-T6-07-0145-001-2018)
工作用热电偶校准记录 HYBN-T6-07-0145-001-2018
- 7.2.3.13 Industrial Thermistor Calibration Records (HYBN-T6-07-0146-001-2018)
工业热电阻校准记录 HYBN-T6-07-0146-001-2018
- 7.2.3.14 Working Liquid-in-glass Thermometer Calibration Records (HYBN-T6-07-0147-001-2018)
工作用玻璃液体温度计校准记录 HYBN-T6-07-0147-001-2018
- 7.2.3.15 Weight Calibration Records (HYBN-T6-07-0148-001-2018)
砝码校准记录 HYBN-T6-07-0148-001-2018
- 7.2.3.16 Electronic Balance Calibration Records (HYBN-T6-07-0149-001-2018)
电子天平校准记录 HYBN-T6-07-0149-001-2018
- 7.2.3.17 Working Capillary Viscometer Calibration Records (HYBN-T6-07-0150-001-2018)
工作用毛细管黏度计校准记录 HYBN-T6-07-0150-001-2018
- 7.2.3.18 Laboratory PH Meter Calibration Records (HYBN-T6-07-0151-001-2018)
实验室 pH(酸度)计校准记录 HYBN-T6-07-0151-001-2018
- 7.2.3.19 Working Glass Hydrometer Calibration Records (HYBN-T6-07-0152-001-2018)
工作玻璃浮计校准记录 HYBN-T6-07-0152-001-2018
- 7.2.3.20 Spectrophotometer Calibration Records (HYBN-T6-07-0153-001-2018)
分光光度计校准记录 HYBN-T6-07-0153-001-2018
- 7.2.3.21 Three-phase Electric Energy Meter Calibration Records (HYBN-T6-07-0154-001-2018)
三相电能表校准记录 HYBN-T6-07-0154-001-2018
- 7.2.3.22 Steel Measuring Tape Calibration Records (HYBN-T6-07-0155-001-2018)
钢卷尺校准记录 HYBN-T6-07-0155-001-2018
- 7.2.3.23 Vernier Caliper Calibration Records (HYBN-T6-07-0156-001-2018)
游标卡尺校准记录 HYBN-T6-07-0156-001-2018
- 7.2.3.24 Micrometer Calibration Records (HYBN-T6-07-0157-001-2018)
千分尺校准记录 HYBN-T6-07-0157-001-2018
- 7.2.3.25 Calibration Records of Dial Indicators (Reading in 0.01mm/0.001mm) (HYBN-T6-07-0158-001-2018)
百分表、千分表校准记录 HYBN-T6-07-0158-001-2018

8 Supplementary Rules

附则

8.1 The Regulations are under the jurisdiction of Equipment Management Dept.

本制度由机械动力部归口管理。

8.2 The Regulations are drafted by the Equipment Management Dept.

本制度起草部门：机械动力部。

8.3 Equipment Management Dept. is responsible for the interpretation of the Regulations.

本制度解释权归机械动力部拥有。

8.4 Preparation and approval of the Regulations are shown in the Table below:

本制度编制和审批情况见下表：

Table 1 Revision, preparation and approval of document

表 1 文件版本编制和审批情况

1	2018-12-31	Ding Shichun 丁似春	Tong Xueyun 童雪云	Xu Ye 徐野	Chen Liancai 陈连财
Revision 版本	Issued date 颁布日期	Prepared by 编制人	Reviewed by 审核人	Authorized by 审定人	Approved by 批准人



Hengyi Industries Sdn Bhd
恒逸实业（文莱）有限公司


HYBN-T3-07-0021-2018-1

Input and Output Material Measurement Management Regulation

进出厂物料计量管理制度

Issued Date: Dec. 2018

颁布日期：2018 年 12 月

 HENGYI	Hengyi Industries Sdn Bhd 恒逸实业（文莱）有限公司			
	Input and Output Material Measurement Management Regulation 进出厂物料计量管理制度			
	Doc No.	HYBN-T3-07-0021-2018-1	Ver No.	1

1 Purpose

目的

The Regulations are hereby formulated to standardize the Company's input and output material measurement management and to ensure the custody transfer measurement data are accurate.

为规范公司进出厂物料计量管理，保证贸易交接计量数据的准确，特制定本制度。

2 Scope of Application

适用范围

The Regulations apply to departments involved in input and output material measurement and management.

本制度适用于涉及到进出厂物料计量及其管理的部门。

3 Terms and Definitions

术语和定义

N/A.

不适用。

4 Management Responsibilities

管理职责

4.1 Specified administrative authority

归口管理部门

Equipment Management Dept. is the specified administrative authority of input and output material measurement supervision, which shall be responsible for: formulating related material measurement management regulations; supervision, random inspection and validation of input and output material measurement process and data; providing technical support for commercial contract of input and output materials measurement; periodic calibration and intermediate check of input and output measurement equipment; providing error analysis report for handling dispute over custody transfer measurement.

机械动力部是进出厂物料计量监督的归口管理部门，负责制定相关计量管理制度；负责进出厂物料计量过程和数据的监督、抽查和确认；负责为进出厂物料计量的商务事宜提供技术支持；负责进出厂计量设备的定期校准和期间核查；负责为贸易计量纠纷的处理提供误差分析报告。

4.2 Coordinated management departments

协同管理部门

4.2.1 Scheduling & Dispatch Dept. is responsible for: coordination in completing the input and output material measurement and the collection of statistics for measurement data;

计划调度部负责协调完成物料进出厂计量以及计量数据的统计；

4.2.2 Hengyi Industries International PTE LTD and Commercial Dept. are responsible for: determining the measurement terms in commercial contract for input and output materials; and managing in-transit loss of input materials and claiming for compensation for excessive loss of them. Commercial Dept. is responsible for the transmission and entry of commercial and commodity inspection information; shall take the lead in organizing settlement of any disputes over output measurement.

恒逸实业国际有限公司和商务部负责确定进出厂商务合同中的计量条款；负责进厂物料的途耗管理及超耗索赔工作；商务部负责商务、商检信息的传递和录入；负责牵头组织对外计量纠纷的处理。

4.2.3 IT Dept. is responsible for establishing and maintaining measurement information transmission network and measurement data server and providing technical support.

信息部负责计量信息传输网络和计量数据服务器的建设、维护，并提供技术支持。

4.3 Executive departments

执行部门

4.3.1 Executive departments include Refining Dept. #4, Power Dept., Utilities Dept., Lab Dept., Port and Storage Department, Electrical Operation Dept. and Instrument Control Dept.

炼油四部、热电部、公用工程部、质量检验部、港务储运部、电气运行部、仪表控制部为执行部门。

4.3.2 Relevant departments carrying out custody transfer are responsible for formulating their own operating procedures for input and output measurement; they are responsible for logging, comparing and uploading transfer data, and cooperating in out-of-tolerance analysis of data compared and in investigation into and settlement of any disputes over measurement.

执行贸易交接的相关部门负责制定本部门进出厂计量操作程序并严格执行；负责交接数据的录入、比对和上传，负责配合比对数据的超差分析和计量纠纷的调查与处理。

4.3.3 Electrical Operation Dept. and Instrument Control Dept. are responsible for the daily maintenance of measurement equipment related to custody transfer, cooperation in calibration

and intermediate check of such custody transfer measurement equipment, and cooperation in investigation into and settlement of any disputes over measurement in the custody transfer process.

电气运行部、仪表控制部负责与贸易交接相关的计量设备的日常维护，配合该类计量设备的校准和期间核查工作，配合贸易交接过程中计量纠纷的调查与处理。

5 Management Content

管理内容

5.1 Requirements for measurement equipment management

计量设备管理要求

5.1.1 Measurement equipment related to custody transfer shall be provided with mark of license for manufacturing measuring instruments or any other internationally recognized mark, and shall be calibrated, and its measurement error shall conform to measurement deviation provisions or international standard/code.

与贸易交接相关的计量设备应具有制造计量器具许可证标志或其它国际认可标志，并经过校准，测量误差符合计量偏差规定或国际标准规范。

5.1.2 Equipment Management Dept. shall regularly calibrate and conduct intermediate check on measurement equipment used for custody transfer and its comparison, and periodically identify measurement traceability of standard equipment.

机械动力部定期对贸易交接及其比对用计量设备进行校准和期间核查，并按周期对标准设备进行量值溯源。

5.1.3 Executive department shall operate the measurement equipment related to custody transfer as required to ensure its intactness and normal operation and, in case of any abnormality, timely notify Instrument Control Dept. for treatment.

执行部门按要求操作与贸易交接相关的计量设备，确保完好并正常运行，如出现异常情况，应及时通知仪表控制部进行处理。

5.1.4 Electrical Operation Dept. and Instrument Control Dept. shall formulate regulations associated with use, maintenance, patrol inspection, collaborative calibration of and intermediate check on measurement equipment related to custody transfer and keep relevant records.

电气运行部和仪表控制部对与贸易交接相关的计量设备的使用、维护、巡检、配合校准和期间核查等制定相关制度，保留相关工作记录。

5.1.5 Maintenance or shutdown of any measurement equipment related to custody transfer cannot be performed until it has been reviewed and approved by Equipment Management Dept.

当与贸易交接相关的计量设备维修或停用时，需经机械动力部审批同意后方可实施。

5.2 Measurement process and measurement supervision management

计量过程及计量监督管理

Solid and liquid material input and output can be measured by five means, i.e. dipstick inspection on board, shore tank, flowmeter, motor truck scale and rationed packing, and the custody transfer measurement data shall be subject to the data of Supplier, the Buyer or commodity inspector as agreed in the commercial contract.

固态和液态物料进出厂的计量方式有船检尺、岸罐、流量计、汽车衡、定量包装五种，贸易交接计量数据根据商务合同约定以供方、买方或商检数据为准。

5.2.1 Crude (material) oil input

原（料）油进厂

5.2.1.1 Crude (material) oil input measurement data consists of quantity measured at port of shipment (bill of lading quantity), quantity measured on board at port of destination and quantity measured in shore tanks at port of destination. Custody transfer mode is subject to the Contract, and if there is any problem with the agreed form of measurement, other forms shall be adopted sequentially as agreed in the Contract.

原（料）油进厂计量数据有发港量（提单量）、到港船量、到港岸罐量三种，贸易交接方式以合同约定为准，约定的计量方式发生问题时则顺序采用合同约定的其它方式。

5.2.1.2 The stock of oil collection tanks shall be checked prior to oil unloading, and oil shall be collected as per the current actual stock.

卸油前应核查收油罐的库存量，按当前实际库存量进行收油。

5.2.1.3 Prior to oil unloading, the unloading personnel must board the ship for supervising dipstick inspection, temperature measurement, sampling, oil quantity calculation and other operations, inspecting the validity of dipstick, thermometer and hold capacity table certificate, and keeping records.

卸油前接卸人员须上船监督检尺、测温、取样、计算油量等操作，检查量油尺、温度计和舱容表证书的有效性，同时做好记录。

5.2.1.4 During oil unloading, the unloading personnel shall give timely unloading optimization suggestions (including hold washing plan, oil unloading temperature control, and stripping draft control and etc.) to the shipper based on oil types and oil hold conditions, so as to minimize the residue of crude oil with high condensation point and high viscosity on walls, and shall supervise and urge the shipper to optimize hold washing operations. During hold washing, they shall pay close attention to the shipper's hold sweeping operations and request the shipper to sweep the unloading lines clean one by one.

卸油作业过程中，接卸人员根据油种、油舱情况及时向船方提出卸油优化建议（包括洗舱方案、卸油温度控制、收舱吃水控制等），尽可能减少高凝点、高粘度原油挂壁，督促船方优化洗舱作业。进入洗舱作业时，需密切关注船方扫舱操作，要求船方逐条扫净卸油管线。

5.2.1.5 Upon completion of oil unloading, the unloading personnel shall timely inspect the oil left in pipelines on deck, recover residual oil from oil transfer arm as much as possible, and, along with commodity inspectors, supervise and urge the shipper to remove all residual oil from hold. Meanwhile, they shall compare ROB with OBQ; when $ROB > OBQ$ and ROB is greater than 0.3% of unloading capacity, the shipper shall be timely informed of it for written confirmation and it shall be reported to Commercial Dept. in time.

卸油完毕后，接卸人员应及时检查甲板管线存油情况，将输油臂内余油尽可能回收，并与商检人员一同督促船方卸净船舱残油。同时对比 ROB 与 OBQ 数据，当 $ROB > OBQ$ 且 ROB 大于卸船量的 0.3% 时，需及时通知船方书面确认，并及时报告商务部。

5.2.1.6 After oil has been collected in oil tanks, dipstick inspection, temperature measurement, sampling and other operations in oil tanks cannot proceed until the tank level has been in static condition until the requirement is met.

油罐收油后，油罐液位静止时间必须达到要求方能进行油罐的检尺、测温、取样等操作。

5.2.1.7 Where the error obtained between the quantity measured in vessel at port of destination and the quantity on the bill of lading for the same oil tanker exceeds 0.3% for three times, and we always get a negative error, high attention shall be paid to this oil tanker and if necessary, application shall be made for blacklisting this tanker.

当同一条油轮到港船量与提单量的误差有三次超过 0.3%，且我方总为负误差时，应对该油轮进行高度关注，必要时提请将该船列入黑名单。

5.2.1.8 Where the comparison between the quantity on the bill of lading and the vessel volume when arriving on port indicates that the error exceeds the agreed or more than 0.3% in the contract, the Equipment Management Dept. shall immediately notify the Commercial Dept. 当提单量与到港船量比对误差超过合同约定或超过 0.3% 时，机械动力部应立即通知商务部。

5.2.2 Coal input

煤炭进厂

5.2.2.1 Coal input measurement data consists of quantity measured at port of shipment (bill of lading quantity), quantity measured at port of destination (water gauge) and quantity measured by electronic belt scale at jetty. Custody transfer mode is subject to the Contract, and if there is any problem with the agreed form of measurement, other forms shall be adopted sequentially as agreed in the Contract.

煤炭进厂计量数据有发港量（提单量）、到港量（水尺）、码头电子皮带秤量三种，贸易交接方式以合同约定为准，约定的计量方式发生问题时则顺序采用合同约定的其它方式。

5.2.2.2 Before coal unloading, the Power Dept. shall check the electronic belt scale for normal operation and perform zero calibration; in the process of coal unloading, the operation of the electronic belt shall be inspected from time to time, and in case of abnormality, immediately contact the Instrument Control Dept. for handling and also inform Equipment Management Dept.

