



固 亚 德

无锡固亚德电力设备有限公司

WUXI GUYADE POWER EQUIPMENT CO. LTD

现场施工作业标准

Standards for construction operation

【吊装 hoisting】 【运输transport】 【基础Base】
【总装Final assembly】 【验收计划Acceptance plan】

版本：01



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Acceptance plan



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PART 01

吊装计划

Hoisting plan



【吊装方案Hoisting scheme】

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【吊装结束语Concluding remarks】



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01.吊装方案

Hoisting scheme

适用于本项目所有舱体吊装 Suitable for lifting all cabins in this project

吊装工具清单 List of hoisting tools

序号 number	编号 Grade	型号 Model	数量 Number	其他 Other
1	吊耳板 Lifting lug	EH36厚板 EH36 thick plate	8	12.9级螺栓连接 Bolted connection of grade 12.9
2	DJ	吊架 Hanger	2	
3	GSA	吊绳 Sling	8	承重10T,长度≥4.5m Load-bearing 10T; length (> 4.5m)
4	GSB	吊绳 Sling	4	承重12T,长度≥3.5m Load-bearing 12T; length (> 3.5m)
5	XKA	弓形卸扣 Bow shackle	8	承重: 8.5T Load-bearing: 8.5T
6	XKB	弓形卸扣 Bow shackle	4	承重: 17.5T Load-bearing: 17.5T
7	XKC	弓形卸扣 Bow shackle	1	承重: 3.3T Load-bearing: 3.3T
8	Crane	吊机 Crane	2	用户自定义 User-defined



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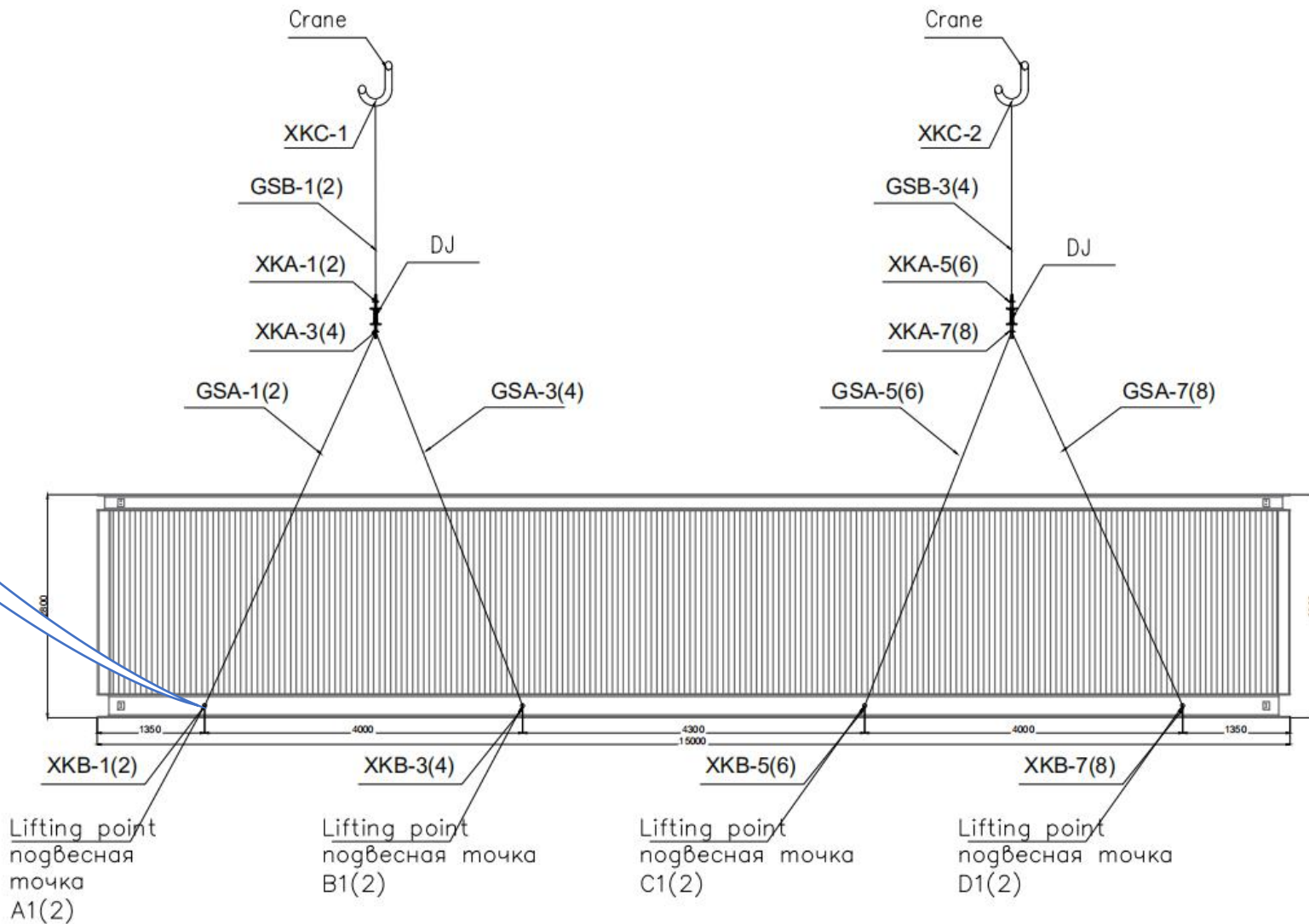
01. 吊装方案

