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巴厘通用能源公司
PT GENERAL ENERGY BALI

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地磅升级改造技术规范书

Technical Specification for Weighbridge Upgrade and Renovation

批准(APPROVE)：

审核(VERIFY) ：

编制（Prepared by）：

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地磅升级改造技术规范书

Technical Specification for Weighbridge Upgrade and Renovation

1. 总则 General Requirements

1.1 适用范围 Scope of Application

本技术规范书适用于巴厘通用能源公司地磅升级改造项目，明确承包方在技术、质量、安全、环保、进度、责任及义务等方面的要求，以确保项目高质量完成。

This technical specification is applicable to the upgrade of weighbridge of PT. General Energy BALI's project, and clarifies the contractor's requirements in terms of technology, quality, safety, environmental protection, progress, responsibilities and obligations to ensure high-quality completion of the project.

1.2 编制依据 Preparation Basis

1.2.1 国家通用计量、衡器标准

GB/T 7723-2022 《固定式电子衡器》
JJG 539-2016 《数字指示秤》
JJG 668-2017 《汽车衡》
GB/T 15464-2021 《仪器仪表包装通用技术条件》
GB/T 13384-2008 《机电产品包装通用技术条件》

1.2.1 National Common Measurement and Weighing Standards

GB/T 7723-2022 Fixed Location Electronic Weighing Instrument
JJG 539-2016 Digital Indicating Weighing Instruments
JJG 668-2017 Vehicle Weighbridge
GB/T 15464-2021 General Specification for Packaging of Instrumentation Products
GB/T 13384-2008 General Specifications for Packing of Mechanical and Electrical Product

1.2.2 称重传感器专项国家标准

GB/T 7551-2021 《称重传感器》
OIML R60 国际建议（等同转化国内计量要求）
GB 4793.1-2020 《测量、控制和实验室用电气设备的安全要求第 1 部分：通用要求》
GB/T 30427-2013 《工业自动化产品环境试验》

1.2.2 National Standard for Weighing Sensors

GB/T 7551-2021 Load Cells

OIML R60 International Recommendations (Equivalent Conversion of Domestic Measurement Requirements)
GB 4793.1-2020 Safety Technical Specification for Electrical Equipment for Measurement, Control and Laboratory Use
GB/T 30427-2013 Environmental Testing of Industrial Automation Products

1.2.3 电气、防雷、现场施工规范
GB 50057-2010 《建筑物防雷设计规范》设计文件、设备技术资料
GB 50303-2015 《工业建筑电气设计规范》
GB 50168-2018 《电气装置安装工程 电缆线路施工及验收标准》
GB 50149-2010 《电气装置安装工程 母线装置施工及验收规范》
DL/T 620-1997 《交流电气装置的过电压保护和绝缘配合》

1.2.3 Electrical, Lightning Protection, On-Site Construction Standards
Design documents and equipment technical data of GB 50057-2010 Design code for protection of Structures against lightning
GB 50303-2015 Code for Electrical Design of Industrial Buildings
GB 50168-2018 Standard for Construction and Acceptance of Cable Line Electric Equipment Installation Engineering
GB 50149-2010 Code for Construction and Acceptance of Busbar Installation of Electric Equipment Installation Engineering
DL/T 620-1997 Overvoltage Protection and Insulation Coordination for AC Electrical Installations

1.2.4 钢结构、磅台基础、安装施工标准
GB 50205-2020 《钢结构工程施工质量验收标准》
GB 50007-2011 《建筑地基基础设计规范》
GB/T 38400-2019 《电子汽车衡安装调试规范》

1.2.4 Steel Structure, Weighbridge Foundation, Installation and Construction Standards
GB 50205-2020 Standard for Acceptance of Construction Quality of Steel Structures
GB 50007-2011 Code for Design of Building Foundation
GB/T 38400-2019 Installation and Commissioning Standards for Electronic Vehicle Scales

