全厂起重设备外委检修技术规范书
Technical Specification for Outsourcing Maintenance of Lifting Equipment of the Whole Plant

1. 总则
General Rules

1.1 适用范围

本规范适用于印度尼西亚巴厘通用能源公司（PT.GENERAL ENERGY BALI）全厂在册 1-105 号全部起重机械外委解体、全面检修工作，设备清单包含：通用桥式起重机、过轨起重机、电动单梁起重机、悬挂起重机、门式抓斗起重机、电动葫芦起重设备。

检修核心覆盖：汽机房、循环泵房、磨煤机区域、GIS 室、检修间、空压机车间、炉顶、渣仓、电除尘、风机泵房、化水车间、输煤系统、卸船机房、燃油泵房、灰库等全厂所有起重设备使用点位。

检修重点核查内容：保险装置、联锁装置、防护装置完整性与有效性；钢丝绳、吊钩、齿轮、传动机构磨损与完好度；设备固定螺栓、螺母、开口销紧固状态；整机电气接地可靠性。

1.1 Scope of Application

This specification applies to the outsourced disassembly and comprehensive maintenance of all lifting machines registered under No. 1-105 in the whole plant of PT. General Energy Bali, Indonesia.

The equipment list covers all categories of lifting equipment, including: general-purpose overhead cranes, overhead transfer cranes, electric single-girder cranes, suspension cranes, gantry grab cranes, electric hoists.

The maintenance scope covers all lifting equipment usage points throughout the plant, including: turbine hall, circulating water pump house, coal mill area, GIS room, maintenance workshop, air compressor room, boiler top, slag silo, electrostatic precipitator, fan and pump house, water treatment workshop, coal handling system, ship unloader room, fuel oil pump house, ash silo, etc.

Key inspection items: integrity and effectiveness of safety devices, interlock devices and protective devices; wear and integrity of wire ropes, hooks, gears and transmission mechanisms; fastening condition of equipment fixing bolts, nuts and cotter pins; and reliability of whole-machine electrical earthing.

1.2 编制依据

本项目检修、试验、验收工作，遵循中国现行法律法规、特种设备安全技术规范、国家/行业标准、设备原厂技术文件及印尼属地法规，主要依据如下：

The maintenance, testing and acceptance work of this project shall follow the current laws and

regulations of China, special equipment safety technical regulations, national/industry standards, original equipment manufacturer (OEM) technical documents and Indonesian local regulations. The main basis is as follows:

1）《中华人民共和国特种设备安全法》（主席令第 4 号）；

1） Special Equipment Safety Law of the People's Republic of China (Presidential Decree No. 4);

2） TSG 51-2023《起重机械安全技术规程》（含第 1 号修改单）；

2） TSG 51-2023 Safety Technical Regulation for Lifting Appliances (including Amendment No. 1);

3） GB 6067.1-2010《起重机械安全规程第 1 部分：总则》；

3） GB 6067.1-2010 Safety Rules for Lifting Appliances - Part 1: General;

4） GB 6067.5-2014《起重机械安全规程第 5 部分：桥式和门式起重机》；

4） GB 6067.5-2014 Safety Rules for Lifting Appliances - Part 5: Bridge and Gantry Cranes;

5）GB/T 3811-2008《起重机设计规范》；

5）GB/T 3811-2008 Design Rules for Cranes;

6）GB/T 5972-2016《钢丝绳实际使用维护及报废》；

6）GB/T 5972-2016 Cranes - Wire ropes - Care and maintenance, inspection and discard;

7）印尼劳动部 JDIH：起重与运输设备 K3 条例；

7）Indonesian Ministry of Labor JDIH: K3 Regulations on Lifting and Transportation Equipment;

1.3 设备概况

1.3 Equipment Overview

全厂在册起重机械共计 105 台，按设备类型分为五类：通用桥式起重机 4 台、过轨起重机 6 台、电动单梁/悬挂起重机 11 台、电动葫芦 83 台、门式抓斗起重机 1 台。设备分布覆盖汽机房、循环泵房、磨煤机区域、检修间、GIS 室、输煤系统、炉本体、灰库等全厂各区域，长期在高温、高粉尘、水汽腐蚀等恶劣环境下运行，安全保护装置、吊具、传动部件、紧固件及接地系统易老化失效。设备分类及数量见表 1-1。

注：以上 105 台为现场实际盘点数量，含各专业配套起重设备，以现场实物为准。

There are a total of 105 registered lifting machines in the whole plant, which are divided into five categories by equipment type: 4 general-purpose overhead cranes, 6 overhead transfer cranes, 11 electric single-girder/suspension cranes, 83 electric hoists, 1 gantry grab crane. The equipment is distributed in all areas of the plant, including the turbine hall, circulating water pump house, coal mill area, maintenance workshop, GIS room, coal handling system, boiler island and ash silo, operating for a long time in harsh environments such as high temperature, high dust and moisture corrosion, and the safety protection devices, lifting attachments, transmission components, fasteners and earthing systems are prone to aging and failure. The equipment categories and quantities are shown in Table 1-1.

表 1-1 全厂起重设备分类及数量一览表

Table 1-1 List of Lifting Equipment Categories and Quantities

设备类别 Equipment Category	主要型号 Main Model	数量（台） Quantity (set)	主要使用区域 Main Application Area
通用桥式起重机 General-purpose overhead crane	QD75/20、QD50/10、QD20/10	4	汽机房、循环泵房 Turbine hall, circulating water pump house
过轨起重机 Overhead transfer crane	LXG10T-4.5M	6	1#～3#磨煤机 Coal mills No.1~3
电动单梁/悬挂起重机 Electric single-girder/suspension crane	LD/LX 系列（5T～10T） LD/LX series (5T~10T)	11	检修间、GIS 室、空压机车间、输煤系统等 Maintenance workshop, GIS room, air compressor room, coal handling system, etc.
电动葫芦 Electric hoist	CD1 型（1T～16T）等 CD1 type (1T~16T), etc.	83	风机、水泵、渣仓、电除尘、采样机、卸船机房等 Fans, pumps, slag silos, ESP, samplers, ship unloader rooms, etc.
门式抓斗起重机 Gantry grab crane	MH5t10m-9m	1	煤水沉淀池 Coal water settling pond

2. 工作范围
Scope of Work

2.1 项目概述

2.1 Project Overview

2.1.1 项目名称：2026 年巴厘通用能源全厂起重设备外委全面检修

2.1.1 Project Name: 2026 comprehensive outsourced maintenance of lifting equipment of the

whole plant of PT. General Energy Bali.

2.1.2 项目地点：印尼巴厘通用能源公司全厂各生产车间、泵房、输煤、炉本体、灰库、码头等区域

2.1.2 Project Location: All production workshops, pump houses, coal handling, boiler island, ash silo, wharf and other areas of PT. General Energy Bali, Indonesia.

2.1.3 项目背景及目的

全厂共计 105 台各类起重机械长期在高温、高粉尘、水汽腐蚀环境运行，安全保护装置、吊具、传动部件、紧固件、接地系统存在老化磨损风险。本次外委检修需完成全设备逐台拆解、系统性检查、缺陷整改、易损件更换、功能校验，消除起重作业重大安全隐患，确保所有起重设备符合印尼及国内特种设备安全标准，并出具检查报告，满足 2026 年度机组稳定检修吊装需求。

2.1.3 Project Background and Purpose: A total of 105 lifting machines of various types in the whole plant have long been operating in high-temperature, high-dust and moisture-corrosion environments, and their safety protection devices, lifting attachments, transmission components, fasteners and earthing systems are at risk of aging and wear. This outsourced maintenance shall complete the disassembly, systematic inspection, defect rectification, wearing parts replacement and function verification of all equipment one by one, eliminate major safety hazards in lifting operations, ensure that all lifting equipment complies with Indonesian and domestic special equipment safety standards, and issue bilingual (Chinese-English) inspection reports to meet the lifting and hoisting needs of the stable maintenance of the units in 2026.

2.1.4 工程范围及核心检修工作内容

2.1.4 Project Scope and Core Maintenance Work Contents

A:1. 汽机房 2 台通用桥式起重机 QD75/20T，存在运行时经常性掉电现象。

A: 1. The two QD75/20T general-purpose overhead cranes in the turbine hall frequently experience power loss during operation.

2 台起重机的感应开关及保护开关、限位开关、保护装置等使用多年存在老化现象，对老化开关进行更换。

The inductive switches, protective switches, limit switches, protective devices, etc. of the two cranes have been in service for many years and are aging; the aged switches shall be replaced.

