



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

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Atmospheric Storage Tank Management System

常压储罐管理制度

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	Atmospheric Storage Tank Management System 常压储罐管理制度				
	Doc No.	HYBN-T3-07-0008-2024-2	Ver No.	2	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°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°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.

5 Management Content

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 Comprehensive inspection shall be organized and implemented by the Equipment Management Department. Generally, it is conducted once every six years. The corrosion rate of the storage medium is not strong, and the corrosion rate is $\leq 0.1\text{mm/a}$, and reliable anti-corrosion measures are available. The last comprehensive inspection confirmed that the technical condition of the storage tank was good, and the operation department went through

the formalities of deferred maintenance. After the approval of the company's competent leader, the comprehensive inspection time can be extended, but the longest time 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, 经公司主管领导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 次外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°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-T2-07-0022-2024-2)

常压储罐管理程序 HYBN-T2-07-0022-2024-2

7.1.2 Management Procedure for Breathing Valve of Atmospheric Storage Tank (HYBN-T2-07-0023-2024-2)

常压储罐呼吸阀管理程序 HYBN-T2-07-0023-2024-2

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

2	2024-04-01	Deng Xianlin 邓咸林	Zhao Tingyun 赵挺云	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