Hoisting scheme

一层 First floor



注意：螺栓必须锁紧
Note: Bolts must be locked



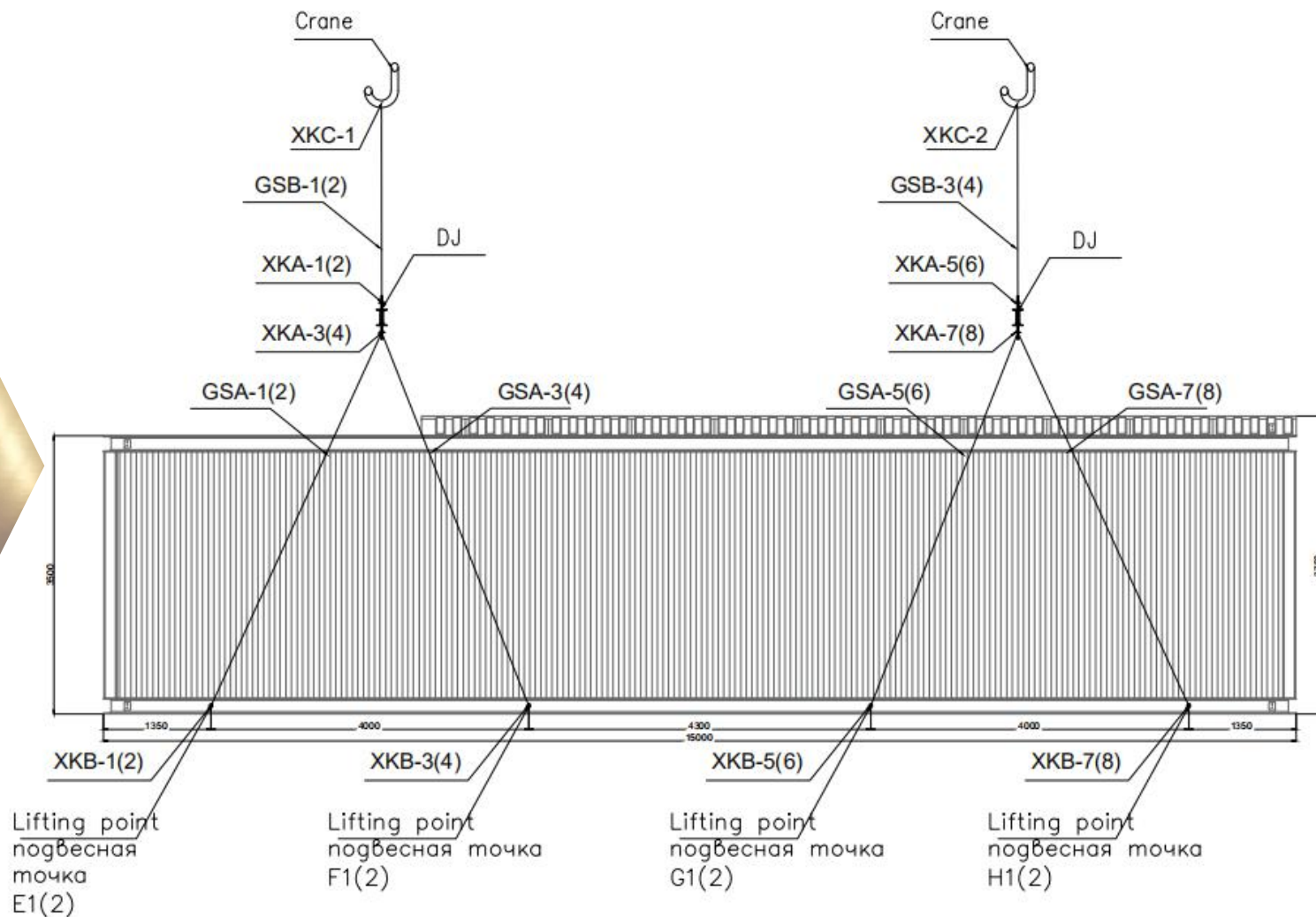


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01. 吊装方案

Hoisting scheme

二层 Second floor





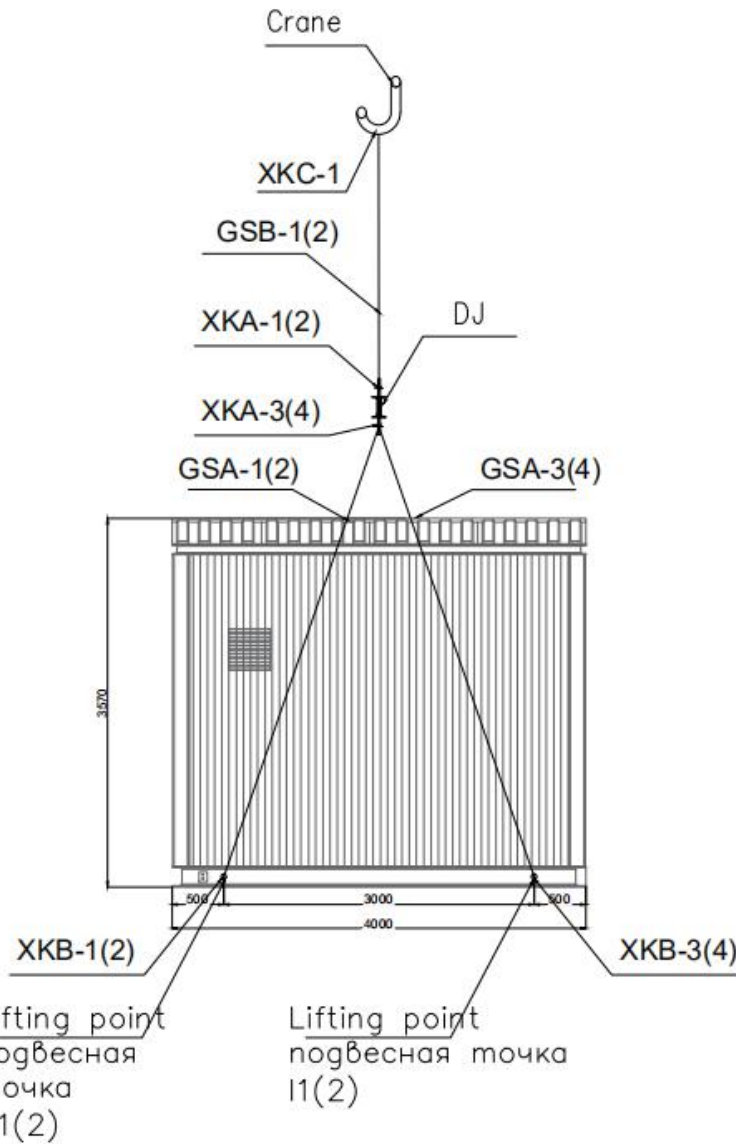
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01. 吊装方案

