

SC Series Construction Hoist Operation Manual

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ZOOMLION

Operation Manual of SC Construction Hoist
(Volume One)



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SC Construction Hoist Series

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Words for User

Dear user, thank you for selecting the construction hoist manufactured by Zoomlion Heavy Industry Science & Technology. Before using this machine, please carefully read and fully understand the contents of this Manual and strictly follow the relevant provisions in this Manual.

In this Operation Manual, the safety information, important technical parameters, erection, dismantling and safe operation of SC construction hoist series are introduced in details, so as to help the user to safely install, operate, use and dismantle the construction hoist. Please properly keep this Operation Manual, so that you can refer to it at any time.

Before you have carefully read and understood the contents of this Operation Manual, please don't try to operate and repair the product. If you have any doubt or question, please contact the local service engineer, and we will provide you with the timely and effective technical support. The Company will not be liable for any negative consequence arising from the operation or use in violation of this Manual.

This Operation Manual forms an integral part of the product. When transferring this machine, please also transfer this Manual to the transferee.

The contents of this Operation Manual are protected as intellectual property rights, and please don't reproduce them or use them for any other purpose without the prior permission.

Owing to the continuous improvement or upgrading of product design and different specification or model of products, some figures and texts in this Manual may vary from the actual situations of the product owned by you. If you have any doubt, please contact the local service engineer.

The Company reserves the right to revise the *Operation Manual of Construction Hoist* on the basis of technical improvement. No further notice will be given for modification (if any), and all users are appreciated for your understanding.

We would like to extend our gratitude to you for your trust and support extended to the Zoomlion product, and hope that things go all right with you.

Safety Notices for Construction Hoist

1. The operation and erection and dismantling personnel shall have passed the exam organized by the competent authority, and have obtained the corresponding qualification certificate. The operation personnel shall get familiar with the operation procedure, performance and state of construction hoist. The erection and dismantling personnel shall get familiar with the erection and dismantling procedures, and carry out the erection and dismantling in accordance with the procedures.

2. The physical conditions of operation and erection/dismantling personnel shall meet the requirements for operation and erection and dismantling. It is absolutely prohibited to carry out operation under tired or drunk conditions or after taking any drug which may affect the mental conditions of human being. The operation and erection and dismantling personnel shall, in accordance with the relevant requirements, wear the personal protective equipment such as safety belt and safety helmet.

3. The erection and dismantling shall be carried out by the professional team which holds the corresponding qualification certificate. The place for erection and dismantling and the safety passage shall meet the requirements for erection and dismantling. Before the erection and dismantling, please ensure that all components relating to erection or erection and dismantling are in good conditions. Before the erection and dismantling, be sure to formulate the operating instructions for erection and dismantling and carry out inspection in accordance with the requirements. The records of inspection carried out at various stages shall be complete, and the hoist may be delivered for use only after such records are reviewed and signed by the person in charge of technology.

4. The erection and dismantling and maintenance shall be carried out in the daytime. Under any of the following circumstances, it is prohibited to carry out erection and dismantling and maintenance:

- The wind velocity at the highest place of construction hoist is higher than 12.5m/s;
- Severe weather such as heavy fog, rain, snow, gale or thunderbolt;
- Abnormal situation such as power failure or mechanical trouble.

If any of the above-mentioned circumstances occurs in the course of erection and dismantling or maintenance, please firstly take measures to maintain the construction hoist in safe and stable state, ensure that neither the components of hoist nor the surrounding environment involves any hidden danger, and then stop the erection and dismantling or maintenance.

5. The erection and repair of electrical equipment shall be carried out by professional electricians.

6. The foundation of construction hoist shall meet the technical requirements of *Operation Manual of Construction Hoist* and construction drawings.

8. All components and safety devices shall be kept in good conditions, and it is prohibited to operate the hoist with trouble.

9. It is prohibited to use the hoist in any highly corrosive environment or in any environment with explosive gas or explosive dust. When the hoist is used near any radio station, TV station or other place with a lot of electromagnetic wave emitted, please take the protective measures, so as to avoid the impact by electromagnetic wave on electrical control system.

10. It is absolutely prohibited to energize and use the construction hoist before the leakage protection device is installed!

11. The cab is equipped with the fire extinguishers suitable for fire on oil or electrical equipment, and it shall be ensured that such fire extinguishers can be used normally.

12. As for operation, please firstly confirm the direction and safety of action, and carry out operation only after giving the warning through electrical bell.

13. In case of forecast of typhoon or earthquake, please take the measures such as height reduction and

reinforcement in advance, so as to ensure the safety of construction hoist.

14. In case of collision, deformation or cracking of hoist, please immediately contact the local service engineer of the company, and require the professional technical personnel of the Company to inspect the equipment and eliminate the hidden dangers.

15. Please use genuine components supplied by the Company for the construction hoist only. The Company shall not be held liable for any accident of construction hoist caused by use of components other than genuine components!

16. Without the approval from the Company, it is prohibited to take any measure for the hoist which may lead to safety problem or is against the relevant regulations and rules!

Note: All matters not covered by this Manual shall be dealt with in accordance with the provisions of the *Operation Manual of Construction Hoist*.



Instructions on Safety Information

The safety icons used in this Manual are explained as follows:



Danger

indicates a emergency hazard which, if not been prevented, will lead to death or serious injury



Warning

indicates a potential hazard which, if not been prevented, may lead to death or serious injury



Note

indicates a potential hazard which, if not been prevented, may lead to minor or moderate injury



Caution

indicates a risk which is not related to personal injury (such as property damage)





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- Safety Signs

General Provisions

Brief Introduction

Preparation

Erection and Dismantling

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Safety Signs

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Safety Signs

1. Instructions on Safety Signs



Warning: live components!

The electrical erection and wiring works shall be carried out by professional personnel.



Emergency stop



No unauthorized entrance!

Rolling!



Falling!

Please fasten the safety belt!



Attention!



Before using the machine, please read the Operation Manual!



Be careful not to get you hand scalded!



Warning: Pay attention to falling article!
Please wear the safety helmet!



Pay attention to lubrication!



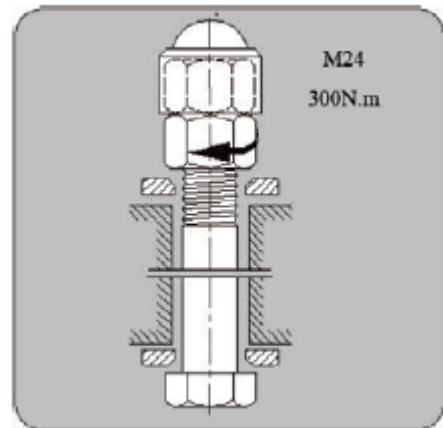
Inspect the structural member!



Inspect the wire rope!



Keep the safety device working normally!



M24 high-strength bolt!



Close the movable door of platform!

Maximum permissible load of jib (to lift up the mast section)!

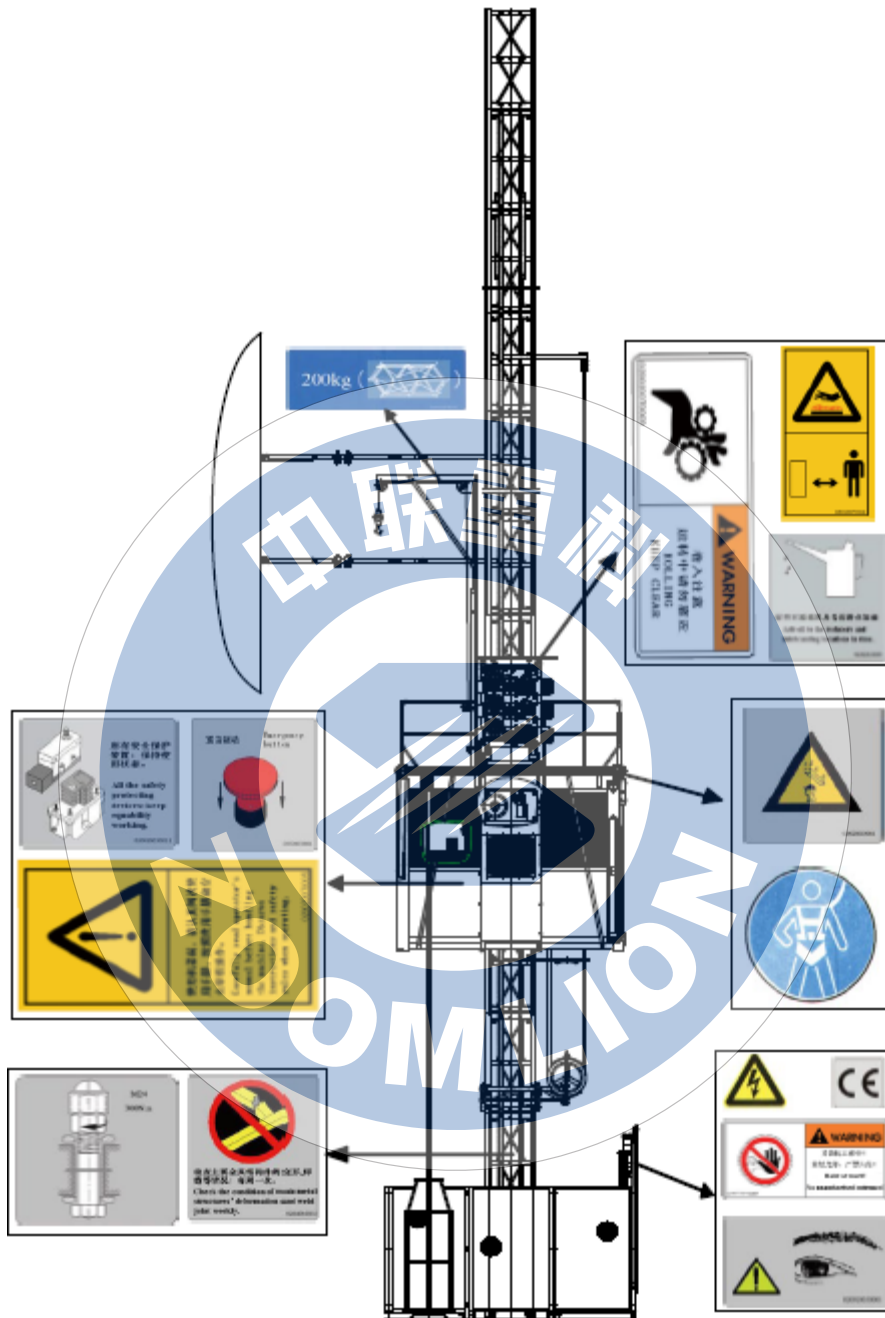


Please fasten the safety belt!



“CE” sign

2. Position of Safety Signs on Construction Hoist





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General Provisions

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General Provisions

1. Use Rules

1.1 General Conditions for Use of Construction Hoist

The general conditions for use of construction hoist include the conditions to be satisfied for normal erection, operation and maintenance of construction hoist, namely the conditions set forth in Chapter 3 “Brief Introduction”, Chapter 4 “Preparation” and Chapter 5 “Erection and Dismantling”. As for the conditions not specified, please consult with the Company.

Some extremely important situations relating to operation of construction hoist will be explained again in the form of graphic representation in the relevant sections of this Manual.

1.1.1 Climatic and Geographic Conditions

The use conditions of construction hoist, such as standard height as well as reactive force and pressure under base plate, are all related to the reference wind velocity of the place where the construction hoist is located;

The reference wind velocity (GB50009.2001) is the average value of wind velocity measured at 10m above ground in 10 minutes.

1.1.1.1 General Conditions

(1) As for the reference wind velocity for operation of construction hoist, please refer to the “Average Wind Velocity Chart of the Country where the Construction Hoist is used”, so as to determine the reference wind velocity range;

(2) As for the reference wind velocity range of a country or region other than China, please consult with the Company.

1.1.1.2 Special Conditions

- (1) There is no average wind velocity chart;
- (2) There are special provisions or some situations in host country or region;
- (3) The elevation is higher than the height as stated in the average wind velocity chart;
- (4) Basin, valley, volcano and mountain;

In case of any of the above-mentioned special circumstances, the user shall carry out the design, so as to determine the reference average wind velocity of the place where the construction hoist is installed. Alternatively, the user may consult with the Company and provide the relevant data.

1.1.1.3 Operation of Construction Hoist

The user of construction hoist may operate the hoist only when the maximum wind velocity measured is less than 72km/h.

1.1.1.4 Erection, Dismantling and Displacement of Construction Hoist

The erection, dismantling and direction change of construction hoist may be carried out only when the maximum

wind velocity measured in the place where the hoist is located is less than 45km/h.

1.1.1.5 Ambient Temperature Measured at Cool Position

(1) The temperature shall mean the temperature measured in an enclosed and covered area, which is free from wind and rain, 2m, above the ground and within 100m away from using site of construction hoist;

(2) Unless otherwise specified in the contract (e.g., special reason in host country), the temperature range for use of construction hoist shall be: working (non-working) state: -20°C - $+40^{\circ}\text{C}$;

(3) When the temperature is not in the range mentioned above, please stop the operation of construction hoist; otherwise it will work abnormally or will get overheated abnormally.

1.1.1.6 Humidity and Precipitation

(1) Humidity and precipitation for use of construction hoist (working or non-working state): the maximum humidity is 95% without dew (unless otherwise specified in the contract);

(2) The maximum humidity for storage of construction hoist (after being dismantled) is 100%.

1.1.1.7 Frost, Ice and Snow

(1) The frost, ice and snow will increase the weight and frontal area of structural members, will get parts damaged in the course of operation, and will, under serious circumstances, cause the falling of person from hoist.

(2) When the construction hoist is covered with frost, ice or snow, it is prohibited to operate the construction hoist.

1.1.1.8 Thunderbolt

(1) The thunderbolt may energize the structure members of construction hoist and cause electrical shock to persons who contact with the hoist directly or indirectly. For example: the persons staying on steel structure, mast tie or base frame and base enclosure of construction hoist.

(2) If the rainstorm may occur, please stop the construction hoist and set it in non-working state. During the thunderstorm, don't get on or leave the construction hoist!



If there is no time for you to leave the construction hoist (The thunderstorm appears suddenly), be sure not to try to leave the construction hoist during the thunderstorm. The risk will be much smaller when you stay in the cage, but don't touch the console.

1.1.1.9 Sandstorm

(1) After the sandstorm, the sand may enter into electrical equipment and structural members and block up the gap.

(2) Before re-starting the construction hoist, please thoroughly clear away the sand in electrical equipment and structural members, and if necessary, remove the moving components of relevant mechanisms.

1.1.1.10 Flood and Tide

Unless otherwise specified in contract, these factors are not considered in design of construction hoist. In case of flood or tide, the stability of construction hoist will reduce, and thus the operation shall be ceased.

1.1.1.11 Earthquake

Unless otherwise specified in contract, no earthquake is considered in design of construction hoist.

1.1.1.12 Special Erection

Unless otherwise specified in contract, the erection on movable foundation (such as drilling platform, barge, and floating box) is not considered in the design of construction hoist.

1.1.1.13 Mast Tie

The design of mast tie shall be able to bear the force given in technical parameters of construction hoist, and the mast tie shall be fabricated strictly within the specified tolerance range.

1.1.2 Environmental Conditions

1.1.2.1 Environment with Radioactive Chemicals

Unless otherwise specified in contract, the maximum permissible concentration in the use environment of construction hoist shall be identical with the concentration in industrial area or heavy-traffic area.

1.1.2.2 Explosive Atmosphere

The construction hoist may not be used in any explosive atmosphere.

1.1.2.3 Electromagnetic Field

(1) Unless otherwise specified in contract, the construction hoist may be used in the environment where the electromagnetic field strength is less than 10V/m, for example: 100kW broadcasting or television transmitter within 500m from construction hoist; portable transmitter within 0.5m from power box or console.

(2) Just like all metal structure, the construction hoist will interfere with the transmission and receipt of Hertzian wave.

1.1.2.4 Radiation

The construction hoist can't resist radiation.

1.1.3 Conditions relating to Design

(1) The adaptability of construction hoist to construction site shall be the responsibility of user.

(2) Power supply: The power supply and fluctuation range designed for construction hoist shall be strictly followed. If the value given is not satisfied, the construction hoist will work abnormally.

(3) Working post of operation personnel: On the basis of the type selected, the operation personnel of construction hoist may control the hoist in the cab or in the cage.

(4) Safety devices: The safety devices (limit devices) of construction hoist may not be used beyond their operation scope. It is prohibited to randomly change the adjustment range of safety devices, otherwise they may

fail.

(5) The protective mechanisms/protective devices are used to prevent persons from entering into dangerous areas, and may not be deactivated under in any event. Before all protective devices (such as: safety cover, base enclosure, handrail, and cover plate) are in place, don't start the construction hoist.

(6) Conventional service life: The conventional service life of construction hoist is the minimum service life used to calculate the wearing state of construction hoist. Unless otherwise specified in contract, the conventional service life of construction hoist shall comply with the classification method as specified in relevant standards such as GB26557-2011. The said classification method respectively specifies the service life of construction hoist and structural members thereof.

- Working class of complete hoist: The conventional service life of structural member is expressed in operation periods (One operation period \equiv one work cycle wherein the cage is moved up and down for once). The working class of structural member is A5-A6;
- Working class of mechanism: The conventional service life of mechanism is expressed in service hours of such mechanism. The class of conventional service life of mechanism is determined in light of type and operation of construction hoist. The load conditions of mechanism decide the service life. The normal working class of mechanism is M5.

(7) Advertising sign set up by user: Unless otherwise specified in contract, without the written consent from the manufacturer of construction hoist, the user may not randomly set up any advertising sign.

(8) Fire extinguisher: The provision and erection of fire extinguisher in cage or in cab shall be borne by the user.

(9) Change/welding of construction hoist: Without the written consent from manufacturer, it is prohibited to change the structure of construction hoist (e.g., addition or modification of components, cutting, welding and etc.).

(10) It is prohibited to change the adjustment device of construction hoist (such as calibration value and adjustment value).

(11) Matching of structural member/replacement of part: If any structural member/part other than those provided or recommended by the manufacturer of construction hoist is used, all consequences shall be borne by the user. It is prohibited to carry out replacement with any part which is not genuine part or is not recognized by the manufacturer of construction hoist.