2. 露天电动葫芦检修完毕，进行整体油漆防腐处理，刷漆前，先进行除锈，经甲方确认除锈合格后进行刷漆防腐。

刷漆范围及面积估算：需整体除锈刷漆的露天设备共 10 台（含循环泵房外 QD20/10T 桥式起重机 1 台、炉顶电动葫芦 3 台、电除尘顶部电动葫芦 3 台、灰库顶部电动葫芦 1 台、C2 入场采样机电动葫芦 2 台），门式抓斗起重机 1 台（煤水沉淀池），合计刷漆面积约 170m²；半露天设备局部除锈补漆共约 20 台，局部补漆面积合计约 30m²。刷漆总面积估算约 200m²，最终以现场实际除锈验收面积为准。

2. After the maintenance of outdoor electric hoists is completed, overall painting and anti-corrosion treatment shall be carried out. Before painting, rust removal shall be performed first, and painting and anti-corrosion shall be carried out after Party A confirms that the rust removal is qualified.

B:1）安全保护装置专项检查：逐台核查保险、联锁、防护装置有无缺失、破损、失效，功能全项校验，起升机构双限位装置是否缺失、失效； 2）吊具与传动附件检测：钢丝绳、吊钩、齿轮、传动轴、减速机构外观、磨损量、变形、裂纹检测； 3）紧固件检查：整机连接螺栓、锁紧螺母、防脱开口销、定位销轴紧固、锈蚀、缺失情况排查更换； 4）电气接地系统检测：金属桥架、葫芦壳体、电机、轨道、控制柜接地连续性、接地电阻测试； 5）金属结构探伤、润滑、调整、缺陷修复；磨损超标、失效零部件整体更换； 6）检修完成后逐台开展空载、额定载荷静载及动载试验，完整记录各项试验数据；每台设备出具检修记录、安全装置校验报告，报告需具备合规效力，可用于特种设备核查，做到一机一档，全部资料加盖乙方有效公章，纸质版、电子版同步移交甲方存档。

B: 1) Special inspection of safety protection devices: Check each equipment one by one for missing, damaged or failed safety, interlock and protective devices, verify all functions, and check whether the double limit devices of the hoisting mechanism are missing or failed; 2) Inspection of lifting attachments and transmission accessories: Inspect wire ropes, hooks, gears, transmission shafts and reduction mechanisms for appearance, wear, deformation and cracks; 3) Fastener inspection: Check and replace whole-machine connecting bolts, lock nuts, anti-loosening cotter pins and locating pins for fastening, rust and missing conditions; 4) Electrical earthing system inspection: Test earthing continuity and earthing resistance of metal cable trays, hoist housings, motors, rails and control cabinets; 5) Metal structure flaw detection, lubrication, adjustment and defect repair; replace parts with excessive wear or failure as a whole; 6) After maintenance, carry out no-load, rated-load static load and dynamic load tests on each equipment one by one, and completely record all test data; issue maintenance records and safety device verification reports for each equipment. The report materials must comply with the relevant requirements of TSG 51 Safety Technical Regulation for Lifting Appliances. The reports shall have compliance validity and be usable for special equipment inspection, achieving one file per machine (one-machine-one-file). All materials shall be stamped with Party B's valid official seal, and both paper and electronic versions shall be handed over to Party A for archiving simultaneously.

2.1.5 设备整体概况

全厂起重设备分为五类：

1）桥式起重机（QD 系列）：汽机房、循环泵房大吨位主吊，双梁结构，大车/小车双限位、舱门联锁；

2）电动单梁/悬挂起重机（LD/LX 系列）：检修间、GIS、输煤、泵房轻小型吊装；

3）过轨起重机（LXG）：磨煤机专用轨道吊；

4）CD1 型电动葫芦：全厂风机、水泵、渣仓、电除尘、采样机配套小型起升设备，数量最多；

5）特种起重设备：门式抓斗起重机。

全部设备露天、半密闭、水下潮湿环境混用，存在水汽腐蚀、粉尘卡滞、高温老化问题，安全装置、吊具、接地易损坏失效。

2.1.5 Overall Equipment Overview

The whole-plant lifting equipment is divided into five major categories:

1) Overhead cranes (QD series): main large-tonnage lifting equipment in the turbine hall and circulating water pump house, with double-girder structure, double limit devices for the trolley/bridge and hatch interlock;

2) Electric single-girder / suspension cranes (LD/LX series): light and small lifting equipment in the maintenance workshop, GIS, coal handling and pump house;

3) Overhead transfer cranes (LXG): rail-mounted cranes dedicated to coal mills;

4) CD1 electric hoists: small hoisting equipment supporting fans, pumps, slag silos, electrostatic precipitators and samplers throughout the plant, with the largest quantity;

5) Special lifting equipment: gantry grab cranes.

All equipment is used in a mix of open-air, semi-enclosed and underwater humid environments, with problems of moisture corrosion, dust jamming and high-temperature aging; safety devices, lifting attachments and earthing are prone to damage and failure.

2.2 甲方责任范围

2.2 Scope of Work for Party A

2.2.1 负责全厂起重设备检修所需大型备品备件的采购与供应，包括但不限于：钢丝绳、吊钩组、滑轮组、制动器摩擦片/制动轮、行程/限位开关、超载限制器、缓冲器、导绳器、防雨罩、电机、减速箱总成、电气元件（接触器、继电器、控制按钮、电缆）等。具体型号规格及数量以现场检修实际需要确定，乙方负责核对型号规格并按需更换。详见附件 A,B

2.2.1 Responsible for the procurement and supply of major spare parts required for the maintenance of the lifting equipment of the whole plant, including but not limited to: wire ropes, hook assemblies, sheave assemblies, brake linings/brake wheels, travel/limit switches, overload limiters, buffers, rope guides, rain shelters, motors, gearbox assemblies, electrical components (contactors, relays, control buttons, cables), etc. The specific models, specifications and quantities shall be determined according to the actual needs of on-site maintenance, and Party B is responsible for verifying the models and specifications and replacing them as required.

2.2.2 负责办理检修工作票、动火工作票等相关作业许可手续，协调设备停电、停机及检修窗口安排。

2.2.2 Responsible for handling relevant work permit procedures such as maintenance work permits

and hot work permits, and coordinating equipment power-off, shutdown and maintenance window arrangements.

2.2.3 提供检修所需的电源、水源及全厂各检修区域行车的协调使用。

2.2.3 Provide the power supply, water supply and coordinated use of the overhead cranes in each maintenance area of the whole plant required for maintenance.

2.2.4 负责提供各起重设备技术资料（设备台账、定期检验报告、使用维护说明书等）。

2.2.4 Responsible for providing the technical documents of each lifting equipment (equipment ledger, periodic inspection reports, operation and maintenance manuals, etc.).

2.2.5 指派专业技术人员进行现场监督、技术指导及验收。

2.2.6 甲方应承担检修过程中所需消耗性材料及低值备品备件，包括但不限于：润滑油/润滑脂（含耐高温润滑脂）、密封件（O 型圈、密封垫、填料）、紧固件（螺栓、螺母、开口销、垫圈、防松止动垫圈）、除锈及刷漆材料（除锈剂、砂纸、底漆、面漆、稀释剂）、清洁用品（清洗剂、棉纱、毛刷）、绝缘胶带、扎带、标识标牌、接地端子及防腐垫片等。

2.2.5 Assign professional and technical personnel to conduct on-site supervision, technical guidance and acceptance.

2.2.6 Party A shall undertake the consumable materials and low-value spare parts required in the maintenance process, including but not limited to: lubricating oil/grease (including high-temperature grease), sealing parts (O-rings, gaskets, fillers), fasteners (bolts, nuts, cotter pins, washers, locking washers), rust removal and painting materials (rust remover, sandpaper, primer, topcoat, and so on).

2.2.6 乙方在检查起重设备后需填写《起重设备检查诊断项目确认表》（附件 C）并提交甲方确认检查诊断内容后方可开始维修工作，维修完毕，需填写《起重设备维修项目确认表》(附件 D)并由甲方确认，以上两表需在结算时提供做为结算依据。

After inspecting the hoisting equipment, Party B must complete the "Hoisting Equipment Inspection and Diagnosis Confirmation Form" (Attachment C) and submit it to Party A for confirmation of the inspection and diagnosis details before commencing repair work. Upon completion of repairs, Party B must complete the "Hoisting Equipment Repair Confirmation Form" (Attachment D) and obtain Party A's confirmation. Both forms must be provided at the time of settlement to serve as the basis for the final accounting.

