



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

HYBN-T3-07-0006-2024-2

## Rotating Equipment Condition Monitoring Management System

## 转动设备状态监测管理制度

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## Version Information 版本信息

1 Rev 1 released on December 31, 2018.

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2 Rev 2 released on April 1, 2024.

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 HENGYI	<b>Hengyi Industries Sdn Bhd 恒逸实业（文莱）有限公司</b>			
	<b>Rotating Equipment Condition Monitoring Management System</b> <b>转动设备状态监测管理制度</b>			
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## 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 IT department is responsible for the function realization and daily maintenance of the network part of the online condition monitoring system for rotating equipment. 信息管理部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℃，轴承金属温度应小于 93℃；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℃，（或油池温度应低于 82℃）。

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 Technicians shall monitor the rotating equipment at least once a month, and upload the monitoring data of that month to the EM system before the 2nd of the following month, and the interval between the two monitoring shall not be more than 40 days.

各部门操作员每日对转动设备至少监测一次，并于当班将监测数据上传到 EM 系统；技术人员每月对转动设备至少监测一次，并于次月 2 日前上传当月的监测数据到 EM 系统，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 equipment maintenance department shall monitor the rotating equipment at least twice a month, including vibration and frequency spectrum. The interval between the two monitoring shall be controlled at about 15 days, and the monitoring results shall be recorded and saved in the pump group monitoring system.

设备检修部每月对转动设备至少监测 2 次，监测内容包括振动、频谱，2 次监测的间隔时间控制

在 15 天左右，监测结果在泵群监测系统中录入保存。

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-T2-07-0018-2024-2)

转动设备日常监测管理程序 HYBN-T2-07-0018-2024-2

##### 7.1.2 Online Condition Monitoring System Management Procedures

(HYBN-T2-07-0019-2024-2)

在线状态监测系统管理程序 HYBN-T2-07-0019-2024-2

#### 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

2	2024-04-01	Li Tao 李涛	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

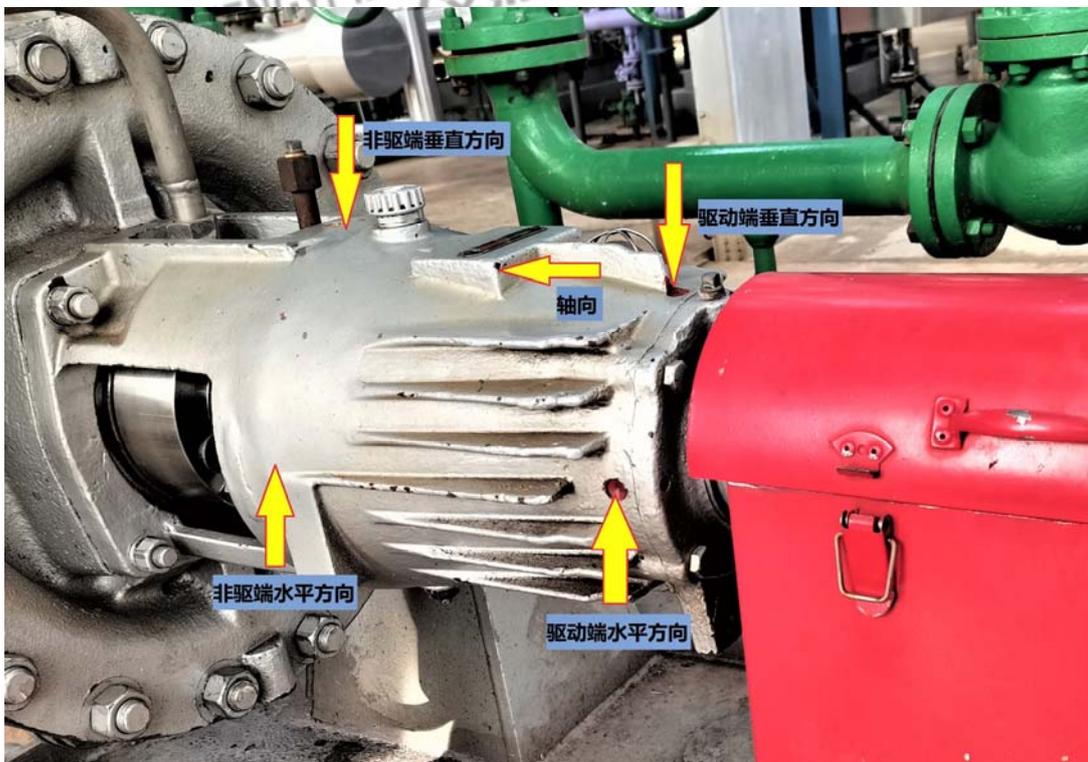
The RMS of the vibration velocity measured on the casing surface and with a frequency with the range of 10Hz~1000Hz shall be used as the measuring parameter to characterize the Equipment Management vibration state, and the maximum value measured at the specified point in the specified direction used 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

Measuring points are generally arranged on each main bearing or bearing seat, and measurement is carried out at three measuring points in radial (2 measuring points) and axial (1 measuring point) directions. For machines installed vertically or obliquely, the measuring points should be arranged at the position where the maximum vibration reading can be obtained or at the specified position, and the measuring point position and the measured value should be recorded together. The location of measuring points shall be fixed and generally marked clearly. Machine guard, cover and other parts are not suitable for measuring points. 测点一般布置在每一主轴承或轴承座上，并在径向（2个测点）和轴向（1个测点）两个方向三个测点上进行测量。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，机器一支撑系统为刚性状态；IV – 大型转机，机器一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					