(12) Supervision/inspection of construction hoist: For the purpose of ensuring the proper storage and safe use of construction hoist, please carry out inspection in accordance with the inspection frequency, inspection period and inspection items as specified in this Manual; as for inspection, if the relevant standards and provisions of the place where the construction hoist is located are stricter than the provisions in this Manual, please carry out inspection in accordance with the former. Please complete the follow-up card of construction hoist on the basis of the instructions given in this Manual.

(13) Clearing of wastes: In accordance with the standards and provisions of the place where the construction hoist is located, clear away all wastes, such as: dirty oil and waste oil.

1.1.4 Erection Conditions

In severe weather such as wind velocity higher than 12.5m/s or thunderstorm or snow, it is prohibited to install or dismantle the construction hoist.

1.1.4.1 Distance from Fixed Obstacle

Keep the specified minimum distance between projection on construction hoist and fixed obstacle. If not specified, this distance shall be at least 0.25m away from fixed obstacle.

1.1.4.2 Distance between Construction Hoist and Overhead Power Line

Please keep the safety distance between components of construction hoist and overhead power line as specified in the place where the construction hoist is located. If not specified: as for the voltage no higher than 40kV, the vertical distance shall be 4m, and the horizontal distance shall be 2m; as for the voltage is higher than 40kV, the distance shall be increased by 5cm for every 1kV increased.

1.1.4.3 Strength Requirements for Concrete Foundation

Before the erection of construction hoist, the concrete foundation shall meet the technical requirements relating to construction strength.

1.1.4.4 Requirements of Power Line and Cable

The power box of construction hoist shall be special power box, and may not be shared by any other current-consuming equipment. As for the cable used to connect the power box, its voltage and current shall meet the requirements of construction hoist and shall be reliably grounded.

1.1.4.5 Acceptance Inspection for Erection

The user shall, in conjunction with the inspection institution of the place where the construction hoist is located and in accordance with the contents of *Acceptance Inspection Report for Construction Hoist* in the *Specifications for Supervision and Inspection of Construction Hoist* (G.Z.J.G. 121.2002), test and inspect the installed construction hoist, and may use the construction hoist only after it is confirmed as qualified through inspection.

1.1.5 Auxiliary Loading/Unloading Conditions

By making use of the jib on cage roof, the auxiliary loading/unloading equipment can load and unload the mast sections, It is prohibited to use any equipment which can cause dynamic action (such as electromagnet, grab hook and bucket) to carry out the loading/unloading operation.

1.1.5.1 Loading/Unloading of Mast Section

- (1) Don't lift up any mast section which has not been firmly bound;
- (2) Don't lift up the mast section in inclined state;
- (3) The lifted mast section shall be vertical to the lifting hook;
- (4) Don't add any weight to mast section which has been lifted up.

(5) When the mast section is being lifting up or lowered down by using the jib, the operation personnel shall carry out monitoring carefully.

1.1.5.2 No Carrying of Person

The jib installed on construction hoist may not be used to carry any person. If the carrying of person is permitted in the country where the construction hoist is located, all liabilities arising therefrom shall be borne by the user.

1.2 General Responsibilities

These responsibilities involve all relevant personnel, and are applicable to the manager and operator of construction hoist, and the relevant personnel shall carefully comply with them.

As for the use of construction hoist, please strictly comply with the “1.1 General Conditions for Use of Construction Hoist”.

1.2.1 Provision relating to User

The manager and operator of construction hoist shall comply with the provisions of the place where the construction hoist is located relating to erection, dismantling, control and accident prevention of construction hoist.

1.2.1.1 Provisions for Manager of Construction Hoist:

- (1) The duty to control and operate the construction hoist shall be delegated to qualified operation personnel:
 - The age meets the provisions of the country where the construction hoist is used;
 - The physical conditions meet the requirements (eyesight, hearing ability, reactivity, adaptability, and suitability for overhead operation);
 - The manager shall go through the training organized by relevant institution, obtain the relevant qualification, confirm that his relevant certificates are qualified and valid, and fully understand the hazards relating to such works (electrical hazard and overhead hazard);
 - No person who fails to meet the above conditions is permitted to operate the construction hoist.
- (2) To define the responsibilities of operation personnel of construction hoist:
 - The command for erection, dismantling, test and maintenance of construction hoist shall be delegated to qualified technical personnel;
 - The human resource manager shall allocate and train the operation personnel during probation period;
 - The manager shall formulate the plan for erection and dismantling.
- (3) To ensure that the working personnel of construction hoist get familiar with and understand the safety provisions, and regularly inspect the implementation of such provisions. The working personnel of construction hoist shall:
 - Be in appropriate clothing (e.g., coil up the hair and wear the appropriate clothing);
 - Use the personal protective equipment such as safety helmet and safety shoes; and wear gloves in the course of work;

- Fasten the safety belt during overhead operation (more than 3m above the ground).

(4) To clarify and implement the special advices given in this Manual:

- The operation personnel of construction hoist shall not leave the operating console before the power supply is cut off;
- During the erection, dismantling or maintenance of construction hoist and in accordance with the relevant provisions of the place where the construction hoist is located, install the passage devices which meet the requirements (stairway, passage and platform);
- The repair and maintenance personnel shall be provided with the corresponding measurement and repair tools;
- When operating the construction hoist, the operation personnel shall pay attention to the hazards relating to work (e.g., existence of persons in upper and lower operation areas, and whistle for moving up and down).

1.2.1.2 Provisions relating to Manager of Construction Site:

(1) Inform the construction personnel of the all direct or indirect hazards which may be caused by the construction hoist (such as: impact from construction site and swinging of load caused by wind).

(2) Inform the construction personnel of the meaning of sound signals relating to operation of construction hoist (See the Section “Safety Signal”).

(3) Obtain the assistance from construction personnel in the place where the construction hoist is located, and set up the anti-falling devices on baseframe and base enclosure and cage of construction hoist.

(4) The construction personnel of the place where the construction hoist is located may not climb up the mast sections of construction hoist.

1.2.2 Provisions relating to Use Conditions

1.2.2.1 Provisions relating to Construction Machinery

Please comply with the provisions relating to construction machinery of the place where the construction hoist is located:

- (1) Highway transportation;
- (2) Provision of fire-extinguishing apparatus;
- (3) Importance attached to environmental protection;
- (4) Control on transmission and receipt of radio frequency;
- (5) Regular inspection.

1.2.2.2 Climatic Conditions

(1) The use shall formulate the emergency response plan (e.g.: stating the operation height, and evacuating from construction site) to be implemented under special climatic conditions.

(2) The said plan may be formulated on the basis of the climatic forecast system set up by meteorological institution of the place where the construction hoist is located.

1.2.2.3 Entry into Construction Hoist and Cab

(1) The entry into construction hoist/cab shall be carried out via the specified passage when the construction hoist is in stopped state.

(2) Keep tidy and clean the passage for entering into construction hoist/cab: Clear away all wastes, oil, spare parts, and tools; and store the tools, articles and parts in the specified place.

(3) The total weight of persons, building materials and tools carried in cage of construction hoist may not exceed the permissible rated load.

1.2.2.4 Abnormal Operation of Construction Hoist

If the construction hoist operates abnormally, please immediately stop the operation, get the hoist inspected by professional personnel, and get the hazard assessed; as for any abnormal situation which will affect the safety, eliminate such situation immediately; and record the abnormal situation in the follow-up record of construction hoist.

1.2.2.5 Safety of Power Supply

Since there may exist electricity on construction hoist, the user shall formulate the plan and procedure for contact with power supply (direct contact or generation of electrical arc), including:

- (1) Don't leave the construction hoist;
- (2) Don't touch the metal structure of construction hoist;
- (3) Inform the external persons not to get close to and touch the construction hoist;
- (4) Cut off the power supply, and then leave the construction hoist.

1.2.2.6 Visibility Conditions

(1) Use the communication tools (such as interphone or video system) suitable for the visibility conditions in construction site.

(2) Under the condition that the light is poor, the sufficient lighting devices shall be provided.

1.2.3 Provisions relating to Particular Hazards

1.2.3.1 Power Supply

(1) When power supply is not required by the construction hoist, please cut off the power supply of the construction hoist.

(2) The power box of construction hoist shall be switched off with key, and under the supervision of specific person.

(3) As for the power box equipped with variable-frequency mechanism, after the power supply is cut off, please wait at least 10 minutes, and then close the power box for carrying out operation (The capacitor in variable-frequency mechanism will discharge electricity).

1.2.3.2 Hydraulic Device

(1) Before operating the construction hoist equipped with hydraulic device, please release the pressure (Note: after the hydraulic device stops, the pressure may still be maintained). In case the oil leaks in the form of jetting, please immediately stop the construction hoist;

(2) Don't carry out the inspection on leakage with hand;

(3) Don't smoke or use any inflammable equipment near any device with oil or grease (retarder or drive system);

(4) Don't fold or knock any hydraulic hose.

1.2.3.3 Chemicals

The storage and handling of chemicals (grease, oil, paint, glue, solvent ...) shall comply with the special safety provisions and instructions given on container. In particular, be sure not to store them in cab.

1.2.3.4 Article Falling

Appropriate measures shall be taken in the operation area of construction hoist, so as to avoid the falling of tool or other unfixd articles.

1.2.4 Provisions relating to various Phases of Use of Construction Hoist

1.2.4.1 Transportation

(1) In light of the transportation conditions of construction hoist and the conditions of lorry-mounted crane used to load/unload components of construction hoist (e.g., ground bearing pressure, climatic conditions, passage slope, loading/unloading place), determine the passage in erection site of construction hoist.

(2) During highway transportation, the warning signs shall be set up for excessively high components such as cage.

1.2.4.2 Site Preparation

The using site shall meet all technical performance and use conditions of construction hoist.

(1) Erection area of construction hoist

Before installing the construction hoist, please analyze the limitations relating to using site, including:

- Provisions relating to overhead limitation of public buildings, other building, roads, railways and riverway in the place where the construction hoist is located;
- Whether there is any other tower crane, airport, power line or electromagnetic wave transmitting station in surrounding areas;
- Site situations, ground bearing pressure, trench, slope, and underground building;
- Provisions relating to overhead limitation of power line, telephone line and optical cable in the place where the construction hoist is located;
- Place where the construction hoist and lifting/transportation equipment are stored, so as to

determine the optimal position of construction and facilitate the loading, overloading and use of construction hoist.

(2) Preparation for erection and dismantling

- The construction personnel in the place where the construction hoist is located shall set up the corresponding management data, listing the possible hazards in erection, dismantling and height increase of construction hoist as well as the corresponding protective measures;
- Before the erection, dismantling and height increase of construction hoist, please consult with the local institutions over meteorological conditions, and make sure that the wind velocity will not exceed the permissible maximum wind velocity;
- During the erection, dismantling, height increase and test of construction hoist, please define some safety areas (storage area, setup area), and use obvious signs to prevent the unauthorized person from entering into such area.

(3) Erection/Dismantling Process

- Please ensure that the lifting team will not use the construction hoist during the erection, dismantling, height increase and test of construction hoist;
- As for unconventional erection and dismantling, please consult with the Company.

1.2.4.3 Repair and Maintenance

(1) Repair

- When the construction hoist operates abnormally or when the repair work is carried out, please use the obvious signs to define the safety areas and prevent unauthorized persons from entering into such areas;
- In the course of repair of construction hoist, please stop the construction hoist, and set up the appropriate warning sign on main power switch, so as to prevent the construction hoist from being started.

(2) Maintenance

- In the course of maintenance of construction hoist, don't use the construction hoist;
- As for unconventional maintenance, please consult with the Company.

1.3 Safety Signal

1.3.1 Instructions

The safety or health signals are the instructions or provisions relating to safety or health which are given specially for the specific environment where the construction hoist works. In light of actual situation, the signal may be a plate, a color, a light or a sound signal.

The safety signals fall into five classes, with one class represented by one color:

(1) Prohibition (red);

- (2) Warning (yellow or yellow/orange);
- (3) Provisions (blue);
- (4) Help or rescue (green);
- (5) Apparatus or equipment used to prevent fire (red).


1.3.2 Terminology

Signal plate is a kind of signal which gives specific instruction by means of geometry, color, symbol or graph.

- (1) Prohibition signal plate: It is prohibited to a certain behavior which may cause hazard;
- (2) Warning signal plate: Used to warning a certain risk or hazard;
- (3) Provision signal plate: specify a certain behavior;
- (4) Help or rescue signal plate: Used to give the instructions relating to escape passage or rescue means;
- (5) Fire-prevention signal plate: Used to give the instructions relating to the location of fire extinguishing equipment and the evacuation passage in case of fire;
- (6) Additional signal plate: The signal plate which is to be used together with other signal plate for giving supplementary explanation;
- (7) Symbol or graph: The graphic representation which indicates a certain situation or specifies a particular behavior and is used on a signal plate or a light emitting surface;
- (8) Light signal: The signal which is made of transparent or semitransparent material and is lighted internally or from the rear or forms a light emitting surface;
- (9) Sound signal: The particular sound signal of which the sound is generated by a special device rather than artificially generated.

1.3.3 Signal Plate

1.3.3.1 Warning Signal Plate

| Warning Signal Plate | Meaning | Remarks |
|---|---------|----------------|
|  | Danger | Safety warning |

| | | |
|--|---|---|
| | Attention | Matters to which attention must be paid in the course of operation and use of hoist |
| | Electrical hazard | No intervention may be carried out before the power supply is cut off |
| | Fire prevention | Don't cause spark or flame, and don't smoke near inflammable substances, such as: paint, oil and glue |
| | Article falling | In the construction site, it is prohibited to throw any article from high place |
| | Drop from high place | Drop of person from high place shall be prevented in construction site |
| | Squeeze by operating articles | Don't enter into the operation areas above and under the construction hoist |
| | Discharge of electricity from capacitor | After the power supply is cut off, wait 10 minutes and then enter into the facility |

| | | |
|--|---------------|--|
| | Danger of use | Before use, please carefully read the provisions in operating instructions |
|--|---------------|--|

1.3.3.1 Prohibition Signal Plate

| Signal Plate | Meaning | Remarks |
|--------------|--------------------------------------|--|
| | No admission to unauthorized person | Authorized person shall mean any qualified person |
| | It is prohibited to start | The construction hoist is in erection and adjustment, and it is prohibited to start it |
| | It is prohibited to close the switch | In the course of repair or maintenance of construction hoist, it is prohibited to close the switch |

1.3.3 Sound Signal

The following hazards will be reminded automatically by sound warning device:

- (1) Start of construction hoist: Short sound;
- (2) Reach of construction hoist at upper final limit switch: Continuous sound.

1.3.4 Safety Control



The operating console of construction hoist is equipped with a mechanically-locked red emergency stop button.



If this button is pressed down, all actions of the construction hoist will be stopped. The emergency stop button may only be used in dangerous circumstances!

2. Safety Rules

Before using the construction hoist, the user shall, in accordance with the relevant laws, regulations and safety standards of the country where the construction hoist is located, carry out the safety supervision in use of construction hoist.

2.1 Safety Responsibilities of User

Before using the construction hoist, the manager and relevant operation personnel of the user shall carefully read, understand and master all contents of this Manual, and carefully and earnestly comply with and implement the provisions of this Manual. The operation personnel shall meet the following requirements:

- (1) Having been trained by relevant institution, obtained the relevant qualification, and confirmed that his relevant certificates are qualified and valid;
- (2) Being able to understand and implement the formulated standards, provisions and safety rules;
- (3) Having received the professional training, and understood and mastered all contents of this Manual;
- (4) Having rich operation experience, and being able to bear the stress of operation and correctly operate the hoist;
- (5) Being able to correctly and quickly make response to possible situations, so as to avoid the occurrence of accident.

2.2 Safety Requirements for erection and dismantling

2.2.1 Responsibilities

- (1) The user of construction hoist shall comply with the safety requirements relating to erection/dismantling, and ensure that the works are carried out in accordance with the relevant laws, regulations and safety standards of the country where the construction hoist is located.
- (2) Before installing the construction hoist, the operation personnel shall carefully read, understand and master the contents of this Manual and the detailed instructions in erection/dismantling program, shall get familiar with the mechanical and electrical performance and principles of construction hoist, and shall strictly implement various safety requirements relating to erection.

2.2.2 Safety Measures before Erection/Dismantling

- (1) The erection/dismantling team of construction hoist shall hold the qualified and valid qualification certificate issued by competent authorities, so as to undertake the erection/dismantling task of construction hoist; the operation personnel shall hold the qualified and valid qualification certificate issued by competent authorities, so as to carry out the specific task relating to erection/dismantling of construction hoist.
- (2) The erection/dismantling site of construction hoist shall be cleaned up, and warning signs shall be set up, so as to prevent persons other than operation personnel from entering into such site.
- (3) In the course of erection/dismantling, the relevant department shall arrange the professional technical personnel to carry out the on-site safety management, supervise over the implementation of construction program

and operation rules, and ensure the implementation of safety measures.

(4) The lifting equipment used shall be suitable for the load to be lifted, and shall be in good conditions.

(5) The groundwork of construction hoist shall be able to bear the specified load, and meet the technical specifications relating to groundwork of the place where the construction hoist is located.

2.2.3 Safety Measures during Erection/Dismantling

(1) In the course of erection/dismantling, the construction hoist shall be subject to command from specific person.

(2) In the course of erection/dismantling, the electrical control box shall be controlled and supervised by specific person.

(3) In the course of erection/dismantling, no person unrelated to erection/dismantling may use the construction hoist.

(4) The operation to move the cage shall be controlled via the cage roof operation box rather than in the cage.

(5) When using the jib on cage roof to carry out the erection, please note that the maximum lifting capacity of jib is 200kg, and don't get it overloaded. The load of cage may not exceed the rated load.

(6) No person may stand under the article lifted.

(7) When there is article hung up on the jib, the cage may not be started.

(8) When the cage is moving, the head and hand of persons and the goods may not protrude beyond the base enclosure.

(9) Before the main power supply is cut off, no person may stay within the scope of base frame and base enclosure, in passage of construction hoist or in the unsafe area enclosed by mast (mast section) and mast tie.

(10) If the emergency stop button on cage roof operation box is not pressed down, don't carry out the erection works on cage roof.

(11) No person without electrician qualification may carry out the electrical wiring works. When carrying out such works, make sure that the power supply has been cut off.

(12) After the mast (mast sections) of required height is installed, the cage may not be started until all connecting bolts are fully tightened up.

(13) The construction hoist shall, in accordance with the relevant provisions, be equipped with the separate grounding device and lightning arrester.