3. 技术检修要求
Technical Maintenance Requirements

3.1 安全保险、联锁、防护装置检修标准

3.1 Maintenance Standards for Safety, Interlock and Protective Devices

3.1.1 保险装置检查校验

3.1.1 Inspection and Verification of Safety Devices

逐台设备核查所有安全保险部件，缺失、损坏、失效必须更换：

Check all safety components of each equipment one by one; missing, damaged or failed components must be replaced:

起升高度限位、下降深度限位、大车/小车行程限位、缓冲止挡保险块齐全；

Hoisting height limit, lowering depth limit, trolley/bridge travel limit and buffer stop safety blocks shall be complete;

超载重量限制器、力矩保险装置灵敏可靠，无短接、屏蔽、失灵；

Overload weight limiters and torque safety devices shall be sensitive and reliable, without short-circuiting, shielding or malfunction;

吊钩防脱安全卡扣保险完好，弹性卡扣无断裂、变形，能自动复位锁住吊索；

The hook anti-drop safety latch shall be intact, the spring latch shall be free from fracture and deformation and able to reset automatically to lock the sling;

制动器制动保险片、防溜车保险、防风防滑固定装置完整；

校验标准：限位动作后机构立即断电停机，超载限制达到额定载荷 90% 预警、105% 强制停机，防脱钩卡扣间隙≤3mm。

Brake safety plates, anti-creep safety devices and wind-proof anti-skid fixing devices shall be complete. Calibration standards: the mechanism shall be powered off and stopped immediately after the limit device acts; the overload limiter shall give an alarm at 90% of the rated load and forcibly stop at 105%; the anti-drop hook latch clearance shall be ≤3mm.

3.1.2 联锁装置功能检查

3.1.2 Functional Inspection of Interlock Devices

舱口门、设备检修通道门、司机室门电气联锁：开门状态下所有起升、行走机构无法启动，禁止人为短接联锁回路；

Electrical interlock of hatch doors, equipment maintenance access doors and cab doors: when the doors are open, all hoisting and traveling mechanisms cannot be started; manually bypassing the interlock circuit is prohibited;

多点操作互锁：遥控+就地双控葫芦、双轨同跨起重机互锁，仅允许单一操作点输出动作；

Multi-point operation interlock: remote control + local dual-control hoists, and cranes on the same span of double rails shall be interlocked, allowing only a single operation point to output action;

紧急停止按钮联锁：整机急停、各机构分路急停按下后立即切断动力电源，复位后方可重启；

定标准：所有联锁触发动作响应时间≤0.5s，无延迟、无失效、无旁路接线。

Emergency stop button interlock: pressing the whole-machine emergency stop or the branch emergency stop of each mechanism shall immediately cut off the power supply, and restart is allowed only after reset. Acceptance criteria: the response time of all interlock trigger actions shall be ≤0.5s, without delay, failure or bypass wiring.

3.1.3 防护装置完好性检查

3.1.3 Integrity Inspection of Protective Devices

外露齿轮、联轴器、传动轴、卷筒两侧全封闭金属防护罩无开裂、缺失、变形；

Fully enclosed metal guards on both sides of exposed gears, couplings, transmission shafts and drums shall be free from cracks, missing parts and deformation;

滑触线、动力电缆绝缘防护套管、防雨挡板完整，破损绝缘套全部更换；

Conductor rails, insulating protective sleeves of power cables and rain-proof baffles shall be complete, and all damaged insulating sleeves shall be replaced;

高空作业平台、走台防护栏杆高度≥1050mm，踏板防滑无破损，防护围板齐全；

The guardrail height of elevated work platforms and walkways shall be ≥1050mm, the treads shall be anti-slip and free from damage, and protective surrounding boards shall be complete;

电机、减速箱隔热、防尘防护盖板完好，高温区域增设隔热防护；

Thermal insulation and dust-proof covers of motors and gearboxes shall be intact, and heat insulation protection shall be added in high-temperature areas;

轨道两端防撞防护挡板、电缆拖链防护外壳无断裂；

Anti-collision protective baffles at both ends of rails and the protective shells of cable drag chains shall be free from fracture;

控制柜绝缘防护门、操作手柄绝缘护套完整无老化开裂。

The insulating protective doors of control cabinets and insulating sleeves of operating handles shall be complete without aging or cracking.

3.2 附件、吊具、传动部件磨损及状态检修要求

3.2 Wear and Condition-Based Maintenance Requirements for Accessories, Lifting Attachments and Transmission Components

3.2.1 钢丝绳检查标准

3.2.1 Wire Rope Inspection Standard

外观：无扭结、压扁、笼状畸变、锈蚀、外层钢丝剥落、绳芯挤出；
Appearance: free from kinking, flattening, cage distortion, corrosion, peeling of outer wires and extrusion of the rope core;

磨损量化：单捻距内断丝数量不超过总丝数 10%，直径磨损量≤公称直径 7%，超标直接报废更换；

Wear quantification: the number of broken wires within one rope lay shall not exceed 10% of the total number of wires, and the diameter wear shall be ≤7% of the nominal diameter; if exceeding the limit, the rope shall be directly discarded and replaced;

绳端固定：压板、绳卡数量齐全，紧固无松动，防松卡扣完好，涂抹专用润滑脂；所有钢丝绳逐段清洁除锈、均匀润滑，炉顶、灰库腐蚀严重区域缩短更换周期。

Rope end fixing: the number of pressure plates and rope clips shall be complete, tightened without looseness, with intact anti-loosening clips, and special grease applied; all wire ropes shall be cleaned, derusted and lubricated evenly section by section, and the replacement cycle shall be shortened in severely corrosive areas such as the boiler top and ash silo.

3.2.2 起重钢丝绳检查标准

3.2.2 Hoisting Wire Rope Inspection Standards

钢丝绳无扭曲、打结、塑性拉长、表面点蚀、裂纹；

The wire rope shall be free from twisting, knotting, plastic elongation, surface pitting and cracks;

钢丝绳磨损直径≤原直径 10%，伸长量不超过标称长度 5%，超限更换；

The wire rope wear diameter shall be ≤10% of the original diameter, and the elongation shall not exceed 5% of the nominal length; replace if exceeding the limit;

钢丝绳导槽、钢丝绳无卡滞、断股断丝、严重磨损，加注耐高温润滑脂。

The wire rope guide groove and wire rope shall be free from jamming, broken strands, broken wires and severe wear, and high-temperature-resistant grease shall be added.

3.2.3 吊钩检测标准

3.2.3 Hook Inspection Standards

钩体无裂纹、焊补痕迹、塑性变形，钩口开口度变形增量不超过原尺寸 10%；

The hook body shall be free from cracks, weld repair marks and plastic deformation, and the deformation increment of the hook mouth opening shall not exceed 10% of the original size;

吊钩轴套、推力轴承转动灵活无卡涩，磨损间隙≤0.2mm；

The hook bushing and thrust bearing shall rotate flexibly without jamming, and the wear clearance

shall be ≤0.2mm;

防脱保险棘爪配套完整，弹簧弹力充足，无断裂丢失。

The anti-drop safety pawl shall be complete, with sufficient spring force, and free from fracture and loss.

3.2.4 齿轮与传动装置检修

3.2.4 Gear and Transmission Device Maintenance

减速箱、行走、起升齿轮无点蚀、断齿、胶合、大面积磨损；齿轮啮合间隙符合原厂图纸；

Reduction gearbox, traveling and hoisting gears shall be free from pitting, broken teeth, scoring and large-area wear; the gear meshing clearance shall conform to the OEM drawings;

传动轴、联轴器弹性缓冲块无老化开裂，连接键、键槽配合无松动，顶部间隙0.10~0.12mm；

The elastic buffer blocks of transmission shafts and couplings shall be free from aging and cracking, the connecting keys and keyways shall be fitted without looseness, and the top clearance shall be 0.10~0.12mm;

轴承无过热、异响、间隙超标，加注润滑油脂，密封油封无渗油漏油；

Bearings shall be free from overheating, abnormal noise and excessive clearance, grease shall be added, and the sealing oil seals shall be free from oil seepage and leakage;

传动皮带、链轮无开裂、拉长、跳齿，张紧度调整至规范区间。

Transmission belts and sprockets shall be free from cracking, elongation and tooth skipping, and the tension shall be adjusted to the specified range.