1.2.5 工业 / 火电企业管理、安全、设备相关规范
《计量器具管理办法》（企业内部计量管理制度）
DL/T 468-2018 《电力行业称重设备技术条件》
GB 28001 / GB/T 45001 职业健康安全管理体系
企业《设备检修改造管理标准》《三措两案管理规定》
火电厂燃料管理相关规程：《火力发电厂燃料计量管理导则》

1.2.5 Industrial / Thermal Power Enterprise Management, Safety, and Equipment Standards
"Measurement Instruments Management Measures" (Internal Enterprise Measurement Management System)

DL/T 468-2018 Technical Specifications for Weighing Equipment in the Electric Power Industry
GB 28001 / GB/T 45001 Occupational Health and Safety Management System
Company's “Equipment Maintenance and Renovation Management Standard” and “Three Measures, Two Plans Management Regulations”
Regulations related to fuel management in thermal power plants: “Guidelines for Fuel Measurement Management in Thermal Power Plants”

1.2.6 数字通讯、数据传输相关标准
GB/T 19582-2008 《基于 Modbus 协议的工业自动化网络规范》
HJ 212-2017 污染源在线监控传输标准（燃煤电厂适用）
企业 SIS/MIS 系统接口技术规范

1.2.6 Standards Related to Digital Communication and Data Transmission
GB/T 19582-2008 Modbus Industrial Automation Network Specification
HJ 212-2017 Data Transmission Standard for Online Monitoring Systems of Pollutant (Applicable to Coal-Fired Power Plants)
Enterprise SIS/MIS System Interface Technical Specifications

1.3 技术规范的解释权

本技术规范书由巴厘通用能源公司生产技术部编制并解释，未尽事宜由双方协商确定。

1.3 Right of Interpretation

This technical specification is prepared and interpreted by the Production Technology Department of PT. General Energy Bali. Any matters not covered shall be determined by negotiation between the two parties.

2. 工作范围 Working Scope

2.1 项目概述 Project Overview

2.1.1 项目名称 Project Name
巴厘通用能源公司地磅更换数字传感器改造项目
Weighbridge Digital Sensor Replacement Project of PT. General Energy Bali

2.1.2 项目地点
华电科工集团印尼巴厘岛电站，巴厘岛电站位于印尼巴厘岛 Gerokgak 区，Celukan Bawang 村，属滨海电厂

2.1.2 Project Location
Indonesia Bali power plant of China Huadian Engineering Co., Ltd, located in Celukan Bawang village, Gerokgak district, Bali, Indonesia. And the power plant is a coastal power plant.

2.1.3 项目背景及目的

原模拟传感器信号易受电磁干扰、长线传输信号衰减大、零点漂移明显、单支点故障无法定位、四角偏差调试繁琐，无法满足长期稳定计量、贸易结算计量精度及无人值守称重系统兼容要求。无法满足称重计量的问题。

2.1.3 Project Background and Purpose

The original analog sensor signals are easily affected by electromagnetic interference, suffer significant signal loss over long-distance transmission, have obvious zero-point drift, can't locate faults at a single point, and the corner calibration is complicated. This makes it impossible to meet the requirements for long-term stable measurement, trade settlement accuracy, and compatibility with unmanned weighing systems. Basically, it can't handle accurate weighing measurements.

2.1.4 工程范围

原有汽车衡（地磅）模拟称重传感器系统整体拆除，更换为 RS485 总线式数字称重传感器，配套更换数字接线盒、专用数字屏蔽线缆，同步完成线路敷设、接地防雷整改、系统调试、偏载校准、量程标定及试运行验收工作升级更换模拟量称重传感器为数字式称重传感器，修复称重盘的锈蚀，并加盖防雨棚。

2.1.4 Project Scope

The old vehicle scale (weighbridge) analog weighing sensor system was completely removed and replaced with RS485 bus digital weighing sensors. We also replaced the digital junction box and special digital shielded cables, and carried out wiring, grounding and lightning protection upgrades, system debugging, off-center calibration, range calibration, and trial run acceptance. The analog weighing sensors were upgraded to digital ones, the weighing platform rust was repaired, and a rain canopy was added.