卸煤前热电部应检查电子皮带秤运行是否正常，并进行校零；卸煤过程中应不定时巡检电子皮带秤运行情况，异常时应立即联系仪表控制部进行处理，并通知机动部。

5.2.2.3 Upon arrival of a coaler at the port of destination, the unloading personnel must board the coaler to supervise the weight check by draft, sampling, hold clearing, and other work, and keep records.

煤船到港时，接卸人员须上船监督商检水尺计重、取样、清舱等工作，并做好记录。

5.2.2.4 Receiving and unloading personnel must compare the quantity on the bill of lading with the data obtained by the other two forms of measurement. When the comparison between bill of lading quantity and water gauge indicates that the error exceeds that agreed in the contract or exceeds 1%, and the comparison error between the bill of lading quantity and the electronic belt scale exceeds 0.5% after the coal ship is unloaded, it shall be reported to the Commercial Dept. immediately.

接卸人员须将提单量与另外两种计量方式得到的数据进行比对，当提单量与水尺比对误差超过合同约定或超过 1%，以及在煤船卸净后提单量与电子皮带秤比对误差超过 0.5%时，应立即通知商务部。

5.2.3 Product output by ship

产品装船出厂

5.2.3.1 Liquid products output by ship can be measured by three forms, i.e. ship, shore tank and flowmeter. Custody transfer mode is subject to the Contract, and if there is any problem with the agreed form of measurement, other forms shall be adopted sequentially as agreed in the Contract.

液态产品装船出厂计量方式有船计量、岸罐计量和流量计计量三种，贸易交接方式以合同约定为准，约定的计量方式发生问题时则顺序采用合同约定的其它方式。

5.2.3.2 Before loading, the Port and Storage Department shall check the stock of outgoing tanks, and send product as per the current actual stock.

装船前港务储运部应核查出厂罐的库存量，按当前实际库存量进行发货。

5.2.3.3 Before loading, the Port and Storage Department must check each ship hold together with commodity inspectors and the shipper, and reject the loading if any unknown liquid or foreign matter is found in the hold; if the quantity measured on board is used for settlement, each ship hold must be calibrated by a third-party agency, and the hold capacity table shall be valid.

装船前港务储运部须与商检及船方检查各船舱情况，如发现舱内有不明液体或杂质存在，则不予装船；以船检量数据结算的船只，船舱必须经过第三方机构校准，且舱容表在有效期内。

5.2.3.4 Before loading, the gauge hatch datum height of each hold must be measured; in case of an error >5mm is found between the measured gauge hatch datum height and that on the hold capacity table, loading cannot be performed until the error has been confirmed by the shipper with its signature.

装船前必须实测各舱的计量基准高，当发现实测计量基准高与舱容表中的计量基准高误差 $>5\text{mm}$ 时，应要求船方签名确认后方可装船。

5.2.3.5 During loading, the Port and Storage Department shall pay close attention to the operation of flowmeter through DCS system and on-site patrol inspection. In case of any abnormality or fault of the flowmeter, loading shall be stopped immediately, the Equipment Management Dept. shall be informed of such abnormality or fault, and the Instrument Control Dept. shall be notified to handle the same.

装船过程中，港务储运部应通过 DCS 系统和现场巡检密切注意流量计的运行情况。如发生流量计异常或故障，立即停止装船并向机械动力部反映，同时通知仪表控制部进行处理。

5.2.3.6 The Port and Storage Department must compare the quantity measured at the port of shipment with the data obtained by other forms of measurement, and shall immediately notify the Equipment Management Dept. if an error is found exceeding 0.3% and still exceeding the same after recheck.

港务储运部须将发港量与其它计量方式得出的数据进行比对，发现误差超过 0.3%且经复查后仍然超差时，应立即通知机械动力部。

5.2.3.7 The Port and Storage Department shall seal the ships if necessary and record the seal no. for the convenience of tracing.

港务储运部对需要封缄的船只进行施封，并记录封缄号以便追溯。

5.2.4 Product output by road

产品公路出厂

5.2.4.1 Oil products output by road shall be measured by the quantity loaded into the station oil dispatching system; coal ash output shall be measured by the quantity weighed with electronic truck scale. Custody transfer mode is subject to the Contract, and if there is any problem with the agreed form of measurement, other forms shall be adopted sequentially as agreed in the Contract.

油品公路出厂以装车站发油系统数据进行计量；煤灰出厂以电子汽车衡称重数据进行计量。贸易交接方式以合同约定为准，约定的计量方式发生问题时则顺序采用合同约定的其它方式。

5.2.4.2 Before loading of oil products every day, the Port and Storage Department shall check the stock of outgoing tanks, and send oil as per the current actual stock.

每天油品装车前，港务储运部应核出厂罐的库存量，按当前实际库存量进行发油。

5.2.4.3 Oil product loading shall be stopped immediately once any abnormality or failure occurs to the flowmeter, the Instrument Control Dept. shall be informed to repair it; meanwhile, the Equipment Management Dept. shall organize related departments to determine the quantity of oil products loaded into tank trucks based on operating time and the condition of tank level.

油品装车过程中流量计发生异常或故障时，应立即停止装车，通知仪表控制部进行处理，同时由机械动力部组织相关部门根据作业时间及汽车罐车液位等条件确定罐车内油品的数量。

5.2.4.4 If the customer has any objection to the oil product loading data, he must present it at

the loading platform. In principle, the Company will not assume any responsibility for the shortage in quantity after the trucks has left the factory or the seal has been damaged; if investigation indicates that such deviation is indeed caused by the Company, the Company may give compensation for it.

客户如对油品装车数据有异议时，须在装车台提出。汽车离厂或封缄破坏后，公司原则上不承担数量短少的责任，若经调查确因公司原因造成偏差的，可给予补偿。

5.2.4.5 The Port and Storage Department shall compare regularly the total quantity of each oil variety loaded onto truck with the delivered quantity measured by dipstick in outgoing tanks; if the error is $\geq 0.30\%$ and the recheck indicates that it is still out of tolerance, the Equipment Management Dept. shall be informed timely.

港务储运部应定期将各品种的装车总量与出厂罐的检尺付量进行比对，当比对误差 $\geq 0.30\%$ 且经复查后仍然超差时，应及时通知机械动力部。

5.2.4.6 The Port and Storage Department shall seal the vehicles if necessary and record the seal no. for the convenience of tracing.

港务储运部对需要封缄的车辆进行施封，并记录封缄号以便追溯。

5.2.5 Product output by rationed packing

定量包装产品出厂

5.2.5.1 Net content of products in rationed packing shall be measured by rationed packing scale, and rechecked by re-inspection scale at specified interval to ensure measurements are accurate.

定量包装产品净含量以定量包装秤计量，并由复检秤在规定时间内进行复核以确保计量准确性。

5.2.5.2 Refining Dept. #4 must check the rationed packing scale and re-inspection scale before packing, and contact the Instrument Control Dept. for handling in case of any abnormality. 炼油四部在每次开始包装工作之前须对定量包装秤、复检秤进行检查，异常时联系仪表控制部进行处理。

5.2.5.3 During normal packing, the bunker and material level need be kept stable and certain material level shall be maintained; batch packing shall be avoided to prevent out-of-tolerance caused by instability.

正常包装时，需保证料仓料位稳定并保持一定料位，避免间歇式包装，以防不稳定导致超差。

5.2.5.4 Equipment Management Dept. shall conduct daily supervision and random inspection of rationed packing scale and re-inspection scale for their use, maintenance and accuracy, and also calibrate them periodically and occasionally.

机械动力部对定量包装秤和复检秤的使用、维护、准确性等进行日常监督抽查，并进行定期和不定期校准。

5.2.6 The Commercial Dept. shall notify timely the supplier and the carrier of any dispute over measurement of material input and coordinate the settlement of such dispute; the dispute over

measurement of material output should be understood and recorded in detail the dispute contents, occurrence time, process and other relevant information, and timely notify the Equipment Management Dept. of such information.

商务部对物料进厂的计量争议应及时通知供货方及运输方，并协调解决；对物料出厂的计量争议，应了解并详细记录计量争议的内容、产生时间和过程等相关信息，及时将信息通报机械动力部。

5.2.7 For any dispute over custody transfer measurement identified by the Commercial Department, the Equipment Management Dept. will draft a report on measurement error analysis based on the investigation results, submit it to the leader in charge for review and approval, and then submit it to the Commercial Dept. In case of failure to reach an agreement between the Company and the customer on the investigation and handling suggestions, either party may refer it to a third party for investigation.

对商务明确的贸易计量纠纷，由机械动力部依据调查结果起草计量误差分析报告，经主管领导审批后提交商务部。公司与客户在调查处理意见上未达成一致，任意一方均可提请第三方进行调查。

6 Inspection and Supervision

检查与监督

The Equipment Management Dept. shall be responsible for the inspection and supervision of the implementation of the Regulations, and give assessment opinions.

机械动力部负责对本制度执行情况进行检查、监督，并提出考核意见。

7 Associated Procedures and Records

关联程序及记录

7.1 Associated procedures

关联程序

7.1.1 Procedure for Coal Input Measurement and Supervision HYBN-T2-07-0066-2018-1

煤炭进厂计量及监督程序 HYBN-T2-07-0066-2018-1

7.1.2 Procedure for Crude (Material) Oil Input Measurement and Supervision HYBN-T2-07-0067-2018-11

原（料）油进厂计量及监督程序 HYBN-T2-07-0067-2018-11

7.1.3 Measurement and Supervision Procedures for Product Input by Truck HYBN-T2-07-0068-2018-1

产品汽车出厂计量及监督程序 HYBN-T2-07-0068-2018-1

7.1.4 Measurement and Supervision Procedures for Product Output by Ship HYBN-T2-07-0069-2018-1

产品装船出厂计量及监督程序 HYBN-T2-07-0069-2018-1

7.1.5 Procedures for Input and Output Measurement by Motor Truck Scale and Supervision

HYBN-T2-07-0070-2018-1

汽车衡进出厂计量及监督程序 HYBN-T2-07-0070-2018-1

7.1.6 Procedure for Measurement Dispute Handling HYBN-T3-07-0071-2018-1

计量纠纷处理程序 HYBN-T3-07-0071-2018-1

7.2 Associated records

关联记录

7.2.1 Records of Input and Output Material Out-of-Tolerance Analysis

HYBN-T6-07-0159-001-2018

进出厂物料超差分析台帐 HYBN-T6-07-0159-001-2018

7.2.2 Records of Measurement Dispute Registration HYBN-T6-07-0160-001-2018

计量纠纷登记台帐 HYBN-T6-07-0160-001-2018

7.2.3 Report on Measurement Dispute and Error Analysis HYBN-T6-07-0161-001-2018

计量纠纷误差分析报告 HYBN-T6-07-0161-001-2018

8 Supplementary Rules

附则

8.1 The Regulations are under the jurisdiction of Equipment Management Dept.

本制度由机械动力部归口管理。

8.2 The Regulations are drafted by the Equipment Management Dept.

本制度起草部门：机械动力部。

8.3 Equipment Management Dept. is responsible for the interpretation of the Regulations.

本制度解释权归机械动力部拥有。

8.4 Preparation and approval of the Regulations are shown in the Table below:

本制度编制和审批情况见下表：

Table 1 Revision, preparation and approval of document

表 1 文件版本编制和审批情况

1	2018-12-31	Ding Shichun 丁似春	Tong Xueyun 童雪云	Xu Ye 徐野	Chen Liancai 陈连财
Revision 版本	Issued date 颁布日期	Prepared by 编制人	Reviewed by 审核人	Authorized by 审定人	Approved by 批准人



Hengyi Industries Sdn Bhd
恒逸实业（文莱）有限公司

HYBN-T3-07-0022-2018-1

Coal Management System

煤炭管理制度

Issued Date: Dec. 2018

颁布日期：2018 年 12 月

 HENGYI	Hengyi Industries Sdn Bhd 恒逸实业（文莱）有限公司			
	Coal Management System			
	煤炭管理制度			
Doc. No.	HYBN-T3-07-0022-2018-1	Ver No.	1	Page 1 of 9

1 Purpose

目的

This System is hereby formulated in order to standardize and strengthen the Company's coal management, define management responsibilities, reduce coal use cost, improve the coal use efficiency and increase the Company's overall benefit.

为规范和加强公司煤炭管理，明确管理职责，降低煤炭使用成本，提高煤炭使用效率和公司总体效益，特制订本制度。

2 Scope of Application

适用范围

This System is applicable to the whole-process management of the Company's coal planning, procurement, inspection, measurement, transfer, storage, use, statistics and analysis.

本制度适用于公司煤炭计划、采购、检验、计量、输转、储存、使用、统计、分析的全过程管理。

3 Terms and Definitions

术语和定义

N/A.

无。

4 Management Responsibilities

管理职责

4.1 Specified administrative authority

归口管理部门

4.1.1 Equipment Management Dept. is the specified administrative authority of the Company's coal management (except for coal quality management), which shall be responsible for organizing the formulation (revision) of the Company's coal management system, planning all departments' coal management regulations and organizing supervision and inspection of the Company's coal management; besides, it shall be responsible for

entrusting the inspection, applying for the purchase and arranging the maintenance of coal ash loading/unloading, transfer and measurement equipment.

机械动力部是公司煤炭管理的归口管理部门（煤炭质量管理除外），负责组织制（修）订公司煤炭管理制度，统筹各部门煤炭管理相关规定，负责组织公司煤炭管理的监督检查；负责煤灰装卸、输转、计量设备的委托检验、申购和维修安排。

4.1.2 Be responsible for reviewing the power plant's coal requirement plan; be responsible for participating in and reviewing the power plant's coal check.

负责审核电站煤炭需求计划；负责参与和审核电站煤炭盘点工作。

4.1.3 Be responsible for managing the coal conveying system and organizing the negotiation and conclusion of an outsourcing contract for terminal coal unloading and conveying trestle clearing operations.

负责煤炭输送系统的管理，组织商谈、订立码头卸煤及输送栈桥清理业务外包合同。

4.1.4 Be responsible for countersigning the coal purchase contract and participating in the coal purchase quality review.