3.3 固定件、紧固件（螺帽、开口销）检修要求

3.3 Maintenance Requirements for Fixed Parts and Fasteners (Nuts, Cotter Pins)

主梁、端梁、轨道压板、车轮支架、电机底座所有高强度螺栓逐颗紧固；缺失螺栓、垫片全部补齐；

All high-strength bolts of the main girder, end beams, rail pressure plates, wheel supports and motor bases shall be tightened one by one; missing bolts and washers shall be fully replenished;

锁紧螺母、防松止动垫圈无脱落、变形，振动部位采用双螺母防松；

Lock nuts and anti-loosening stop washers shall be free from falling off and deformation, and double-nut anti-loosening shall be adopted at vibrating parts;

销轴、吊钩轴、车轮轴配套开口销完整，开口角度≥60°，断裂、缺失开口销全部更换；

Cotter pins for pins, hook shafts and wheel shafts shall be complete, with an opening angle ≥60°, and all fractured or missing cotter pins shall be replaced;

锈蚀严重螺纹件除锈或更换，螺纹无毛刺、乱扣，紧固力矩符合设备说明书要求；所有紧固件做好标记，便于日常点检复查。

Threaded parts with severe rust shall be derusted or replaced, the threads shall be free from burrs and crossed threads, and the tightening torque shall conform to the requirements of the equipment manual; all fasteners shall be marked for convenient daily inspection and recheck.

3.4 整机接地系统检修标准

3.4 Maintenance Standards for Whole-Machine Earthing System

桥架、葫芦金属壳体、电机外壳、轨道、操作控制柜、电缆金属线管全部可靠电气接地；

Metal cable trays, hoist metal housings, motor casings, rails, operation control cabinets and metal conduits of cables shall all be reliably electrically earthed;

接地扁铁、接地线无断裂、腐蚀、虚接，连接端子除锈紧固，加装防腐蚀垫片；

Earthing flat steel and earthing conductors shall be free from fracture, corrosion and false connection, the connecting terminals shall be derusted and tightened, and anti-corrosion gaskets shall be installed;

接地电阻测试：保护接地电阻≤4Ω，露天起重设备防雷接地≤10Ω；

Earthing resistance test: protective earthing resistance ≤4Ω, and lightning protection earthing of outdoor lifting equipment ≤10Ω;

禁止利用起重设备主梁、钢丝绳替代中性线，接地回路独立敷设；

It is prohibited to use the main girder or wire rope of the lifting equipment as a substitute for the neutral conductor; the earthing circuit shall be laid independently.

3.5 装配与调试通用要求

3.5 General Requirements for Assembly and Commissioning

解体前对所有配合面、传动部件、线路做对位标记，分类收纳小型零件、紧固件，箱体标注设备点位，杜绝混装丢失；

Before disassembly, make alignment marks on all mating surfaces, transmission components and circuits, store small parts and fasteners by classification, mark the equipment location on the boxes, and prevent mixed storage and loss;

清理所有金属部件锈蚀、粉尘、油污，密封垫、O 型圈、填料全部一次性更换；

Clean rust, dust and oil stains on all metal parts, and replace all sealing gaskets, O-rings and packing at one time;

轴、卷筒、车轮表面光洁无磨损、裂纹，主轴弯曲度≤0.03mm；

The surfaces of shafts, drums and wheels shall be smooth and free from wear and cracks, and the

main shaft bending shall be ≤0.03mm;

各机构装配间隙、联轴器同心度、平行度符合原厂技术文件；

The assembly clearances of each mechanism and the concentricity and parallelism of couplings shall conform to the OEM technical documents;

装配完成后先空载全程试运行，再分 50%、100% 额定载荷静载、动载试验；

After assembly is completed, first carry out a full no-load trial operation, and then carry out static load and dynamic load tests at 50% and 100% of the rated load respectively;

单台设备检修完成填写完整检修台账，记录安全装置校验数据、磨损测量值、接地电阻、更换备件清单。

After the maintenance of each equipment is completed, fill in a complete maintenance ledger, recording the safety device verification data, wear measurement values, earthing resistance and the list of replaced spare parts.

3.6 质量验收判定标准

3.6 Quality Acceptance Criteria

所有保险、联锁、防护装置齐全完好，动作灵敏有效，无屏蔽、无失效；

All safety, interlock and protective devices shall be complete and intact, with sensitive and effective action, without shielding or failure;

钢丝绳、吊钩、齿轮磨损量全部在标准允许区间，无裂纹、变形、报废缺陷；

The wear of wire ropes, hooks and gears shall all be within the allowable range of the standards, without cracks, deformation or discardable defects;

全部螺栓、螺母、开口销紧固齐全，无缺失松动；接地系统连续导通，接地电阻达标；

All bolts, nuts and cotter pins shall be tightened and complete, without missing or looseness; the earthing system shall be continuously conductive and the earthing resistance shall meet the standard;

整机空载、额定载荷连续试运不少于 2 小时，运行无异响、无卡滞、无漏油漏电；

The whole machine shall be continuously trial-run under no-load and rated load for no less than 2 hours, with no abnormal noise, jamming, oil leakage or electric leakage during operation;

电机、减速箱运行温度＜70℃，各机构制动平稳，限位、联锁触发准确；

The operating temperature of motors and gearboxes shall be <70℃, each mechanism shall brake smoothly, and the limit and interlock devices shall be triggered accurately;

设备金属结构无新增裂纹、变形，润滑到位，外观清洁，标识完整清晰；

The metal structure of the equipment shall have no new cracks or deformation, lubrication shall be in

place, the appearance shall be clean, and the markings shall be complete and clear;

检修资料齐全：单台检修记录表、安全装置校验报告、接地电阻测试记录、备件更换清单、载荷试验记录。

Maintenance documents shall be complete: single-equipment maintenance record form, safety device verification report, earthing resistance test record, spare parts replacement list and load test record.

4 施工、人员及安全作业要求

Construction, Personnel and Safety Operation Requirements

4.1 检修队伍人员：项目负责人 1 名，起重专业检修技术专业工程师不少于 2 人； 在印尼提供行车、电动葫芦检修维护服务的企业，须经在线单一提交系统（OSS）取得营业执照号（NIB）。乙方公司经营范围必须含“机器修理与维护”（KBLI 33121）。现场作业人员须为持有 Lisensi K3 的技术员。

4.1 Maintenance team members: 1 person in charge of the project, and no less than 2 professional engineers in maintenance technology for hoisting; Enterprises providing maintenance services for traveling crane and electric hoist in Indonesia must obtain business license number (NIB) through online single submission system (OSS). The business scope of Party B's company must include "machine repair and maintenance" (KBLI 33121). On-site operators shall be technicians with Lisensi K3.

4.2 开工前完成三级安全教育、危险源辨识、专项安全技术交底，办理全厂统一工作票；高空作业搭设合格脚手架，设置警戒围栏、警示标识，专人监护，规避交叉作业；

4.2 Before commencement, complete three-level safety education, hazard source identification and special safety technical disclosure, and handle the unified work permit of the whole plant; for working at heights, erect qualified scaffolding, set up warning fences and warning signs, assign dedicated personnel for supervision, and avoid cross operations;

4.3 临时用电执行“三级配电、五芯电缆、漏电保护”，严禁私拉乱接，检修完毕切断总电源；

动火作业办理动火票，清理周边易燃物，配备灭火器材；每日完工清理现场，孔洞盖板、栏杆恢复完整；所有作业人员规范佩戴安全帽、安全带、绝缘手套、劳保鞋、护目镜等防护用品。

4.3 Temporary power consumption shall implement "three-level power distribution, five-core cable, leakage protection", unauthorized wiring is strictly prohibited, and the main power supply shall be cut off after maintenance; hot work shall be handled with a hot work permit, flammable materials around shall be cleared, and fire extinguishing equipment shall be provided; the site shall be cleaned after daily completion, and hole covers and railings shall be restored to complete condition; all operators shall properly wear protective equipment such as safety helmets, safety

belts, insulating gloves, labor protection shoes and goggles.

4.4 本项目检修作业所需全部脚手架、测量仪器、专用检修工装、由乙方全部自备。

4.4 All scaffolding, measuring instruments and special maintenance tools required for the maintenance of this project shall be provided by Party B.

4.4.1 乙方自备的脚手架设施必须符合安全规范要求，搭设完成后乙方组织自检合格后方可投入使用；脚手架材料、构配件完好无裂纹、腐蚀变形，配套防护栏杆、挡脚板齐全，满足现场检修登高作业需要。

4.4.1 Scaffolding facilities provided by Party B must meet the requirements of safety regulations, and can only be put into use after Party B has organized self-inspection after the erection is completed; Scaffolding materials, components and fittings are in good condition without cracks, corrosion and deformation, and supporting protective railings and baseboards are complete, which can meet the needs of on-site maintenance and climbing operation.