(14) If the installed height of construction hoist is more than 120m and exceeds the relevant building, the aeronautical obstacle lamp shall be set up.

2.2.4 Post-erection Safety Measures

Before the construction hoist passes the acceptance inspection, it may not be put into normal use.

2.2.4.1 Acceptance Inspection for Construction Hoist

(1) In order to ensure the safe use of newly installed construction hoist and retrofitted construction hoist, the

acceptance inspection shall be carried out after the erection or retrofitting is completed and before the construction hoist is put into normal use.

(2) The user of construction hoist is responsible to ensure that the inspection implemented indicates that the whole erection procedure meets the laws, regulations and safety standards relating to construction hoist of the country where the construction hoist is located.

(3) The inspection shall be carried out by inspection personnel under the supervision from relevant authorities.

2.2.4.1.1 General Test and Inspection of Construction Hoist

(1) The inspection on mast and mast tie shall meet the following requirements:

- In accordance with the specified lifting height, use and fix the mast section of mast;
- The position, size and bearing capacity of foundation meet the requirements;
- The mast section and rack are in good conditions;
- The erection of mast meets the relevant requirements;
- The tightening of rack meets the relevant requirements;
- The erection of mast tie meets the relevant requirements; and the tightening of connecting bolt meets the relevant requirements;
- The height of free end of mast meets the relevant requirements;
- The erection of every limit device (stopper) meets the relevant requirements.

(2) The inspection on base frame and base enclosure shall meet the following requirements:

- The internal and external position of base enclosure meets the requirements;
- The components of base enclosure are free of rust, damage and deformation, and meet the relevant requirements;
- The electromechanical interlock device of base enclosure door acts sensitively and reliably, and meets the requirements;
- The tightening of baseframe fixing bolts meets the relevant requirements;
- The erection position of cable drum meets the requirements.

(3) The inspection on cage shall meet the following requirements:

- The size and bearing capacity meet the requirements;
- The structure is free of rust, damage and deformation, and meets the relevant requirements;
- The size and strength of cage door and door frame meet the requirements, and the mechanical and electrical interlocking can be opened easily;
- The erection of guide roller and safety hook meets the relevant requirements;

- The floor in cage is not damaged, and meets the relevant requirements;
 - The jib is in good conditions, and its erection position and strength meet the relevant requirements.
- (4) The drive system inspected shall meet the following requirements:
- The erection of drive system on cage frame meets the relevant requirements;
 - The tightening of back wheel and the clearance of rack meet the requirements;
 - The worm gear is in good conditions, and the designation and level of lubricating oil meet the relevant requirements;
 - The brake has the specified function and meets the relevant requirements.
- (5) The inspection on cable guiding device shall meet the following requirements:
- The erection position of cable guiding device is correct, and the distance meets the requirements;
 - The rubber parts or leaf springs fixed on guiding device are in good conditions and meet the relevant requirements;
 - The fixing of cable arm on cage meets the requirements;
 - The model, specification, connection and erection of cable meet the requirements.
- (6) The electrical equipment shall meet the following requirements:
- The voltage and frequency of power supply used meet the relevant requirements;
 - The grounding resistance meets the relevant requirements;
 - They are in safe conditions and meet the relevant requirements.
- (7) The electrical equipment shall meet the following requirements:
- The main control system is in good conditions and meets the requirements;
 - The erection position of every control element is appropriate, and they are sensitive and reliable and meet the requirements.
- (8) The whole-stroke conditions of cage shall meet the following requirements:
- The distance between the highest position of cage in its whole stroke and the top of mast meets the requirements;
 - The distance between the lowest position of cage in its whole stroke and the ground meets the requirements;
 - In the course of operation, every final limit switch acts sensitively and reliably and meets the requirements.

2.2.4.1.2 Special Test and Inspection for Safety Facilities

After the general inspection procedure for construction hoist is implemented and the requirements are satisfied, please also carry out the special inspection, so as to ensure the safe use of construction hoist. The inspection items are as follows:

(1) The inspection on overspeed safety device shall meet:

- The overspeed safety device shall meet the requirement within the specified calibration period (The overspeed safety device shall, in accordance with the provisions, be calibrated by inspection institution every year, and shall be replaced every five year);
- The erection of overspeed safety device shall meet the requirements;
- The drop test under rated load shall be carried out. In the course of drop test, the sliding distance of cage before stop shall meet the requirements;
- After the hoist passes the drop test, please reset the overspeed safety device;
- The overspeed safety seal shall meet the requirements.

(2) Indicating Symbol

- The relevant warning and indicating symbols of construction hoist shall meet the requirements;
- The operator shall carry a copy of this Manual, so as to refer to it from time to time;
- The operator shall read, understand and master the meaning of the warning and indicating symbols in this Manual.

(3) Final Operation Test

- The final operation test and inspection of construction hoist shall be carried out in accordance with the instructions given in this Manual, and the requirements shall be satisfied.

(4) Final Report

- After the acceptance inspection for construction hoist is completed, the final report shall be submitted. This report shall briefly summarize all problems found through inspection, and set forth all works to be implemented before the construction hoist can be put into use.

2.2.5 Safety Measures for Acceptance Test and Inspection

During the acceptance inspection of construction hoist, appropriate safety measures shall be taken, so as to ensure the safety of operation personnel and inspection personnel. In particular, during the drop test, no person may stay in the cage or within the scope of baseframe and base enclosure, and the ground operation mode shall be adopted.

2.3 Regular Inspection and Test

2.3.1 Requirements for Regular Inspection and Test

The regular inspection and test on construction hoist shall be carried out in accordance with the relevant laws, regulations and safety standards of the country where the construction hoist is located, and shall also be carried out in accordance with the following requirements.

2.3.1.1 Responsibilities

(1) Inspector

- The inspection and test works shall be carried out by qualified technical personnel.

(2) Safety measures for inspection and test

- Before carrying out the functional test, please ensure the safety of operation personnel and inspection personnel. During the load test and drop test, no person may stay in the cage or within the scope of baseframe and base enclosure, and the ground operation mode shall be adopted.

(3) General inspection and test of construction hoist

- All components shall be inspected on a regular basis. If necessary, additional test shall be carried out, so as to confirm that it is in safe and usable conditions;
- The inspection and test shall be carried out in accordance with the interval and instructions given the *Maintenance Manual*;
- The adjustable worn parts shall be adjusted in time; the wearing parts which have reached the wear limit and other damaged parts shall be replaced with the spare parts from the Company, and the replacement parts shall pass the safety inspection;
- All consequences arising from use of non-genuine parts by the user without the written confirmation from the Company shall be borne by the user.

(4) As for inspection on overspeed safety device, the drop test shall be carried out at least every three months in accordance with the requirements, so as to confirm that the function of overspeed safety device meets the requirements. During the drop test, the sliding distance of cage before stop shall meet the specified requirements. In order to ensure the safety, when carrying out the drop test, please ensure safety.

- The inspection and test shall be carried out by qualified technical personnel;
- Before the test, the motor brake shall function normally;
- Before the test, move up the cage to the safety height, and ensure that in the course of test, the cage will not collide into the buffer spring
- In the course of test, no person may stay in cage and baseframe base enclosure, and the ground control mode shall be adopted;
- After the test, the overspeed safety device shall be rest correctly in time.

2.3.2 Routine Safety Inspection

2.3.2.1 Responsibilities

(1) The user of construction hoist shall always be responsible for routine safety inspection of construction hoist.

(2) The works carried out shall comply with the relevant laws, regulations and safety standards of the country where the construction hoist is located.

(3) Before carrying out the routine safety inspection on the construction hoist, please carefully read and earnestly implement the detailed contents of “Routine Safety Inspection”.

2.3.2.2 Safety Measures for Routine Safety Inspection

(1) Before carrying out the routine safety inspection on construction hoist which has been subject to rainstorm or strong typhoon, please appoint the professional personnel to inspect all key components, and take the necessary safety measures.

(2) When the wind velocity is higher than 20m/s or there is ice on mast or cable, it is prohibited to operate the construction hoist.

(3) Before the works specified in “Regular Inspection and Test” and “Maintenance and Repair” are completed, don’t operate the construction hoist.

(4) Before making sure that there is no obstacle existing in the passage of construction hoist or in nearby areas, don’t operate the construction hoist.

(5) Before the routine safety inspection on cage is completed, don’t operate the construction hoist.

(6) When operating the cage and carrying out the routine safety inspection, please be prudent and careful.

2.4 Operational Safety

2.4.1 Responsibilities

(1) The user of construction hoist shall always be responsible for operating safety of construction hoist.

(2) The works carried out shall comply with the relevant laws, regulations and safety standards of the country where the construction hoist is located.

(3) Before operating the construction hoist, please carefully read and earnestly implement the detailed contents of “Operational Safety”.

2.4.2 Safety Measures for Operation

(1) When the wind velocity is higher than 20m/s, it is prohibited to operate the construction hoist.

(2) When there is ice on mast and cable, it is prohibited to operate the construction hoist.

(3) Before the works specified in “Regular Inspection and Test” and “Maintenance and Repair” are completed, don’t operate the construction hoist.

(4) The total weight of goods and persons carried by the cage may not exceed the rated value specified in the nameplate.

(5) No goods may protrude out from the cage.

(6) After the additional mast sections are installed, the jib on cage roof shall be removed.

(7) Neither person other than operator nor goods may be carried in the cab.

(8) Before confirming that all protective and safety devices work normally, don’t operate the construction hoist.

(9) Before confirming that no obstacle/person exists in the passage of cage, don’t operate the construction hoist.

(10) When the construction hoist is operated in the cage, no person may stay on cage roof.

(11) In case of trouble of any situation which endangers the safety, please immediately report to the on-site safety supervisor. Before such trouble or situation is eliminated, don't operate the construction hoist.

2.5 Emergency Measure and Rescue Plan

According to the local related laws and regulations, specialized rescue team should be established to protect personal safety of constructors when erection, dismantling, operation, maintenance and take construction hoist, and to ensure emergency rescue timely when accident occurring. The members of rescue team must master the related knowledge of maintaining and operating construction hoist.

2.6 Repair and Maintenance

2.6.1 Responsibilities

- (1) The user of construction hoist shall always be responsible for duly maintaining the construction hoist.
- (2) The works carried out shall comply with the relevant laws, regulations and safety standards of the country where the construction hoist is located.
- (3) Before operating the construction hoist, please carefully read and earnestly implement the detailed contents of "Maintenance".

2.6.2 Safety Measures for Repair and Maintenance

- (1) Before carrying out any repair or maintenance work on equipment of construction hoist or in passage of construction hoist or in the surrounding areas, be sure to cut off the main power supply.
- (2) Before carrying out repair on cage, drive system or safety device, be sure to stop the cage stably on buffer spring. If there is any counterweight, please lock the cage onto the mast.
- (3) When testing the braking torque of motor brake, please stop the cage on buffer spring stably and cut off the main power supply.

2.7 Environmental Protection

The designation and usage of construction hoist must conform to the local related environmental laws and regulations.





ZOOMLION

Operation Manual of Construction
Hoist (Volume One)

Safety Signs

General Provisions

● Brief Introduction

Preparation

Erection and Dismantling

Annexes



③

Brief Introduction

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1. Overview

1.1 Explanation of Model

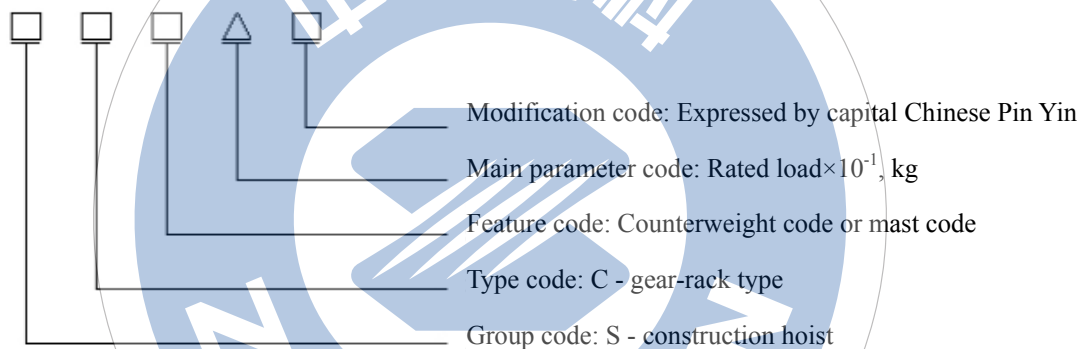
The SC construction hoist is a construction hoist driven by gear and rack and is mainly used to transport persons and goods for high rise buildings, and the working class of complete machine is A5-A6.

This construction hoist can be easily installed and dismantled, and its height may be increased as the height of building increases. On the basis of operation speed, the construction hoists fall into low-speed, medium-speed and high-speed construction hoists; on the basis of control mode, the construction hoists fall into ordinary and variable-frequency construction hoists. In addition, there are SC industrial hoists specially designed to transport persons and goods for large tower crane, steel tower and bridge.

The SC construction hoist has very reliable mechanical and electrical safety systems, and is the safe and highly-efficient vertical transportation equipment in construction projects.

The model of construction hoist is composed of group, type, feature, main parameter and modification codes.

The model is explained as follows:



(1) Main parameter code: The single-cage construction hoist is only marked with one code, and the double-cage construction hoist is marked with two codes which are separated by the symbol “/”, with one code for the rated load of a cage;

(2) Feature code: The symbol indicating two main features of construction hoist;

- Counterweight code: D is marked if there is counterweight and no code is given if there is no counterweight;
- Mast code: Q is marked for inclined or curve type, and E is marked if there are two masts.

(3) Example for formulation of model:

- SC30 indicates the single-cage industrial hoist of which the carrying capacity is 300kg;
- SC100 indicates the single-cage ordinary construction hoist of which the carrying capacity is 1000kg;
- SC200/200 indicates the double-cage three-motor ordinary construction hoist of which the carrying capacity of every cage is 2000kg;
- SC200/200BD indicates the double-cage three-motor ordinary variable-frequency construction hoist of which the carrying capacity of every cage is 2000kg;

- SC200/200E indicates the double-cage two-motor ordinary construction hoist of which the carrying capacity of every cage is 2000kg;
- SC200/200EB indicates the double-cage two-motor ordinary variable-frequency construction hoist of which the carrying capacity of every cage is 2000kg;
- SC200/200BZ indicates the double-cage medium-speed variable-frequency construction hoist of which the carrying capacity of every cage is 2000kg;
- SC200/200BG indicates the double-cage high-speed variable-frequency construction hoist of which the carrying capacity of every cage is 2000kg.

2. Structural Principle and Brief Introduction

2.1 Mast

The mast is the rail on which the construction hoist runs, and is composed of 1508mm mast sections connected with class-8.8 M24×230 high-strength bolts (The pre-tightening torque for bolts is no less than 300N•m). The mast section is composed of seamless steel tube or welded tube, angle steel or molded section and steel tube, the mast section is equipped with rack (one rack for single-cage mast section, and two racks for double-cage mast section), and every rack is fixed with three screws. The rack is removable and replaceable, and on the basis of the installed height, the thickness of main chord of mast section also varies.

The lower end of four main chords on mast section is equipped with a port, and the lower end of rack is equipped with a cylindrical pin, so as to facilitate the accurate positioning of mast section in the course of erection. The sectional size of mast section of SC construction hoist is 650×650mm, and the mast is connected to the building via mast ties.

2.2 Cage

The cage is a steel structure, runs along the mast via the rollers installed on cage, and is equipped with incoming door and outgoing door. The incoming and outgoing doors of cage are vertically-drawing door.

The cage roof is equipped with a movable door, and the specially-provided special ladder makes it easy to climb up onto the cage roof for carrying out erection and repair. During the erection and dismantling, the cage roof may serve as working platform, and is enclosed by cage roof base enclosure.

The cage is equipped with electrical interlock device, and when the cage door is opened, the cage will stop, so as to ensure the safety of persons in cage.

On one side of the cage, the cab is installed, wherein the operator will operate the hoist. All operation switches are located in cab.

The cage is decorated with aluminum sheets, and the cab may be omitted in light of the needs of user.

According to the request of customers, the lower cage can be chosen for export cage, and it can be transported by high cube container.

2.2.1 Cage door

There are two types of cage door—entrance door and exit door. Entrance door usually refers to vertical full height entrance door, and exit door include exit door in two parts, exit door combined with manual operated load ramp,

and exit door with little ramp door inside cage. Exit door in two parts is standard configuration and others are optional, as shown in picture 2.2-1.

Vertical full height entrance door is opened by moving up and down. The weight of the door is balanced by counter weight.

Exit door in two parts is composed of upper and lower door; the upper door is opened upwards, the lower door is opened downwards, the weight of door is balanced by each other when opened. The structure is simple and reliable.

Exit door combined with manual operated load ramp is composed of upper door and ramp door. The upper door is opened upwards, and the ramp door turns outwards with the axis of lower end. The weight of door is balanced by each other when opened. It has the advantage that it can be used as a springboard when the cage door has a certain distance from the landing. In addition, door structure, baffle and guardrail comprise the ramp door, whose structure is generally welded by standard section steels, and the sections are connected by bolts.

Exit door combined with little manual operated load ramp inside cage is composed of exit door in two parts and little ramp door inside cage. After the opening of the exit door in two parts upward and downward, the little ramp door inside cage turns outward at the axis of lower end, working as a springboard.



(a) Entrance door

(b) Exit door in two parts



(c) Exit door combined with manual operated load ramp



(d) Exit door combined with little manual operated load ramp inside cage

Figure 2.2-1 Cage door

2.3 Drive System

The drive system is composed of driving body and drive unit. The driving body is a component which integrates the drive devices into a structure, and it transmits the driving force generated by drive unit to the cage, so that the cage will move up and down. The connecting bolts of driving body and drive unit are class-8.8 high-strength bolts.

The drive unit is the power unit of construction hoist, which moves up and down the construction hoist and the load (or construction personnel) in cage. The drive unit is composed of driving gear, retarder, coupling and motor (with brake).

On the basis of the model of construction hoist, the reducer mainly falls into circle tooth and cylindrical worm reducer, worm gear reducer and helical gear and bevel gear reducer.

The couplings are of claw type, and there are elastic elements (polyurethane rubber) between two couplings so as to reduce the shock and vibration during operation. The retarder and motor in imported SEW and NORD drive units are in integrated structure, and are referred to as reduction motor.