负责煤炭采购合同的会签，参与煤炭采购质量评审。

4.1.5 Be responsible for supervising the inspection of draft gauge for coalers, inspecting hold and confirming the coal measurement data; be responsible for organizing calibration of electronic belt scale for coal handling; be responsible for investigation into and analysis of measurement disputes and issuance of measurement error report; and be responsible for organizing the mid-year and year-end coal stocktaking and other coal stocktaking supervision.

负责运煤船的水尺检尺监督、验舱及煤炭计量数据确认；负责组织输煤电子皮带秤的检定；负责计量纠纷的调查分析，出具计量误差报告；负责组织年中、年末煤炭盘库工作及其他煤炭盘库监督工作。

4.2 Coordinated management departments

协同管理部门

4.2.1 Scheduling & Dispatch Dept. is responsible for dispatch, balance and coordination among coal use/consumption, inventory and demand/procurement;

计划调度部负责煤炭使用消耗、库存与需求采购间的调度平衡、协调工作；

4.2.2 Commercial Dept. is responsible for procurement, receipt and entrusted inspection of coal, takes the lead in quality and measurement dispute handling; it is also responsible for sending notices on arrival information of coalers and organizing commodity inspection and sampling upon their arrival.

商务部负责煤炭的采购、到货接收、到货委托检验，牵头负责质量、计量纠纷处理；负责煤船到港信息通知、到港后的商检组织和采样组织。

4.2.3 Finance Dept. is responsible for coal settlement, periodic coal cost analysis, and account handling in case of difference in coal inventory quantity or value.

财务管理部负责煤炭结算，定期进行煤炭成本分析；负责煤炭盘库量值差异的帐务处理。

4.3 Executive departments

执行部门

4.3.1 Power Dept., Port and Storage Department, and Lab Dept. are the executive departments.

热电部、港务储运部、质量检验部为执行部门。

4.3.1.1 Power Dept. is responsible for: managing the technological process of coal in this department; preparing the coal requirement plan; preparing the statistical statement on coal consumption; initial measurement of as-received coal; daily management and stocktaking of coal; supervising the sampling of as-fired coal and the sampling and sample preparation of as-received coal; and applying for the maintenance, inspection and repair of coal loading/unloading, transfer and measurement equipment in the charge of it.

热电部负责本部门的煤炭工艺过程管理；负责煤炭需求计划编制；负责煤炭消耗统计报表编制；负责进厂煤炭的初始计量；负责煤炭的日常管理及盘库工作；负责入炉煤的采样和入厂煤采制样的监督；负责所属煤炭装卸、输转、计量设备的维护、检验和维修申请。

4.3.1.2 Port and Storage Department is responsible for: ship berthing and unberthing management; submitting applications to the maritime and port authority of Brunei for arrangement of ship berthing; arranging the ship unberthing operations according to production dispatch instructions; and maintenance & management of berthing and mooring equipment (bitt, fender and beacon).

港务储运部负责船舶靠泊和离泊管理；负责向文莱海港局申报申请，安排船舶靠泊；负责按生产调度指令安排船舶离泊作业；负责靠泊和系泊设备（系缆柱、护舷、航标）的维护管理。

4.3.1.3 Lab Dept. is responsible for: whole-process management of coal quality; coal sampling, sample preparation and laboratory test management and quality control and quality dispute handling; sample check, sample preparation and laboratory test of as-received coal and the sample preparation and laboratory test of as-fired coal.

质量检验部负责煤炭质量的全过程管理；负责煤炭采、制、化管理及质量控制、质量纠纷处理，负责入厂煤的样品核查、制样、化验以及入炉煤的制样、化验工作。

5 Management Content

管理内容

5.1 Plan management

计划管理

5.1.1 Power Dept. prepares the annual, quarterly and monthly coal requirements plans based on the annual, quarterly and monthly power and steam consumption plans of units of Scheduling & Dispatch Dept. and the actual conditions of boilers. The requirements plans shall include the quantity required and the quality criteria and shall be submitted to the Equipment Management Dept. for review and approval before being submitted to Scheduling & Dispatch

Dept.

热电部根据计划调度部的年、季、月装置用电、用汽计划和锅炉实际情况，编制年、季、月煤炭需求计划，需求计划应当包含需求数量和质量指标，报机动部审核后发计划调度部。

5.1.2 Scheduling & Dispatch Dept. prepares the coal purchase plan by balancing the requirements plan and inventory and then sends it to Commercial Dept.

计划调度部通过平衡需求计划和库存情况，编制煤炭采购计划发商务部。

5.2 Procurement management

采购管理

5.2.1 Commercial Dept. is responsible for sending the coal purchase plan to and signing a coal purchase contract with Hengyi Industries International PTE LTD.

商务部负责向恒逸国际有限公司发出煤炭采购计划，并与其签订煤炭采购合同。

5.2.2 Commercial Dept. shall define in the coal purchase contract the following principles that must be followed in coal purchase:

商务部应当在煤炭采购合同中明确煤炭采购须遵循以下原则：

5.2.2.1 Comply with coal quality criteria;

符合煤炭质量指标；

5.2.2.2 Make quality and price comparisons to strive for the lowest comprehensive cost;

比质比价，力争综合成本最低；

5.2.2.3 Give preference to use our measurement equipment and standard and to measure by electronic belt scale;

优先采用以我方计量设备和标准，计量方式优先采用电子皮带秤计量；

5.2.2.4 Give preference to our quality analysis data.

优先采用以我方质量分析数据。

5.2.2.5 The coal purchase contract shall contain provisions on rejection criteria and on penalty for failure to meet coal quality criteria, and such provisions shall be submitted in advance to Equipment Management Dept. and Power Dept. for their comments or for countersigning the contract.

煤炭采购合同应有拒收指标和未达到煤炭质量指标的违约处罚条款，并且该条款应提前书面征求机械动力部、热电部意见或进行合同会签。

5.2.4 The specific implementation of coal purchase shall comply with *Coal Purchase Management System* of Commercial Dept.

煤炭采购的具体实施按商务部《煤炭采购管理制度》执行。

5.3 Unloading and transfer

接卸、输转

5.3.1 Commercial Dept. shall, based on the information offered by Hengyi Industries International PTE LTD, contact the Coal Supplier and the Coal Carrier, determine the name/voyage and time of berthing of each coaler 24 hours before the berthing, and notify

Equipment Management Dept., Lab Dept. and Port and Storage Department of the same.

商务部根据恒逸国际有限公司提供的信息，联系煤炭供方、运输方，在靠港 24 小时前确定煤炭运输船的船名/航次、靠港时间，通报机械动力部、质量检验部、港务储运部。

5.3.2 After Commercial Dept. and Port and Storage Department have completed all formalities for coalers to berth and piloted the coalers to the coal jetty for berthing, Commercial Dept. shall inform the Equipment Management Dept. and Lab Dept. in advance of the exact time of berthing.

商务部、港务储运部办理完成煤船靠港的所有手续，将煤船引至煤码头靠港后，由商务部将靠港确切时间提前通知机械动力部、质量检验部。

5.3.3 Commercial Dept. contacts the commodity inspection personnel to board for draft inspection, and the measurement personnel from Equipment Management Dept. to board for supervising the draft inspection and keeping records. Personnel supervising the draft inspection must be familiar with the draft survey knowledge.

商务部联系商检人员登船检尺，机械动力部计量人员登船监督检尺，并做好记录。监督检尺人员须熟悉水尺计量知识。

5.3.4 Power Dept. organizes teams/groups to inspect the equipment within the scope from hopper-equipped portal crane to spherical coal bunker, including conveyor belt, electronic belt scale, automatic sampling machine and de-ironing separator, to ensure equipment meets the coal unloading demand and, in line with the coaler berthing information offered by Equipment Management Dept., arranges for the operators of hopper-equipped portal crane to make inspection and preparation before coal unloading.

热电部组织班组对带斗门机至球形煤仓范围内的包括输送皮带、电子皮带秤、自动采样机、除铁器在内的设备进行检查，确保设备满足卸煤需求，并根据机械动力部提供的煤船靠港信息安排带斗门机操作人员做好卸煤前的检查、准备工作。

5.3.5 Coal unloading shall begin upon ending of draft inspection and continue after coal is unloaded to a relatively independent area of spherical coal bunker. During this course, teams/groups of Power Dept. shall conduct patrol inspection on coal unloading process in accordance with the *Process Technology Management System* and record the same in the shift change log. Focus shall be put on recording the time of startup and shutdown of belt, time of placement and remove of sampling bucket, initial and ultimate data of electronic belt scale, etc. 检尺结束开始卸煤，煤炭卸至球仓某一相对独立区域，卸煤应连续进行。期间，热电部班组应按《工艺技术管理制度》对卸煤过程进行巡检并在交接班日志中记录。重点应记录皮带开机时间、停机时间、采样桶放置时间、取走时间、电子皮带秤起始数据、终了数据等。

5.3.6 After coalers have been emptied, and after which have been confirmed by measurement personnel from Equipment Management Dept., the hopper-equipped portal crane shall stop operation. Power Dept. shall stop the operation of belts according to operating instructions after confirmation that no coal has been left on the belts and in the stacker.

煤船卸空后，经机械动力部计量人员确认后，带斗门机停止作业。热电部确认皮带上煤全部走空、堆料机无落料后按操作规程停止皮带运行。

5.4 Quality management

质量管理

5.4.1 Lab Dept. is responsible for implementing whole-process management of coal quality, formulating *Coal Quality Management Regulations*, making and organizing the implementation of stipulations about sampling, sample preparation, laboratory test, quality control, quality dispute, etc. of coal. Lab Dept. shall conduct independent quality inspection on each batch of coal.

质量检验部对煤炭质量实施全过程管理，并制定《煤炭质量管理规定》，对煤炭的采样、制样、化验、质量控制及质量纠纷等作出规定，并组织实施。质量检验部应当对每一批次煤炭进行独立的质量检验。

5.4.2 Equipment Management Dept. formulates and issues the coal quality criteria and analysis frequency. Where the coal purchased fails to meet the coal quality criteria, Lab Dept. will organize Commercial Dept., Planning and Dispatching Dept., Equipment Management Dept. and Power Dept. to conduct non-conformance review, and make a non-conformance disposition plan, submit it to the Company's Deputy General Manager in Charge of Quality and Mechanical Power for approval and implement it upon being approved.

机械动力部制订煤炭质量指标和分析频率，并予以发布。当采购煤炭未达煤炭质量标准，由质量检验部组织商务部、计划调度部、机械动力部、热电部进行不合格评审，并制定不合格品处置方案，报公司分管质量和机械动力的副总经理批准后执行。

5.4.3 Power Dept. is responsible for managing and operating automatic sampling machine, and taking samples in accordance with operating rules and such sampling plan as is presented by Lab Dept; as-fired coal sampling plan is presented by Lab Dept. and sampling is in the charge of Power Dept. Power Dept. is responsible for handing samples over to Lab Dept. which will inspect and confirm the samples, prepare samples and conduct analysis and inspection, and then issue a coal quality report.

热电部负责自动采样机的管理和操作，负责按操作规程和质量检验部提出的采样方案进行采样；入炉煤采样方案由质量检验部提出，热电部负责采样。热电部负责将样品移交质量检验部，质量检验部在对样品进行检查、确认后制样、分析检验并出具煤炭质量报告。

5.5 Technological process and storage yard management

工艺过程管理和堆场管理

5.5.1 Equipment Management Dept. organizes the preparation of the process technology regulations about coal unloading, conveyance, crushing, storage and firing, and handles countersigning, review and approval formalities as required by the *Process Technology Management System* before releasing it.

机械动力部组织编写煤炭卸煤、输送、破碎、储存、燃烧过程的工艺技术规程，按《工艺管理制度》要求办理会签、审批手续后予以发布。

5.5.2 Power Dept. shall mark the coal stored in spherical coal bunker by its incoming batches, transfer it based on the principle of "first warehouse-in, first warehouse-out", and carry out daily management such as regular temperature measurement. Engineers of fuel discipline from

Power Dept. shall organize the coal unloading, conveyance, crushing, storage and firing in accordance with the *Process Technology Management System* and the process technology regulations. The management process mentioned above shall be recorded and analyzed in the *Monthly Report on Production Technology* on a monthly basis.

热电部应对球形煤仓存煤按进煤批次进行标记，按先进先出原则做好转输工作，并做好定期测温工作等日常管理工作。热电部燃料专业工程师按《工艺技术管理制度》、工艺技术规程，组织做好煤炭卸煤、输送、破碎、储存、燃烧工作。以上管理过程按月在《生产技术月报》中予以记录、分析。

5.5.3 Any problem found by the engineers of fuel discipline from Power Dept. in the course of coal process management shall be handled as per corrective and preventive measures.

热电部燃料专业工程师在煤炭工艺管理过程中发现的问题，按纠正和预防措施处理。

5.5.4 Equipment Management Dept. shall timely organize Power Dept. to conduct trial firing of new coals; upon completion of trial firing, Power Dept. will prepare a trial firing assessment report and Equipment Management Dept. will organize the review of the same.

机械动力部应当及时组织热电部开展新煤种试烧工作，试烧结束由热电部编制试烧评价报告，机动部组织评审。

5.6 Measurement, statistics and stocktaking management

计量、统计及盘库管理

5.6.1 Measurement Discipline of Equipment Management Dept. takes the lead in coal measurement management and organizes the setting and implementation of check frequency and methods for measurement devices in the course of coal measurement; it is responsible for supervising and confirming the measurement data in commodity inspection, and also organizes or participates in stocktaking of spherical coal bunker.

机械动力部计量专业牵头负责煤炭计量管理，组织制订煤炭计量过程中计量装置的校验频率和方法并组织实施；负责对商检计量数据进行监督和确认；组织或参与球形煤仓的盘库工作。

5.6.2 Power Dept. is responsible for initial measurement of coal; measured data will be confirmed by the Measurement Discipline of Mechanical Department before it is submitted to Planning and Dispatching Dept.

热电部负责煤炭初始计量，经机械动力部计量专业进行数据确认，报计划调度部。

5.6.3 Power Dept. reports the coal consumption, warehouse-in, storage and other statuses in the last 24 hours to the dispatcher on duty of Planning and Dispatching Dept. at 6:00 every day and keeps records accordingly. Power Dept. analyzes the loss of coal reserves in the *Monthly Report on Production Technology* and reports it to Equipment Management Dept.