4.4.2 所有电动工器具必须检验合格，绝缘完好，漏电保护装置配置齐全；进场前完成自检，严禁绝缘破损、故障工器具带入施工现场。

4.4.2 All electric tools must pass inspection, with intact insulation and complete leakage protection devices; self-inspection shall be completed before entering the site, and tools with damaged insulation or faults are strictly prohibited from being brought into the construction site.

4.4.3 检修使用的力矩扳手、卡尺、接地电阻测试仪、载荷试验工装、限位校验仪器等测量、试验工器具应在检定有效期内，确保检测数据准确有效。

4.4.3 Measuring and testing tools used in maintenance, such as torque wrenches, calipers, earthing resistance testers, load test tooling and limit verification instruments, shall be within the validity period of calibration to ensure accurate and effective test data.

4.4.4 乙方应根据全厂不同位置起重设备检修工况，配备适配的吊具、撬杠、拆装工装、润滑工具、零部件存放箱，用于设备解体、零部件收纳保管，防止零件丢失、磕碰损伤。

4.4.4 Party B shall, according to the maintenance conditions of lifting equipment at different locations of the whole plant, provide suitable lifting attachments, pry bars, disassembly/assembly tooling, lubrication tools and parts storage boxes for equipment disassembly and parts storage and protection, so as to prevent parts loss and impact damage.

4.4.5 所有自备脚手架、防护装备由乙方负责日常维护、保管、定期检查，因工器具、脚手架缺陷造成的安全事故、设备损坏，全部责任由乙方承担。

4.4.5 Party B shall be responsible for the daily maintenance, storage and regular inspection of all self-provided scaffolding and protective equipment, and Party B shall bear all responsibilities for safety accidents and equipment damage caused by defects of tools and scaffolding.

5 进度工期要求

5. Schedule Requirements

施工前，安排技术人员到现场统计工作量，对所有设备进行技术摸排，对维修所需配件进行统计，制定施工计划。施工计划包括：工作周期计划，节点完工计划。

Before construction, arrange technical personnel to go to the site to quantify the workload, conduct technical survey of all equipment, make statistics of the spare parts required for maintenance, and formulate a construction plan. The construction plan includes: work cycle plan and milestone completion plan.

5.1 总工期：2026 年 12 月 01 日进场至 2027 年 01 月 30 日，共计 60 天，覆盖全厂 105 台起重设备逐台检修、试验、验收；

5.2 乙方进场时间：2026 年 12 月 01 日抵达厂区，完成工器具、备件清点、现场安全培训；

5.3 分区域检修顺序：循环泵房→汽机房→磨煤机区域→炉本体（炉顶、渣仓、电除尘）→风机泵房、化水车间→输煤系统、卸船机房→灰库、燃油泵房；

5.4 若全厂机组检修计划调整，甲方提前 7 个工作日书面通知乙方调整进场、施工工期。

5.1 Total construction period: from December 1, 2026 to January 30, 2027, a total of 60 days, covering the overhaul, test and acceptance of 105 lifting equipment in the whole plant one by one;

5.2 Arrival time of Party B: Arrive at the factory on December 1, 2026, and complete the inventory of tools and spare parts and on-site safety training;

5.3 Maintenance sequence by region: circulating pump room → steam turbine room → coal mill area → furnace body (roof, slag bin, electrostatic precipitator) → fan pump room, chemical water workshop → coal conveying system, ship unloader room → ash storage and fuel pump room;

5.4 If the overhaul plan of the whole plant is adjusted, Party A shall notify Party B in writing 7 working days in advance to adjust the mobilization and construction period.

6 环保及废弃物管理要求

Environmental Protection and Waste Management Requirements

6.1 检修产生废钢丝绳、报废吊钩、废润滑油、破损密封件、锈蚀金属废料分类收集；6.2 废油使用专用密封容器存放，严禁直接排入沟渠、水坑、循环水系统，避免水体腐蚀污染；

6.3 所有废弃物由承包方统一转运至厂区指定危废、固废存放点，做好移交台账；6.4 检修过程避免粉尘、油污大面积扩散，完工后恢复设备周边环境卫生。

6.1 Waste wire ropes, discarded hooks, waste lubricating oil, damaged sealing parts and rusted metal waste generated from maintenance shall be collected by classification; 6.2 Waste oil shall be stored in dedicated sealed containers, and it is strictly prohibited to discharge it directly into ditches, puddles or the circulating water system, so as to avoid water corrosion and pollution; 6.3 All wastes shall be uniformly transported by the contractor to the designated hazardous waste and solid waste storage points of the plant, and a handover ledger shall be kept; 6.4 During the maintenance process, avoid large-area diffusion of dust and oil stains, and restore the surrounding environmental sanitation

of the equipment after completion.

7 工程验收
Project Acceptance

7.1 验收方式

7.1 Acceptance Method

执行单台节点过程验收及项目整体竣工验收。单台设备检修设置过程节点验收，全部 105 台设备完成单台节点验收、缺陷闭环后，开展项目整体竣工验收。

Both single-equipment node process acceptance and overall completion acceptance of the project shall be carried out. Process node acceptance shall be set for the maintenance of each equipment. After all 105 equipment complete single-equipment node acceptance and defect closure, the overall completion acceptance of the project shall be carried out.

7.2 单台节点过程验收

7.2 Single-Equipment Node Process Acceptance

单台设备按检修工序设置节点验收，主要节点：设备解体检查、关键部件更换/修复完成、装配完成、载荷试验。

Node acceptance shall be set for each equipment according to the maintenance process. The main nodes are: equipment disassembly inspection, completion of key component replacement/repair, completion of assembly, and load test.

1. 乙方完成对应检修节点后，向甲方申请节点验收，提交该节点检查、测量记录；未经甲方节点确认，不得进入下一道工序。

2. After Party B completes the corresponding maintenance node, it shall apply to Party A for node acceptance and submit the inspection and measurement records of that node; without Party A's node confirmation, it shall not proceed to the next process.

3. 全部工序完成后，乙方汇总提交该台完整检修记录、安全装置校验、接地电阻、备件更换记录，申请该台最终验收。甲方现场核查实物及试验数据，合格签署单台验收记录；不合格乙方须 48h 内整改完成并复验；未完成全部节点及最终验收的设备，严禁投入使用。

4. After all processes are completed, Party B shall summarize and submit the complete maintenance records, safety device verification, earthing resistance and spare parts replacement records of that equipment, and apply for the final acceptance of that equipment. Party A shall verify the physical objects and test data on site, and sign the single-equipment acceptance record if qualified; if unqualified, Party B must complete rectification and re-inspection within 48 hours; equipment that has not completed all nodes and final acceptance

is strictly prohibited from being put into use.

7.3 整体竣工验收

7.3 Overall Completion Acceptance

全部设备单台节点及最终验收闭环，现场清理完毕、废弃物按规范处置。乙方提交一机一档中英文双语竣工资料（纸质 2 套+电子版，加盖公章），包含：竣工总报告、各台全流程节点及检修校验记录、接地与载荷试验记录、备件更换清单、整改闭环记录、作业人员资质复印件。甲方依据本规范印尼相关标准组织竣工验收，验收合格签署竣工验收证书；存在遗留缺陷需限期闭环。

Single node of all equipment and final acceptance closed loop, site cleaning is completed, and wastes are disposed according to specifications. Party B shall submit bilingual completion materials (two sets of paper+electronic version, stamped with official seal) for one machine and one file, including: general completion report, records of all process nodes and maintenance verification, grounding and load test records, spare parts replacement list, closed-loop records of rectification, and copies of operators' qualifications. Party A shall organize the completion acceptance according to relevant Indonesian standards in this specification, and sign the completion acceptance certificate if it is qualified; There are remaining defects that need to be closed within a time limit..

8 违约责任

Liability for Breach of Contract

8.1 进度违约责任

Schedule Breach Liability

8.1.1 因乙方原因未按照合同约定竣工日期完成工期，每延误一日，按合同价款的 0.1%向甲方支付违约金。

8.1.1 If Party B fails to complete the construction period by the completion date agreed in the contract due to Party B's reasons, it shall pay Party A a penalty of 0.1% of the contract price for each day of delay.

8.1.2 因不可抗力导致工期延误，乙方应在事件发生后 14 日内提交书面报告并提供证明文件，经甲方确认后可免除相关责任。

8.1.2 If the construction period is delayed due to force majeure, Party B shall submit a written report and provide supporting documents within 14 days after the occurrence of the event, and may be exempted from relevant liabilities after confirmation by Party A.