The motor is lifting-purpose disc-brake three-phase asynchronous motor, the electromagnet in brake can carry out automatic follow-up as the brake disc is worn, and the braking torque is adjustable.

The drive system of variable-frequency speed-regulation construction hoist is equipped with a variable-frequency speed-regulation system, which can improve the smoothness in the course of start and braking operation; realize the stepless adjustment of operation speed within a certain range; reduce the starting current and mechanical wear, and prolong the service life of wearing parts; improve the working efficiency; save energy.

2.4 Overspeed Safety Device

As indicated in Figure 2.4-1, the overspeed safety device is mainly composed of casing, brake cone, centrifugal block, spring and stroke switch.

When the cage accidentally drops at an overspeed, the centrifugal block in overspeed safety device will overcome the pulling force of spring and drive the brake cone to rotate, and the screw connected will turn in, the brake cone will contact with the casing, and the frictional force will increase gradually, so as to ensure that the cage is braked smoothly. In addition, the stroke switch will act and cut off cage power supply, so as to ensure the safety of personnel and equipment.

The overspeed safety device falls into single-gear overspeed safety device and three-motor overspeed safety device. The braking principle of three-motor overspeed safety device is totally same as that of single-gear overspeed safety device, but it has the relatively high braking torque, so that it is suitable for medium/high-speed construction hoist.

The activation speed of overspeed safety device has been accurately adjusted and properly sealed when it is delivered from factory, and the user may not randomly open the overspeed safety device.

The use period is stated on the nameplate of overspeed safety device, and normally the use period may not exceed one year. After expiration of use period, the overspeed safety device shall be sent to the manufacturer or testing institution for re-calibration. The service life of overspeed safety device is five years.

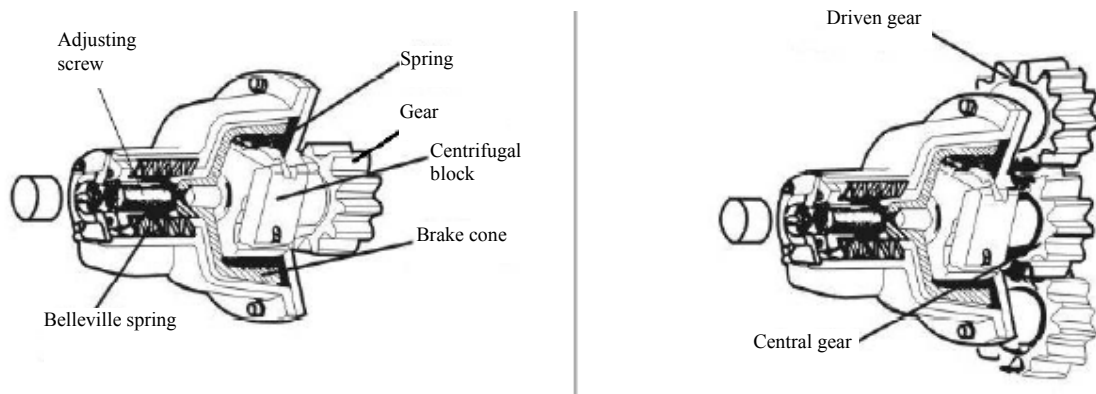


Figure 2.4-1 Overspeed safety device

2.5 Limit Devices

The limit devices include terminal stopping switches, and final limit switch, the variable-frequency speed-regulation construction hoist is also equipped with up/down deceleration final limit switch, and some variable-frequency construction hoists are only equipped with a deceleration limit.

The terminal stopping switches ensure that when the cage moves up or down to the designated position, the power supply will be cut off automatically, so as to stop the construction hoist. The up/down deceleration final limit switch is used to ensure that the construction hoist is switched over from high-speed gear to low-speed gear.

The final limit switch ensures that if the cage continues to move after moving to the upper/lower limit position owing to failure of final limit switch, the main power supply will be immediately cut off so as to stop the cage, so that the cage will not exceed the top when moving upwards and will not collide into the foundation when moving downwards.

The final limit switch can't be reset automatically, and shall be reset manually. Please inspect from time to time that the position of all limit devices is correct, so as to ensure that the final limit switches will act correctly.

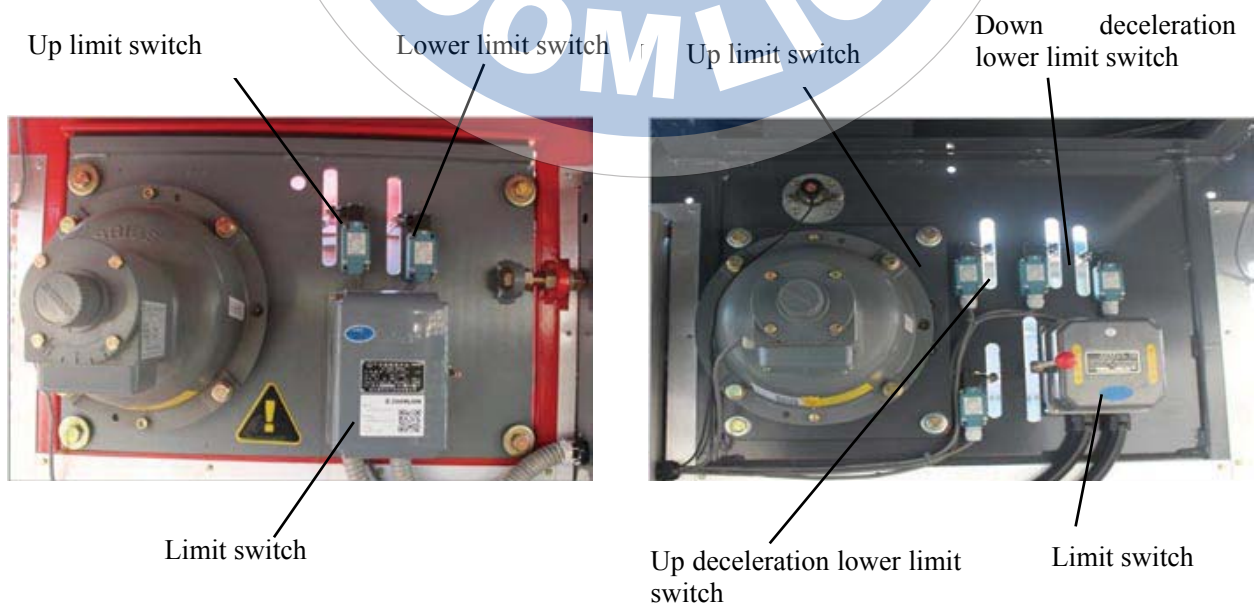


Figure 2.5-1 Limit device

2.6 Electrical Control System

The electrical system is the control interface of mechanical operation of construction hoist, and all actions of construction hoist are controlled via the electrical system. The electrical system is composed of electrical control cabinet, resistor Box, power box, operating console in cab, main control cable and various limit switches.

2.6.1 Power Box

The power box is the part which supplies power to the control system of construction hoist, and is installed on baseframe and base enclosure.

2.6.2 Electrical Control Cabinet

The electrical control cabinet is the heart of electrical system of construction hoist, and is mainly composed of up/down operation contactor, control transformer, overheating protector, frequency converter (for variable-frequency speed-regulation construction hoist) and open-phase & phase sequence relay. The electrical control cabinet is installed in cage. As for variable-frequency speed-regulation construction hoist, the electrical control cabinet is normally installed on cage roof.

2.6.3 Resistor Box

Normally, the resistor box is fixed onto the base enclosure on cage roof, and the resistor is used to consume the energy sent by variable-frequency speed-regulation construction hoist to frequency converter in the course of downward moving. In light of the needs of user, the energy feedback unit may be used in stead of resistor, so as to send the energy back to electrical grid.

2.7 Mast tie

The mast tie is the connecting component between mast and building, and is used to maintain the stability of mast and overall structure of construction hoist.

The mast tie of SC construction hoist falls into I-type, II-type, III-type, IV-type and V-type, of which IID-type is the standard configuration, and the others are optional configurations. The detail parameters can be checked in chapter 4 section3.

2.8 Cable Drum

Cable drum is the component used to release and retract the cable. Since the wind force may cause relatively great impact on cable drum, normally it is only used in the situation that the installed height is no more than 100m and the wind force is relatively low. When the cage is moving upwards, the cage will cause the main cable in cable drum to move upwards; when the cage is moving downwards, the main cable will be slowly retracted into the cable drum, so as to prevent the main cable from being piled on ground and generating hazard.

2.9 Trolley

When the erection position of construction hoist is relatively high, the impact from supply voltage, wind force and dead weight will be relatively high. In such case, the trolley may be adopted. The trolley is installed on lower portion of cage, is of simple structure, and is easy to install. The mast of this hoist is not only the running rail of cage, but also the running rail of trolley, so that it is not so seriously affected by wind force and is widely used. The existing trolley is of combined type, and the trolleys for left and right cages are interchangeable. The height

of base enclosure doorsill for installing short trolley is 680mm, while is 950mm for high trolley.

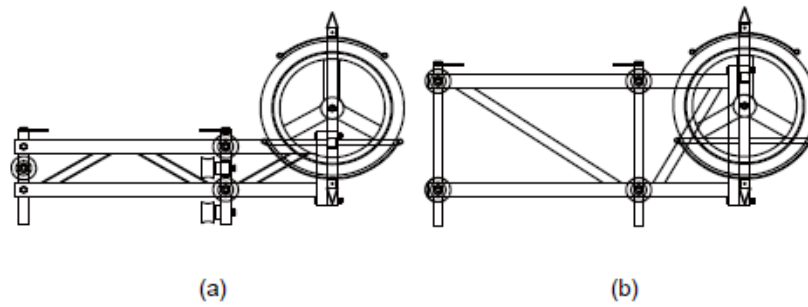


Figure 2.9-1 Trolley

(a) Short Trolley; (b) High Trolley

2.10 Cable Arm

The cable arm is the device which draws the main cable up and down. As drawn by the cable arm, the main cable will safely pass through the cable ring, so as to prevent the cable from being scratched.

The cable drum type cable arm can pick the main cable out of the base frame and base enclosure, so that the main cable can be retracted into cable drum safely.

2.11 Cable Guiding Device

The cable guiding device is used to ensure the safety of cable in the course of operation. When the hoist is operating, the cable guiding device ensures that the cable is in the protective ring on cable guiding device, so as to prevent the cable from winding around any nearby equipment.

When installing the cable guiding device, please ensure that the cable arm and trolley can smoothly put through the guard ring on cable guiding device.

2.12 Slide Wire

Slide wire is another power supply mode for construction hoist. It is installed on mast, and the running height increases with the height of mast. It supplies power for construction hoist instead of cable. Using slide wire to supply power can decrease many parts, such as cable drum, cable trolley, cable guiding device, cable etc. Slide wire is usually used to supply power for high-rise construction hoist.

2.13 Jib

The jib is an indispensable component for realizing the self-served addition of mast sections to construction hoist and the self-served dismantling of construction hoist.

After the foundation of construction hoist is properly installed, use the jib to lift the mast section on cage to the top of installed mast, so as to implement the addition of mast section; in the course of dismantling, the jib may be used to dismantle the mast sections in the order from top to bottom.

Warning

- (1) The rated lifting capacity of jib is 200kg, and it is absolutely prohibited to get it overloaded;
- (2) When the construction hoist is operating, it is absolutely prohibited to hand any heavy article onto the jib;
- (3) After the erection/dismantling of construction hoist is completed, the jib shall be removed from the cage roof.

2.14 Baseframe and base enclosure

The baseframe and base enclosure includes baseframe and protective base enclosure:

The baseframe is made of steel sections and steel sheets, its perimeter is connected to ground protective base enclosure, and at the center there is the mast base. It can bear the load transmitted by construction hoist. In the course of erection, the base frame is fixed onto the embedded part of foundation with bolts.

Protective base enclosure: Composed of steel section, steel sheet and steel wire net, it encloses the host machine of construction hoist, so as to form an enclosed area and prevent any person from entering into such area when the construction hoist is running. At the entrance of protective base enclosure, there is a base enclosure door, which is equipped with the electromechanical interlock device. The rotary clamping mode is adopted between steel wire net and steel wire net as well as steel wire net and door frame, so as to realize the quick erection.

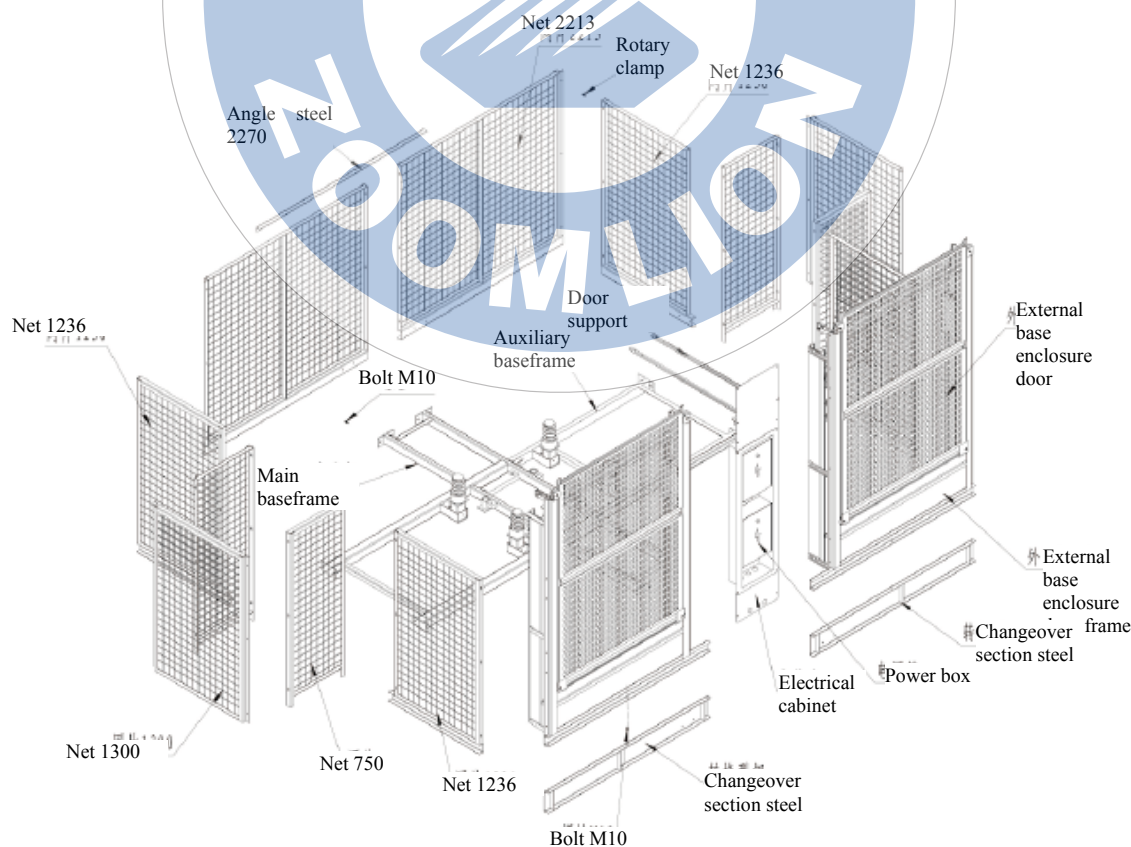


Figure 2.13-1 Assembly diagram for baseframe and base enclosure

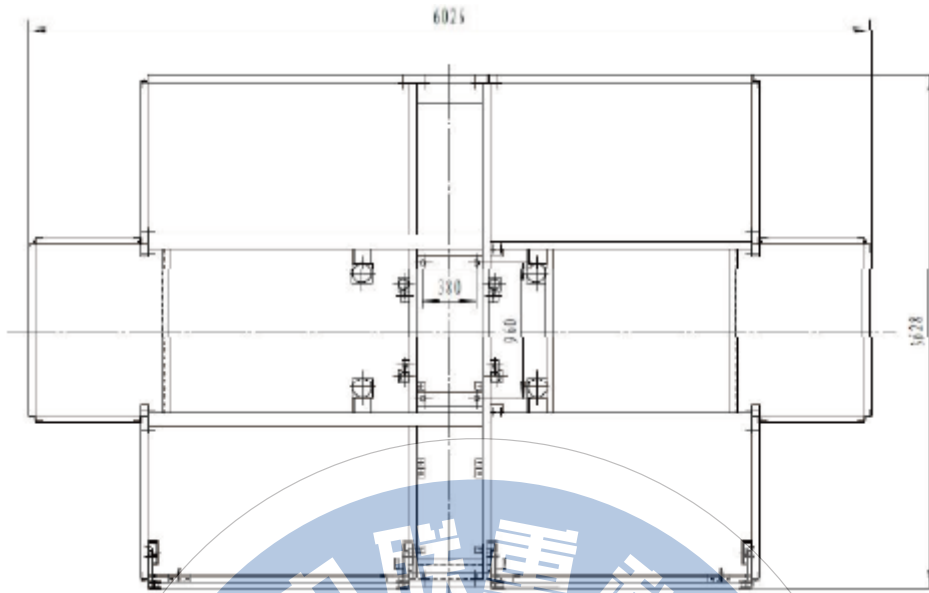
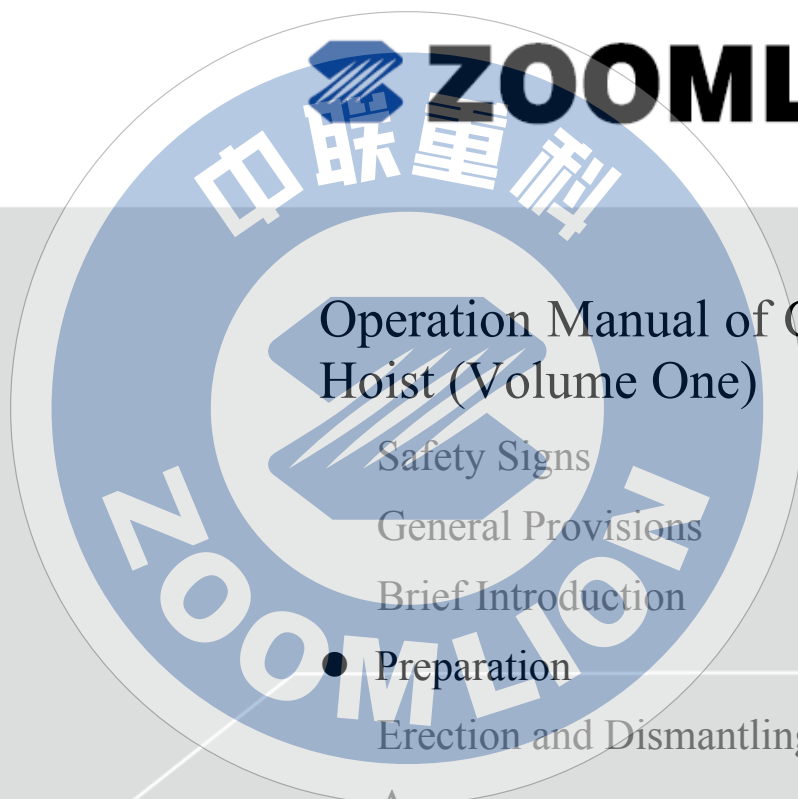


Figure 2.13-2 Vertical view of base frame base enclosure

The base frame and base enclosure of SC construction hoist is of combined type, namely cable drum type, slide wire type and trolley type, which is interchangeable by changeover the section steel as indicated in the figure 2.13-1, and the doorsill height (450, 680, 950) is also interchangeable; the doorsill height of cable drum and slide wire is 450mm; the doorsill height of short trolley is 680mm; the doorsill height of high trolley is 950mm.