Hoisting scheme

三层 Third floor

夹角 $\leq 60^\circ$
included angle $\leq 60^\circ$

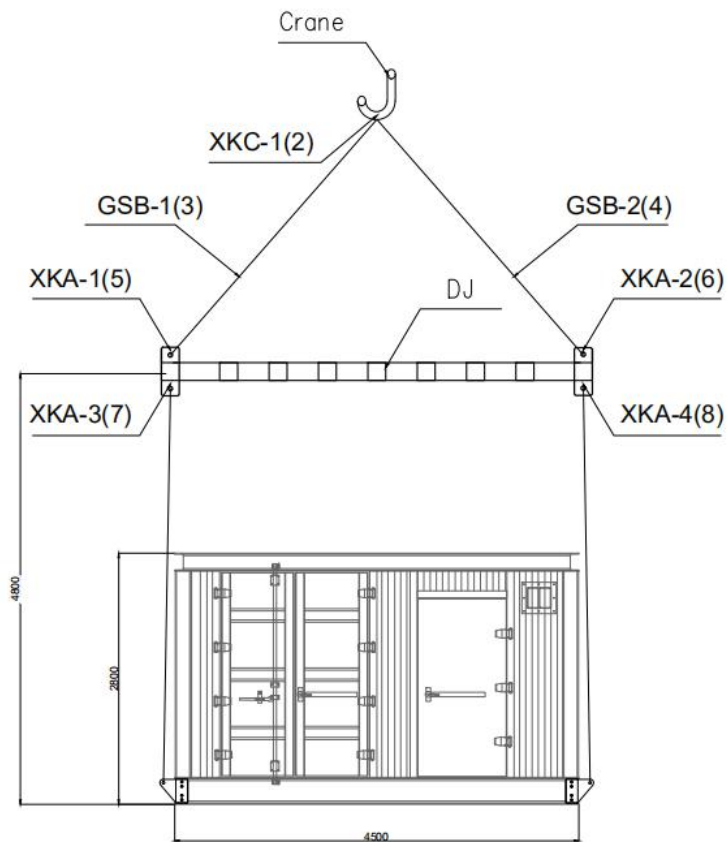




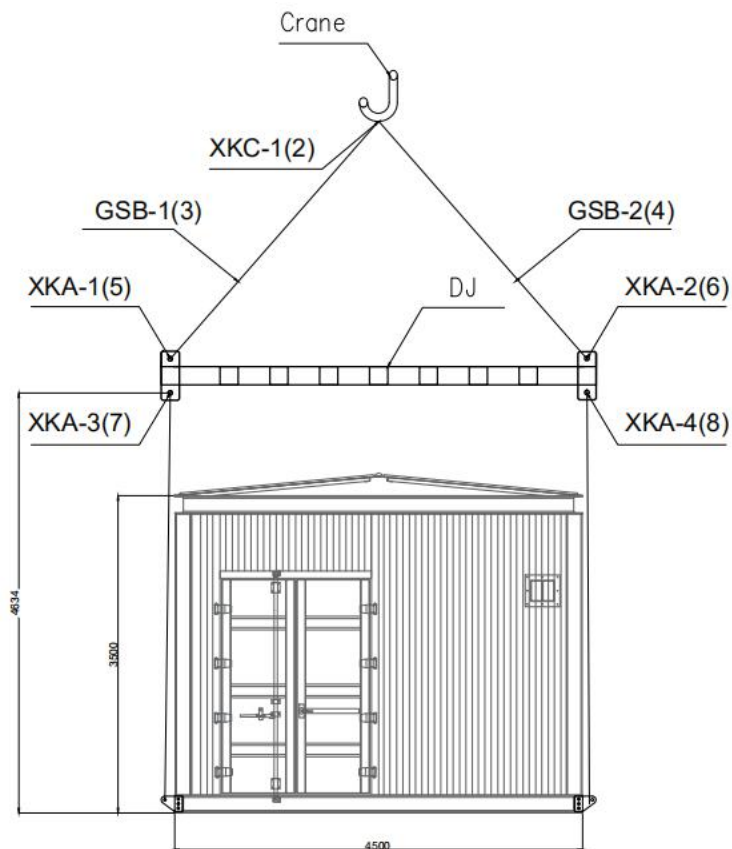
01. 吊装方案

Hoisting scheme

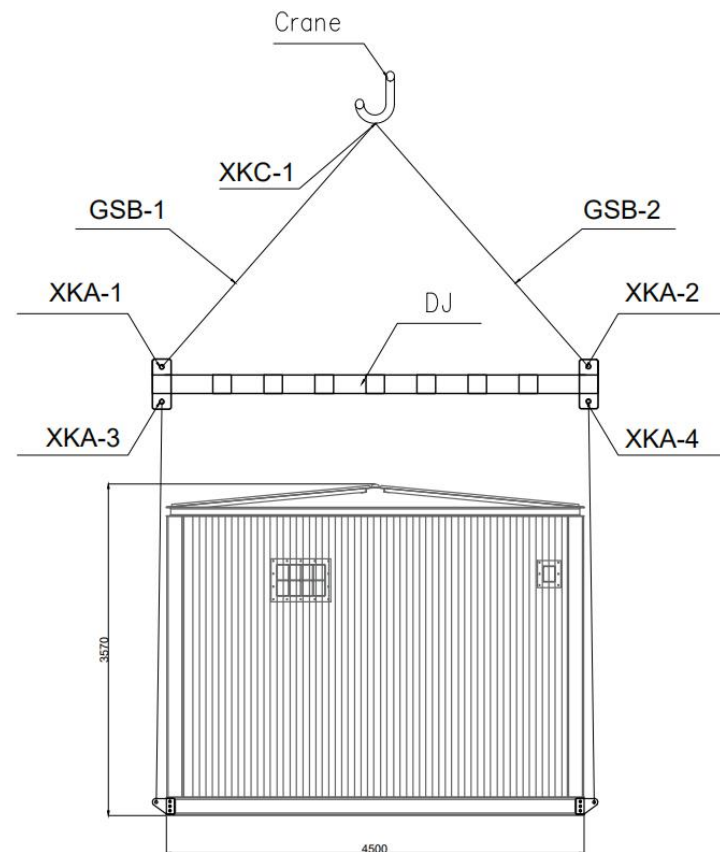
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一层 First floor



二层 Second floor



三层 Third floor



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02. 吊装准备工作

Dead work

- 1, 现场勘察确认基础、货车与吊机相对位置及距离, 确认吊机选型** On-site investigation confirms the foundation, the relative position and distance between the truck and the crane, and confirms the selection of the crane.
- 2, 检查吊装工具是否齐全** Check whether the hoisting tools are complete.
- 3, 检查连接准确性/可靠性** Check the connection accuracy/reliability
- 4, 测绘舱体对应基础位置, 并做标记** Mapping the base position of the cabin and marking it

04. 吊装结束语

Concluding remarks

我司根据舱体规格为客户制定舱体吊装工具；材料选型；详细明确的吊装作业示意图；以便给现场吊装（拼装）作业人员专业、详细的技术指导。确保舱体及内部设备在吊装就为过程中可靠、安全。

According to the cabin specifications, our company formulates cabin hoisting tools for customers; material selection; detailed and clear hoisting operation sketch map; in order to provide professional and detailed technical guidance for field hoisting (assembly) operators. Ensure that the cabin and internal equipment are reliable and safe in the process of hoisting.

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03. 吊装注意事项

Matters needing attention

- 1, 当吊机开始承载时需停顿, 再一次检查各连接部位准确性/可靠性** When the crane starts to load, it should stop and check the accuracy/reliability of the connecting parts again.
- 2, 舱体升降和平移速度 $\leq 2 \text{ m / min}$** The lift and translation velocity of the cabin is less than 2 m/min.
- 3, 吊装就位后应检查舱体方位与整站蓝图是否保持一致, 且舱体与基础连接处是否可靠后** After hoisting in place, check whether the orientation of the cabin is consistent with the blueprint of the whole station, and whether the connection between the cabin and the foundation is reliable.
- 4, 吊装工作过程中, 所有人应站安全线以外** During hoisting, everyone should stand outside the safety line.
- 5, 整理吊装工具, 清理场地、结束吊装工作** Clean up the hoisting tools, clean up the site and finish the hoisting work.



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PART 02

运输计划

Transport plan



【固定Fixed】

【包装Packing】

【运输Transport】



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1. 固定 Fixed



固定

- 1, 舱体底座借用吊装点圆孔与车厢固定点交叉连接固定 Hoisting round hole of cabin and fixed point of carriage are crossed and fixed.
- 2, 绳索须采用钢索 The rope shall be made of steel cables.
- 3, 绳索与舱体接触位置需设置保护垫板 Protective cushion plate should be installed at the contact position between rope and cabin.
- 4, 连接固定点 ≥ 8 处 Connection Fixed Point (> 8)

2. 包装 Packing

包装

- 1, 基础保护: 使用保护膜将舱体缠绕包装 Basic protection: wrapping the cabin with protective film
- 2, 运输保护: 使用软质防雨布将舱体整体无死角、无遗漏完全包裹, 且使用网绳紧固 Transportation protection: use soft rainproof cloth to completely wrap the cabin without dead angle and missing, and use mesh rope to tighten it



3. 运输 Transport



运输

- 1、省道及一下道路行驶速度严格控制在40km/h以内 The speed of provincial road and the next road should be strictly controlled within 40 km/h.
- 2、高速公路行驶速度严格控制在80km/h以内 The speed of expressway is strictly controlled within 80 km/h.
- 3、转弯道路行驶速度严格控制在10km/h以内 The speed of turning roads should be strictly controlled within 10 km/h.
- 4、颠簸道路需要根据情况适当减速 The bumpy road needs to decelerate appropriately according to the situation.
- 5、如果遇障碍物, 严禁强行, 需第一时间反馈 If encounter obstacles, forcible, need the first time feedback.
- 6、省道及一下每行车200公里, 高速公路每行车400公里, 司机必须停车检查 Provincial highway and highway are 200 kilometers and 400 kilometers respectively. Drivers must stop for inspection.
 - (1) 运输外观是否有明显异样 Is there any obvious difference in the appearance of transportation?
 - (2) 需掀开雨布角落检查所有固定点连接可靠性, 检查舱体是否有移位 It is necessary to open the corner of the Raincloth to check the reliability of all fixed point connections and check whether the cabin is displaced or not.
 - (3) 舱体内部巡视, 检查舱体内部有关设备是否有明显异样 Inspecting the interior of the cabin to check whether there is any obvious difference in the relevant equipment inside the cabin.

运输服务热线 Transport Service Hotline: 18020507400



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PART 03

基础

Base



【基础校验Base check】

【补救措施Remedial measures】



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01.基础校验

Base check



基础平整度测量方法 Base flatness measurement method:

1/承重梁水平度测量 Horizontal measurement of load-bearing beam:
基础承重梁的不平整度误差应小于千分之0.5; 即用2米的靠尺放在任意一段基础槽钢上, 采用1mm的塞尺无法塞入 The unevenness error of the bearing beam of the base should be less than 0.5 per 1,000; that is to say, the 2-meter gauge should be placed on any section of the channel steel of the base, and the 1-mm gauge should not be inserted;

2/整体水平度测量 Overall Level Measurement: :

2-1/基础长度 $\leq 10\text{m}$, 采用直径4mm尼龙绳在两端点拉直, 基础水平面偏离尼龙绳距离不得超过5mm; base length is less than 10m, 4 mm diameter nylon rope is used to straighten the two ends, and the distance from the base horizontal plane to the nylon rope should not exceed 5mm. ;

2-2/基础长度 $\leq 20\text{m}$, 采用直径4mm尼龙绳在两端点拉直, 基础水平面偏离尼龙绳距离不得超过10mm; When the length of the base is less than 20m, the 4mm Diameter nylon rope is used to straighten the two ends, and the distance from the horizontal plane of the base to the nylon rope shall not exceed 10mm.