热电部每日 6:00 向计划调度部值班调度汇报前 24 小时的煤炭消耗、入库、库存等情况，并作记录。热电部在《生产技术月报》中对煤炭储损进行分析并报机动部。

5.6.4 Measurement Discipline of Equipment Management Dept. organizes the mid-year and year-end stocktaking of spherical coal bunker of Power Dept; Power Dept. conducts stocktaking once per month under the supervision of person assigned by Measurement Discipline of Equipment Management Dept. Upon completion of stocktaking, Power Dept.

prepares and submits the *Coal Stocktaking Form* to Equipment Management Dept. The loss of coal reserves in spherical coal bunker shall not exceed 0.5%.

机械动力部计量专业组织做好年中、年末的热电部球形煤仓的盘库工作；热电部做好每月一次的盘库工作，机械动力部计量专业派员监督盘库。盘库结束后由热电部编制《煤炭盘点表》报机械动力部。球形煤仓存损率不得超 0.5%。

5.6.5 Settlement of the coal purchase contract shall be subject to our measurement preferably, and electronic belt scale is adopted preferably for measurement; if the settlement of contract is based on the counterparty's measurement and if the difference between both parties' measurements is out of limits, Commercial Dept. shall organize the coordination in measurement dispute handling and present handling suggestions, and the Leader in charge of measurement of Equipment Management Dept. shall investigate into the measurement dispute and issue an investigation report. Moisture measured by both parties shall be averaged.

煤炭采购合同优先采用我方计量为准的结算方式，计量优先采用电子皮带秤为依据；若合同采用对方计量为结算依据，当双方计量差异超标时，由商务部组织协调计量纠纷处理并出具处理意见，机动部计量管理人员应当开展计量纠纷调查并出具调查报告。计量时两者水份应折平。

5.6.6 Finance Dept. shall handle accounts about coal loss on a monthly basis as required. If the loss rate is within the fixed range, the monthly loss shall be written off by Finance Dept; if the loss rate exceeds the fixed loss rate, the monthly loss shall be verified by Equipment Management Dept. first, and then written off by Finance Dept.

财务管理部按规定每月对煤炭损耗量进行帐务处理。若损耗率在定额范围内，当月损耗量，由财务管理部作帐务核销处理；若损耗率超过定额损耗率，当月损耗量由机械动力部核定后，由财务管理部作帐务核销处理。

6 Inspection and Supervision

检查与监督

6.1 GM's Office is responsible for incorporating coal management into the Company's performance management measures for assessment.

总经理办公室负责将煤炭管理纳入公司绩效管理办法进行考核。

6.2 Equipment Management Dept. is responsible for establishing assessment criteria, determining assessment methods, conducting supervision and assessment, and issuing assessment comments in terms of relevant departments' implementation of the coal management system.

机械动力部负责对相关部门煤炭管理制度执行情况，制定考核指标，明确考核办法，实施监督和考核，并出具考核意见。

6.3 Lab Dept. is responsible for establishing assessment criteria, determining assessment methods, conducting supervision and assessment, and issuing assessment comments in terms of relevant departments' coal quality management.

质量检验部负责对相关部门煤炭质量管理情况，制定考核指标，明确考核办法，实施监督和考核，并出具考核意见。

7 Associated Procedures and Records

关联程序和记录

7.1 Associated procedures

关联程序

Coal Management Procedures HYBN-T2-07-0072-2018-1

煤炭管理程序：HYBN-T2-07-0072-2018-1

7.2 Associated records

关联记录

N/A.

无

8 Supplementary Rules

附则

8.1 This System is under the jurisdiction of Equipment Management Dept.

本制度由机械动力部归口管理。

8.2 This System is drafted by Equipment Management Dept.

本制度起草部门：机械动力部。

8.3 Equipment Management Dept. is responsible for the interpretation of this System.

本制度解释权归机械动力部拥有。

8.4 Revision, preparation and approval of this System are shown in Table 1:

本制度编报编制和审批情况见表 1:

Table 1 Revision, preparation and approval of document

表 1 文件版本编制和审批情况

1	2018-12-31	Xie Kejun 谢可君	Tong Xueyun 童雪云	Xu Ye 徐野	Chen Liancai 陈连财
Revision 版本	Issued date 颁布日期	Prepared by 编制人	Reviewed by 审核人	Authorized by 审定人	Approved by 批准人



Hengyi Industries Sdn Bhd
恒逸实业（文莱）有限公司

HYBN-T3-07-0023-2019-1

Single Point Mooring Inspection Maintenance Management System

单点系泊检查维护管理制度

Issued Date: May 2019

颁布日期：2019年03月

 HENGYI	Hengyi Industries Sdn Bhd 恒逸实业（文莱）有限公司			
	Single Point Mooring Inspection Maintenance Management System 单点系泊系统检查维护管理制度			
	Doc No.	HYBN-T3-07-0023-2019-1	Ver No.	1

1 Objective

目的

The single point mooring immersed in tropical sea water all year round will be naturally corroded by the sea water, requiring daily inspection and maintenance of the single point mooring. At the same time, frequent oil loading and unloading and ship activities may also cause damage to the mooring system. Carrying out inspection and maintenance work of different frequencies is conducive to ensuring the integrity of the mooring system, reducing the failure of mooring equipment and prolonging the life of the single point mooring. Therefore, this management system is hereby formulated.

单点系统常年浸泡在热带海水中，会被海水自然腐蚀，需要对单点系统进行日常检查和维护，同时频繁的接卸油和船舶活动也可能对系泊系统产生损伤，开展不同频次的检查维护作业有利于确保系泊系统的设施完整性、降低系泊设备的故障，延长单点寿命，为此特制订本管理制度。

1 Scope of Application

适用范围

This system is applicable to the inspection and maintenance management of the company's single point mooring system.

本制度适用于公司单点系泊系统检查维护管理。

2 Terms and Definitions

术语和定义

2.1 Single-point mooring: the single-point system is composed of equipment such as single-point buoy, floating hose, underwater hose, buoy anchor chain & other pile foundation system, underwater valve and hydraulic-driven system, terminal manifold, mooring cable and remote control system.

单点系泊：单点系统是由单点浮筒、漂浮软管、水下软管、浮筒锚链及其桩基系统、水下阀门和液压驱动系统、终端管汇、系船缆、远程控制系统等设备组成。

3.2 single-point system inspection and daily maintenance include: Daily inspection, pre-berthing inspection, weekly inspection, monthly inspection, annual inspection and special inspection (only after extreme weather conditions occur) for single-point mooring.

单点系统检查和日常维护包括：单点日常检查、泊前检、周检、月检、年检和特殊检查（只在极

端天气情况发生后进行)

3.3 Maintenance period refers to the time interval between two maintenance

维护周期是指两次维护之间的时间间隔。

3 Management Responsibilities

管理职责

3.1 Department in charge

归口管理部门

4.1.1 Equipment Management Dept. is the department in charge of this management system, responsible for the review, preparation and revision of the inspection and maintenance management system of single point mooring system, as well as the inspection and assessment of this management system.

机械动力部是本制度的归口管理部门，负责单点系泊系统检查维护管理制度的审核、编制、修订，负责本制度的检查与考核。

4.1.2 Equipment Management Dept. shall be responsible for reviewing the contents of the single point mooring system inspection and maintenance record submitted by the Port and Storage Department.

机械动力部负责对港储部上报的《单点系泊系统检查维护记录表》内容进行审核。

4.1.3 Equipment Management Dept. to organize Equipment Maintenance Department, Port and Storage Department, Instrument Control Department, Electrical Operation Department and Outsourced Maintenance Unit to carry out daily inspection, maintenance and repair of single point system.

机械动力部组织检修部、港储部、仪控部、电气运行部、外委维保单位对单点系统进行日常检查和维护、维修。

4.2 Implementation Department

执行部门

4.2.1 Port and Storage Department, Equipment Maintenance Department, Instrument Control Department and Electrical Operation Department shall carry out daily inspection and maintenance of topside equipment of single-point mooring system, and they shall be the implementation department of daily inspection and maintenance of single-point mooring.

港储部、检修部、仪控部、电气运行部对单点系统水上部分设备进行日常检查和维护，为单点系泊日常检查维护的执行部门。

4.2.2 Handle the general problems found in daily and weekly inspection, report major problems to the Equipment Management Department and take corresponding measures.

处理日检、周检中查出的一般问题，对于重大问题上报机械动力部并采取相应措施。

4.2.3 Equipment Maintenance Department, Electrical Operation Department, Instrument Control Department and Outsourced Maintenance Unit shall handle the entrusted maintenance tasks in a timely manner.

4.2.3 设备检修部、电气运行部、仪表控制部、外委维保单位应对委托的检修任务及时处理。

5 Management Content

5 管理内容

5.1 Maintenance scope division of single point mooring system

单点系泊系统维保范围划分

Topside part: This shall be responsible by Equipment Management Dept., Electrical Operation Dept., Instrument Control Dept., Operation Dept. and Equipment Management Dept. of Hengyi Brunei. Underwater part: the external maintenance unit shall be responsible for the underwater part.

水上部分：由恒逸文莱公司机、电、仪、操、管相关部门负责。水下部分：由外委维保单位负责。

5.2 Maintenance Personnel Requirement

维保人员要求

5.2.1 The department participating in maintenance inspection shall have the personnel with corresponding technical ability, and the personnel participating in weekly, monthly and annual inspection shall be the technician of each department.

参加维护检查的部门应具有相应技术能力的人员，参加周检、月检、年检的人员应为各部门的技术人员。

5.2.2 The personnel list of daily inspection, weekly inspection, monthly inspection and annual inspection shall be reviewed by the Equipment Management Department, and any changes in personnel list shall be approved by Equipment Management Department.

日检、周检、月检、年检的各部门人员名单需要经过机械动力部审核，人员变更须经机械动力部批准。

5.3 Daily inspection

日检

5.3.1 Port and Storage Dept. shall conduct on-site inspection of the single point mooring system once a day, conduct all-weather monitoring of the single point buoy in the central control room, and fill in the daily inspection record form of the single point mooring system.

港储部应对单点系泊系统现场每天巡检一次，对单点浮筒在中控室进行全天候监控，填写《单点

系泊系统日检记录表》。

5.3.2 Daily inspection of single point mooring system shall be carried out continuously all year round, and the personnel on duty shall be responsible for it during public holidays.

全年单点系泊系统日检不间断，节假日的日检由值班人员负责。

5.3.3 Daily inspection record form of single point mooring system shall be issued once a month and shall be placed in the designated place and managed by the Port and Storage Department. The shelf life shall be one year.

《单点系泊系统日检记录表》每月一本，放置在指定位置，由港储部负责管理，保存期为1年。

5.3.4 Personnel of single-point mooring system shall timely deal with or inform relevant personnel of the problems found in daily inspection, and implement the Management Procedures of single-point mooring system.

单点系泊系统人员在日检中发现的问题应及时处理或通知有关人员，并按单点系泊系统管理程序执行。

5.3.5 Port and Storage Department is responsible for the daily normalization of single point mooring system.

港储部负责单点系泊系统日常规格化。

5.4 Weekly inspection, pre-berthing inspection, monthly inspection and annual inspection
周检、泊前检、月检、年检

5.4.1 Equipment Management Department shall organize various units such as Equipment Maintenance Dept., Electrical Operation Dept., Instrument Control Dept., Operation Dept. and Equipment Management Dept. to conduct comprehensive inspection of the topside of single point mooring in weekly inspection, pre-berthing inspection, monthly inspection and annual inspection. All departments shall fill in the weekly and pre-berthing inspection records of the single-point mooring system. The weekly inspection is scheduled to start at 8:30 am every Wednesday.

周检、泊前检、月检、年检、由机械动力部组织机、电、仪、操、管各工种对单点系泊水上部分进行全面检查。各部门在单点系泊系统周检、泊前检记录本填写检查情况。周检时间定于每周三上午 8:30 开始。

5.4.2 Equipment Management Department shall keep track on the handling of weekly inspection problems, and coordinate to solve important problems and problems that requires multi-professional cooperation.

机械动力部应跟踪周检问题的处理，协调解决重要问题和需多专业协同处理的问题。

5.5 Emergency maintenance, planned maintenance and overhaul
应急检修、计划检修及大修

5.5.1 Emergency maintenance: Equipment Management Department takes the lead to

organize the Port and Storage Department and other relevant departments to implement.

应急检修：机械动力部牵头组织港储部等相关部门实施。

5.5.2 Planned maintenance and regular overhaul: The inspection and maintenance plan shall be prepared by the Port and Storage Department and after it is reviewed by Equipment Management Department, relevant departments shall be organized to implement the plan.

计划检修、定期大修：由港储部编制检维修计划，机械动力部审核后，牵头组织相关部门实施。

6 Inspection and Supervision

6 检查与监督

Equipment Management Department is responsible for the supervision, inspection and assessment of the daily inspection and maintenance of the single point mooring system.

机械动力部负责对单点系泊系统日常检查维护情况进行监督检查并考核。

7 Associated Programs and Records

关联程序和记录

7.1 Associated Programs

关联程序

Single Point Mooring System Management Procedure HYBN-T2-07-0073-2019-1

单点系泊系统管理程序 HYBN-T2-07-0073-2019-1

7.2 Associated Records

关联记录

7.2.1 Personnel List of Single Point Mooring System HYBN-T6-07-0163-2019

单点系泊系统人员一览表 HYBN-T6-07-0163-2019

7.2.2 Inspection and Maintenance Records of Single Point Mooring System
HYBN-T6-07-0164-2019

单点系泊系统检查维护记录表 HYBN-T6-07-0164-2019

8 Supplementary Provisions

附则

8.1 This management system shall be in charged by Equipment Management Dept.

本制度由机械动力部归口管理。

8.2 This management system is composed by: Equipment Management Dept.

本制度起草部门：机械动力部。

8.3 The right of interpretation of this system belongs to the Equipment Management Dept.
本制度解释权归机械动力部拥有。

8.4 The preparation and approval of this version of management system are shown in Table 1:
本制度版本编制和审批情况见表 1:

Table 1: Document version preparation and approval status

表 1 文件版本编制和审批情况

1	2019-03-25	Mi Jianbin 米建彬	Tong Xueyun 童雪云	Xu Ye 徐野	Chen Liancai 陈连财
Revision 版本	Issued date 颁布日期	Prepared by 编制人	Reviewed by 审核人	Authorized by 审定人	Approved by 批准人



Hengyi Industries Sdn Bhd
恒逸实业（文莱）有限公司

HYBN-T3-07-0024-2018-1

Coal Inventory Management Regulation

煤炭盘库管理制度

Issued Date: Dec. 2018

颁布日期：2018 年 12 月

 HENGYI	Hengyi Industries Sdn Bhd 恒逸实业（文莱）有限公司			
	Coal Inventory Management Regulation 煤炭盘库管理制度			
	Doc No.	HYBN-T3-07-0024-2018-1	Ver No.	1

1 Purpose

目的

The Regulations are hereby formulated in order to regulate the Company's inventory management of "incoming, consumption and inventory" and ensure a true and accurate inventory data based on the *Coal Management System*.