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Safety Signs

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● Preparation

Erection and Dismantling

Annexes

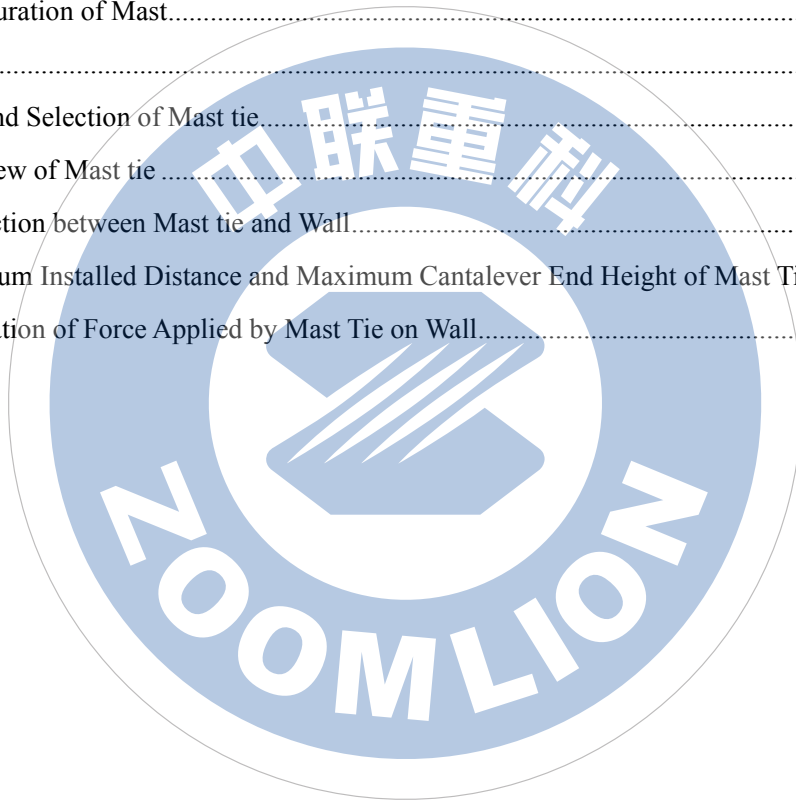




④

Preparation

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Preparation

1. Setup of Foundation

Before using the construction hoist, the user shall, in accordance with the provision of 5.1.10 of the *Construction Hoist* (GB/T10054-2005) “The foundation of construction hoist shall be able to bear all load under the most unfavorable operating conditions”, calculate the load to be borne by foundation and set up the foundation.

1.1 Calculation of Load to be Borne by Foundation

The load to be borne by foundation is: $P=n \times mg$

In the formula above, P is the load to be borne by foundation (N); in consideration of the impact on foundation from error in dynamic load, wind load and dead weight, the safety coefficient n is set as 2; m is the dead weight of cage (including the drive system) + rated load of cage + dead weight of baseframe and base enclosure + dead weight of mast + weight of attachments + weight of mast tie + dead weight of counterweight (kg); g is the gravitational acceleration ($9.8m/s^2$).

Namely: $P=0.02m$ (kN)

Calculation example 1:

Example: The height of mast of SC200/200 construction hoist is 150m, and the IID mast tie is adopted;

Model of foundation: CM6238 for;

Dead weight of cage (including drive system): $2000 \times 2 = 4000kg$;

Rated load of cage: $2000 \times 2 = 4000kg$;

Dead weight of baseframe and base enclosure: 1300kg;

Dead weight of mast: $145 \times 100 = 14500kg$;

The weight of power cable, cable guiding device and fasteners is about 10% of dead weight of mast, namely 1450kg;

Weight of IID mast tie: $146 \times 16 = 2336kg$;

Dead weight of counterweight: 0kg (None);

Therefore: $P = (4000 + 4000 + 1300 + 14500 + 1450 + 2336) \times 0.02 = 551.72kN$

Conclusion: The concrete foundation shall be able to at least bear the minimum load of 552kN, which can be satisfied the operation requirement of construction hoist.



Warning

The groundwork under foundation of construction hoist shall meet the following requirements:

- (1) Height of mast $\leq 100\text{m}$: the bearing capacity $\geq 0.10\text{MPa}$;
- (2) $100\text{m} < \text{height of mast} \leq 300\text{m}$: the bearing capacity $\geq 0.15\text{MPa}$;
- (3) $300\text{m} < \text{height of mast} \leq 500\text{m}$: the bearing capacity $\geq 0.2\text{MPa}$.

1.2 Setup Program for Concrete Foundation

The following programs are available for concrete foundation:

Program 1:

The concrete foundation is above the ground.

Advantage: No drainage is required.

Disadvantage: The doorsill is relatively high.

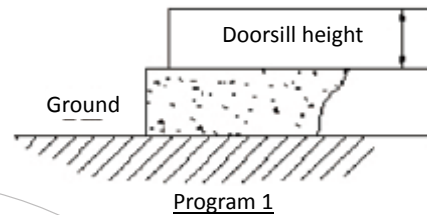


Figure 1.2-1 Program 1 for Concrete Foundation

Program 2:

The concrete foundation is at the same level as the ground

Advantage: The drainage is relatively simple.

Disadvantage: There is doorsill, but it is only necessary to set up a simple slope with wooden plate.

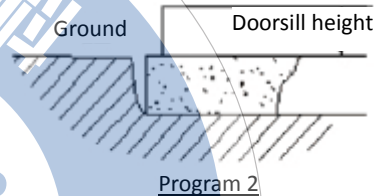


Figure 1.2-2 Program 2 for Concrete Foundation

Program 3:

The concrete is lower than the ground

Advantage: There is no doorsill between ground and cage.

Disadvantage: Since water may accumulate easily, appropriate drainage measures shall be taken, so as to prevent the foundation from getting corroded.

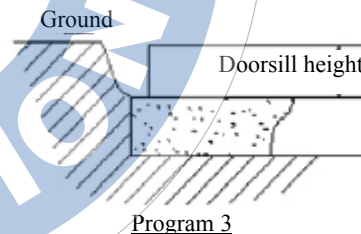


Figure 1.2-3 Program 3 for Concrete Foundation



Note

When selecting the setup program for foundation, the user shall, in light of the actual situations of construction site, properly make decision.

(1) As for different cable guiding devices, the doorsill height will vary. As for cable drum type and slide wire type, the doorsill height is 450mm; as for short trolley type, the doorsill height is 680mm; as for high trolley type, the doorsill height is 950mm;

(2) The foundation shall be made by the use, and shall be completed at least one week prior to the erection of hoist.

1.3 Selection of Concrete Foundation

1.3.1 Selection of Foundation for SC Construction Hoist

1.3.1.1 Model CM3038 (applicable to SC single-cage hoist without cab)

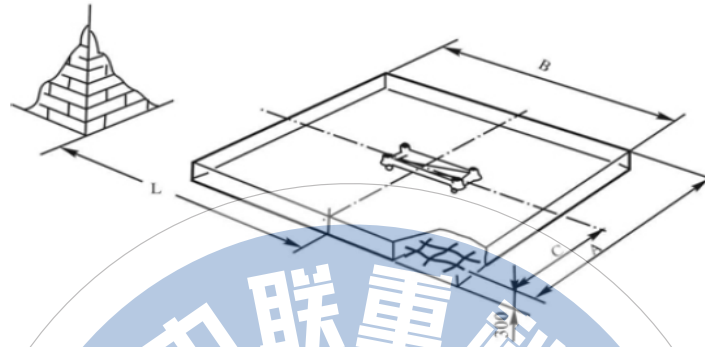


Figure 1.3-1 CM3038 Concrete Foundation

Table 1.3-1 Detailed Size of CM3038 Concrete Foundation

| Model | Specification of Cage | Distance L between Foundation and Wall | A (mm) | B (mm) | C (mm) | |
|-------------------------------|-----------------------|--|--------|--------|-----------|------------|
| | | | | | Left Cage | Right Cage |
| single-cage hoist without cab | 3.2×1.5m | I, II, III, IV and V-type mast tie: | 3000 | 3800 | 2400 | 600 |

1.3.1.2 Model CM3838 (applicable to SC single-cage hoist with cab)

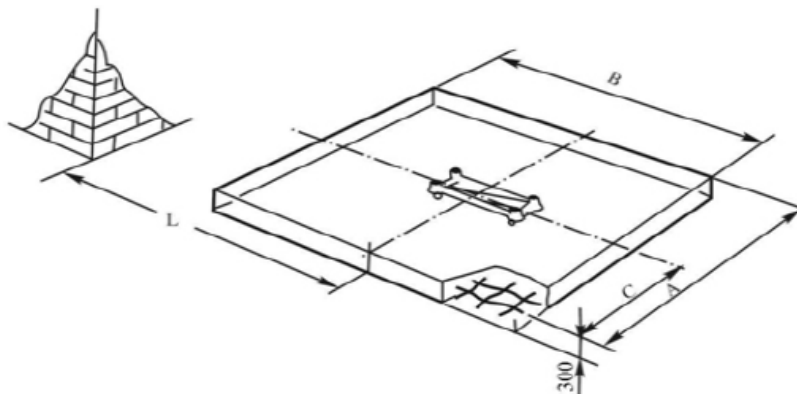


Figure 1.3-2 CM3838 Concrete Foundation

Table 1.3-2 Detailed Size of CM3838 Concrete Foundation

| Model | Specification of Cage | Distance L between Foundation and Wall | A (mm) | B (mm) | C (mm) | |
|----------------------------|-----------------------|--|--------|--------|-----------|------------|
| | | | | | Left Cage | Right Cage |
| single-cage hoist with cab | 3.2×1.5m | I, II, III, IV and V-type mast tie: | 3800 | 3800 | 3200 | 600 |
| | | | | | | |

1.3.1.3 Model CM4638 (applicable to double-cage hoist without cab)

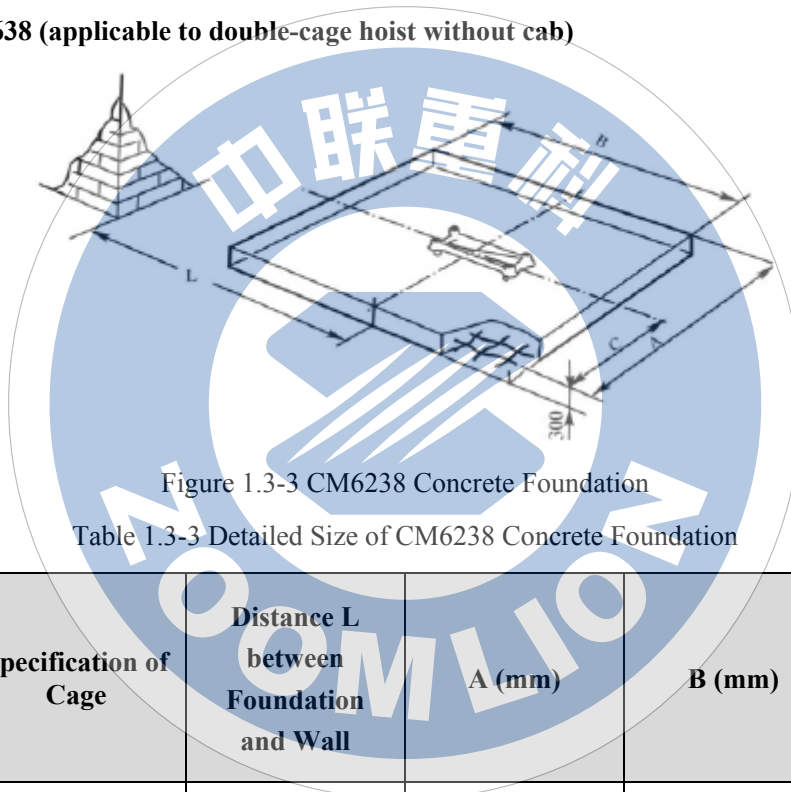


Figure 1.3-3 CM6238 Concrete Foundation

Table 1.3-3 Detailed Size of CM6238 Concrete Foundation

| Model | Specification of Cage | Distance L between Foundation and Wall | A (mm) | B (mm) | C (mm) |
|-------------------------------|-----------------------|--|--------|--------|--------|
| double-cage hoist without cab | 3.2×1.5m | I, II, III, IV and V-type mast tie: | 4600 | 3800 | 2300 |

1.3.1.4 Model CM6238 (applicable to SC double-cage hoist with cab)

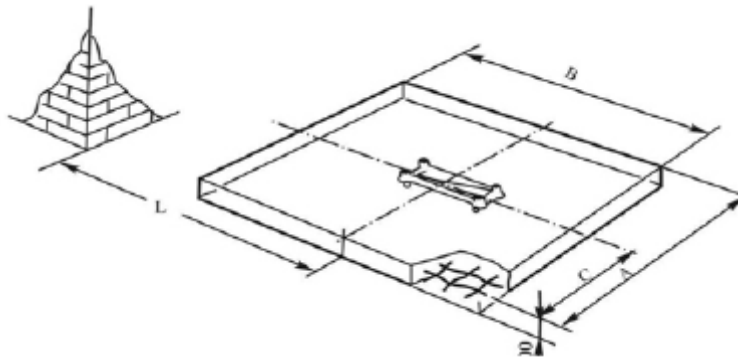


Figure 1.3-4 CM6238 Concrete Foundation

Table 1.3-4 Detailed Size of CM6238 Concrete Foundation

| Model | Specification of Cage | Distance L between Foundation and Wall | A (mm) | B (mm) | C (mm) |
|----------------------------|-----------------------|--|--------|--------|--------|
| double-cage hoist with cab | 3.2×1.5m | I, II, III, IV and V-type mast tie: | 6200 | 3800 | 3100 |

1.3.3 Schematic Diagram for Intermediate Embedded Frame of Concrete Foundation

The intermediate embedded frame shall be set up at the center of the area where the foundation is to be formed, and its schematic diagram is given as follows:

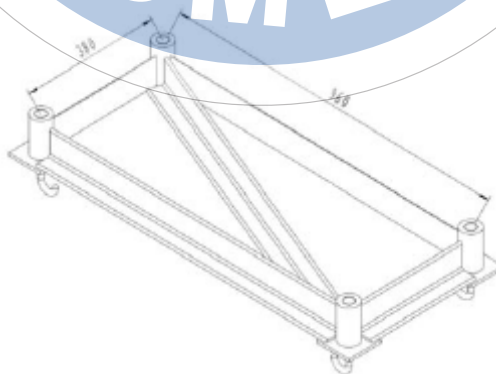


Figure 1.3-6 Schematic Diagram for Intermediate Embedded Frame

1.4 Notices for Making of Concrete Foundation

(1) The bearing capacity of groundwork under concrete foundation shall meet the following requirements:

- Height of mast $\leq 100\text{m}$: the bearing capacity $\geq 0.10\text{MPa}$;
- $100\text{m} < \text{height of mast} \leq 300\text{m}$: the bearing capacity $\geq 0.15\text{MPa}$;
- $300\text{m} < \text{height of mast} \leq 500\text{m}$: the bearing capacity $\geq 0.2\text{MPa}$;

If the above requirement is not satisfied, the groundwork under foundation shall be reinforced.

(2) The drain trench shall be set up near the concrete foundation in light of the actual conditions of the construction site.

(3) The embedded seat of concrete foundation shall be connected with the reinforcing steel bar mesh in foundation.

(4) When casting the concrete, the bolt holes on embedded frame shall be temporarily covered with wooden plate or blocked with plastic plug, so as to prevent the concrete from entering into bolt holes, and its end face shall be 1mm higher than the concrete surface.

(5) The concrete foundation shall be made in accordance with the *Specification for Construction and Acceptance of Reinforced Concrete Works* (GBJ204).

- Size of reinforcing steel bars in concrete foundation: No less than 12mm; mesh: 200mm; material: HPB235 or HRB335;
- The designation of concrete for making foundation shall be higher than C30;
- The technical strength of concrete foundation shall meet the *Specification for Construction and Acceptance of Reinforced Concrete Works* (GBJ204) and the erection requirements of construction hoist.

(6) If the above program for concrete foundation is not applicable, the user shall refer to the relevant specifications and standards of the country where the user is located.

2. Mast

2.1 Configuration of Mast

For different installed height of hoist, the configuration of mast sections is also different. The thickness of main chord of mast section will vary as the installed height increases, and the changeover section shall be set up between the mast sections with different thickness of main chord.

Example for selection of specification of mast section:

When the installed height of mast is 500m, the thickness of mast section is indicated in Figure 2.1-3:

Table 2.1-1 Erection of Mast sections for Different Installed Height

| Installed Height | 150m | 260m | 380m | 500m |
|---------------------------------|------|---------------------------------------|---------------------------------------|---------------------------------------|
| Specification of Mast section | | | | |
| $\Phi 76 \times 4.5 \text{mm}$ | 100 | 93 (including one changeover section) | 93 (including one changeover section) | 93 (including one changeover section) |
| $\Phi 76 \times 6.0 \text{mm}$ | 0 | 80 | 80 (including one changeover section) | 80 (including one changeover section) |
| $\Phi 76 \times 8.0 \text{mm}$ | 0 | 0 | 79 | 80 (including one changeover section) |
| $\Phi 76 \times 10.0 \text{mm}$ | 0 | 0 | 0 | 79 |
| Total number of mast sections | 100 | 173 | 252 | 332 |

In order to distinguish between different thickness of mast section and changeover section, there are a figure indicating thickness of main chord and a small area with paint of different color on erection face of middle frame of every mast section. In the course of erection, please carefully distinguish from them!