2.2 现场原有基础核查要求

2.2.1 传感器安装基础底板无明显不均匀沉降、大面积开裂、积水浸泡，底板平整度满足安装条件。

2.2.2 秤台纵向、横向限位装置完好，限位间隙可调，称重过程无卡滞、磕碰、顶死现象。

2.2.3 现场具备 AC220V 稳定供电、接地极敷设及线缆穿管敷设空间。

2.2 On-Site Inspection Requirements for Existing Foundation

2.2.1 The base plate for the sensor installation has no obvious uneven settlement, large cracks, or water accumulation, and the flatness of the base plate meets the installation requirements.

2.2.2 The longitudinal and lateral limit devices of the scale platform are intact, the limit gaps are adjustable, and there is no jamming, collision, or sticking during weighing.

2.2.3 The site has a stable AC220V power supply, grounding electrodes laid out, and space for cable conduit installation.

2.3 项目范围清单

序号	规格描述	单位	数量	备注
称重桥				
1	**准备工作**			
	区域调查，交通运输	项	1	
	清洁工作区域	项	1	
2	**称重桥电子设备**			
	数字称重显示器/不锈钢	台	1	
	301 型数字称重传感器，不锈钢材质，30 吨	个	6	
	称重传感器安装套件	套	6	
	Arde 电缆用于接地称重传感器	套	6	
	指示灯电缆 + 连接器	套	6	
	平台称重桥接地电缆	套	1	
3	**钢结构平台组件**			
	主梁 IWF 600 X 200 X 18 X 11 = @ 4 X 6000mm	套	4	
	模块横梁 IWP250 支撑梁 IWP200，顶板 12mm 1500mm×3200mm×260mm	套	8	
	螺栓和螺母 3/4×2 英寸	套	128	
	涂漆 2 层铬酸盐 + 防护涂料表面处理	套	1	
4	**服务**			
	现场安装服务	项	1	
	送货服务	项	1	
	计量和证书验证服务	项	1	
	技术人员交通和住宿	项	1	
称重桥防雨棚				
1	**准备工作**			
	勘测、运输和动员	项	1	
	完工后区域清洁	项	1	
2	**称重桥钢屋顶**			
	结构 WF 150 X 75 X 5.5	M	84.12	
	CNP 120 X 4.X 1.8 屋顶桁架	M	193.80	
	GALVALIM 屋顶 0.4	M^2	153.80	
	RAINDROPS 镀铝锌 0.4mm + 框架	M	32.08	
	螺栓和螺母	套	1	
	闭口 L 镀铝锌 0.4	M	16	

	刷漆	套	1	
3	**称重桥雨棚的土建基础**			
	施特劳斯桩 250 直径 x 1500	套	8	
	土木结构混凝土+系梁	M^3	6	
	底座 + 底板 + 松弦	套	8	
	雨水管	套	4	
	PVC4 AW	套	1	
	背衬材料	套	1	
4	**服务**			
	安装费	项	1	
	运费	项	1	

2.3 Project Scope List

NO.	Spesifikasi	Unit	quantity	Remark
Weighing bridge				
1	**PREPARATION**			
	Survey area, Transportasi	Lot	1	
	Cleaning work area	Lot	1	
2	**Weighing bridge electronic equipment**			
	Digital Weighing Indicator / Stainless Steel	Set	1	
	Model 301 digital load cell, made of stainless steel, 30 tons.	piece	6	
	Weighing sensor mounting kit	Set	6	
	Arde cables are used for grounding load cells.	Set	6	
	Indicator light cable + connector	Set	6	
	Platform weighing bridge grounding cable	Set	1	
3	**Steel structure platform components**			
	Main beam IWF 600 X 200 X 18 X 11 = @ 4 X 6000mm	Set	4	
	Modular crossbeam IWP250, support beam IWP200, top plate 12mm, 1500mm×3200mm ×260mm	Set	8	
	Bolts and nuts 3/4 x 2 inches	Set	128	
	Painting 2 Layer，Zincromate + Finishing by etching primer	Set	1	
4	**Service**			
	On-site installation service	Lot	1	
	Delivery service	Lot	1	
	Metrology and Certificate Verification Services	Lot	1	