为了规范公司煤炭“进、消、存”的盘库管理，确保盘库数据真实、准确，根据《煤炭管理制度》，特制定本制度。

2 Scope of Application

适用范围

The Regulations are applicable to the inventory management of the Company's coal bunkers. 本制度适用于公司煤仓的盘库管理。

3 Terms and Definitions

术语和定义

N/A.

不适用。

4 Management Responsibilities

管理职责

4.1 Specified administrative authority

归口管理部门

4.1.1 The Equipment Management Dept. is the specified administrative authority for coal inventory management and responsible for organizing the relevant departments for the mid-year and year-end inventory of coal bunkers.

机械动力部是公司煤炭盘库管理的归口部门，负责组织相关部门对煤仓进行年中、年末的盘库工作。

4.1.2 Be responsible for supervising the monthly inventory work by the Power Dept. and confirming the measurement data in the *Coal Inventory Count Sheets*.

负责监督热电部的月度盘库工作，对《煤炭盘点表》的计量数据进行确认。

4.1.3 Be responsible for supervising a third-party commercial inspection organization's inspection work to the tide staff and void cabins before loading or after unloading during coal transportation through waterways to access the plant.

负责监督第三方商检对煤炭水路进厂的卸前、卸后水尺及空舱检验工作。

4.1.4 Be responsible for periodically calibrating and checking electronic belt scales on coal jetties.

负责煤码头电子皮带秤的定期校准和期间核查。

4.1.5 Be responsible for assisting the Commercial Dept. in dealing with the measurement disputes over in-coming coal.

负责协助商务进行煤炭进厂计量纠纷的处理。

4.2 Coordinated management departments

协同管理部门

4.2.1 The Scheduling & Dispatch Dept. shall be responsible for coordinating the coal inventory work. The no warehousing and ex-warehouse shall be arranged during inventory.

计划调度部负责煤炭盘库的协调工作，在盘库过程中不安排煤炭进出库的操作。

4.2.2 The Commercial Dept. shall be responsible for organizing commercial inspection and dealing with the measurement disputes upon the arrival of coal ships; confirming the measurement data of *Coal Inventory Count Sheets*.

商务部负责煤船到港的商检组织和计量纠纷处理；负责参与《煤炭盘点表》计量数据的确认。

4.2.3 The financial department shall join the mid-year and year-end inventory work and handle the account affairs concerning profits and losses of inventory.

财务部参与煤炭的年中和年末盘库工作，并对盘库盈亏进行帐务处理。

4.3 Executive departments

执行部门

4.3.1 The Power Dept. and the Lab Dept. are executive departments.

热电部和质量检验部为执行部门。

4.3.2 The Power Dept. shall be responsible for checking the inventory level monthly, in the middle and at the end of the year; timely submitting the coal inventory results to relevant departments; daily managing the coal metering equipment; timely recording the actual accepted amount of coal in the MES system.

热电部负责月度、年中和年末盘库的具体操作；负责及时将煤炭盘库结果报送相关部门；负责所属煤炭计量设备的日常管理；负责及时在MES系统中录入煤炭进厂的实收量。

4.3.3 The Lab Dept. shall be responsible for the laboratory analysis of coal and timely release the laboratory results in the Lims system.

质量检验部负责煤炭的化验分析，并及时在 Lims 系统中发布化验结果。

5 Management Content

管理内容

5.1 Basic requirements

基本要求

5.1.1 The monthly inventory begins at 9:00 on the last day of each month; the mid-year inventory starts at 9:00 on the last day of June while the year-end inventory starts at 9:00 on the last day of December.

月度盘库时间为每月最后一天 9:00 开始；年中盘库时间为 6 月份最后一天 9:00 开始，年末盘库时间为 12 月份最后一天 9:00 开始。

5.1.2 In principle, the inventory work will not be postponed in case of holidays and festivals and the specific notifications of the Company shall prevail for special cases.

盘库时间原则上逢节假日不顺延，如有特殊情况，按公司的具体通知执行。

5.1.3 The inventory work shall be fully prepared. Personnel checking the inventory level shall arrive at the coal yard on time and follow the Regulations for inventory.

盘库工作必须准备充分，参与盘库人员应按规定时间到达煤场，按照本制度进行盘存。

5.1.4 Personnel checking the inventory level shall be relatively permanent, the metering devices for inventory shall be in line with the metering requirements, and the inventory personnel shall be specially assigned by the Power Dept.

参与盘库人员应保持相对稳定，使用的盘库计量器具应符合计量要求，并由热电部指定专人操作。

5.1.5 The stacking density shall be measured with reference to relevant standards, and accumulate experience data gradually. The value closest to the true stacking density can be used for calculation during the inventory.

煤炭堆密度应参考相关标准进行测定，并逐步积累经验数据。盘库时根据实际采用最接近真实堆密度的值进行计算。

5.1.6 The inventory methods are proper and the inventory data shall be detailed, reliable, accurate and complete, and shall be signed and confirmed by the personnel checking the inventory level.

盘库方法正确，盘库数据应详实、准确、完整，并经参与盘库人员的签字确认。

5.1.7 The Power Dept. shall create and keep the original records of coal bunkers, including all the basic data such as geometric volume, stacking density and adjustment amount due to moisture difference during coal bunker inventory, as well as computational procedures and computed results.

热电部建立并保存煤仓盘存的原始记录，包括煤仓盘存过程中的全部基础数据：如几何体积、堆积密度、煤水分差调整煤量等，以及计算过程、计算结果等。

5.1.8 The variance analysis of profits and losses of inventory shall be accurate and account

affairs shall be handled as per relevant procedures and regulations.

盈亏库差异分析应准确，并按相关流程和制度进行账务处理。

5.2 Supervision on the incoming and consumption of coal 煤炭进厂及消耗监督

5.2.1 The Equipment Management Dept. shall supervise the metering process by the third-party commercial inspection organization upon the arrival of coal ship at the harbor, the acceptance rates staff of the un-load and heavy-load tide staff shall be 100%.

机械动力部监督煤船到港后的第三方商检计量过程，空载水尺和重载水尺的验收率都须达到100%。

5.2.2 The computational formulas for rate of loss during coal shipping:

煤炭运损率计算公式为：

$$\text{Loss rate (\%)} = [(\text{bill of lading weight} - \text{landed weight}) / \text{bill of lading weight}] \times 100\%$$

$$\text{运损率 (\%)} = [(\text{提单量} - \text{到港量}) \div \text{提单量}] \times 100\%$$

5.2.3 When the loss rate is greater than 1.0%, or when the comparison difference between the bill of lading quantity and electronic balance at the jetty is greater than 0.5% after unloading completely, the Commercial Dept. shall organize relevant departments for inspection and initiate the metering dispute resolution procedures if necessary.

当运损率超过 1.0%，或在煤炭卸净后提单量与码头电子皮带秤比对误差超过 0.5%时，由商务部组织相关部门调查，必要时发起计量纠纷处理流程。

5.2.4 In principle, the consumption of coal entering furnaces shall be subject to the data of electronic belt scale on the belt conveyor of coal entering the furnace. During a monthly inventory, data can be balanced by revising appropriately according to the coal “incoming, consumption and inventory” status.

入炉煤耗原则上以入炉煤皮带机上的电子皮带秤数据为准。月末盘库时，可根据煤炭“进、消、存”情况平衡数据，进行适当修正。

5.2.5 If the electronic belt scale for coal entering furnaces is faulted or subject to a temporary overhaul and the coal consumption cannot be counted, the coal consumption shall be calculated according to the electronic belt scale of the coal feeder.

当入炉煤电子皮带秤发生故障或临时检修造成无法计算煤炭耗量时，应按给煤机电子皮带秤消耗量计算煤耗量。

5.2.6 The Power Dept. shall regularly check the operating conditions of all electronic belt scales, including removing the coal and ashes accumulated on the scale bodies, checking whether the meters of belt scales are normal, etc. In case of any abnormality, inform the Instrument Control Dept. for treatment.

热电部应对所有电子皮带秤的运行工况定期检查，包括清理秤体的积煤、积灰，检查皮带秤表计是否正常等，出现异常应及时联系仪表控制部进行处理。

5.3 Computation of inventory profit and loss of coal bunkers and rate of inventory profit and loss.

煤仓盈亏量和盈亏率计算

5.3.1 Computational formulas for inventory profits and losses of coal bunkers are as follows:

煤仓盘点盈亏量计算公式如下：

Inventory profits and losses = Actual inventory storage amount – ledger storage amount

盘点盈亏量=实际盘点库存量-账面库存量

Inventory profits are when the actual inventory storage amount is larger than the ledger storage amount. Inventory losses are when the actual inventory storage amount is less than the ledger storage amount.

当实际盘点库存量大于账面库存量时为盈，当实际盘点库存量小于账面库存量时为亏。

Where:

式中：

Ledger inventory amount = Initial inventory of current period + actual acceptance amount of current period – current period's consumption + adjustment amount of coal due to moisture difference in coal

账面库存量=当期期初库存+当期实收量-当期消耗量+煤水分差调整煤量

Adjustment amount of coal due to moisture difference in coal = total consumption of coal entering furnaces by electronic belt scale × [1 – (100 – M_{Entering furnace})/(100 – M_{Warehousing})], where:

煤水分差调整煤量=入炉煤电子皮带秤累计耗煤量× [1 – (100- M_{入炉}) ÷ (100- M_{入仓})], 其中：

M_{Entering furnace} — Weighted average of total moisture of coal entering the furnaces (%)

M_{入炉}—入炉煤全水分加权平均值，%

M_{Warehousing} — Weighted average of total moisture of coal entering coal bunkers (%)

M_{入仓}—入仓煤全水分加权平均值，%

5.3.2 Computational formulas for rate of inventory profits and losses of coal bunkers are as follows:

煤仓盈亏率计算公式如下：

Rate of inventory profits and losses (%) = (Inventory storage amount / daily amount of coal actually stored in the current month) × 100%

盈亏率（%）=（盘点库存量÷当月日平均实际存煤量）×100%

5.3.3 The prescribed reference value for inventory profits and losses rate of coal bunker is 0.5%. The allowable inventory profits and losses of coal bunkers are generally no greater than 0.5% of the monthly amount of coal actually stored in the current month, i.e.: allowable inventory profits and losses = daily amount of coal actually stored in the current month × 0.5%. 规定煤仓盈亏率的基准值为 0.5%，一般情况下按不大于当月的日平均存煤量的 0.5% 计算煤仓允许盈亏量，即：允许盈亏量 = 当月日平均存煤量 × 0.5%。

5.3.4 When the inventory profits and losses are greater than the maximum allowable inventory profits and losses, that is, if the inventory profits and losses rate exceeds 0.5%, the Equipment Management Dept. shall organize relevant departments for error analyses, find out the causes and complete a technical report.

当盘点盈亏量大于允许盈亏量，即盈亏率超出 0.5%时，由机械动力部组织相关部门进行误差分析，查明原因并形成技术报告。

6 Inspection and Supervision

检查与监督

The Equipment Management Dept. shall be responsible for supervising, inspecting and assessing the inventory of coal.

机械动力部负责对煤炭盘库情况进行监督检查考核。

7 Associated Procedures and Records

关联程序和记录

N/A.

不适用。

8 Supplementary Rules

附则

8.1 The Regulations are under the jurisdiction of Equipment Management Dept.

本制度由机械动力部归口管理。

8.2 The Regulations are drafted by the Equipment Management Dept.

本制度起草部门：机械动力部。

8.3 The Equipment Management Dept. is responsible for the interpretation of the Regulations.

本制度解释权归机械动力部拥有。

8.4 Revision, preparation and approval of the Regulations are shown in Table 1:

本制度编报编制和审批情况见表 1:

Table 1 Revision, preparation and approval of document

表 1 文件版本编制和审批情况

1	2018-12-31	Xia Tianyu 夏天宇	Tong Xueyun 童雪云	Xu Ye 徐野	Chen Liancai 陈连财
Revision 版本	Issued date 颁布日期	Prepared by 编制人	Reviewed by 审核人	Authorized by 审定人	Approved by 批准人



Hengyi Industries Sdn Bhd
恒逸实业（文莱）有限公司

HYBN-T3-07-0025-2019-1

Safety Relief Devices Management System

安全泄放装置管理制度

Issued Date: July. 2019

颁布日期：2019 年 7 月

 HENGYI	Hengyi Industries Sdn Bhd 恒逸实业（文莱）有限公司				
	Safety Relief Device Management System				
	安全泄放装置管理制度				
Doc No.	HYBN-T3-07-0025-2019-1	Ver No.	1	Page 1 of 8	

1 Purpose

目的

This system is formulated to standardize the management of the company's safety relief devices and ensure the safe operation of boilers, pressure vessels, pressure pipelines and other equipment.

为规范公司安全泄放装置的管理，保证锅炉、压力容器、压力管道等设备安全运行，特制定本制度。

2 Scope of Application

适用范围

This system is applicable to all departments.

本制度适用于各部门。

3 Terms and Definitions

术语和定义

Safety relief device: it is an automatic device for safety relief, including safety valve, rupture disc and breathing valve. It does not rely on any external force but uses the working medium to discharge or suck a rated amount of fluid to prevent the pressure from exceeding or falling below the rated safety value. When the pressure of safety valve and breathing valve returns to normal, the valve will close itself and prevent the medium from flowing out or in. Once the rupture disc ruptures, it cannot recover on its own.

安全泄放装置：是一种自动装置，包括安全阀、爆破片和呼吸阀。它不借助任何外力而是利用介质本身的里来排出或吸入一额定数量的流体，以防止压力超过或低于额定的安全值。安全阀和呼吸阀当压力恢复正常后，阀门自行关闭并阻止介质继续流出或流入；爆破片一旦爆破无法自行恢复。

4 Management Responsibilities

管理职责

4.1 Specified administrative authority

归口管理部门

4.1.1 The Equipment Management Dept. is the specified administrative authority of the safety relieve device.

机械动力部是安全泄放装置的归口管理部门。

4.1.2 To organize the compilation of ledger for safety relief devices; Supervise and inspect the use, inspection and daily maintenance of safety relief devices in each operation department.