2-3/基础长度 $\leq 30\text{m}$, 采用直径4mm尼龙绳在两端点拉直, 基础水平面偏离尼龙绳距离不得超过15mm; When the length of the foundation is less than 30m, the 4mm Diameter nylon rope is used to straighten the two ends, and the distance from the horizontal plane of the foundation to the nylon rope should not exceed 15mm.



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02.补救措施

Remedial measures



1/高于水平线处理办法 Above the horizontal line:

将基础高于水平线部位使用混凝土平整机进行打磨削平处理 When the base is above the horizontal line, the concrete leveler is used for grinding and leveling.

2/低于水平线处理办法 Treatment below the horizontal line:

2-1/基础低于水平线超过30mm, 需要基础施工单位进行水泥浇筑, 重新找水平 Foundation is below the horizontal line and more than 30 mm. It needs cement pouring by the foundation construction unit to find the level again.

2-2/基础低于水平线 \leq 30mm, 在基础低于水平线部位使用钢制垫块进行填充处理; 钢制垫块尺寸: 建议准备150*30*5; 150*50*5; 150*80*5等规格; 如需要特殊尺寸可使用专用工具现场进行切割后使用 Foundation is less than or equal to 30 mm below the horizontal line, and steel pads are used for filling treatment at the position below the horizontal line. The size of steel pads is recommended to prepare 150*30*5, 150*50*5, 150*80*5 and other specifications. If special size is needed, special tools can be used after cutting on site.





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PART 04

总装计划

Transport plan



【工艺流程图Process flow chart】

【舱体拼装Cabin assembly】

【顶部拼装Roof assembly】

【防水处理Waterproof treatment】

【爬梯/围栏安装installation of Ladder/Fence】

【附件安装Accessories installing】

【电气安装调试Electrical Installation and Debugging】



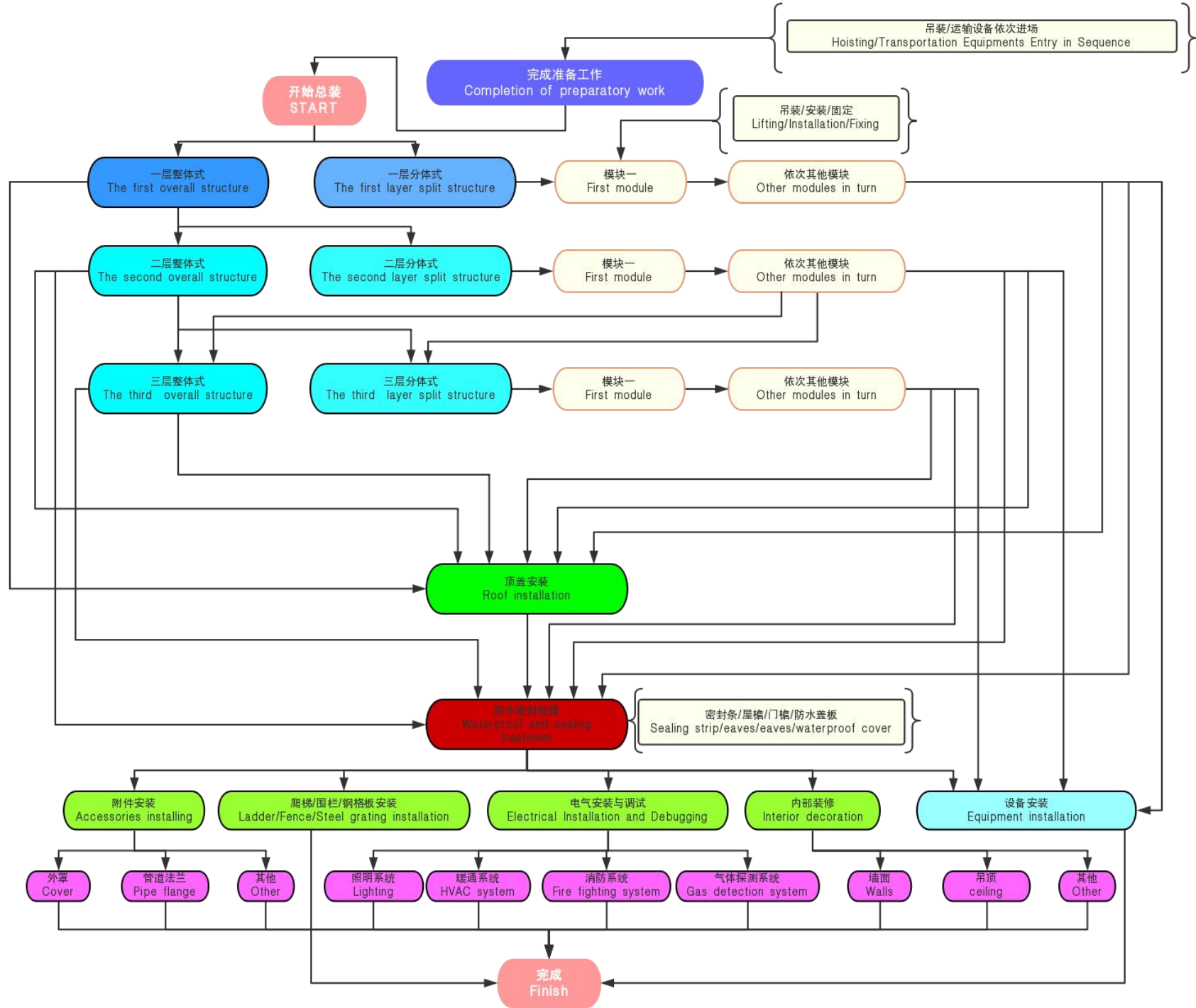
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01.总装工艺流程图

Process flow chart

注 Note:

- 1/请严格按照工艺流程完成现场施工工作
Please complete the site construction work strictly according to the technological process.
- 2/根据项目实际情况可选择不同的路径完成设备总装
According to the actual situation of the project, different paths can be selected to complete the equipment assembly.
- 3/同一级工作可确保安全的条件下同时作业
Work at the same level to ensure simultaneous operation under safe conditions





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02. 舱体拼装

Cabin assembly

拼装示意图

Assembly sketch

注释Notes:

端头模块End module

(左边为左端模块/右边为右端模块)

(Left module on the left /right module on the right)