The mark on mast section is detailed as follows:

- (1) As for $\Phi 76 \times 4.5$ mast section, no treatment will be carried out;
- (2) As for $\Phi 76 \times 6.0$ mast section, the area surrounding the figure 6 which is used to indicate the thickness is coated with blue paint;
- (3) As for $\Phi 76 \times 8.0$ mast section, the area surrounding the figure 8 which is used to indicate the thickness is coated with orange yellow paint;

(4) As for $\Phi 76 \times 10.0$ mast section, the area surrounding the figure 10 which is used to indicate the thickness is coated with green paint.

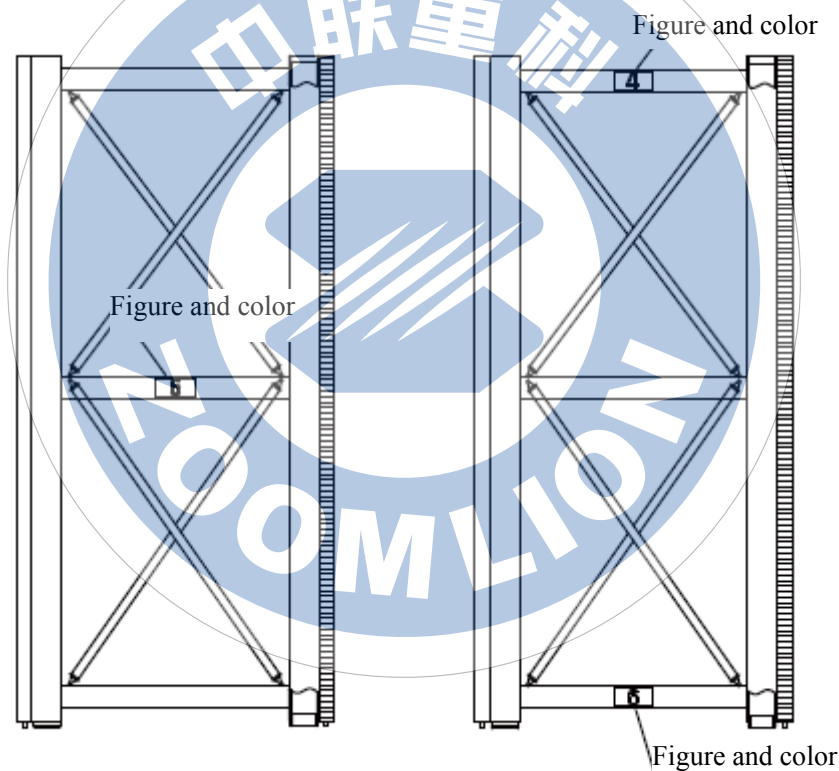
The mark on changeover section is detailed as follows:

(1) As for 4.5-6.0mm changeover section, the area surrounding the figure 4 is coated with red paint (for galvanized mast section) or white paint (for painted mast section), and the area surrounding the figure 6 is coated with blue paint;

(2) As for 6.0-8.0 changeover section, the area surrounding the figure 6 is coated with blue paint, and the area surrounding the figure 8 is coated with orange yellow paint;

(3) As for 8.0-10.0 changeover section, the area surrounding the figure 8 is coated with orange yellow paint, and the area surrounding the figure 10 is coated with green paint.

Taking $\Phi 76 \times 6.0$ mm mast section and 4.5-6.0mm changeover section as an example, the mark is indicated in the figure below:



Mast section with 6mm Thickness

Changeover Section with 4.5mm-6mm Thickness

Figure 2.1-1 Schematic Diagram for Reinforcing Section and Changeover Section of SC Construction Hoist

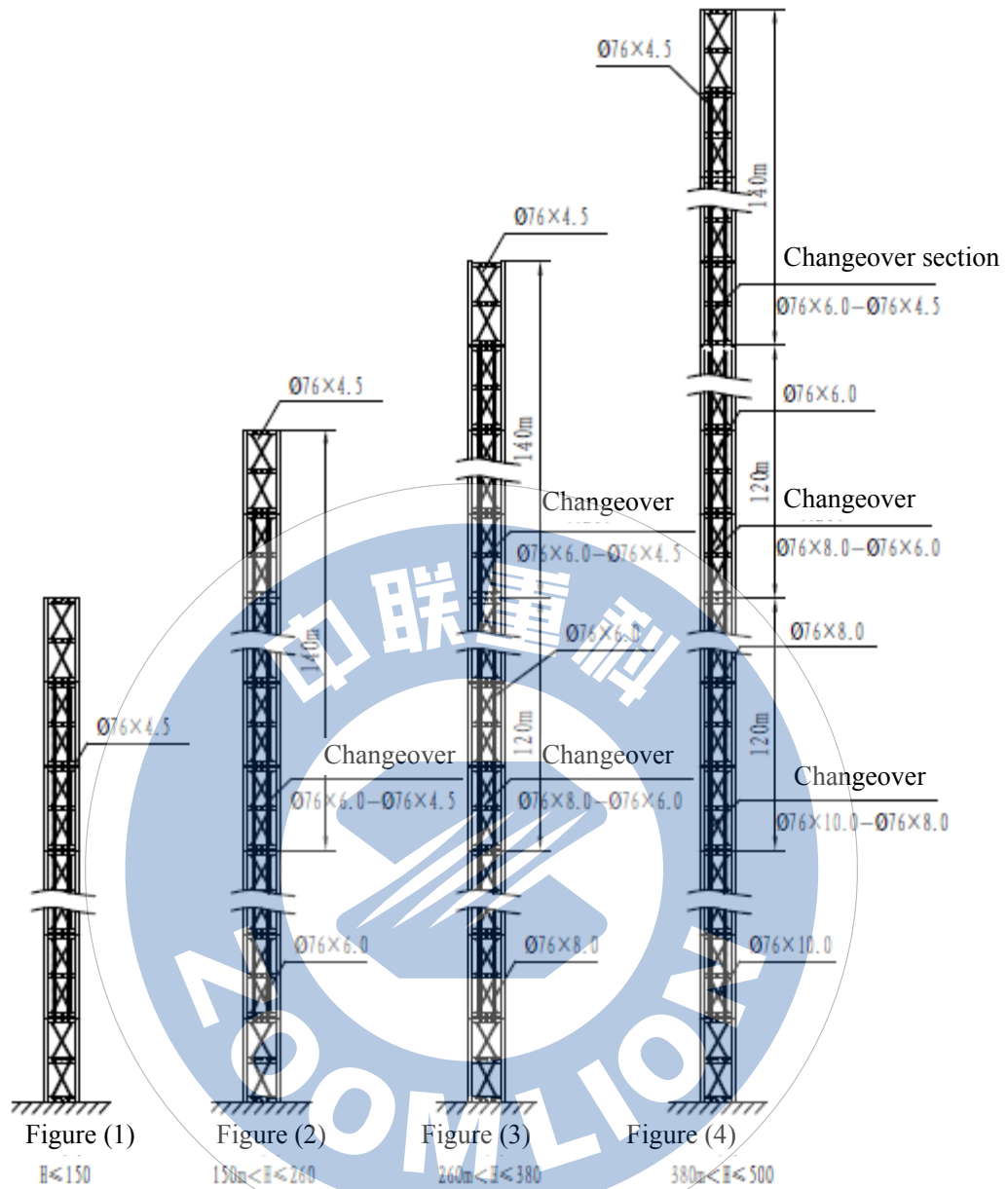


Figure 2.1-3 Thickness of Vertical Tube of Mast section

Note: H is the installed height of mast

3. Mast tie

3.1 Type and Selection of Mast Tie

In order to meet the user's actual needs for construction hoist, the mast tie for construction hoist falls into five types (These types may be combined into several specifications), the standard configuration offered by the Company is IID type, and the applicability scope of various types of mast tie is as follows:

(1) I-type mast tie: Only available for single-cage construction hoist;

(2) II-type mast tie: This type is available for single-cage or double-cage construction hoist with or without cab and with or without counterweight. If the construction site is equipped with scaffold or floor-connecting platform, this mast tie may be used instead of III-type mast tie;

(3) III-type mast tie: The applicability scope is as same as that of II-type mast tie. This mast tie shall be equipped with upright rod, short front support rod and bridge rod (Effect: The floor connecting platform can be directly placed on mast);

(4) IV-type and V-type mast tie: The range of application is the same with II-type mast tie, but the distance of the mast tie is shorter, namely bridge platform isn't needed between cage and unloading platform.

3.2 Overview of Mast tie

3.2.1 Overview of Mast tie of SC Construction Hoist

3.2.1.1 I-type Mast tie

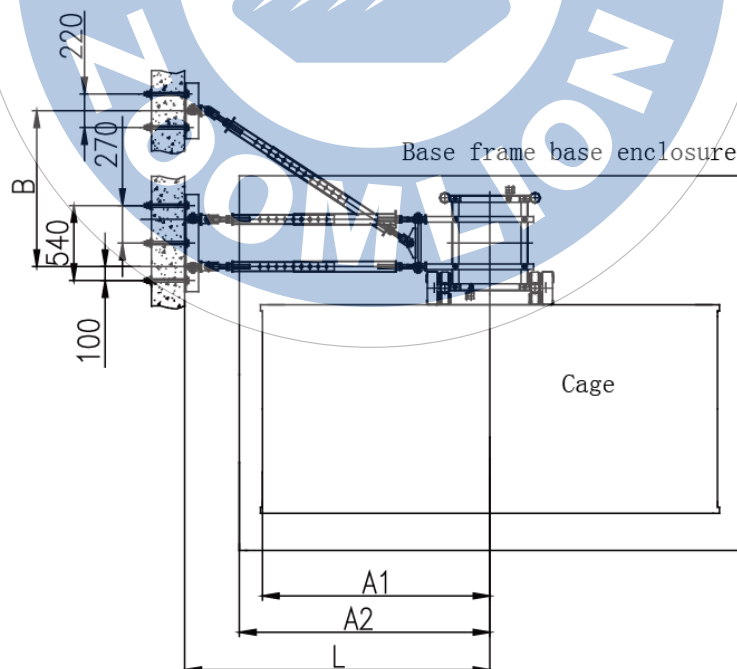


Figure 3.2-1 Schematic Diagram for I-type Mast tie

Applicability: Applicable to the single-cage construction hoist which is relatively close to wall and the carrying capacity is not high

Table 3.2-1 Connection Size of I-type Mast Tie

| Specification of Cage | L (mm) | A1 (mm) | A2 (mm) | B (mm) |
|-----------------------|-----------|---------|---------|-----------|
| 3.2×1.5m | 1800-2500 | 1650 | 1800 | 1000-1570 |
| 3.0×1.3m | | 1540 | 1700 | 1000-1570 |

3.2.1.2 II-type Mast Tie (IID mast tie recommended)

Table 3.2-2 Connection Size of II-type Mast Tie

| Specification of Cage | Model | L (mm) | A1 (mm) | A2 (mm) | B (mm) |
|-----------------------|-------|-----------|---------|---------|--------|
| 3.2×1.5m | IIA | 2800-3200 | 1650 | 1800 | 1500 |
| | IIB | 3000-3600 | | | 1750 |
| | IIC | 3400-4200 | | | 2000 |
| | IID | 3000-3600 | | | 1500 |
| | IIE | 2400-2800 | | | 1300 |
| | IIG | 4200-5000 | | | 2200 |
| 3.0×1.3m | IIA | 2800-3200 | 1540 | 1700 | 1500 |
| | IIB | 3000-3600 | | | 1750 |
| | IIC | 3400-4200 | | | 2000 |
| | IID | 3000-3600 | | | 1500 |
| | IIE | 2400-2800 | | | 1300 |
| | IIG | 4200-5000 | | | 2200 |

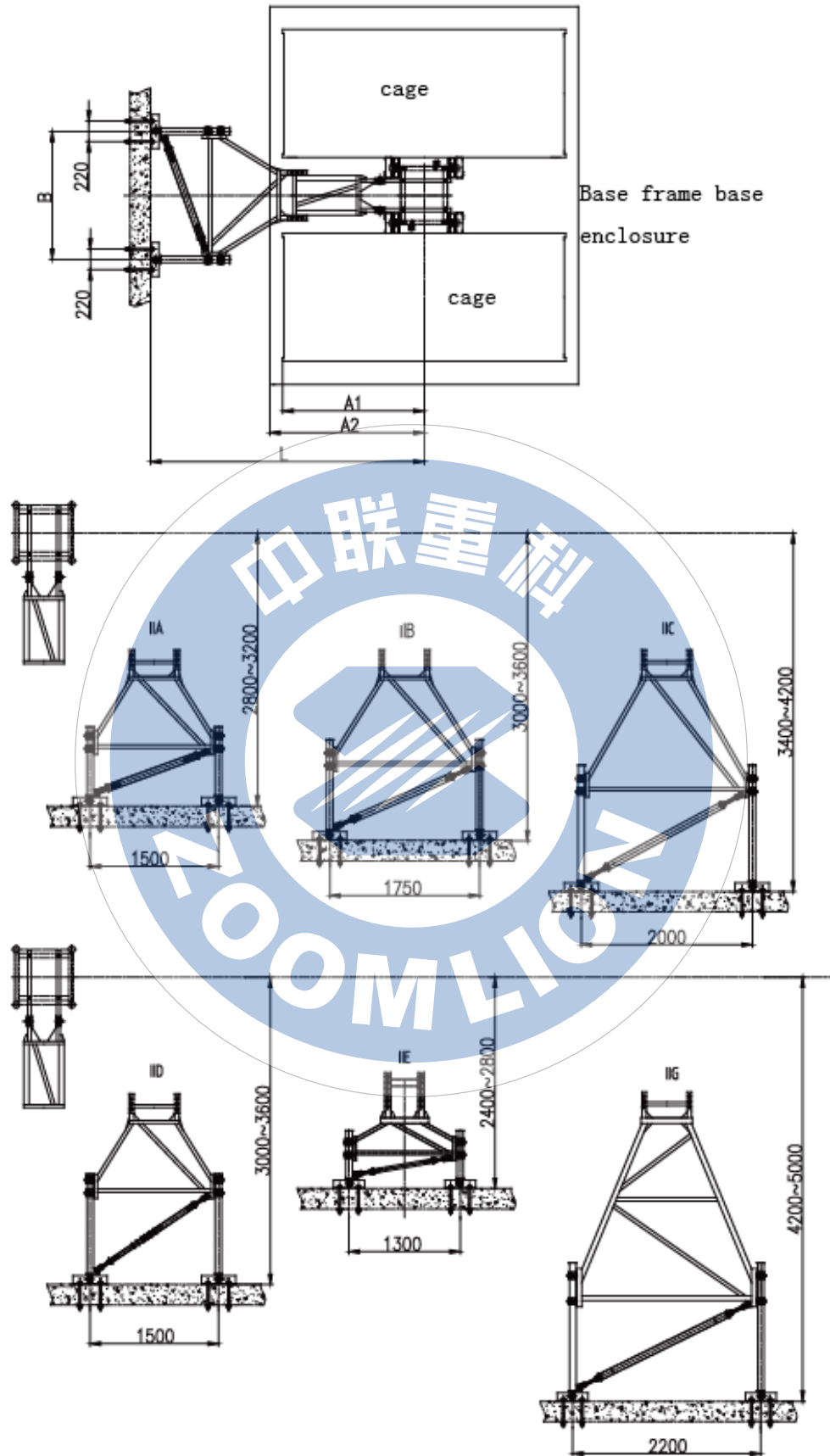


Figure 3.2-2 Schematic Diagram for II-type Mast Tie

3.2.1.3 III-type Mast Tie

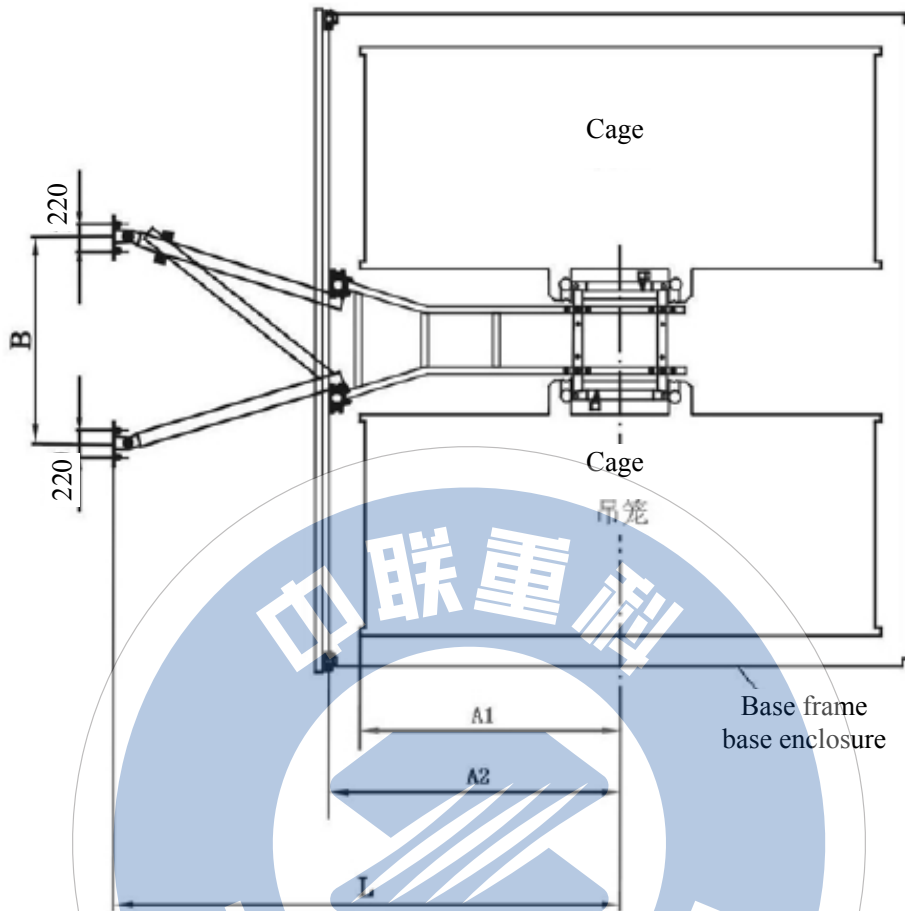


Figure 3.2-3 Schematic Diagram for III-type Mast Tie

Table 3.2-3 Connection Size of III-type Mast Tie

| Specification of Cage | L (mm) | A1 (mm) | A2 (mm) | B (mm) |
|-----------------------|-----------|---------|---------|-----------|
| 3.2×1.5m | 3000-3600 | 1650 | 1850 | 1200-1600 |
| 3.0×1.3m | 3000-3600 | 1540 | 1750 | 1200-1600 |