组织编制安全泄放装置台帐；对各运行部安全泄放装置的使用、检验以及日常维保情况进行督促、检查。

4.1.3 To be responsible for the delayed inspection, shutdown, scrapping and cancellation of safety relief devices.

负责安全泄放装置的延期检验、停用、报废、注销等工作。

4.2 Coordinated Management Departments

协同管理部门

4.2.1 The HSE Management Dept. is responsible for the safety supervision of the safety relief device; countersigned application for extension of inspection of safety relief device.

HSE 管理部负责安全泄放装置的安全监督；会签安全泄放装置延期检验申请。

4.2.2 The Scheduling and Dispatch Dept. will countersign the application for extension inspection and inspection of the safety relief device and organize the formulation of monitoring measures.

计划调度部会签安全泄放装置延期检验申请并组织制定监控措施。

4.2.3 The Material & Supplies Department is responsible for the qualification examination of manufacturers of safety relief devices and accessories (RMB); Responsible for the procurement, unpacking acceptance, safekeeping and provision of quality assurance materials for safety relief devices and accessories (RMB)

物资装备部负责安全泄放装置及配（元）件制造商资质审查；负责安全泄放装置及配（元）件的采购、开箱验收、保管并提供质保资料。

4.3 Executive departments

执行部门

4.3.1 Each operation department is the executive department and is responsible for preparing the ledger of the safety relief device and organizing the quarterly inspection of the safety relief device and check the checklist to solve the existing problems;

各运行部为执行部门，负责编制安全泄放装置台帐，组织安全泄放装置季度检查；并审核检查表，对存在问题进行解决；

4.3.2 Responsible for the correct use of the safety relief device, the inspection and the maintenance during use;

负责安全泄放装置正确使用及使用过程中的检查、维护工作；

4.3.3 Be responsible for preparing and implementing the inspection plan for safety relief devices;

负责编制安全泄放装置检验计划并实施；

4.3.4 Prepare the application for delayed inspection of safety relief devices, formulate and implement monitoring measures for delayed inspection equipment, and make monitoring records.

编制安全泄放装置延期检验申请，制定、落实延期检验设备的监控措施，并做好监控记录。

4.3.5 The equipment maintenance department is responsible for the calibration, maintenance and overhaul of the safety relief device to ensure the safe operation of the safety relief device.

设备检修部负责安全泄放装置的校验、维护保养与检修工作，保证安全泄放装置的安全运行。

5 Management Content

管理内容

5.1 The management of safety relief devices shall conform to the requirements of specifications and standards such as "Safety Valve Technical Supervision Regulation TSGZF001-2006".

安全泄放装置的管理应符合《安全阀技术监察规程 TSGZF001-2006》等规范标准要求。

5.2 Safety relief devices must be purchased from units with manufacturing licenses, and the quality shall conform to the provisions of relevant standards

安全泄放装置必须向具有制造许可证单位采购，质量应符合相关标准的规定。

5.3 User department shall establish safety valve, rupture disc and breathing valve ledger, which shall be updated once every year.

安全泄放装置使用部门应建立安全阀、爆破片、呼吸阀台账，每年更新一次。

5.4 The operators shall check the safety relief device once every quarter. The equipment management personnel of the operation department shall prepare a quarterly check list and issue it to the operators. The operators shall complete it in the first month of each quarter and record the inspection results in the quarterly inspection report of the safety relief device. The inspection report shall be submitted to the equipment management personnel of the operation department within 5 days from the beginning of the second month of each quarter to deal with the safety relief devices with problems in a timely manner.

操作人员每季度需对安全泄放装置进行一次检查，运行部设备管理人员编制季度检查表下发操作

人员，操作人员在每个季度第一个月内完成并将检查结果记录在安全泄放装置季度检查报告中。检查报告需在每个季度第二个月的开始 5 天内交给运行部设备管理人员，对存在问题的安全泄放装置及时进行处理。

5.5 Safety Valve

安全阀

5.5.1 The setting pressure of safety valves shall be managed using level pressure notebook. Each safety valve shall have one notebook. The relevant basic parameters in the level pressure notebook shall be filled in by the user department. The approval column for setting pressure shall be confirmed and signed by the person in charge of the user department and the technical person in charge

安全阀定压采用定压本方式管理，每台一本，定压本中有关基本参数由使用部门填写，整定压力的审定栏由使用部门主管人员及技术负责人确认签字。

5.5.2 The setting pressure of safety valve shall be fixed and set in strict accordance with the values given in the design. Changes shall be reported to the Equipment Management Department, Scheduling and Dispatch Department and HSE Management Department in written form and approved by the company's director in charge.

安全阀的整定压力严格按照设计给出的数值进行定压和设定；变更应以书面形式向机械动力部、计划调度部、HSE 管理部申报，经公司分管领导批准。

5.5.3 Safety valves for pre-inlet, post-outlet and bypass line cut-off valves are installed on normal operation boilers, pressure vessels, pressure pipelines and other equipment. The cut-off valves for the safety valves in service must be fully opened and lead-sealed. The cut-off valve before the inlet of the standby safety valve must be fully closed, and the cut-off valve after the outlet must be fully opened and lead-sealed. The bypass line valve of the safety relief device must be fully closed and lead-sealed.

正常运行的锅炉、压力容器、压力管道等设备上设置了进口前、出口后和副线截断阀的安全阀，投用的安全阀进口前、出口后截止阀必须全开并加铅封；备用安全阀进口前截断阀必须全关、出口后截断阀必须全开并加铅封。安全泄放装置副线阀必须全关并加铅封。

5.5.4 On-site inspection of safety valves includes the following contents:

安全阀在线检查包括以下内容：

5.5.4.1 Whether the safety valve is installed correctly;

安全阀安装是否正确；

5.5.4.2 Whether the documents of safety valves are complete (nameplate, quality certificate, installation number, calibration record and report);

安全阀的资料是否齐全（铭牌、质量证明文件、安装号、校验记录及报告）；

5.5.4.3 Whether the lead seal of the external regulating structure of the safety valve is in good

condition;

安全阀外部调节结构的铅封是否完好;

5.5.4.4 Any factors affecting the normal function of the safety valve;

有无影响安全阀正常功能的因素;

5.5.4.5 When a cut-off valve must be set, is the lead seal of the cut-off valve before the inlet and after the outlet of the safety valve intact and in the open position;

必须设置截断阀的情况时,其安全阀进口前和出口后的截断阀铅封是否完好并且处于开启位置;

5.5.4.6 Whether the safety valve leaks;

安全阀有无泄露;

5.5.4.7 Whether there is corrosion on the surface of the safety valve;

安全阀外表有无腐蚀情况;

5.5.4.8 Discharge holes provided for bellows shall be open and clean;

为波纹管设置的卸出孔应当敞开和清洁;

5.5.4.9 The lifting device (wrench) acts effectively and is in proper position;

提升装置(扳手)动作有效,并且处于适当位置;

5.5.4.10 Relevant accessories outside the safety valve are intact and normal. The problems found in the inspection should be promptly investigated for the cause and solved.

安全阀外部相关附件完整无损并且正常。对在检查中发现的问题要及时查找原因,并予以解决。

5.5.5 The safety valve technical file established by the safety valve user department shall include the following contents:

安全阀使用部门建立的安全阀技术档案应当包括以下内容:

5.5.5.1 The product quality certification documents, installation, operation, maintenance and calibration instructions of the safety valve manufacturer;

安全阀制造单位的产品质量证明文件、安装及使用维护、校验说明书;

5.5.5.2 Regular inspection records and reports of safety valves;

安全阀定期检查记录及报告;

5.5.5.3 Approval documents for delayed verification;

延期校验的批准文件;

5.5.5.4 Daily usage and maintenance records of safety valves;

安全阀的日常使用情况和维护保养记录;

5.5.5.5 Safety valve operation failure and accident record.

安全阀运行故障和事故记录。

5.5.6 Safety valve calibration shall be conducted at least once a year. If the calibration needs to be postponed, the approval procedures shall be implemented according to 5.12 of the Special Equipment Management System.

安全阀校验每年至少进行一次,如需延期校验,审批程序参照《特种设备管理制度》5.12 执行。

5.5.7 The safety valve calibration shall be carried out by a unit specialized in safety valve

calibration, and the maintenance and calibration personnel shall obtain the "Safety Relief Device Operator Certificate".

安全阀校验应由专门从事安全阀校验的单位进行，检修、校验人员应取得《安全泄放装置作业人员证》。

5.5.8 The calibration unit shall issue a calibration report in duplicate within 15 days after passing the calibration, one copy for calibration unit and one copy for user department.

校验单位在校验合格后 15 日内出具一式二份的校验报告，校验单位、使用部门各一份。

5.5.9 The safety valve calibration record shall be filled in and signed by the calibration unit, and the user department shall participate in setting pressure and sign it. The safety valve must be lead-sealed and hung with the name of the calibration organization, calibration number, installation equipment number, safety valve number, set pressure, next calibration date, etc. After the safety valve is put into operation, the technical personnel of the user department shall confirm and sign on the level pressure notebook and enter the calibration result into the EM system.

安全阀校验记录由校验单位填写签字，使用部门参加定压并签字。安全阀校验合格须加铅封并悬挂有校验机构名称、校验编号、安装设备位号、安全阀编号、整定压力和下次校验日期等内容的标牌。安全阀投用正常后由使用部门技术人员在定压本上确认签字并将校验结果录入 EM 系统。

5.5.10 Safety valves calibrated off-site shall be kept vertical during transportation and installation and collision shall be avoided.

离线校验的安全阀运输安装过程中应保持垂直并避免碰撞。

5.5.11 The new safety valve can only be installed and used after debugging. In case of any abnormality during use, calibration shall be entrusted in time.

新安全阀经调试后方可安装使用；使用期间出现异常应及时委托校验。

5.6 Rupture Disc

爆破片

5.6.1 Rupture discs are generally replaced every 2~3 years, and those used under harsh conditions should be replaced every year. Those that exceed the maximum design pressure and are not blasted shall be replaced immediately. The rupture disc with specified service life shall be replaced within the service life.

爆破片一般 2~3 年更换一次，苛刻条件下使用的应每年更换；对超最大设计压力而未爆破的应立即更换；爆破片规定使用年限的应在使用年限内更换。

5.6.2 When the rupture disc and safety valve are used in series, a pressure gauge and an exhaust valve shall be installed between the two, and whether the rupture disc is normal or not shall be confirmed through regular display of the pressure gauge and exhaust and drainage of the exhaust valve.

爆破片和安全阀串联使用时两者之间应装压力表和排气阀，通过定期对压力表显示和排气阀排气、排液情况确认爆破片是否正常。

5.7 Breathing Valve

呼吸阀

5.7.1 On-site inspection shall be carried out on the tank breathing valve every quarter to check whether the breathing valve bird net is in good condition, and whether there is any air leakage, stuck, sticking, clogged, corrosion, etc.

每季度对储罐呼吸阀进行一次在线检查，检查呼吸阀防鸟网是否完好，是否有漏气、卡死、粘结、堵塞、锈蚀等情况。

5.7.2 The breathing valve of the storage tank shall be disassembled and inspected once a year (including flame arrestor), and the valve disc, valve seat and corrugated flame retardant layer shall be cleaned in time.

储罐的呼吸阀应每年解体检查一次（包括阻火器），及时清洗阀盘、阀座和波纹阻火层。

6 Inspection and Supervision

检查与监督

The Equipment Management Dept. is responsible for supervision, inspection and assessment of the management and implementation of the safety relief devices by operation department.

机械动力部负责对运行部安全泄放装置管理执行情况进行监督、检查、考核。

7 Associated Procedures and Records

关联程序和记录

7.1 Associated procedures

关联程序

None

无

7.2 Associated records

关联记录

7.2.1 Safety Valve Quarterly Checklist HYBN-T6-07-0170-001-2019

安全阀季度检查表 HYBN-T6-07-0170-001-2019

7.2.2 Rupture Disc Quarterly Checklist HYBN-T6-07-0171-001-2019

爆破片季度检查表 HYBN-T6-07-0171-001-2019

7.2.3 Breathing Valve Quarterly Checklist HYBN-T6-07-0172-001-2019

呼吸阀季度检查表 HYBN-T6-07-0172-001-2019

8 Supplementary Rules

附则

8.1 This System is under the jurisdiction of Equipment Management Dept.

本制度由机械动力部归口管理。

8.2 This System is drafted by Equipment Management Dept.

本制度起草部门：机械动力部。

8.3 Equipment Management Dept. is responsible for the interpretation of this System.

本制度解释权归机械动力部拥有。

8.4 Revision, preparation and approval of this System are shown in Table 1:

本制度版本编制和审批情况见表 1:

Table 1 Revision, preparation and approval of document

表 1 文件版本编制和审批情况

1	2019-7-10	Han JinShan 韩金山	Tong Xueyun 童雪云	Xu Ye 徐野	Chen Liancai 陈连财
Revision 版本	Issued date 颁布日期	Prepared by 编制人	Reviewed by 审核人	Authorized by 审定	Approved by 批准人



Hengyi Industries Sdn Bhd
恒逸实业（文莱）有限公司

HYBN-T3-07-0026-2019-1

Hoisting Work Management System

吊装作业管理制度

Issued Date: Sept. 2019

颁布日期：2019 年 09 月

 HENGYI	Hengyi Industries Sdn Bhd 恒逸实业（文莱）有限公司			
	Hoisting Work Management System			
	吊装作业管理制度			
Doc No.	HYBN-T3-07-0026-2019-1	Ver No.	1	Page 1 of 14

1 Purpose

目的

In order to strengthen safety management and supervision of hoisting operation, standardize hoisting operation procedures, reduce hoisting operation risks and prevent and eliminate production safety accidents, this system is specially formulated according to the nature and risk degree of hoisting operation and in combination with the actual situation of the company.

为了加强吊装作业安全管理与监督，规范吊装作业程序，减少吊装作业风险，预防和杜绝生产安全事故的发生，根据吊装作业的性质及风险程度，结合本公司实际，特制定本制度。

2 Scope of Application

适用范围

This system is applicable to all departments of the company and relevant contractor.