	Transportation and accommodation for technical personnel	Lot	1	
Rain shelter for weighing bridge				
1	**Preparation**			
	Surveying, transportation and mobilization	Lot	1	
	Clean the area after finishing.	Lot	1	
2	**Weighing bridge steel roof**			
	Structure WF 150 X 75 X 5.5	M	84.12	
	CNP 120 X 4.X 1.8 Roof Truss	M	193.80	
	GALVALIM ROOF 0.4	M^2	153.80	
	RAINDROPS Galvalum 0.4mm + frame	M	32.08	
	BOLTS AND NUTS	Set	1	
	Close Up L galvalum 0.4	M	16	
	Painting	Set	1	
3	**Civil engineering foundation of the weighbridge canopy**			
	Strauss pile 250 dia x 1500	Set	8	
	Civil structural concrete + tie beam	M^3	6	
	Pedestal + base plate + unchor	Set	8	
	Water control tub	Set	4	
	PVC 4 " AW	Set	1	
	Material backisting	Set	1	
4	**Service**			
	Installation fee	Lot	1	
	Shipping Cost	Lot	1	

3. 主要设备技术要求
Main Equipment Technical Requirements

3.1 数字称重传感器

3.1.1 新的承压底座尺寸与原有承压底座一致。

3.1.2 额定载荷匹配原衡器单支点设计吨位，安全过载≥150% FS，极限过载≥200% FS。

3.1.3 精度等级：C3 级（III 级衡器专用），非线性、滞后、重复性误差≤±0.02% FS；具备内置温度自动补偿模块。

3.1.4 通讯方式：RS485 总线数字信号，支持独立地址编码、单支传感器数据单独读取、断线故障报警；总线传输距离≥800m。

3.1.5 防护等级 IP68，不锈钢外壳、激光密封焊接，适应露天雨雪、潮湿粉尘工况；工作环境温度 - 40℃～+70℃。

3.1.6 配套专用 8 芯双层屏蔽数字线缆，线缆耐碾压、耐老化、防水耐磨。

3.1 Digital Weighing Sensor

3.1.1 The size of the new pressure-bearing base is consistent with that of the original one.

3.1.2 Rated load matches the single-point design capacity of the original scale, with a safe overload ≥150% FS and ultimate overload ≥200% FS.

3.1.3 Accuracy level: C3 (for III-class scales), with non-linearity, hysteresis, and repeatability errors ≤±0.02% FS; comes with a built-in temperature auto-compensation module.

3.1.4 Communication: RS485 bus digital signals, supporting independent address coding, individual reading of single sensor data, and disconnection fault alarms; bus transmission distance ≥800m.

3.1.5 Protection level IP68, stainless steel casing with laser-sealed welding, suitable for outdoor rain, snow, and humid dusty conditions; operating temperature -40℃ to 70℃.

3.1.6 Comes with a dedicated 8-core double-shielded digital cable that is crush-resistant, aging-resistant, waterproof, and wear-resistant.

3.2 数字总线接线盒

3.2.1 总线汇聚型数字接线盒，端口数量与传感器数量匹配；外壳 IP67 防水。

3.2.2 内置浪涌防雷保护、终端匹配电阻，接线端子紧固可靠，具备密封防潮措施；预留接地端子。

3.2 Digital Busline Junction Box

3.2.1 Bus-converged digital junction box, with the number of ports matching the number of sensors; IP67 waterproof casing.