Preparation

3.2.1.4 IV-type Mast Tie

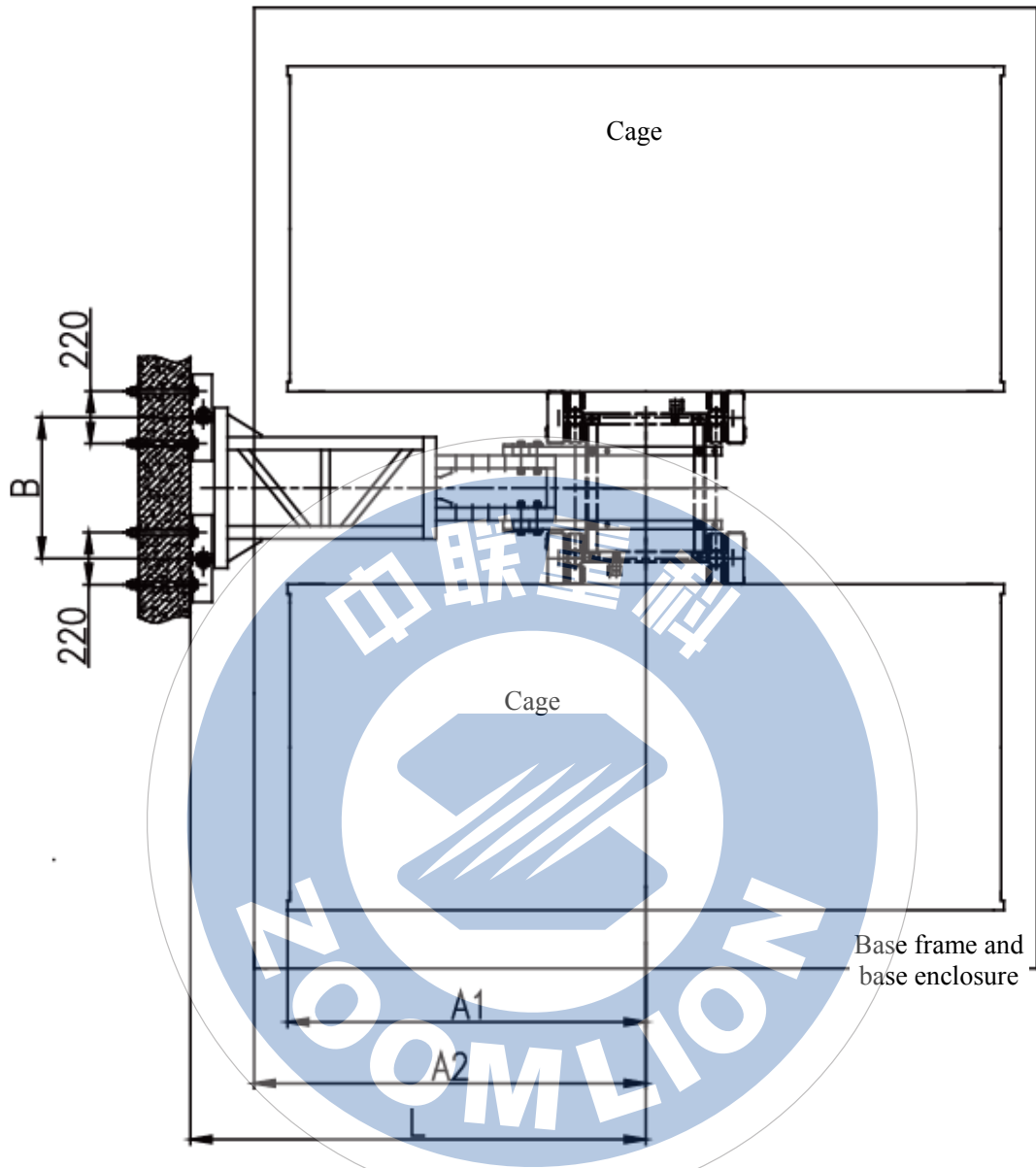


Figure 3.2-4 Schematic Diagram for IV-type Mast Tie

Table 3.2-4 Connection Size of IV-type Mast Tie

| Specification of Cage | L (mm) | A1 (mm) | A2 (mm) | B (mm) |
|-----------------------|-----------|---------|---------|--------|
| 3.2×1.5m | 1800-2100 | 1650 | 1800 | 650 |
| 3.0×1.3m | 1800-2100 | 1540 | 1700 | 650 |

3.2.1.5 V-type Mast Tie

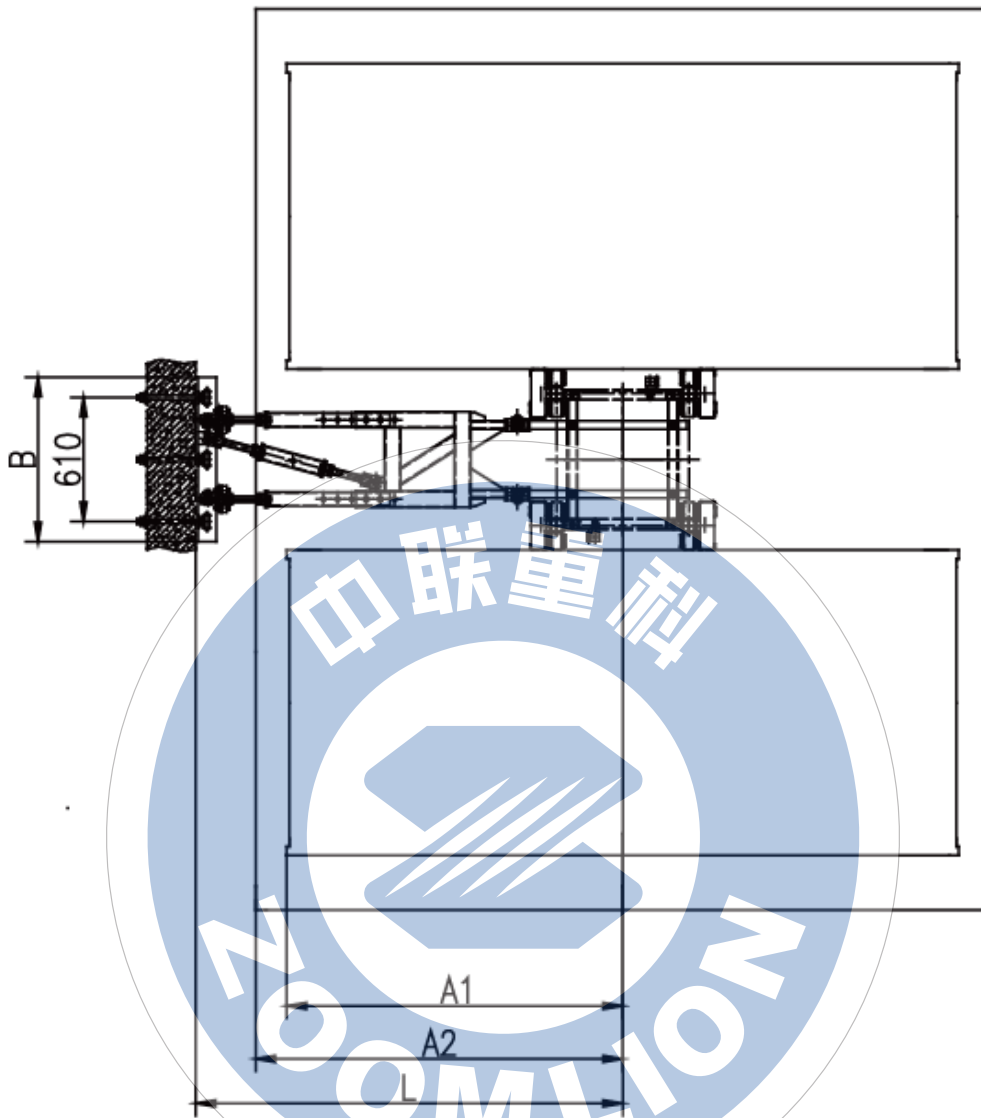


Figure 3.2-5 Schematic Diagram for V-type Mast Tie

Table 3.2-5 Connection Size of V-type Mast Tie

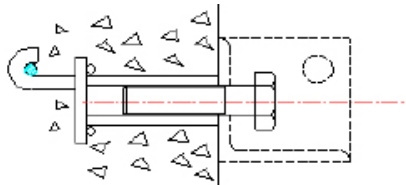
| Specification of Cage | Model | L (mm) | A1 (mm) | A2 (mm) | B (mm) |
|-----------------------|-------|-----------|---------|---------|--------|
| 3.2×1.5m | VA | 1800-2100 | 1650 | 1800 | 610 |
| | VB | 2100-2400 | | | |
| 3.0×1.3m | VA | 1800-2100 | 1540 | 1700 | 610 |
| | VB | 2100-2400 | | | |

3.3 Connection between Mast Tie and Wall

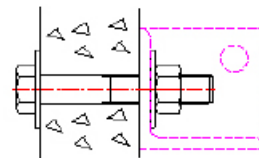
3.3.1 Connection between Wall and Mast Tie of SC Construction Hoist

The connection between mast tie and wall can be realized in the following manners:

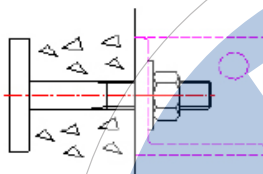
[Example 1] Connected with embedded part in wall



[Example 2] Fixed with wall-penetrating bolt



[Example 3] Embedded bolt



[Example 4] Welded onto steel structure

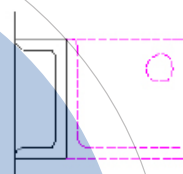


Figure 3.3-1 Mode of Connection between Wall and Mast tie of Construction Hoists

Note

- (1) In light of actual needs, the user shall select the connection mode between mast tie and wall, and prepare the connecting bolts and parts, which shall be able to bear the force F calculated in accordance with the formula given in 3.5 (The M24 bolt of which the strength class is 8.8 may be selected);
- (2) As for connection between mast tie and wall, it is prohibited to use any expansion bolt;
- (3) If the on-site erection conditions are special, please contact the Company.

3.4 Maximum Installed Distance and Maximum Cantilever End Height of Mast Tie

3.4.1 Maximum Installed Distance and Maximum Cantilever End Height of Mast tie of SC Construction Hoist

3.4.1.1 Erection of I-type, II-type, IV-type and V-type Mast Tie and Cable Guiding Device (Trolley Type)

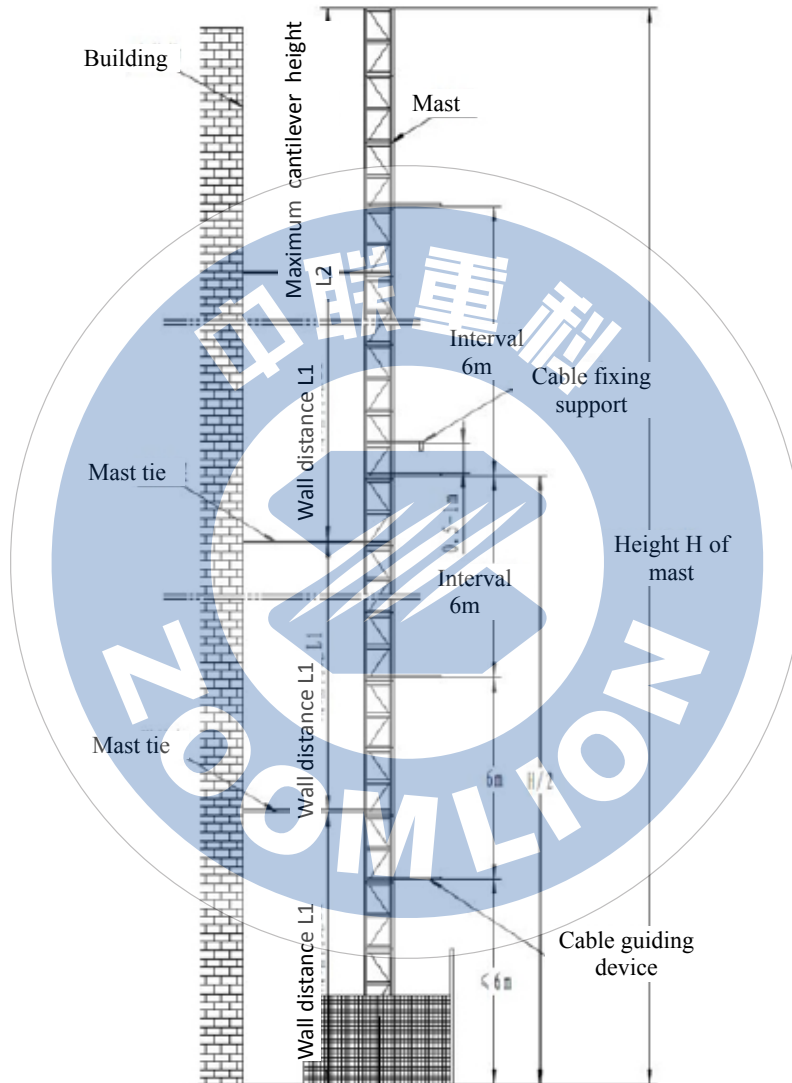


Figure 3.4-1 Schematic Diagram for Erection of I-type, II-type, IV-type and V-type Mast tie and Cable guiding device

Note

- (1) The maximum distance of I, II and IV-type mast tie shall meet the requirements in Table 3.4-1;
- (2) When the installed height of mast exceeds 150m, it is not advised to adopt the I or IV-type mast tie;
- (3) The installed distance of cable drum type mast tie is as same as that of trolley type.

3.4.1.2 Erection of III-type Mast Tie and Cable Guiding Device (Trolley Type)

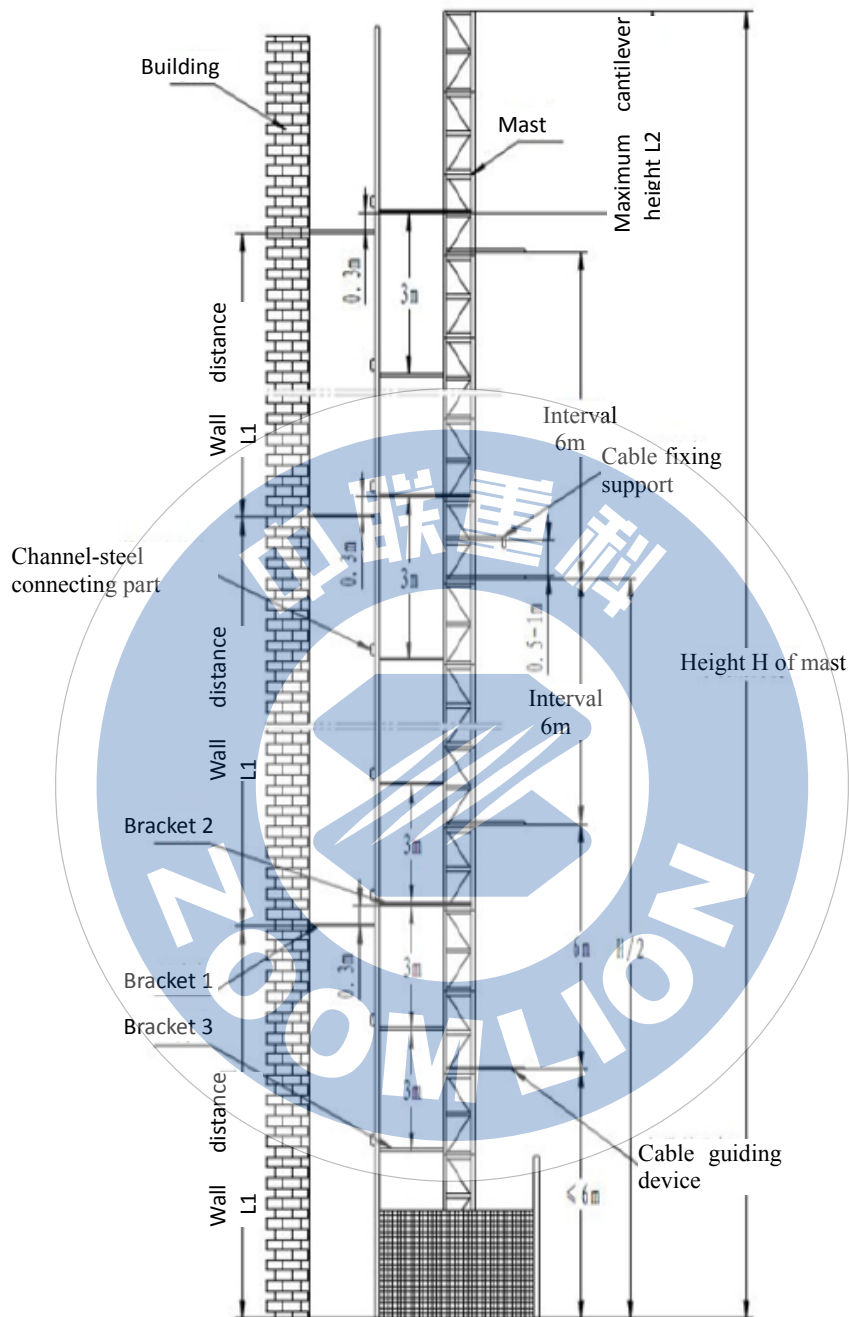


Figure 3.4-2 Schematic Diagram for Erection of III-type Mast tie and Cable guiding device

! Note

- (1) The maximum wall distance of bracket 1 shall meet the requirements in Table 3.4-1;
- (2) When the erection height of mast exceeds 150m, it is not advised to adopt the III-type mast tie;
- (3) The installed distance of cable drum type mast tie is as same as that of trolley type.