本制度适用于本公司各部门及相关承包商单位。

3 Terms and Definition

术语和定义

3.1 Hoisting operation: refers to the operation process in which equipment, workpieces, appliance materials, etc. are hoisted by hoisting machinery to change their positions.

吊装作业：是指利用起重机械将设备、工件、器具材料等吊起，使其发生位置变化的作业过程。

3.2 Hoisting machinery: refers to bridge crane, gantry crane, loading bridge, cable crane, truck crane, tire crane, crawler crane, railway crane, tower crane, portal crane, mast crane, hydraulic hoisting device, elevator, electric hoist, simple hoisting equipment and auxiliary equipment (such as hanging basket), etc.

起重机械：系指桥式起重机、门式起重机、装卸桥、缆索起重机、汽车起重机、轮胎起重机、履带起重机、铁路起重机、塔式起重机、门座起重机、桅杆起重机、液压提升装置、升降机、电葫芦及简易起重设备和辅助用具(如吊篮)等。

3.3 Classification of hoisting operations: hoisting operations are divided into three grades according to the quality of hoisting workpieces, with grade 1: $m \geq 100t$; Level 2: $40t \leq m < 100t$; Level 3: $m < 40t$.

吊装作业分级：吊装作业按起吊工件质量划分为三个等级，一级： $m \geq 100t$ ；二级： $40t \leq m < 100t$ ；三级： $m < 40t$ 。

4 Management Responsibilities

管理职责

4.1 Specified administrative authority

归口管理部门

4.1.1 The Equipment Management Department is the specified administrative authority of hoisting operations, which is responsible for formulating the hoisting operation management system and inspecting and supervising the implementation of hoisting operations by various departments.

机械动力部是吊装作业的归口管理部门，负责制定吊装作业管理制度，对各部门吊装作业执行情况进行检查与监督。

4.1.2 Be responsible for the examination and approval of the first-level hoisting operation and the second-level hoisting operation.

负责一级吊装作业的审定及二级吊装作业的审批。

4.1.3 To be responsible for the management and coordination of hoisting operations for on-site construction projects.

负责对现场施工项目的吊装作业进行管理和协调。

4.2 Coordinated management departments

协同管理部门

4.2.1 HSE Management Department is responsible for the qualification confirmation of operators engaged in command, rigging and hoisting machinery, and is responsible for the supervision and inspection of the hoisting operation process.

HSE 管理部负责对从事指挥、司索和起重机械操作人员进行资格确认，负责吊装作业过程的监督检查。

4.2.2 The Human Resources Department is responsible for organizing and coordinating the training, filing and certificate management of the commanding, rigging and hoisting machinery operators during hoisting operations.

人力资源部负责组织、协调吊装作业中指挥、司索和起重机械操作人员的培训，备案和证件管理工作。

4.3 Executive departments

执行部门

Each operation department is the executive department

各运行部为执行部门

4.3.1 Each production and operation department, electrical department, instrument and

control department.

各生产运行部、电气部、仪控部

4.3.1.1 Responsible for applying for hoisting operation, taking the lead in handling the Permit for Hoisting Operation, organizing personnel of various departments to carry out risk identification and implementing risk reduction measures.

负责提出吊装作业申请，牵头办理《吊装作业许可证》，组织各部门人员进行风险识别，落实风险削减措施。

4.3.1.2 Responsible for monitoring the hoisting operation and assisting in the implementation of safety measures on the hoisting operation site.

负责吊装作业监护，协助落实吊装作业现场安全措施。

4.3.1.3 Responsible for examining and approving Level III Hoisting Operation Permit; review the first and second level hoisting operation permits.

负责审批三级《吊装作业许可证》；审核一、二级吊装作业许可证。

4.3.1.4 Responsible for on-site supervision and inspection of hoisting operations.

负责吊装作业的现场监督检查工作。

4.3.2 Equipment maintenance department

设备检修部

4.3.2.1 Responsible for the establishment of all kinds of hoisting machinery technical files; Responsible for the daily use, maintenance and repair of hoisting machinery, and carry out regular safety inspection on hoisting machinery.

负责建立各类起重机械技术档案；负责起重机械的日常使用、维护保养，对起重机械进行经常性的安全检查。

4.3.2.2 To implement Risk Reduction Measures and Monitoring in Hoisting Process.

落实吊装作业过程中的风险削减措施及监护。

4.3.2.3 Responsible for preparing the hoisting operation plan and the operating rules of hoisting machinery and strictly implementing them.

负责编制吊装作业方案及起重机械的操作规程并严格执行。

4.3.2.4 Proposed the training needs of hoisting workers and arranged to participate in the training.

提出吊装作业人员培训需求，并安排参加培训。

5 Management Content

管理内容

5.1 Basic requirement

基本要求

5.1.1 Hoisting machinery must have product certification and instructions for safe use, maintenance and maintenance; Its manufacturers must have relevant qualifications issued by

the competent government departments, and its safety and protection devices must be complete.

起重机械必须具有产品合格证和安全使用、维护、保养说明书；其生产厂家必须具有政府主管部门颁发的相关资质，其安全、防护装置必须齐全、完备。

5.1.2 Simple hoisting equipment such as slings, riggings, etc. that are self-made, modified and repaired must have design data (including drawings, calculation sheets, etc.) and be archived. Self-made, modified and repaired simple hoisting equipment must be strictly carried out in accordance with the drawings, and can only be used after passing the inspection by a qualified organization.

自制、改造和修复的吊具、索具等简易起重设备，必须有设计资料(包括图纸、计算书等)，并予以存档。自制、改造和修复简易起重设备必须严格按照图纸执行，并经具有检验资质的机构检验合格后方可使用。

5.1.3 For level I and level II hoisting operations, a hoisting scheme shall be prepared. For level III hoisting operations, the hoisting scheme shall also be prepared under special circumstances such as complicated shape, small rigidity, large aspect ratio and operating conditions, although the hoisting weight is less than 40 tons. The operating unit shall be responsible for preparing the scheme.

对于一级、二级吊装作业须编制吊装方案，对于三级吊装作业，吊物虽不足 40 吨，但形状复杂、刚度小、长径比大、作业条件特殊情况下，也应编制吊装作业方案，方案由作业单位负责编制。

5.1.4 Except for the fixed hoisting operation originally designed for production and operation, other hoisting operations shall be subject to the hoisting operation permit in accordance with clause 5.3 of this system.

除了原固有设计用于生产运行操作的固定吊装作业外，其他吊装作业均应按照本制度 5.3 条款规定办理吊装作业许可证。

5.1.5 When using the shaped hoisting machinery such as tires, automobiles, crawler belts and bridge cranes for hoisting operations, the operating procedures of the shaped hoisting machinery shall also be observed.

利用轮胎、汽车、履带和桥式起重机等定型起重机械进行吊装作业时，还应遵守定型起重机械的操作规程。

5.2 Management content and it's requirement

管理内容及其要求

5.2.1 General safety management requirements

一般安全管理要求

5.2.1.1 Before hoisting operation, risk identification shall be carried out according to the operation contents and corresponding risk reduction measures shall be determined.

进行吊装作业前，应针对作业内容进行风险识别，确定相应的风险削减措施。

5.2.1.2 The operating unit must carry out daily inspection, monthly inspection and annual

inspection of hoisting machinery in accordance with the standards. Any problems found in hoisting equipment shall be repaired in time and the repair files shall be kept.

作业单位必须按照标准规定对起重机械进行日检、月检和年检，发现的起重设备问题要及时进行检修处理，并保存检修档案。

5.2.1.3 The hoisting commander, the cable operator (rigger) and the crane operator shall hold the "Operation Certificate for Special Operators" issued by the relevant departments before they can conduct the command and operation.

吊装指挥人员、司索人员(起重工)和起重机械操作人员，应持有相关部门颁发的《特种作业人员操作证》，方可从事指挥和操作。

5.2.1.4 Before the primary and secondary hoisting operations, the technical department shall, together with the safety department, carry out risk assessment and review on the operation scheme, operation safety measures and emergency plans.

一级、二级吊装作业前，技术部门应会同安全部门对作业方案、作业安全措施和应急预案进行风险评估和审查。

5.2.1.5 The hoisting operation site shall designate a special person to monitor, and the hoisting application unit and the operation unit shall each assign one person to monitor, and if there is any relevant unit, another guardian shall be assigned.

吊装作业现场应指定专人进行监护，由吊装申请单位与作业单位各派一人进行监护，如有相关单位，则还需再派一名监护人。

5.2.1.6 The following items shall be inspected for safety before hoisting:

吊装作业前应对以下项目进行安全检查：

(1) The on-site person in charge of the unit applying for hoisting shall confirm the qualifications of the commanding, commanding and operating personnel;

申请吊装作业单位现场负责人应对从事指挥、司索和操作人员资格确认；

(2) Carry out safety inspection and confirmation on hoisting machinery and spreader protection devices to ensure they are in good condition;

对起重机械和吊具保护装置进行安全检查确认，确保处于完好状态；

(3) Confirm the implementation of safety measures;

对安全措施落实情况进行确认；

(4) To inspect the safety conditions in the hoisting area (including the delineation, identification and obstruction of the hoisting area);

对吊装区域内的安全状况进行检查(包括吊装区域的划定、标识、障碍)；

(5) Verify weather conditions.

核实天气情况。

5.2.2 Safety Requirements for Hoisting Related Personnel:

吊装相关人员安全要求：

5.2.2.1 The hoisting commander shall comply with the following provisions:

吊装指挥人员应遵守以下规定：

(1) During hoisting operations, the commander must be clearly identified, and the commander

should wear obvious signs.

吊装作业时必须明确指挥人员，指挥人员应佩戴明显的标志。

(2) The hoisting commander must command according to the specified command signal, and other operators should know the hoisting scheme and command signal clearly.

吊装指挥人员必须按规定的指挥信号进行指挥，其他操作人员应清楚吊装方案和指挥信号。

(3) The hoisting commander shall strictly implement the hoisting scheme, and timely negotiate with the scheme designer to solve any problems found.

吊装指挥人员应严格执行吊装方案，发现问题要及时与方案编制人员协商解决。

(4) Trial hoisting shall be carried out before formal hoisting to check the stress of all machines and tools and ground anchors. If problems are found, the hoisting objects should be put back to the ground first.

正式起吊前应进行试吊，检查全部机具、地锚受力情况。发现问题，应先将吊物放回地面，

(5) If there is a fault in the hoisting process, the hoisting operator should immediately report to the commander, and no one is allowed to leave the post without authorization.

吊装过程中出现故障，吊装操作人员应立即向指挥人员报告，任何人不得擅自离开岗位。

(6) When commanding hoisting and lowering hooks or hoisting objects, the safety of operators and equipment shall be ensured.

指挥吊运、下放吊钩或吊物时，应确保作业人员、设备的安全。

(7) Hoisting rigging shall not be untied before hoisting heavy objects in place.

起吊重物就位前，不得解开吊装索具。

5.2.2.2 Hoisting operators shall comply with the following provisions:

起重操作人员应遵守以下规定：

(1) Operate according to the command signals issued by the command personnel; For emergency stop signals, any person shall immediately execute them.

按指挥人员发出的指挥信号进行操作；对于紧急停车信号，任何人发出均应立即执行；吊

(2) When the weight is close to or reaches the rated hoisting capacity, the brake shall be checked, and the weight shall be hoisted after trial hoisting with low height and short stroke.

重物接近或达到额定起重吊装能力时，应检查制动器，用低高度、短行程试吊后，再吊起。

(3) No hoisting operation shall be carried out when there are people under the hoisting arm, hook or hanging object, or when there are people on the hanging object or floating objects.

当起重臂、吊钩或吊物下面有人，或吊物上有人、浮置物时不得进行起重操作。

(4) It is strictly prohibited to lift overloaded and unclear quality articles and buried objects.

严禁起吊超载、质量不清的物品和埋置物体。

(5) Hoisting equipment such as brake and safety device failure, hook anti-loosening device damage, wire rope damage reaching scrapping standard, etc. shall be installed.

在制动器、安全装置失灵、吊钩防松装置损坏、钢丝绳损伤达到报废标准等起重设备、设

(6) Hoisting binding, unstable or unbalanced hoisting may cause sliding, and hoisting operation shall not be carried out when no liner is added between edges and corners of hoisting objects and wire rope, sling or sling.

吊装捆绑、吊装不牢或不平衡可能造成滑动，吊物棱角处与钢丝绳、吊索或吊带之间未加衬垫时，不得进行吊装操作。

(7) When the site, hoisting situation and command signal cannot be clearly seen, hoisting operation is not allowed.

无法看清场地、吊装情况和指挥信号时，不得进行吊装操作。

(8) Hoisting machinery and its boom, hoisting appliance, spreading tool, steel wire rope, cable wind rope and hanging objects shall not be close to high and low voltage power transmission lines. When it is really necessary to operate near the power transmission lines, sufficient safe distance must be kept according to regulations. Otherwise, power shall be cut off for hoisting operations. Minimum safe distance between hoisting machinery, slings, slings and equipment and overhead transmission lines:

起重机械及其臂架、吊具、辅具、钢丝绳、缆风绳和吊物不得靠近高低压输电线路，确需在输电线路近旁作业时，必须按规定保持足够的安全距离，否则，应停电进行起重作业。起重机械、吊索、吊具及设备与架空输电线间的最小安全距离：

Item 项目	Transmission line voltage 输电导线电压 (kv)						
	<1	10	35	110	220	330	500
Safe Distance (m) 安全距离 (米)	2.0	3.0	4.0	5.0	6.0	7.0	8.5

(9) Suspending objects, cages, slings and slings shall not be suspended in the air during shutdown or rest.

停工或休息时，不得将吊物、吊笼、吊具和吊索悬吊在空中。

(10) When hoisting machinery is working, it shall not be inspected and maintained; The hoisting and luffing mechanism shall not be adjusted under the condition of load.

起重机械工作时，不得对其进行检查和维修；不得在有载荷的情况下调整起升、变幅机构

(11) When two or more hoisting machines are used to lift the same heavy object, the hoisting and operation shall be kept synchronous. When two cranes are used as the main hoisting and hoisting equipment, the hoisting capacity of the cranes shall be the same. The load borne by each hoisting machine shall not exceed 80% of its rated hoisting capacity.