8.1.3 因甲方原因导致工期延误，乙方有权要求顺延工期，具体顺延天数由双方协商确定。

8.1.3 If the construction period is delayed due to Party A's reasons, Party B has the right to request an extension of the construction period, and the specific number of extension days shall be determined through negotiation between both parties.

8.2 质量违约责任

Quality Breach Liability

8.2.1 乙方不得擅自修改技术标准。违反本规范书要求造成检修质量不合格的，乙方负责返工、修理，并赔偿由此给甲方造成的损失。

8.2.1 Party B shall not modify technical standards without authorization. If the maintenance quality is unqualified due to violation of the requirements of this specification, Party B shall be responsible for rework, repair, and compensation for losses caused to Party A.

8.2.2 若检修质量验收不合格，乙方必须限期整改，每逾期一日按合同价款的 0.1%支付金。

8.2.2 If the maintenance quality acceptance is unqualified, Party B must make rectification within a time limit, and pay a penalty of 0.1% of the contract price for each overdue day.

8.2.3 工程竣工验收合格后，乙方按合同价款的 10%留存质量保证金，质保期为检修验收合格后 180 天。质保期满且无质量问题后，甲方在 60 日内返还质量保证金（不计利息）。

8.2.3 After the project is completed and accepted, Party B shall keep the quality deposit at 10% of the contract price, and the warranty period shall be 180 days after the inspection and acceptance. After the warranty expires and there are no quality problems, Party A shall return the quality deposit (excluding interest) within 60 days.

8.2.4 质保期内因乙方检修质量原因导致设备故障，乙方应在接到甲方通知后 48 小时内到场免费处理，并承担由此造成的直接损失。

8.2.4 If equipment failure occurs during the warranty period due to Party B's maintenance quality, Party B shall arrive at the site within 48 hours after receiving Party A's notice to handle it free of charge, and bear the direct losses caused thereby.

8.3 争议解决 Dispute Resolution

8.3.1 争议解决方式：双方应首先通过友好协商解决争议。

8.3.1 Dispute resolution method: Both parties shall first resolve disputes through friendly negotiation.

8.3.2 协商不成的，可由第三方（如行业协会、调解机构）介入协助调解。

8.3.2 If negotiation fails, a third party (such as an industry association or mediation institution) may intervene to assist in mediation.

8.3.3 调解不成的，双方同意将争议提交合同签订地有管辖权的人民法院诉讼解决。

8.3.3 If mediation fails, both parties agree to submit the dispute to the people's court with jurisdiction at the place of contract signing for litigation resolution.

8.3.4 争议处理期间，除争议事项外，双方应继续履行合同其他条款。

8.3.4 During dispute resolution, except for the disputed matters, both parties shall continue to perform other terms of the contract.

9 附录

9. Appendix-A,B,C,

附录 A 甲供主要物资清单

Appendix A List of Main Spare Parts

以下物资由甲方提供，乙方负责核对型号规格并按需更换，具体数量按现场检修实际需要确定；其他材料由乙方承担，费用由乙方自理。

The following large-scale spare parts are provided by Party A, and Party B is responsible for checking the models and specifications and replacing them as needed. The specific quantity is determined according to the actual needs of on-site maintenance. The expenses have been included in the total contract price.

表 A-1 甲方提供主要备品备件清单

Table A-1 List of Main Spare Parts Provided by Party A

序号 No.	备件名称 Spare Part Name	规格/型号 Specification/Model	数量 Quantity	备注 Remarks
1	钢丝绳 Wire rope	按各设备原厂型号 Per OEM model of each equipment	按需 As required	含绳端压板、绳卡 Incl. pressure plates & rope clips
2	吊钩（含防脱装置） Hook (incl. anti-drop device)	按各设备原厂型号 Per OEM model	按需 As required	钩口磨损超限更换 Replace if hook mouth wear exceeds limit
3	滑轮及滑轮轴 Sheave and sheave shaft	按各设备原厂型号 Per OEM model	按需 As required	—
4	制动器摩擦片/制动轮 Brake lining/brake wheel	按各设备制动器型号 Per brake model of each equipment	按需 As required	磨损超限更换 Replace if wear exceeds limit
5	行程/限位开关 Travel/limit switch	各规格 Various sizes	按需 As required	老化、失效更换 Replace if aged or failed
6	超载限制器 Overload limiter	按各设备额定载荷 Per rated load of each equipment	按需 As required	含传感器及显示仪表 Incl. sensor & display
7	缓冲器、导绳器 Buffer, rope guide	各规格 Various sizes	按需 As required	—
8	扳手、螺丝刀	按尺寸 By size	按需 As required	
9	电气元件（接触器、继电器、控制按钮、电缆） Electrical components (contactors, relays, control buttons, cables)	各规格 Various sizes	按需 As required	绝缘老化更换 Replace if insulation aged
10	润滑油、润滑脂/ Lubricating oil, grease	各规格/ Various sizes	按需/ As required	含耐高温润滑脂/ Incl. high-temp grease

11	刷漆材料（底漆、面漆、稀释剂）/ Painting materials (primer, topcoat, thinner)	防锈底漆+面漆/ Anti-rust primer + topcoat	按需/ As required	露天及半露天设备防腐/ Anti-corrosion for outdoor/semi-outdoor equipment

附录 B 乙方自备主要工器具清单及人员清单

Appendix b list of main instruments and personnel

表 B-1 乙方主要工器具清单

Table B-1 List of Main Tools and Instruments

序号 No.	工器具名称 Tool/Instrument Name	规格/型号 Specification/Model	数量 Quantity
1.	百分表及表架 Dial indicator & stand	0～10mm/0～30mm	4 套 4 sets
2.	塞尺 Feeler gauge	0.02～1.0mm	2 把 2 pcs
3.	游标卡尺 Vernier caliper	0～300mm	2 把 2 pcs
4.	接地电阻测试仪 Earthing resistance tester	数字式 Digital	1 台 1 pc
5.	绝缘电阻表（兆欧表） Insulation resistance tester (Megger)	500V/1000V/2500V	1 台 1 pc
6.	数字万用表 Digital multimeter	各规格 Various sizes	2 台 2 pcs
7.	其他工器具		按需自备，费用自理

乙方人员配置清单 Party B's staffing list				
	名称 name	单位 unit	单价 unit price	预估工程量 60 天总价 Estimated 60-day total price of engineering quantity
起重设备检修 Overhaul of lifting equipment	项目负责人 1 人 1 project leader	1		
	技术人员 2 人 2 technicians	2		
	其他费用 other charges			

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附件C

起重设备检查诊断项目确认表

序号 No.	设备名称 Equipment Name	型号Model	使用位置 Location	数量 Quantity	检查诊断内容描述（实际）/Work Content Description	是否刷漆 /Painting Required?	刷漆面积 (m^2)/Painting Area (m^2)
1	通用桥式起重机	QD75/20T	汽机房	1			
2	通用桥式起重机	QD75/20T	汽机房	1			
3	通用桥式起重机	QD50/10T	循环泵房（内）	1			
4	通用桥式起重机	QD20/10T	循环泵房（外）	1			
5	过轨起重机	LXG10T-4.5M	1#磨煤机	1			
6	过轨起重机	LXG10T-4.5M	1#磨煤机	1			
7	过轨起重机	LXG10T-4.5M	2#磨煤机	1			
8	过轨起重机	LXG10T-4.5M	2#磨煤机	1			
9	过轨起重机	LXG10T-4.5M	3#磨煤机	1			
10	过轨起重机	LXG10T-4.5M	3#磨煤机	1			
11	电动单梁起重机	LD5T11.5m-6m	GIS室	1			
12	电动单梁起重机	LD5T-9m	检修间	1			
13	电动单梁起重机	LD5T-6m	检修间	1			
14	电动单梁起重机	LD3T-10m	空压机车间	1			
15	电动单梁起重机	LD3T-10m	空压机车间	1			
16	悬挂起重机	LX5-8M	消防泵	1			
17	电动单梁起重机	LX5T10M	曝气风机	1			
18	电动葫芦	CD1型1T9m	1#高效浓缩池	1			
19	电动葫芦	CD1型2T55m	1#炉顶	1			
20	电动葫芦	CD1型2T55m	2#炉顶	1			
21	电动葫芦	CD1型2T55m	3#炉顶	1			
22	电动葫芦	CD1型2T12m	1#渣仓	1			
23	电动葫芦	CD1型2T12m	2#渣仓	1			
24	电动葫芦	CD1型2T12m	3#渣仓	1			
25	电动葫芦	CD1型2T30m	1#电除尘顶部	1			
26	电动葫芦	CD1型2T30m	2#电除尘顶部	1			
27	电动葫芦	CD1型2T30m	3#电除尘顶部	1			
28	电动葫芦	CD1型5T9M	1#A送风机电机	1			
29	电动葫芦	CD1型8T9M	1#A一次风机电机	1			
30	电动葫芦	CD1型12T9M	1#A引风机电	1			