3.2.2 Built-in surge and lightning protection, terminal matching resistors, secure wiring terminals, with sealing and moisture-proof measures; reserved grounding terminal.

3.3 配套辅材

镀锌钢管 / PVC 阻燃穿线管、不锈钢找平垫片、高强度防松紧固件、接地扁钢、接地极、防水密封胶、线缆固定卡扣等辅材均采用国标合格产品。

3.3 Supporting Materials

Galvanized steel pipes / PVC flame-retardant conduit, stainless steel leveling shims, high-strength anti-loosening fasteners, grounding flat steel, grounding rods, waterproof sealant, cable fixing clips, and other auxiliary materials all use products that meet national standards.

3.4 防雨棚
Rain Shelter

3.4.1 结构荷载与安全技术要求
Structural Loads and Safety Technical Requirements

（1）荷载标准（开阔厂区 / 露天场地）
- 基本风压：≥0.55kN/㎡，抗风≥8 级；沿海、风口、矿区提升至 10 级，提供完整风荷载计算书。
- 屋面检修活荷载：≥0.5kN/㎡；檐口、悬挑部位附加集中荷载验算。
- 抗震：7 度及以上设防区设置交叉斜撑、柱间支撑，整体刚性加强。

(1) Load Standards (Open Factory Area / Outdoor Site)

- Basic wind pressure: ≥0.55 kN/m², wind resistance≥grade 8; for coastal areas, wind-exposed locations, and mining areas, upgrade to grade 10, and provide a full wind load calculation report.
- Roof maintenance live load: ≥0.5 kN/m²; verify additional concentrated loads for eaves and cantilever sections.
- Seismic: In areas with a seismic fortification intensity of 7 or above, install cross bracing and inter-column supports, and enhance overall rigidity.

3.4.2 主体钢结构材质

（1）立柱：Q235B H 型钢/方矩管，常规跨度 12m 以内≥200×100×4mm(IWF 150 X 75 X 5.7) ；大跨度＞14m 采用 H250×125，(IWF 150 X 75 X 5.7)□禁止薄壁圆管。
（2）屋面主梁：H 型钢 / 16# 工字钢，次檩条 C180 镀锌 C 型钢，壁厚≥2.5mm，檩条间距≤1.5m。
（3）连接：主梁、立柱采用 8.8 级热镀锌高强螺栓；关键节点满焊，焊缝无夹渣气孔。
（4）支撑系统：每跨设置柱间交叉斜撑、屋面横向水平支撑，抵抗侧风晃动，杜绝棚体共振影响称重精度。

3.4.2 Main Steel Structure Material

(1) Columns: Q235B H-shaped steel / square rectangular tube, with a conventional span within 12m≥200×100×4mm (IWF 150 X 75 X 5.7)✓; for large spans >14m use H250×125, (IWF 150 X 75 X 5.7)✓ thin-walled round tubes are not allowed.

(2) Roof main beams: H-shaped steel / 16# I-beam, secondary purlins C180 - (C 120)✓ galvanized C-shaped steel, wall thickness≥2.5mm, purlin spacing≤1.5m.

(3) Connections: Main beams and columns use 8.8 grade hot-dip galvanized high-strength bolts; critical nodes are fully welded, with welds free of slag and pores.

(4) Bracing system: Each span has cross braces between columns and transverse horizontal roof braces to resist sway from wind, preventing resonance that could affect weighing accuracy.

3.4.3 基础与安装精度

（1）独立混凝土基础 C25，基础埋深≥1.2m，预埋 M24 (M20)✓及以上热镀锌地脚螺栓，锚筋与基础钢筋焊接。
（2）立柱垂直度偏差≤H/1000，最大≤12mm；屋面水平高差≤3‰单跨长度。
（3）禁止膨胀螺栓替代预埋地脚；回填土、软基地面需做换填或扩大基础，防止沉降倾斜。

3.4.3 Base and Installation Accuracy

(1) Independent concrete foundation C25, foundation depth≥1.2m, pre-embed M24 (M20)✓ or larger hot-dip galvanized anchor bolts, weld anchor bars to foundation rebar.
(2) Column vertical deviation≤H/1000, maximum≤12mm; roof horizontal height difference≤3‰ of single span length.
(3) Expansion bolts are not allowed to replace pre-embedded anchor bolts; backfill soil or soft ground needs to be replaced or the foundation enlarged to prevent settlement or tilting.