利用两台或多台起重机械吊运同一重物时，升降、运行应保持同步，当采用两台起重机作为主吊抬吊高、细设备，起重机起重能力宜相同。各台起重机械所承受载荷不得超过各自额定起重能力的 80%。

5.2.2.3 The company's personnel shall comply with the following provisions:

司索人员应遵守以下规定：

(1) Obey the command of the commander and report any dangerous situation in time.

听从指挥人员的指挥，发现险情及时报告。

(2) According to the specific situation of the hanging objects, choose the appropriate hoisting tools and slings. It is not allowed to directly wrap the hanging objects with hooks, and it is not allowed to mix slings and slings of different types or specifications. The sling load shall not exceed the rated hoisting mass and the sling shall not exceed the safety load. Check whether the connection point is firm and reliable when hoisting the hanging objects.

根据吊物具体情况选择合适的吊具与吊索；不准用吊钩直接缠绕吊物，不得将不同种类或不同规格的吊索、吊具混合使用；吊具承载不得超过额定起质量，吊索不得超过安全负荷；起升吊物时应检查连接点是否牢固、可靠。

(3) The hanging objects shall be bound firmly, and the hanging point and the center of the hanging objects shall be on the same vertical line.

吊物捆绑应牢靠，吊点和吊物的中心应在同一垂直线上。

(4) It is forbidden to use hoisting machinery to transfer personnel and directly hoist gas cylinders;

禁止使用起重机械移送人员和直接吊装气瓶；

(5) Personnel are prohibited from staying under hooks and hanging objects; If it is necessary to enter the lower part of the suspension due to special circumstances, contact the commanding personnel and hoisting operation personnel in advance and set up supporting devices. No one is allowed to stay on the crane track.

禁止人员在吊钩、吊物下停留；因特殊情况需进入悬吊物下方时，应事先与指挥人员和吊装作业人员联系，并设置支撑装置。任何人不得停留在起重机运行轨道上。

(6) When hanging heavy objects, the edges and corners through which the hoisting ropes and chains pass shall be padded; The number of single pieces to be hoisted at one time shall not exceed 3 and the hoisting pieces shall be fixed properly. When hoisting more than 3 pieces of scattered objects, hanging baskets, buckets and other appliances shall be used.

吊挂重物时，起吊绳、链所经过的棱角处应加衬垫；一次吊装的单件数量不能超过 3 件且吊装件应固定好；吊运 3 件以上零散物件时，应使用吊篮、吊斗等器具。

(7) Heavy objects of unknown quality, buried underground or connected with other objects shall not be tied and hung.

不得绑挂起吊不明质量、埋在地下或与其他物体连接在一起的重物。

(8) It is strictly prohibited to bind and lift at a single point except for the hoisting objects with special structures.

除具有特殊结构的吊物外，严禁单点捆绑起吊。

(9) Personnel and hanging objects should keep a certain safe distance. When placing the hanging objects in place, the hauling rope or stay rod and hook shall be used to assist in positioning.

人员与吊物应保持一定的安全距离。放置吊物就位时，应用牵引绳或撑杆、钩子辅助就位。

(10) When the production equipment is abnormal and may endanger the safety of the operators, the operators shall stop the operation and evacuate quickly.

当生产装置出现异常，可能危及作业人员安全时，作业人员应停止作业，迅速撤离。

5.2.2.4 Guardians shall comply with the following provisions:

监护人员应遵守以下规定:

(1) The guardian does not directly participate in the operation, he is responsible for the inspection of the implementation of the operation safety measures, and implements communication, supervision and management in the whole operation process.

监护人不直接参与作业,负责作业安全措施落实情况的检查,对整个作业过程中实施沟通、监督、管理。

(2) Be responsible for confirming whether the relevant permit procedures for hoisting operation are complete, and check and confirm whether all risk reduction measures for hoisting operation site are implemented item by item.

负责确认吊装作业相关许可手续是否齐全,逐项检查、确认吊装作业现场风险削减措施是否全部落实。

(3) When it is found that the hoisting conditions do not meet the basic safety requirements, the safety measures are not implemented, and abnormal conditions occur around, the guardian has the right to stop the operation in time; After the operation is terminated immediately in case of any abnormal situation on the site, the initial disposal such as alarm, personnel evacuation and rescue shall be carried out in a timely manner.

当发现吊装条件不符合安全基本要求、安全措施不落实、周边出现异常情况时,监护人有权及时制止作业;在现场出现异常情况立即终止作业后,应及时进行报警、人员疏散、救援等初期处置。

(4) During the hoisting period, they shall not leave the site without permission or engage in anything unrelated to guardianship. At the end of hoisting, the guardian shall close the hoisting permit after checking the site to confirm that there are no remaining problems.

吊装期间不得擅自离现场,不得从事与监护无关的事;在吊装结束,监护人在对现场进行检查确认无遗留问题后,关闭吊装作业许可证。

5.2.2.5 After the hoisting operation is completed, the operators must also do the following work:

吊装作业完毕,作业人员还必须做好以下工作:

(1) Put the hoisting hook and hoisting arm in the specified safe position, all control handles shall be placed in zero position, and the main power switch shall be disconnected for hoisting machinery using electrical control.

将吊钩和起重臂放到规定的稳妥位置,所有控制手柄均应放到零位,对使用电气控制的起重机械,应将总电源开关断开。

(2) The crane working on the track shall be effectively anchored.

对在轨道上工作的起重机应有效锚定。

(3) Take back the slings and place them in specified places, and carry out routine inspection on them.

将吊索、吊具收回放置于规定的地方,并对其进行例行检查。

(4) When carrying out maintenance on hoisting machinery, the main power supply shall be cut off and signs shall be hung or locks shall be added.

对起重机械进行维护保养时，应切断主电源并挂上标志牌或加锁。

5.2.3 Other safety management requirement

其他安全管理要求

5.2.3.1 Response to Severe Weather

恶劣天气的应对

(1) Stop hoisting operation when the wind speed is greater than 10.8m/s (strong wind above level 6).

风速大于 10.8m/s（六级以上大风）时停止吊装作业。

(2) In principle, hoisting is not arranged at night. It is strictly prohibited in thunderstorm days, at night and when visibility is low. The hoisting of large pieces should be arranged in the morning.

吊装原则上不安排在夜间进行，雷雨天、夜间、能见度低时严禁吊装作业；大件吊装宜安排在早上进行。

5.2.3.2 Hoisting Operation and Pavement and Civil Foundation of Plant Area

吊装作业与厂区路面及土建基础

(1) The crawler crane cannot directly contact the road surface during walking. Protective measures such as paving the road base plate and steel plate must be taken to protect the road.履带吊车行走作业不能直接接触路面，必须采取铺垫路基板、钢板等保护措施，以保护道路。

(2) During crane operation, the support legs must be padded with driftwood.

吊车作业时，支腿必须下垫道木。

(3) The foundation or equipment cannot be collided during hoisting.

吊装时不能碰撞基础或设备。

(4) The crane is strictly prohibited from rolling on the basis.

吊车严禁在基础上碾压。

(5) In principle, the equipment foundation cannot be used as anchor point.

原则上设备基础不能当锚点。

5.2.3.3 Protection of underground concealed works

地下隐蔽工程保护

(1) Where underground pipes are buried under the route through which vehicles pass, protective measures shall be taken.

车辆通过的路线下埋地管的地方，要采取保护措施。

(2) Before the crane passes through the inspection well, the well shall be filled with yellow sand and padded with thick steel plates.

吊车通过窰井前，井要填满黄沙，上垫厚钢板。

(3) When the crane passes through the fire hydrant, special personnel shall be assigned to observe and take fire hydrant protection measures to prevent damage.

吊车通过消防栓时，要设专人观察，并采取消防栓保护措施，防止碰坏。

(4) When the crane passes through the cable trench, protective measures shall be taken to prevent the cover plate from crushing.

吊车通过电缆沟时，要采取保护措施，防止盖板压坏。

5.3 Hoisting permit management

吊装作业许可证管理

5.3.1 Application and Handling of “Hoisting Operation Permit”

《吊装作业许可证》申请与办理

5.3.1.1 The “Hoisting Operation Permit” is the basis for hoisting operations, which must be applied for and handled in advance and can only be carried out after passing the examination and approval.

《吊装作业许可证》是进行吊装作业的依据，必须提前申请、办理，并经审批合格后方可作业。

5.3.1.2 The hoisting operation follows the principle that whoever manages the hoisting equipment applies for the “Hoisting Operation Permit”. As the unit applying for hoisting operation, the equipment disciplines (including electrical and instrument technicians) of the unit, i.e. the applicant, shall take the lead in handling the “Hoisting Operation Permit”. When the electrical department and the instrument control department need hoisting operation due to overhaul of the production equipment, the electrical department and the instrument control department shall be the applicant and the production operation department shall be the relevant unit.

吊装作业遵循吊装设备谁管理谁申请《吊装作业许可证》的原则，作为申请吊装作业单位，需由本单位的设备专业人员（包括电气、仪表技术人员），即申请人，牵头办理《吊装作业许可证》，当电气部、仪控部在生产装置内因检修需要吊装作业时，电气部、仪控部为申请单位，生产运行部为相关单位。

5.3.1.3 The equipment disciplines of the applicant shall organize the operators, guardians and relevant on-site persons in charge of each unit (including this unit, relevant units and operation units) to jointly identify the risks in the hoisting operation process, formulate risk reduction measures, conduct on-site verification on the implementation of relevant measures, and sign in the corresponding columns after confirming that they are qualified.

申请单位设备专业人员组织各单位（包括本单位、相关单位、作业单位）作业人、监护人及相关现场负责人，共同对吊装作业过程进行风险识别，制定风险削减措施，对相关措施的落实情况现场核查，确认合格后在相应栏目内签名。

5.3.1.4 When filling in the “Hoisting Operation Permit”, it must be filled in item by item, not blank. For the optional item of “□”, tick the corresponding “□” according to the actual situation. For blank items, if they are not applicable or need not be filled in, they are indicated by “-” and the applicable items are filled in according to the actual situation.

在填写《吊装作业许可证》时，须逐项填写，不得空项，对于“□”的可选项，按实际情况在对应的□内划“√”；对于空格项，不适用或不需要填写时，用“-”表示，适用项则按实际情况填写。

5.3.1.5 The period of validity of the “Hoisting Operation Permit” is one cycle of the operation

project, and one cycle shall not exceed 3 days.

《吊装作业许可证》有效期为作业项目一个周期，一个周期不超过 3 天。

5.3.1.6 The "Hoisting Operation Permit" is in four copies, with the first copy retained by the applicant, the second copy held by the on-site guardian, the third copy held by the person in charge of on-site hoisting, and the fourth copy stored in the operation control room or post where the operation is located.

《吊装作业许可证》一式四联，第一联申请单位留存，第二联由现场监护人持有，第三联由现场吊装负责人持有，第四联存放在作业所在操作控制室或岗位。

5.3.2 Review and approval of "Hoisting Operation Permit"

《吊装作业许可证》的审核、审批

The "Hoisting Operation Permit" shall first be organized by the equipment disciplines of the operation application unit to organize the operators, guardians and relevant on-site responsible persons of each unit to confirm the implementation of various safety measures and sign in the corresponding columns.

《吊装作业许可证》先由作业申请单位设备专业人员组织各单位作业人、监护人及相关现场负责人确认各项安全措施落实情况，并在相应栏目内签名。

5.3.2.1 When $m < 40t$, it is a level 3 hoisting operation, which is approved by the leaders of the applying unit and relevant units (if any).

当 $m < 40t$ 时，属三级吊装作业，经申请单位及相关单位（如有）领导批准。

5.3.2.2 When $40t \leq m < 100t$, it is a Level 2 hoisting operation, which shall be reviewed by the leaders of the applying unit and relevant units (if any) and approved by the leaders of the Equipment Management Department.

当 $40t \leq m < 100t$ 时，属二级吊装作业，经申请单位及相关单位（如有）领导审核，机动部领导批准。

5.3.2.3 When $m \geq 100t$, it is a Level 1 hoisting operation, which is reviewed by the leaders of the application unit and relevant units (if any), reviewed by the leaders of the Equipment Management Department, and approved by the company's Director in charge.

当 $m \geq 100t$ 时，属一级吊装作业，经申请单位及相关单位（如有）领导审核，机动部领导审定，公司主管领导批准。

5.3.3 Closing and keeping of "Hoisting Operation Permit"

《吊装作业许可证》关闭、保存

5.3.3.1 After the hoisting operation is completed, the operation unit shall clean up the operation site and leave after confirming that there are no remaining problems. All guardians shall confirm and sign the closure and submit it to the equipment discipline of the application department for storage.

吊装作业完成后，作业单位应清理作业现场，在确认无遗留问题后方可离开；所有监护人进行关闭确认、签名，并交给申请部门的设备专业人员保存。

5.3.3.2 The “Hoisting Operation Permit” shall be kept by the applicant unit in a unified manner and filed on a monthly basis for one year.

《吊装许可证》应由申请单位统一保存，按月归档，保存期为一年。

6 Supervision and inspection

监督检查

The Equipment Management Department and HSE Management Department are responsible for supervising the hoisting operation management carried out by various departments and integrating them into performance management, and conducting regular inspection and assessment.

机械动力部和 HSE 管理部负责对各部门执行吊装作业管理进行监督并纳入绩效管理，定期进行检查和考核。

7 Associated programs and records

关联程序和记录

7.1 Associated programs

关联程序

Procedure for Approval of Hoisting Operation Permit HYBN-T2-07-0074-2019-1

吊装作业许可证审批程序 HYBN-T2-07-0074-2019-1

7.2 Associated records

关联记录

Hoisting Operation Permit HYBN-T6-07-0174-0001-2019

吊装作业许可证 HYBN-T6-07-0174-0001-2019

8 Supplementary Rule

附则

8.1 This System is under the jurisdiction of Equipment Management Dept.

本制度由机械动力部归口管理。

8.2 This System is drafted by Equipment Management Dept.

本制度起草部门：机械动力部。

8.3 Equipment Management Dept. is responsible for the interpretation of this System.

本制度解释权归机械动力部拥有。

8.4 Preparation and approval of this system are shown in Table 1

本制度编制和审批情况见表 1:

Table 1 Revision, preparation and approval of document

表 1 文件版本编制和审批情况

1	2019-08-31	Mi Jianbin 米建彬	Tong Xueyun 童雪云	Xu Ye 徐野	Chen Liancai 陈连财
Revision 版本	Issued date 颁布日期	Prepared by 编制人	Reviewed by 审核人	Authorized by 审定人	Approved by 批准人