序号 No.	设备名称 Equipment Name	型号Model	使用位置 Location	数量 Quantity	检查诊断内容描述（实际）/Work Content Description	是否刷漆 /Painting Required?	刷漆面积 (m^2)/Painting Area (m^2)
			机				
31	电动葫芦	CD1型5T9M	1#b送风机电机	1			
32	电动葫芦	CD1型8T9M	1#b一次风机电机	1			
33	电动葫芦	CD1型12T9M	1#b引风机电机	1			
34	电动葫芦	CD1型5T9M	2#A送风机电机	1			
35	电动葫芦	CD1型8T9M	2#A一次风机电机	1			
36	电动葫芦	CD1型12T9M	2#A引风机电机	1			
37	电动葫芦	CD1型5T9M	2#b送风机电机	1			
38	电动葫芦	CD1型8T9M	2#b一次风机电机	1			
39	电动葫芦	CD1型12T9M	2#b引风机电机	1			
40	电动葫芦	CD1型5T9M	3#A送风机电机	1			
41	电动葫芦	CD1型8T9M	3#A一次风机电机	1			
42	电动葫芦	CD1型12T9M	3#A引风机电机	1			
43	电动葫芦	CD1型5T9M	3#b送风机电机	1			
44	电动葫芦	CD1型8T9M	3#b一次风机电机	1			
45	电动葫芦	CD1型12T9M	3#b引风机电机	1			
46	电动葫芦	CD1型5T6M	1a开式水泵电机	1			
47	电动葫芦	CD1型 5T6M	1b开式水泵电机	1			
48	电动葫芦	CD1型5T6M	1a真空泵	1			
49	电动葫芦	CD1型5T6M	1b真空泵	1			
50	电动葫芦	CD1型16t6m-a	1#机电动给水	1			

序号 No.	设备名称 Equipment Name	型号Model	使用位置 Location	数量 Quantity	检查诊断内容描述（实际）/Work Content Description	是否刷漆 /Painting Required?	刷漆面积 (m^2)/Painting Area (m^2)
			泵b电机				
51	电动葫芦	CD1型16t6m-b	1#机电动给水泵b电机	1			
52	电动葫芦	CD1型10t6m	1#机电动给水泵b电机	1			
53	电动葫芦	CD1型10t6m-a	1#机电动给水泵A电机	1			
54	电动葫芦	CD1型16t6m-a	1#机电动给水泵a电机	1			
55	电动葫芦	CD1型16t6m-b	1#机电动给水泵a电机	1			
56	电动葫芦	CD1型5t6m	1#机a闭式水泵电机	1			
57	电动葫芦	CD1型5t6m	1#机b闭式水泵电机	1			
58	电动葫芦	CD1型3t6m	1#低加疏水泵	1			
59	电动葫芦	CD1型 5T6M	2a开式水泵电机	1			
60	电动葫芦	CD1型 5T6M	2b开式水泵电机	1			
61	电动葫芦	CD1型5T6M	2a真空泵	1			
62	电动葫芦	CD1型5T6M	2b真空泵	1			
63	电动葫芦	CD1型16t6m-a	2#机电动给水泵b电机	1			
64	电动葫芦	CD1型16t6m-b	2#机电动给水泵b电机	1			
65	电动葫芦	CD1型10t6m	2#机电动给水泵b电机	1			
66	电动葫芦	CD1型10t6m-a	2#机电动给水泵A电机	1			
67	电动葫芦	CD1型16t6m-a	2#机电动给水泵a电机	1			
68	电动葫芦	CD1型16t6m-b	2#机电动给水泵a电机	1			
69	电动葫芦	CD1型5t6m	2#机a闭式水泵电机	1			
70	电动葫芦	CD1型5t6m	2#机b闭式水	1			

序号 No.	设备名称 Equipment Name	型号Model	使用位置 Location	数量 Quantity	检查诊断内容描述（实际）/Work Content Description	是否刷漆 /Painting Required?	刷漆面积 (m^2)/Painting Area (m^2)
			泵电机				
71	电动葫芦	CD1型3t6m	2#低加疏水泵	1			
72	电动葫芦	CD1型 5T6M	3a开式水泵电机	1			
73	电动葫芦	CD1型5T6M	3b开式水泵电机	1			
74	电动葫芦	CD1型5T6M	3a真空泵	1			
75	电动葫芦	CD1型5T6M	3b真空泵	1			
76	电动葫芦	CD1型16t6m-a	3#机电动给水泵b电机	1			
77	电动葫芦	CD1型16t6m-b	3#机电动给水泵b电机	1			
78	电动葫芦	CD1型10t6m	3#机电动给水泵b电机	1			
79	电动葫芦	CD1型10t6m-a	3#机电动给水泵A电机	1			
80	电动葫芦	CD1型16t6m-a	3#机电动给水泵a电机	1			
81	电动葫芦	CD1型16t6m-b	3#机电动给水泵a电机	1			
82	电动葫芦	CD1型5t6m	3#机a闭式水泵电机	1			
83	电动葫芦	CD1型5t6m	3#机b闭式水泵电机	1			
84	电动葫芦	CD1型3t6m	3#低加疏水泵	1			
85	电动葫芦	CD1型10T9M	喷淋泵	1			
86	电动葫芦	CD1型5t6m	化水车间	1			
87	电动葫芦	CD1型2t12m	灰库2楼	1			
88	电动葫芦	CD1型2t36m	灰库顶部	1			
89	电动单梁起重机	LD5t8m-9m	综合水泵房	1			
90	门式抓斗起重机	MH5t10m-9m	煤水沉淀池	1			
91	电动单梁起重机	LD 10T 10M-18M	碎煤机楼C5皮带机头部	1			
92	电动葫芦	CD1型1t6m	C4皮带机头部a	1			
93	电动葫芦	CD1型1t6m	C4皮带机头部	1			

序号 No.	设备名称 Equipment Name	型号Model	使用位置 Location	数量 Quantity	检查诊断内容描述（实际）/Work Content Description	是否刷漆 /Painting Required?	刷漆面积 (m^2)/Painting Area (m^2)
			b				
94	电动单梁起重机	LX10T10M-36M	输煤楼顶楼	1			
95	电动葫芦	CD1型1t6m	输煤检修间	1			
96	电动葫芦	CD1型2t18m	入炉煤样采样间（碎煤机3楼）	1			
97	电动葫芦	CD1型5t6m	C皮带机尾部	1			
98	电动葫芦	CD1型5t36m	C2入场采样机中部	1			
99	电动葫芦	CD1型5t24m	C2入场采样机	1			
100	电动葫芦	CD1型3t9m	C1头部	1			
101	电动单梁悬挂起重机	LX 3T8.5 M-55M	C7皮带头部	1			
102	电动葫芦	LX 3T8.5 M-55M	#6皮带头部上方	1			
103	电动葫芦	LXB 2T5M-6M	燃油泵房	1			
104	电动葫芦	LD5T-8m-9m	#1卸船机	1			
105	电动葫芦	LD5T-8m-9m	#2卸船机	1			

编制：　　审核（甲方工程师）：　　批准（甲方）：

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CHINA HUADIAN ENGINEERING CO., LTD.