3.4.4 防腐标准

（1）标准工况：整体热浸镀锌，锌层厚度≥85μm。(Marine Painted)
（2）高腐蚀 / 沿海：热镀锌 + 环氧富锌底漆 1 道 + 户外氟碳面漆 2 道，耐盐雾≥2000h；焊缝二次补锌补漆。(Marine Painted)
（3）所有螺栓、螺母、垫片全热镀锌，杜绝普通发黑紧固件锈蚀断裂。

3.4.4 Anti-Corrosion Standard

(1) Standard conditions: Entire piece hot-dip galvanized, zinc layer thickness≥85μm. (Marine Painted)
(2) High corrosion/coastal areas: Hot-dip galvanizing, 1 coat of epoxy zinc-rich primer, 2 coats of outdoor fluorocarbon finish, salt spray resistance≥2000h; welds are re-zinc coated and painted. (Marine Painted)
(3) All bolts, nuts, and washers are fully hot-dip galvanized to prevent rust and breakage like ordinary black fasteners.

4. 施工安装技术要求

4.1 断电后有序拆除旧模拟传感器、旧接线盒及老旧线缆，清理走线通道。

4.2 采用对称顶升方式抬升秤台，平稳安放数字传感器，保证传感器垂直受力、球面承压居中，螺栓均匀紧固防松。

4.3 调整限位间隙至标准范围，空载状态通过增减钢垫片完成各支点受力找平，消除安装预应力。

4.4 数字线缆规整敷设，强弱电管线分开布置，远离电机、变频器、配电柜等强干扰源，线缆预留松弛余量，严禁紧绷拉扯。

4.5 线路接线区分通讯 A/B 线、电源线、屏蔽地线，接线牢固无虚接，屏蔽层按规范单端接地。

4.6 完善衡器独立接地系统，接地电阻≤4Ω，接线盒及仪表端增设防雷保护，降低雷击、电网浪涌损坏风险。

4.7 管线穿管口做防水封堵，户外裸露部位做好防护，避免积水浸泡线路接头

4. Construction and Installation Technical Requirements

4.1 After powering off, carefully remove the old analog sensors, old junction boxes, and aged cables, and clean the cable routes.

4.2 Lift the scale platform using a symmetrical jacking method, place the digital sensors steadily, ensure the sensors take vertical loads, the spherical surfaces are centered under pressure, and bolts are tightened evenly to prevent loosening.

4.3 Adjust the limit gaps to standard ranges and level the load on each support by adding or removing steel shims in an unloaded state, eliminating any installation pre-stress.

4.4 Lay out the digital cables neatly, separate strong and weak electrical cables, keep them away from motors, inverters, distribution cabinets, and other strong interference sources, leave some slack in the cables, and never stretch them tight.

4.5 In the wiring area, separate communication A/B lines, power lines, and shielded ground wires. Make sure connections are secure without any loose contacts, and ground the shield layer at a single end according to standards.

4.6 Improve the scale's independent grounding system, with grounding resistance≤4Ω, and add lightning protection to junction boxes and instrument terminals to reduce the risk of lightning strikes and power surges.

4.7 Seal cable entry points to prevent water, protect exposed outdoor parts, and avoid water from soaking the cable joints.