“A”“B”表示不同层

"A" and "B" denote different layers

“X”表示拼装模块顺序

Assembly Module Sequence

表示拼装方向

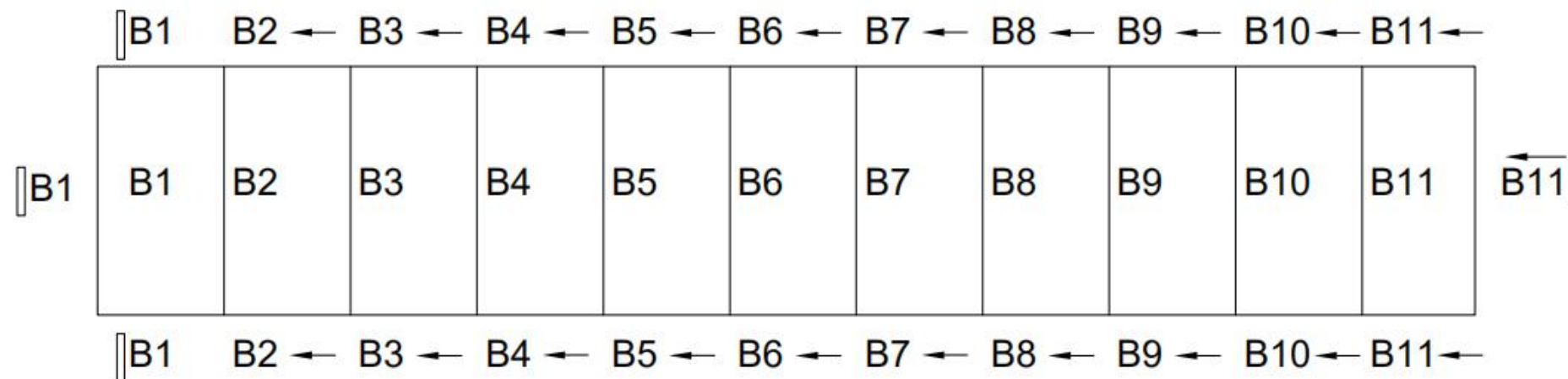
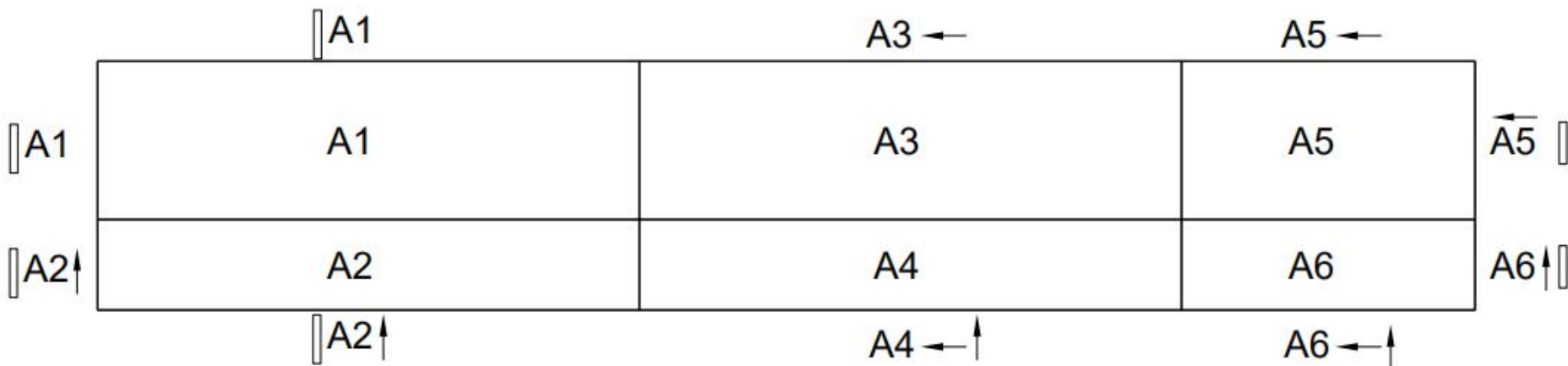
Assembly direction

请严格按照拼装顺序依次完成拼装工作
Please complete the assembly work
in strict accordance with the assembly
sequence.

黏贴标识实例

Instances of sticking labels

A6 ← ↑





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02.舱体拼装

Cabin assembly

一层拼装 First floor assembly

舱体拼装前应先放样每一个模块的位置并做好标记

The position of each module should be laid out and marked before assembly.

一层第一个模块吊装就位安装固定（确保与基础可靠连接，确保不移动）

The first module of the first floor is hoisted, installed and fixed in place (to ensure reliable connection with the foundation, to ensure that it does not move)





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02.舱体拼装

Cabin assembly

一层拼装 First floor assembly

第一模块吊装就位后其余模块按照拼装示意图拼装顺序依次拼装

After the first module is hoisted in place, the rest modules are assembled in sequence according to the assembly sequence of assembly sketches.

直接按照箭头方向与其他舱体接触面靠紧放置, 并将拼装螺栓一并安装紧固

Place in close proximity to the contact surface of other cabins directly in the direction of arrow, and fasten the assembly bolts together.





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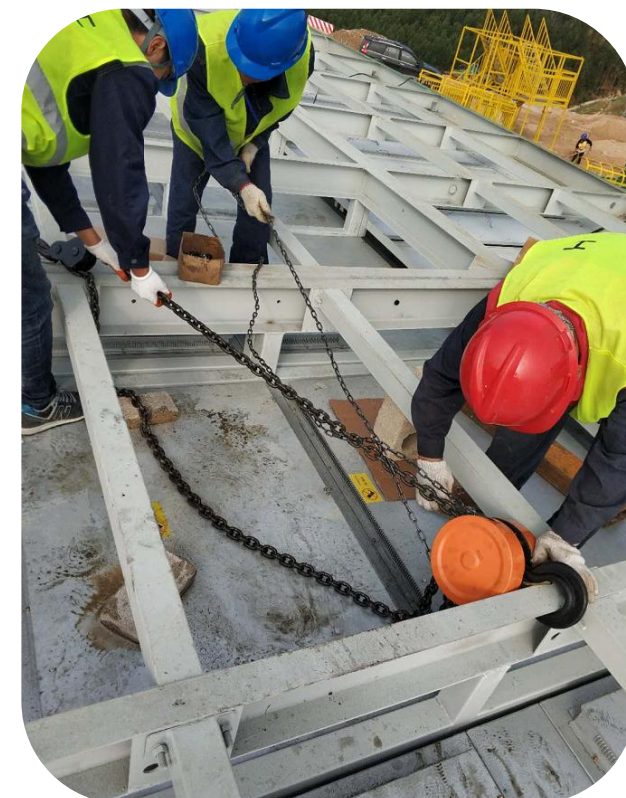
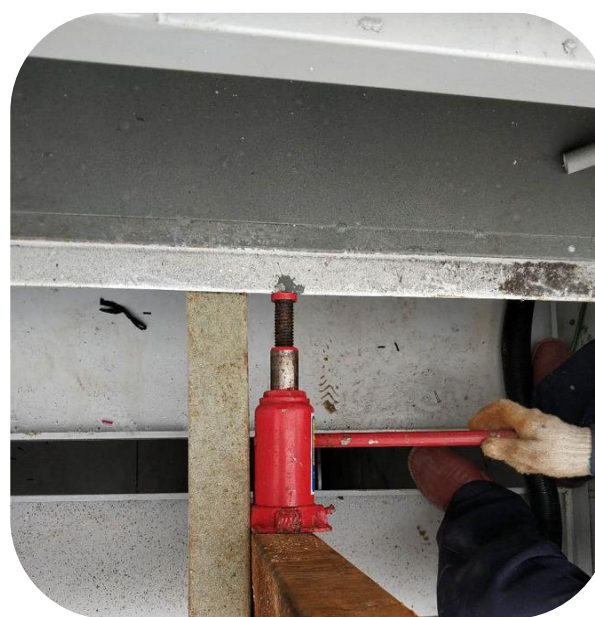
02. 舱体拼装

Cabin assembly

调节方法 Adjustment method

当两节舱体就位时立柱上下不平齐无法安装螺栓时可以使用手拉葫芦或千斤顶进行调节工作，确保所有拼装螺栓均可顺利拼装就位 When the two sections of cabin are in place, when the bolts cannot be installed on the upright column with uneven top and bottom, the manual hoist or jack can be used to adjust the work to ensure that all assembly bolts can be put in place smoothly.

螺栓就位后需要检查舱体与基础之间是否有一定间隙，如果出现间隙，则需要将基础间隙使用钢片填实 After the bolts are in place, it is necessary to check whether there is a certain gap between the cabin body and the foundation. If there is a gap, it is necessary to fill the gap with steel sheets.