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附件D

起重设备维修项目确认表

序号 No.	设备名称 Equipment Name	型号Model	使用位置 Location	数量 Quantity	维修/换件内容描述（实际）/Work Content Description	是否刷漆 /Painting Required	刷漆面积 (m^2)Painting Area (m^2)
1	通用桥式起重机	QD75/20T	汽机房	1			
2	通用桥式起重机	QD75/20T	汽机房	1			
3	通用桥式起重机	QD50/10T	循环泵房（内）	1			
4	通用桥式起重机	QD20/10T	循环泵房（外）	1			
5	过轨起重机	LXG10T-4.5M	1#磨煤机	1			
6	过轨起重机	LXG10T-4.5M	1#磨煤机	1			
7	过轨起重机	LXG10T-4.5M	2#磨煤机	1			
8	过轨起重机	LXG10T-4.5M	2#磨煤机	1			
9	过轨起重机	LXG10T-4.5M	3#磨煤机	1			
10	过轨起重机	LXG10T-4.5M	3#磨煤机	1			
11	电动单梁起重机	LD5T11.5m-6m	GIS室	1			
12	电动单梁起重机	LD5T-9m	检修间	1			
13	电动单梁起重机	LD5T-6m	检修间	1			
14	电动单梁起重机	LD3T-10m	空压机车间	1			
15	电动单梁起重机	LD3T-10m	空压机车间	1			
16	悬挂起重机	LX5-8M	消防泵	1			
17	电动单梁起重机	LX5T10M	曝气风机	1			
18	电动葫芦	CD1型1T9m	1#高效浓缩池	1			
19	电动葫芦	CD1型2T55m	1#炉顶	1			
20	电动葫芦	CD1型2T55m	2#炉顶	1			
21	电动葫芦	CD1型2T55m	3#炉顶	1			
22	电动葫芦	CD1型2T12m	1#渣仓	1			
23	电动葫芦	CD1型2T12m	2#渣仓	1			
24	电动葫芦	CD1型2T12m	3#渣仓	1			
25	电动葫芦	CD1型2T30m	1#电除尘顶部	1			
26	电动葫芦	CD1型2T30m	2#电除尘顶部	1			
27	电动葫芦	CD1型2T30m	3#电除尘顶部	1			
28	电动葫芦	CD1型5T9M	1#A送风机电机	1			
29	电动葫芦	CD1型8T9M	1#A一次风机电机	1			
30	电动葫芦	CD1型12T9M	1#A引风机电	1			

序号 No.	设备名称 Equipment Name	型号Model	使用位置 Location	数量 Quantity	维修/换件内容描述（实际）/Work Content Description	是否刷漆 /Painting Required	刷漆面积 (m^2)Painting Area (m^2)
			机				
31	电动葫芦	CD1型5T9M	1#b送风机电机	1			
32	电动葫芦	CD1型8T9M	1#b一次风机电机	1			
33	电动葫芦	CD1型12T9M	1#b引风机电机	1			
34	电动葫芦	CD1型5T9M	2#A送风机电机	1			
35	电动葫芦	CD1型8T9M	2#A一次风机电机	1			
36	电动葫芦	CD1型12T9M	2#A引风机电机	1			
37	电动葫芦	CD1型5T9M	2#b送风机电机	1			
38	电动葫芦	CD1型8T9M	2#b一次风机电机	1			
39	电动葫芦	CD1型12T9M	2#b引风机电机	1			
40	电动葫芦	CD1型5T9M	3#A送风机电机	1			
41	电动葫芦	CD1型8T9M	3#A一次风机电机	1			
42	电动葫芦	CD1型12T9M	3#A引风机电机	1			
43	电动葫芦	CD1型5T9M	3#b送风机电机	1			
44	电动葫芦	CD1型8T9M	3#b一次风机电机	1			
45	电动葫芦	CD1型12T9M	3#b引风机电机	1			
46	电动葫芦	CD1型5T6M	1a开式水泵电机	1			
47	电动葫芦	CD1型 5T6M	1b开式水泵电机	1			
48	电动葫芦	CD1型5T6M	1a真空泵	1			
49	电动葫芦	CD1型5T6M	1b真空泵	1			
50	电动葫芦	CD1型16t6m-a	1#机电动给水	1			

序号 No.	设备名称 Equipment Name	型号Model	使用位置 Location	数量 Quantity	维修/换件内容描述（实际）/Work Content Description	是否刷漆 /Painting Required	刷漆面积 (m^2)Painting Area (m^2)
			泵b电机				
51	电动葫芦	CD1型16t6m-b	1#机电动给水泵b电机	1			
52	电动葫芦	CD1型10t6m	1#机电动给水泵b电机	1			
53	电动葫芦	CD1型10t6m-a	1#机电动给水泵A电机	1			
54	电动葫芦	CD1型16t6m-a	1#机电动给水泵a电机	1			
55	电动葫芦	CD1型16t6m-b	1#机电动给水泵a电机	1			
56	电动葫芦	CD1型5t6m	1#机a闭式水泵电机	1			
57	电动葫芦	CD1型5t6m	1#机b闭式水泵电机	1			
58	电动葫芦	CD1型3t6m	1#低加疏水泵	1			
59	电动葫芦	CD1型 5T6M	2a开式水泵电机	1			
60	电动葫芦	CD1型 5T6M	2b开式水泵电机	1			
61	电动葫芦	CD1型5T6M	2a真空泵	1			
62	电动葫芦	CD1型5T6M	2b真空泵	1			
63	电动葫芦	CD1型16t6m-a	2#机电动给水泵b电机	1			
64	电动葫芦	CD1型16t6m-b	2#机电动给水泵b电机	1			
65	电动葫芦	CD1型10t6m	2#机电动给水泵b电机	1			
66	电动葫芦	CD1型10t6m-a	2#机电动给水泵A电机	1			
67	电动葫芦	CD1型16t6m-a	2#机电动给水泵a电机	1			
68	电动葫芦	CD1型16t6m-b	2#机电动给水泵a电机	1			
69	电动葫芦	CD1型5t6m	2#机a闭式水泵电机	1			
70	电动葫芦	CD1型5t6m	2#机b闭式水	1			

序号 No.	设备名称 Equipment Name	型号Model	使用位置 Location	数量 Quantity	维修/换件内容描述（实际）/Work Content Description	是否刷漆 /Painting Required	刷漆面积 (m^2)Painting Area (m^2)
			泵电机				
71	电动葫芦	CD1型3t6m	2#低加疏水泵	1			
72	电动葫芦	CD1型 5T6M	3a开式水泵电机	1			
73	电动葫芦	CD1型5T6M	3b开式水泵电机	1			
74	电动葫芦	CD1型5T6M	3a真空泵	1			
75	电动葫芦	CD1型5T6M	3b真空泵	1			
76	电动葫芦	CD1型16t6m-a	3#机电动给水泵b电机	1			
77	电动葫芦	CD1型16t6m-b	3#机电动给水泵b电机	1			
78	电动葫芦	CD1型10t6m	3#机电动给水泵b电机	1			
79	电动葫芦	CD1型10t6m-a	3#机电动给水泵A电机	1			
80	电动葫芦	CD1型16t6m-a	3#机电动给水泵a电机	1			
81	电动葫芦	CD1型16t6m-b	3#机电动给水泵a电机	1			
82	电动葫芦	CD1型5t6m	3#机a闭式水泵电机	1			
83	电动葫芦	CD1型5t6m	3#机b闭式水泵电机	1			
84	电动葫芦	CD1型3t6m	3#低加疏水泵	1			
85	电动葫芦	CD1型10T9M	喷淋泵	1			
86	电动葫芦	CD1型5t6m	化水车间	1			
87	电动葫芦	CD1型2t12m	灰库2楼	1			
88	电动葫芦	CD1型2t36m	灰库顶部	1			
89	电动单梁起重机	LD5t8m-9m	综合水泵房	1			
90	门式抓斗起重机	MH5t10m-9m	煤水沉淀池	1			
91	电动单梁起重机	LD 10T 10M-18M	碎煤机楼C5皮带机头部	1			
92	电动葫芦	CD1型1t6m	C4皮带机头部a	1			
93	电动葫芦	CD1型1t6m	C4皮带机头部	1			

序号 No.	设备名称 Equipment Name	型号Model	使用位置 Location	数量 Quantity	维修/换件内容描述（实际）/Work Content Description	是否刷漆 /Painting Required	刷漆面积 (m^2)Painting Area (m^2)
			b				
94	电动单梁起重机	LX10T10M-36M	输煤楼顶楼	1			
95	电动葫芦	CD1型1t6m	输煤检修间	1			
96	电动葫芦	CD1型2t18m	入炉煤样采样间（碎煤机3楼）	1			
97	电动葫芦	CD1型5t6m	C皮带机尾部	1			
98	电动葫芦	CD1型5t36m	C2入场采样机中部	1			
99	电动葫芦	CD1型5t24m	C2入场采样机	1			
100	电动葫芦	CD1型3t9m	C1头部	1			
101	电动单梁悬挂起重机	LX 3T8.5 M-55M	C7皮带头部	1			
102	电动葫芦	LX 3T8.5 M-55M	#6皮带头部上方	1			
103	电动葫芦	LXB 2T5M-6M	燃油泵房	1			
104	电动葫芦	LD5T-8m-9m	#1卸船机	1			
105	电动葫芦	LD5T-8m-9m	#2卸船机	1			

编制：　　审核（甲方工程师）：　　批准（甲方）：