5. 系统调试与标定要求

5.1 传感器逐一设置独立通讯地址，仪表完成总线扫描，确认全部传感器通讯正常。

5.2 仪表设置衡器总量程、单支传感器量程、分度值、通讯模式等基础参数；设备通电预热稳定后开展调试。

5.3 执行空载零点校准，空载零点漂移满足计量规范要求；

5.4 采用标准砝码开展四角偏载调试，利用数字系统独立角差修正功能，使各支点偏载误差符合 III 级衡器允许误差标准。

5.5 分级加载完成全量程标定，重复标定两次，保存标定参数。

5.6 开展稳定性测试、故障报警测试、数据通讯联动测试，确保单支传感器故障可主动报警、称重数据传输稳定无跳变。

5. System Commissioning and Calibration Requirements

5.1 Sensors are set with individual communication addresses one by one, and the instrument performs a bus scan to ensure all sensors are communicating properly.

5.2 The instrument sets basic parameters such as the total range of the scale, the range of each sensor, the division value, and the communication mode; debugging begins after the equipment is powered on and warmed up.

5.3 Perform zero-point calibration under no load, ensuring that the zero-point drift meets metrology standards.

5.4 Use standard weights to carry out four-corner offload debugging, and utilize the digital system's independent corner difference correction function to ensure that the offload error of each support point meets the Grade III scale allowable error standard.

5.5 Complete full-range calibration with stepwise loading, repeat the calibration twice, and save the calibration parameters.

5.6 Conduct stability tests, fault alarm tests, and data communication linkage tests to ensure that any single sensor fault can trigger an active alarm and that weighing data is transmitted stably without sudden changes.

6. 验收标准

6.1 安装验收：设备安装牢固、走线规整、限位灵活无卡滞，接地防雷、防水密封施工达标。

6.2 计量精度验收：零点稳定性、偏载误差、全量程示值误差、重复性误差均满足 JJG539III 级衡器检定允许误差要求。

6.3 功能验收：传感器寻址读取、故障报警、数据上传、大屏 / 称重软件联动功能运行正常。

6.4 资料验收：交付设备合格证、出厂检测资料、接线原理图、传感器地址台账、施工调试记录、验收记录表。

6. Acceptance Criteria

6.1 Installation Acceptance: Equipment is installed securely, wiring is neat, limit switches operate smoothly without sticking, and grounding, lightning protection, and waterproof sealing meet the required standards.

6.2 Measurement Accuracy Acceptance: Zero stability, off-center load error, full-scale reading error, and repeatability error all meet the allowed error requirements for JJG539 Class III scales.

6.3 Function Acceptance: Sensor addressing and reading, fault alarms, data uploading, and the interaction between the large screen/weighing software function normally.

6.4 Documentation Acceptance: Delivery includes equipment certificate, factory inspection documents, wiring diagrams, sensor address ledger, installation and commissioning records, and acceptance record forms.

7. 安全施工及质保要求

7.1 施工严格遵守高空作业、顶升作业、断电作业安全规范，落实现场安全防护措施；雨天不开展户外接线与通电调试。

7.2 数字传感器、接线盒整体质保不少于 12 个月，质保期内非人为损坏故障免费检修更换。

7.3 完工后提供调试操作指导，留存备品备件型号清单，便于后期运维更换。

7. Safety Construction and Warranty Requirements

7.1 Construction must strictly follow safety regulations for working at heights, lifting operations, and power-off operations, and implement on-site safety protection measures; outdoor wiring and power-on testing should not be carried out on rainy days.

7.2 Digital sensors and junction boxes should have an overall warranty of no less than 12 months, with free repair or replacement for non-human-damage faults during the warranty period.

7.3 After completion, provide guidance on commissioning and operation, and keep a list of spare parts and their models for easy maintenance and replacement later.

8. 改造完工判定

满足设备安装合格、线路接地防雷达标、计量精度达标、各项功能正常、竣工资料齐全五项要求，方可正式验收交付。

8. Renovation Completion Assessment

The project can only be officially accepted and handed over if it meets five requirements: the equipment is properly installed, the wiring is grounded and lightning protection meets standards, measurement accuracy is up to standard, all functions are working normally, and all completion documents are complete.