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02.舱体拼装

Cabin assembly

水平度校验Level calibration

注 Note:

一层舱体拼装结束后校验Verification of the first deck after assembly

1/舱体拼装位置是否满足设计要求Whether the assembly position of the cabin meets the design requirements

2/舱体拼装效果是否达到预期效果Whether the assembly effect of cabin achieves the anticipated effect

3/校验舱体上表面水平度（水平度测量方法详见“基础水平校验”），为二层舱体拼装做准备
Check the level of the upper surface of the cabin (see "Basic Level Check" for the measurement method of the level) to prepare for the assembly of the second deck.





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02. 舱体拼装

Cabin assembly

临时防雨措施 Temporary rainproof measures

注 Note:

- 1/尽量选择晴朗天气开展拼装舱体工作
Choose sunny weather as far as possible to carry out assembly work
- 2/每天工作结束，需要使用防雨布将舱体顶盖整体遮盖，并做好防风措施；避免露水/突降雨等造成舱体内部漏雨导致设备损坏。
At the end of each day's work, it is necessary to use rainproof cloth to cover the cabin roof as a whole, and to take good windproof measures to avoid dew/sudden rainfall and other internal leakage of dew causing damage to equipment.
- 3/为避免积水，中间需要使用软质材料将防雨布略微顶起。
In order to avoid water accumulation, soft materials are needed to slightly lift the rainproof cloth.





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01.舱体拼装

Cabin assembly

二楼（三楼）拼装

Assembly on the second (third) floor

拼装二层（三层）舱体前应先放样每一个模块的位置并做好标记

The position of each module should be laid out and marked before assembling the second (third) deck.

二层（三层）第一个模块吊装就位安装固定（确保与下部舱体可靠连接，确保不移动）

The first module of the second (third) floor is hoisted, installed and fixed in place (to ensure reliable connection with the lower cabin and not to move)





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02. 舱体拼装

Cabin assembly

二楼 (三楼) 拼装

Assembly on the second (third) floor



舱体基本就位后，使用手拉葫芦将舱体细微调节，将两台模块仅靠在一起。

After the cabin is basically in place, the cabin is slightly adjusted by hand hoist, and the two modules are only together.

千斤顶辅助微调作业，确保严丝合缝/螺栓能够完全紧固

Jack-assisted fine-tuning operation to ensure that the seam/bolt can be fully tightened

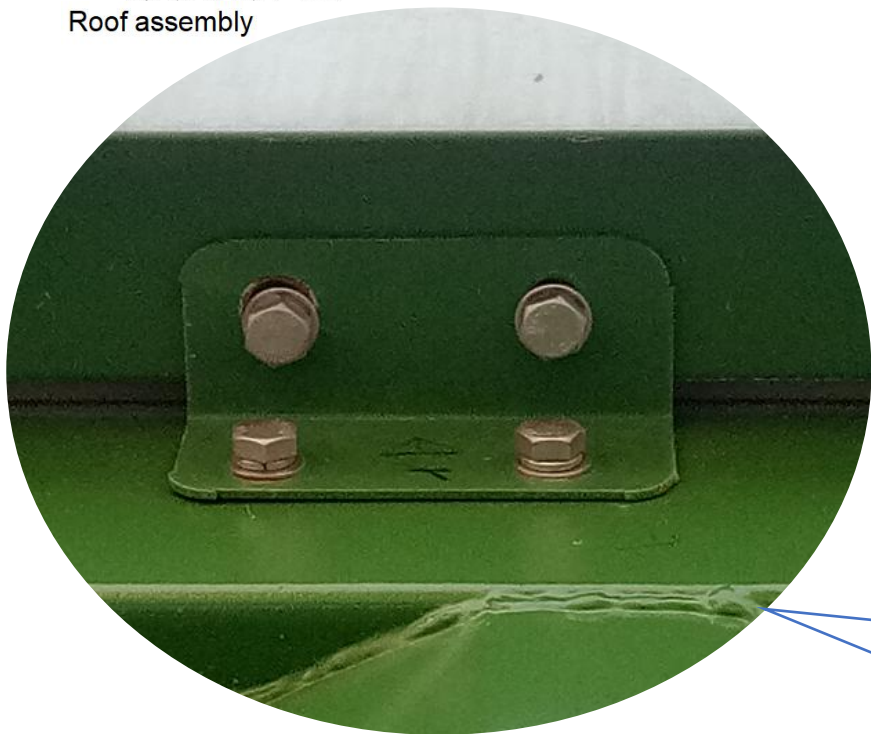




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03.顶部拼装

Roof assembly



顶部利用螺栓与墙体固定，确保方便拆卸
The roof is fixed with bolts to ensure easy disassembly.





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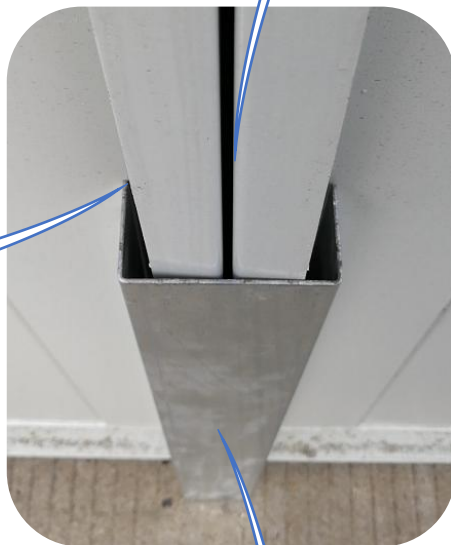
04.防水处理

Waterproof treatment

耐候性硅酮密封胶密封处理
Sealing treatment of
weatherproof silicone sealant

- 1/防水盖板利用螺栓与墙体防水法兰连接
Waterproof cover plate is connected with wall waterproof flange by bolts
- 2/墙体防水/顶部防水均采用本结构防水工艺，可靠/稳定
Wall waterproofing/top waterproofing adopts this structure waterproofing technology, reliable/stable

3%压缩比密封胶
3% Compression Ratio
Sealant



防水盖板
Waterproof cover plate





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05.爬梯/围栏安装

Installation of ladder/fence

拼装示意图

Assembly sketch

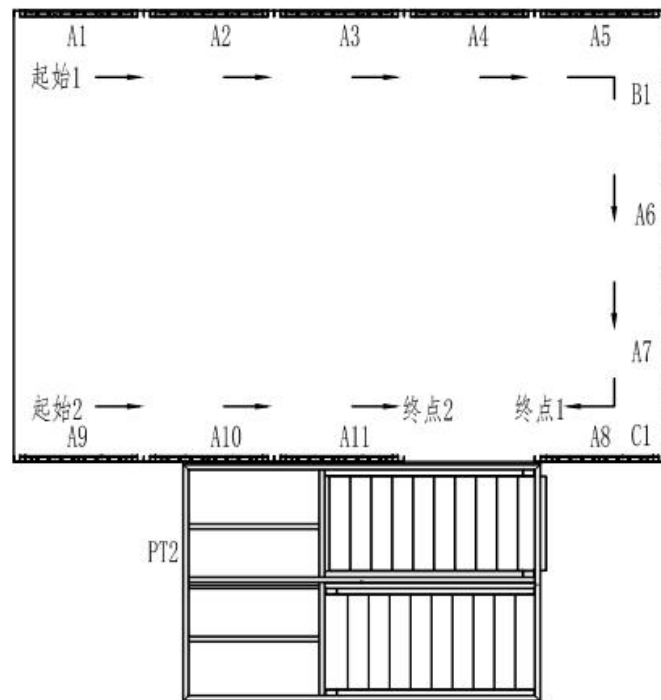
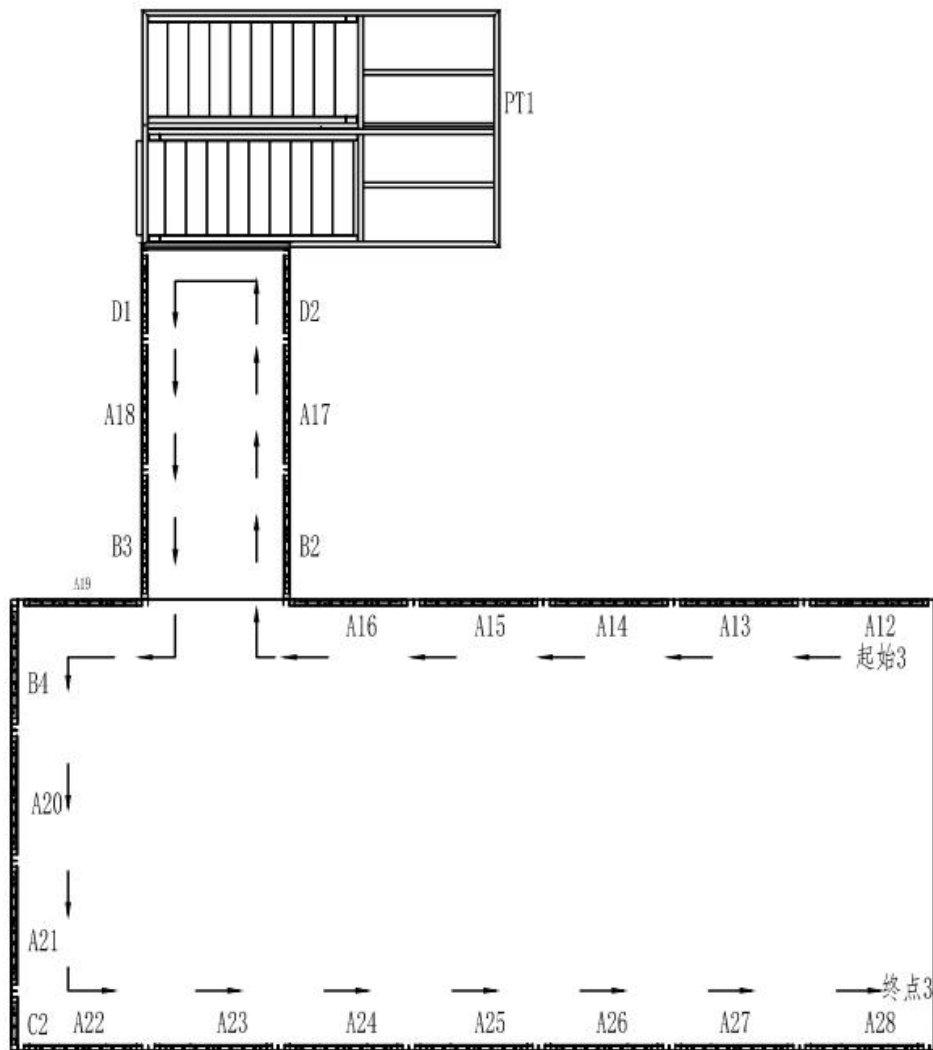
注 Note:

1/条件允许的条件下, 应先安装PT (爬梯)
If conditions permit, PT (climbing ladder)
should be installed first.

2/请严格按照工起始点顺序完成围栏拼装
工作

Please complete the fence assembly work
strictly according to the order of the
starting point.

3/不同起始点工作可确保安全的条件下同
时作业Working at different starting points
ensures simultaneous operation under
safe conditions





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05.爬梯/围栏安装

Installation of ladder/fence

爬梯安装

Assembly of Ladder

注 Note:

1/爬梯基础与舱体基础在同一个水平面，且需保证基础水平 The foundation of climbing ladder and cabin are on the same level, and the level of foundation should be guaranteed.

2/爬梯与舱体紧靠安装，且与舱体固定 The climbing ladder is installed close to the cabin and fixed to the cabin.

3/踏步采用钢格板并采用螺栓连接 Stepping with steel grille and bolted connection





固亚德

05.爬梯/围栏安装

Installation of ladder/fence

围栏安装

Assembly of fence

所有附件均采用M6*25 304不锈钢螺栓固定

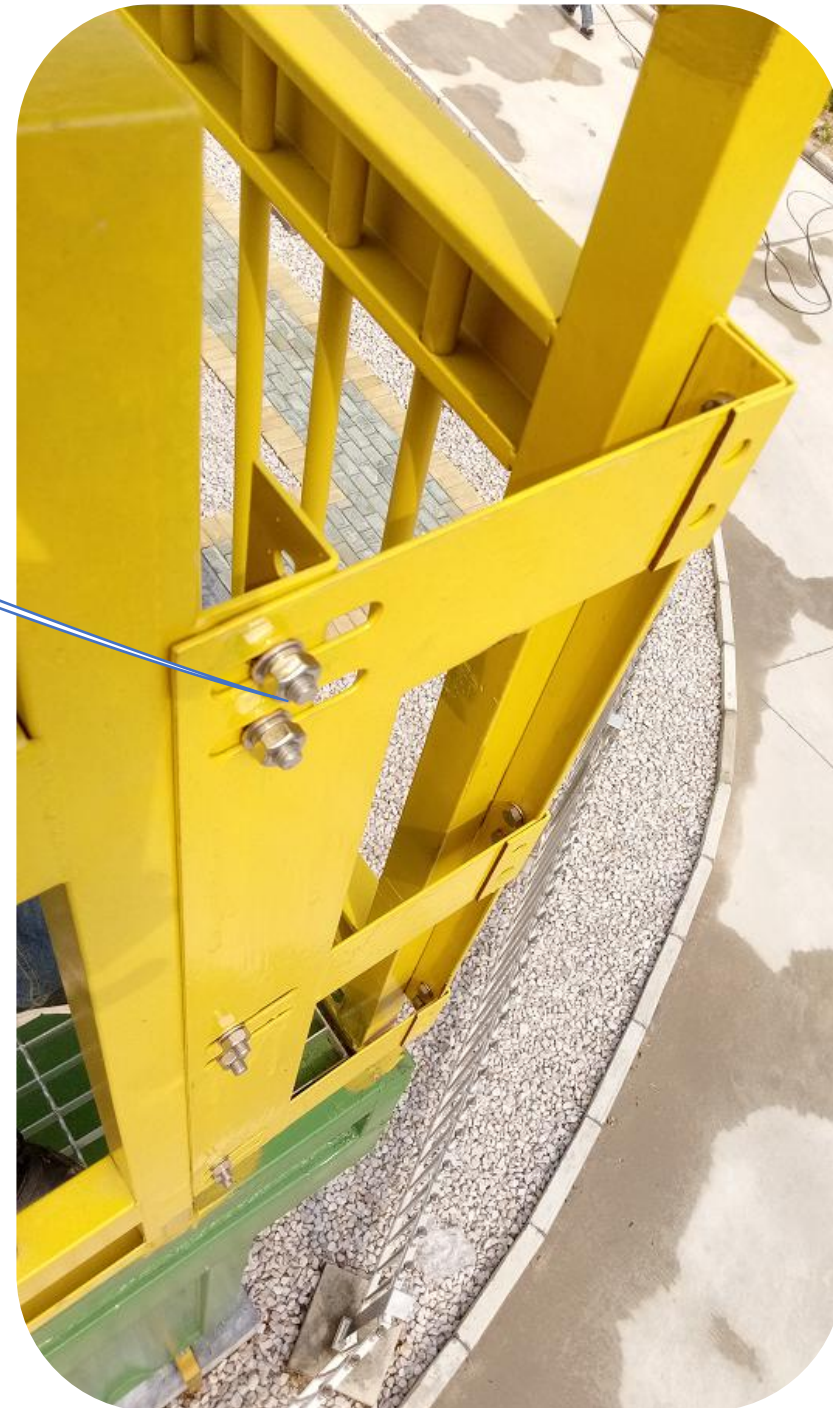
All accessories are fixed with M6*25 304 stainless steel bolts and fixing

围栏拐角处使用可调节钣金件连接固定

Connection and Fixation of Adjustable Sheet Metal Parts at Corner

围栏连接

Connect protective fence





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05.爬梯/围栏安装

Installation of ladder/fence

钢格板安装

Assembly of steel grille



围栏材料：钣金件，表面处理：RAL1023(交通黄) Fence material: sheet metal, surface treatment: RAL1023 (traffic yellow)
走廊/平台材料：钢格板，表面处理：热浸锌 Corridor/Platform Material: Steel Lattice, Surface Treatment:Galvanized
钢格板固定方式：专用锁扣连接 Fixed way of steel grille plate: special locking connection

围栏
Enclosure

走廊
corridor

平台
platform





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07.附件安装

Accessories installing

外挂小件

External small parts

1/所有附件均采用M6*25 304不锈钢螺栓固定

All accessories are fixed with M6*25 304 stainless steel bolts

2/安装固定后法兰处缝隙密封处理

Sealing treatment of gap in flange after installation and fixing





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07.附件安装

Accessories installing

电缆沟

Cable trench

1/电缆沟内布置等电位/接地铜排, 规格: 30*4, 截面积: 120mm²

Cable trench equipotential/grounding copper bars, specifications: 30*4, cross-sectional area: 120 mm²

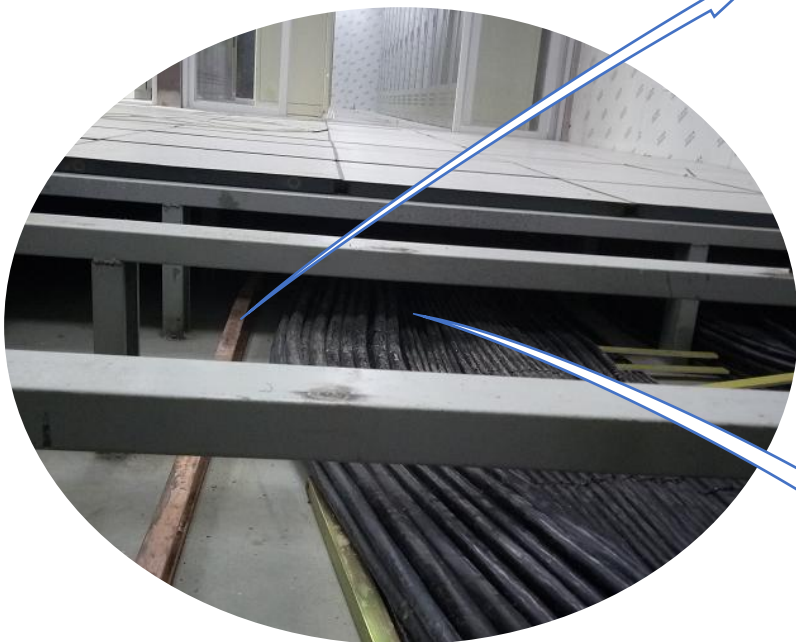
2玻璃幕墙材质: 双层8mm钢化玻璃

Glass Curtain Wall Material: Double 8mm Tempered Glass

3/地板: 托架式仿陶瓷防静电地板

Floor: Bracket-type anti-static ceramic floor

4/夹层电缆沟: 高度≥250mm; 与电缆井联通可直通基础电缆沟
Cable trench: height (> 250mm); connected with cable well, it can pass through basic cable trench.



等电位/接地铜排
Equipotential/Grounding Copper Bar

屏柜
Screen cabinet

玻璃幕墙
Glass screen wall

地板
floor

夹层电缆沟
Cable trench





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07.附件安装

Accessories installing

电缆井

Cable well

1/电缆井采用隐藏式，外观与柜体一致，美观大方

Cable well adopts concealed type, the appearance is consistent with cabinet body, beautiful and generous.

2/电缆井连接上层舱体与基础电缆沟

Cable well connecting upper cabin and foundation cable trench

3/设计多层电缆层，确保不同类型电缆隔离处理

Design multi-layer cable layer to ensure different types of cable isolation treatment

4/设计等电位铜排及接地铜排

Design of Equipotential Copper Bar and Grounding Copper Bar





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07.附件安装

Accessories installing

接地

Earthing



舱体接地点与接地网可靠连接

Reliable connection between grounding point and grounding grid





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07.电气安装调试

Electrical Installation and Debugging

舱体分割处均采用重载连接器24芯16A航空插头将二次电缆连接

Heavy-duty connector 24-core 16A aviation plug is used to connect secondary cables at cabin partition.

通电测试所有线路是否贯通 On-line testing of all lines

检查所有元器件是否满足正常工作

Check that all components are working properly

当发现有元器件异常时需判断是否因运输导致元器件接线松脱或者元器件损坏

When abnormal components are found, it is necessary to determine whether the connection of components is loosened or damaged due to transportation.

矩形重载连接器

24芯 16A航空插头

HDC-HE-024



阻燃材料 光滑针头 防水性好 紧密扣 使用安全





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PART 05

验收计划

Acceptance plan



【外观验收Appearance Acceptance】

【功能验收Functional Acceptance】

【竣工资料验收Data acceptance】



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01.外观验收

Appearance Acceptance

巡视拼舱结构/爬梯等关键部位是否达到预期效果

Whether the key parts such as patrol pool structure/climbing ladder have achieved the expected results

巡视产品结构设计/加工工艺是否满足要求
Inspect whether the product structure design/processing technology meets the requirements





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02.功能验收

Functional Acceptance

检查暖通系统/照明系统/消防系统/监控系统
工作是否正常/是否达到预期效果

Check whether the HVAC/Lighting/Fire
Control/Monitoring System works
properly/achieves the desired results

检查舱体防雨性能是否满足要求

Check whether the rainproof performance of
cabin meets the requirements





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03.竣工资料验收

Data acceptance

竣工资料清单List of completed data

序号	资料名称	数量	备注
1	图纸 Drawing	1套	舱体/爬梯等相关图纸 house/ladder climbing etc.
2	检测报告 Test Report	1套	钢材；油漆；电动百叶窗；保温材料；吊绳、卸扣第三方认证报告
3	电气配件使用说明书 Instructions for the Use of Electrical Parts	1套	照明系统/暖通系统/消防系统/监控系统/气体探测系统等相关系统元器件 Related system components such as lighting system/HVAC system/fire fighting system/monitoring system/gas detection system
4	试验报告 Test report	1套	IP防护等级；IP防护等级2；抗震；温度型式试验（冬季）；温度型式试验（夏季）；焊接型式试验；耐腐蚀试验；舱体重心计算书；防火型式试验；电动百叶窗低温试验；起吊实验报告；平台载重报告；
5	检验记录 Inspection record	1套	过程检验记录/出厂检验/拼装检验 Process Inspection Record/Exit Inspection/Assembly Inspection
6	专利证书 Patent certificate	1套	一种对功能预制舱结构；一种新型电力设备预制舱结构；一种用于电力设备预制舱的百叶窗结构；一种电力设备预制舱上用的防水门结构；一种预制舱体与板车的对接结构；一种预制舱体与顶盖的对接结构；一种预制舱体中门框与门板的配合结构.jpg；一种预制舱体的吊装结构；一种预制舱体的爬梯结构；一种预制舱的照明结构；一种预制舱的透气窗电子屏蔽结构；一种预制舱的避雷针结构；变电站预制舱的顶部防水舱结构；智能自装自卸电力预制舱；电力预制舱；雪橇拖拽式变电站预制舱
7	业绩表 Performance tables	1份	无锡固亚德电力设备有限公司业绩表 Wuxi Guyade Electric Power Equipment Co., Ltd. Performance Statement
8	企业资质文件 Qualification Documents	1套	产学研基地；商标注册；商标注册；安全生产标准化；开户许可证；开票资料；机构信用代码证；江苏省民营科技企业证书；营业执照副本；质量保证承诺书；质量管理体系认证书
9	焊接文件 Welding documents	1套	焊接工艺评定WPQ；焊工证 Welding Process Qualification WPQ；Welder Certificate
10	使用保养计划 Use Maintenance Plan	1套	年度使用保养计划Annual Use and Maintenance Plan



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完成