The mast tie shall be attached to the building in accordance with the specified distance, and as for every type of mast tie, the maximum installed distance L1 and the maximum cantilever end height L2 are indicated in Table 3.4-1:

Table 3.4-1 Maximum Installed Distance and Maximum Cantilever End Height of Mast Tie of SC Construction Hoist

| Type of Mast Tie Item | | I Type | II Type | III Type | IV Type | V Type |
|---|-----------------------------|--|----------------------|----------|---------|--------|
| | | Maximum Installed Distance L1 (m) | Height of mast ≤100m | 9 | 10.5 | 10.5 |
| 100m < height of mast ≤150m | 7.5 | | 9 | 9 | 9 | 9 |
| 150m < height of mast ≤300m | / | | 9 | / | 9 | 9 |
| Height of mast ≥300m | / | | 7.5 | / | / | / |
| Maximum Cantilever End Height L2 (m) | Height of mast ≤100m | 7.5 | 7.5 | 7.5 | 7.5 | 7.5 |
| | 100m < height of mast ≤150m | 6 | 7.5 | 7.5 | 7.5 | 7.5 |
| | 150m < height of mast ≤300m | / | 7.5 | / | 7.5 | 7.5 |
| | Height of mast ≥300m | / | 6 | / | / | / |

3.5 Calculation of Force Applied by Mast Tie on Wall

While setting the construction hoist in accordance with the maximum installed distance L1 and mast maximum cantilever end height L2 in Table 3.4-1 and Table 3.4-2 as well as parameters L and B of mast tie, the user shall determine the force applied by various types of mast tie onto embedded parts and bolts, so as to set up the appropriate embedded parts and bolts (Normally, the class-8.8 M24 high-strength bolts are selected). In addition, the attaching point on building (such as wall, beam or post) shall be subject to force verification, so as to ensure safety and reliability.

The acting force F can be calculated in accordance with the following formula:

$$F = \frac{L \times 60}{B \times 2.05} \text{ (kN)}$$

For example:

IID-type Mast Tie of SC Construction Hoist

Wall-attaching point distance B=1500, and wall distance L=3200,

Then $F=3200 \times 60 / (1500 \times 2.05) = 62.44 \text{ kN}$.





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Operation Manual of Construction Hoist (Volume One)

Safety Signs

General Provisions

Brief Introduction

Preparation

● **Erection and Dismantling**

Annexes

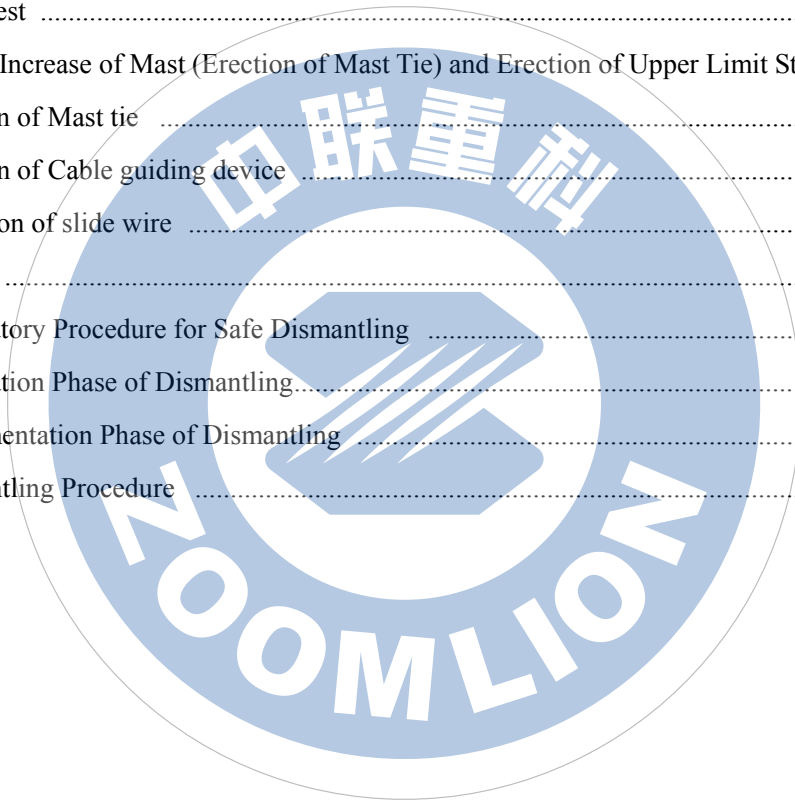




⑤

Erection and Dismantling

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Erection and Dismantling

1. Erection

Before the erection, please carefully read and understand the relevant contents of this Manual. The erection personnel shall be duly trained, and hold the relevant qualification certificate.

1.1 Erection Procedure

- (1) Making of foundation (For the specific method, please refer to Chapter 4 “Setup of Foundation”);
- (2) Preparatory works for erection;
- (3) Pre-erection safety training;
- (4) Erection of baseframe, buffer spring and lowest four mast sections;
- (5) Erection of baseframe and base enclosure;
- (6) Erection of cage, drive system, cage roof base enclosure and jib;
- (7) Increase mast height to 15m (and at the same time install one set of mast tie);
- (8) Erection of electrical control system and overload protector;
- (9) Erection of lower limit stopper and electrically-driven trial operation;
- (10) Commissioning of complete hoist;
- (11) Drop test;
- (12) Height increase of mast (erection of mast tie) and erection of upper limit stopper;
- (13) Erection of counterweight device (for hoist with counterweight);
- (14) Erection of cable guiding device;
- (15) Erection of floor call system.

1.2 Preparatory Works for Erection

In order to ensure that the erection of construction hoist will be carried out quickly and safely, the user shall properly complete the following preparatory works before the installation:

(1) Please ensure that the selected erection site for construction hoist meets the requirements of relevant safety standards and codes, has been inspected by the relevant institution and has been granted the qualification certificate.

(2) Please ensure that the erection site for construction hoist has power supply, lighting and lifting equipment and other necessary tools; the road and site has the areas required for storage of transportation vehicle and components of construction hoist.

(3) The user shall use the embedded parts, mast tie and relevant standard parts provided by the Company.

(4) Before the erection, the user shall inspect and confirm that no component has been collided, deformed or otherwise damaged in the course of storage and transportation; otherwise the user shall make efforts to make up, repair or replace such components.

(5) In accordance with the relevant provisions and requirements, set up the protective grounding device, with the grounding resistance $\leq 4\Omega$.

(6) The distance between on-site power supply box and power box on baseframe and base enclosure of construction hoist shall be minimized, and normally may not exceed 20m. Every cage shall be equipped with a copper cable of which the section area exceeds 25mm^2 ; if the distance is too long, the sectional area of cable shall be increased appropriately, so as to ensure the quality of power supply.



Note

When the construction hoist is being used, the supply voltage shall be controlled within $380\text{V}\pm 5\%$.

(7) As for any re-used construction hoist, before it is put into use again, please in accordance with the relevant provisions of the *Maintenance Manual*, carry out the maintenance, and ensure that all components are in good conditions. That is: to inspect all structural members for deformation and damage; to repair or replace the components which must be repaired or replaced.

(8) Before the erection, please prepare 2-3 sets of mast tie and cable guiding devices. The connecting parts and standard parts for mast tie shall be properly prepared.

(9) If the construction site is equipped with other lifting equipment (such as tower crane and lorry-mounted crane), please assemble 4-6 mast sections with M24×230 special bolts on ground, clear away soil and other foreign matters from pipe connector and both ends of rack, and apply the lubricating grease onto pipe connector.

(10) Necessary auxiliary equipment: One 5t (or above) lorry-mounted crane (tower crane available on site), and one theodolite.

(11) Components to be prepared by user:

- Foundation made in accordance with the requirements; and some 2-12mm thick steel washers to be placed in baseframe for adjusting the verticality of mast;
- Special power box provided in accordance with the requirements, and cable used to connect the special power box and power box on baseframe and base enclosure. The specific requirements for cable are given in (6);
- In addition to the special tools provided together with the hoist, the user shall also prepare a set of erection tools.



Figure 1.2-1 Tools to be Prepared by User for Erection

1.3 Erection of host machine

1.3.1 Pre-erection Notices

- (1) When entering into the construction site, all persons shall comply with the ten work safety rules;
- (2) The safety warning area shall be set up in construction site, and specific person shall be appointed to carry out supervision;
- (3) The erection personnel may not wear hard-bottom shoes or high-heel shoes, shall wear the tight-fitting and convenient clothing, and shall fasten the safety belt;
- (4) When carrying out overhead operation such as erection or dismantling of mast sections, the overhead operation personnel shall find a safe and appropriate position on their respective post, fasten the safety belt, and lock up the safety hook;
- (5) As for erection of hoist, it is absolutely prohibited to use any damaged fastener such as bolt, pin shaft or cotter pin; and it is also prohibited to use any discarded rope or lifting equipment;
- (6) Before the erection, please get familiar with all contents of Section 2.2 “Safety Requirements for Erection/Dismantling Phase” in Chapter “General Provisions”; fully understand the mechanical function and electrical performance of various components of construction hoist;
- (7) Without permission, don't replace the electrical wiring of construction hoist;
- (8) When the construction hoist is operating, the head and hand of personnel may not protrude beyond the base enclosure on cage roof, and the persons and goods carried may not lean against the base enclosure on cage roof;
- (9) It is absolutely prohibited to carry out the erection at night or under drunk state;
- (10) Before the erection, please remove the rust and burr from interface, pin hole and bolt hole on components to be installed such as mast section and mast tie, and apply the appropriate lubricating grease to such positions and rack, so as to ensure that the rotating components are fully lubricated and can rotate smoothly;
- (11) In severe weather such as wind velocity higher than 12.5m/s or thunderstorm or snow, it is prohibited to install or dismantle the construction hoist!

(12) If there is any person working on mast or mast tie, it is absolutely prohibited to start the hoist;

(13) When installing the construction hoist, please take the operation box to cage roof, and don't carry out operation in the cage;

(14) When installing the construction hoist, please load the construction hoist in accordance with the rated load, and don't get it overloaded;

(15) When using the jib to carry out the erection, it is prohibited to get it overloaded, and the jib may only be used to install and dismantle the components of construction hoist, and may not be used for any other purpose. When the construction hoist is operating, it is absolutely prohibited to hang up any heavy article on jib;

(16) Don't forget to tighten up the connecting bolts between mast section and mast tie;

(17) The concrete foundation shall go through the specified concrete curing period.



Figure 1.3-1 Notice Diagram 1 for Erection

Figure 1.3-2 Notice Diagram 2 for Erection

1.3.2 Erection of Baseframe and Base Enclosure

1.3.2.1 Erection of Baseframe, Lowest Mast sections and Base Frame and Base enclosure of SC Construction Hoist

(1) Clean up the surface of foundation;

(2) Transport the baseframe to the erection position, determine the erection position and direction, level the baseframe (by using the level meter), use M30×180 bolts to connect the baseframe to the embedded parts of foundation, and don't tighten up them immediately;

(3) Install the first mast section (Normally, it is not equipped with rack; before the erection, wipe clean the pipe connectors on both ends of mast section and rack pin, and apply a little of lubricating grease; in the course of erection, pay attention to the direction of rack);

(4) Install 3-4 mast sections by using the same method, insert the steel washers between foundation baseframe and concrete foundation at the position as indicated in Figure 1-6, so as to adjust the levelness of foundation baseframe (to be corrected with level meter). Use the theodolite, level meter to carry out measurement, adjust the verticality of mast, ensure that the verticality of every vertical tube in two adjacent directions is no more than 1/1500, and then tighten up the connecting bolts between underpan and embedded parts of foundation with

the pre-tightening torque of 600N•m;

- (5) Use M16 bolts to connect the main baseframe and auxiliary baseframe, and use steel washers to block up the auxiliary baseframe;
- (6) Fix the buffer spring device onto the buffer seat with bolts;

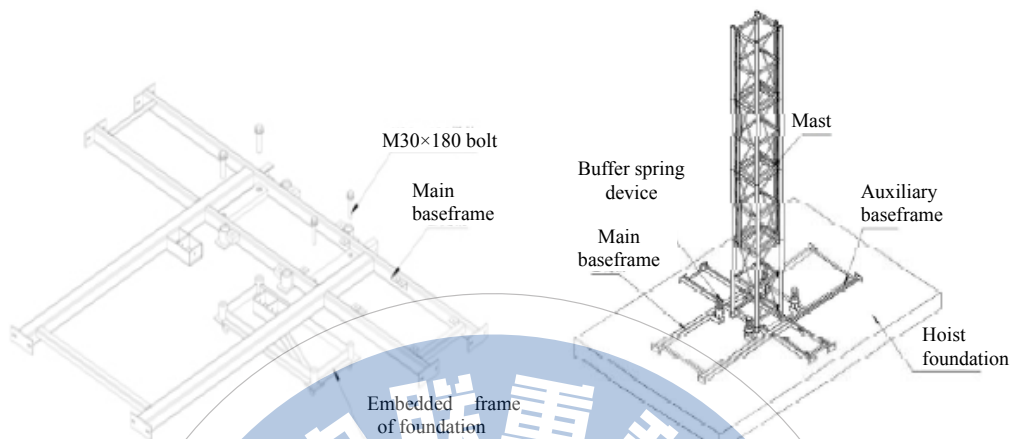


Figure 1.3-3 Erection Diagram of Baseframe

Figure 1.3-4 Erection Diagram of Mast

(7) Use M10 bolts to connect the rear base enclosure, side base enclosure, door frame and middle box with main baseframe and auxiliary baseframe respectively, and don't tighten up them immediately;

(8) Install the door support, adjust the verticality of door frame, and ensure that the verticality of door frame in two adjacent direction is no more than 1/1000; adjust the verticality of rear base enclosure and side base enclosure, and tighten up all clamps;

(9) Install the external base enclosure door, door counterweight slideway and door counterweight;

(10) Install the cage door stopper and external base enclosure door lock, and adjust the distance between door lock and external base enclosure door, so as to enable the door lock to lock up the external base enclosure door;

(11) Install the power box onto the middle box on baseframe and base enclosure.

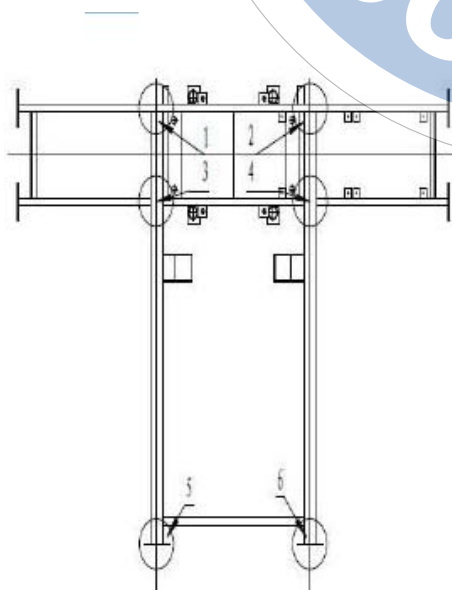


Figure 1.3-5 Adjustment Diagram of Baseframe

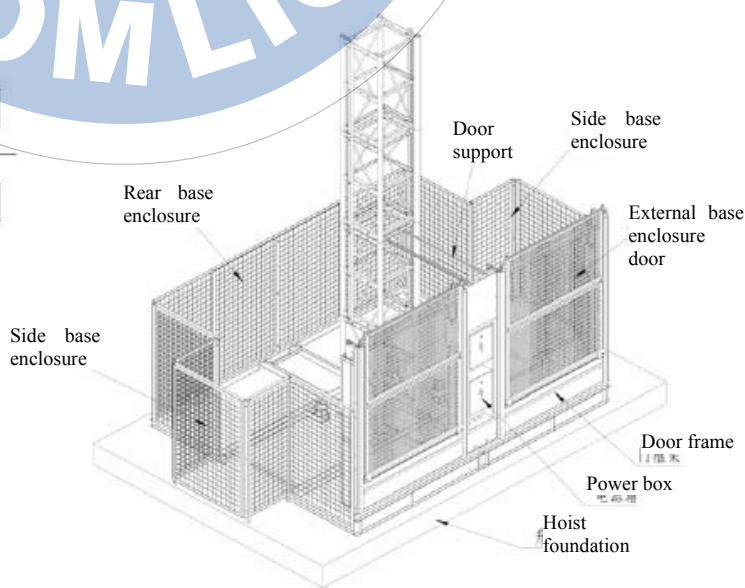


Figure 1.3-6 Baseframe, Mast and Base Frame Base Enclosure after Erection

1.3.3 Erection of Cage, Drive System, Cage Roof Base enclosure and Jib

(1) Place a sleeper or other steel section on the base frame (The height shall exceed the height of spring buffer device);

(2) Arrange an erection worker to stand on the top of mast for directing the alignment between cage and drive system, use the lifting equipment (lorry-mounted crane or tower crane) to slowly lower down the cage from the top of mast slowly and stop it on the previously-prepared sleeper or steel section, and lift up another cage by using the same method;

(3) Release all motor brakes on drive system. The method is as follows: (1) As for domestically-manufactured motor: Screw in the two nuts on brake (Please ensure that the two nuts are screwed in parallel), until the brake is released and the brake disc can be turned freely; (2) As for NORD motor, firstly screw the manual release tiebar into the threaded hole on brake, and then pull the release tiebar, turn the supporting bolt to uphold the tiebar, and ensure that the brake disc can be turned freely; (3) As for SEW motor brake, use the hexagon ring spanner to slowly tighten up the hexagonal bolt of brake, until the brake is released and the brake disc can be turned freely.

Use the lifting equipment to slowly lower down the drive system from cage roof. When the distance between plate on drive system and cage plate is 400mm, return the motor brake to normal state, and then lift up and install the other drive system by using the same method;

(4) Insert the long base enclosure, short base enclosure and end base enclosure on care roof into the corresponding tube, and tighten up the connection of base enclosures with bolts. During erection of base enclosure, the end with baffle plate shall be installed at inner side of cage;

(5) As for variable-frequency speed-regulation construction hoist, please lift the electrical control cabinet and resistor box onto the cage roof, and then fix them onto the base enclosure with bolts;

(6) Assemble the jib on ground, and then use the lifting equipment to lift the jib up and insert it into the jib hole; after it is installed, the rotating shaft of jib shall be able to rotate smoothly;

(7) Install the cable arm.

Note: The guardrail baffle shall be installed inwards

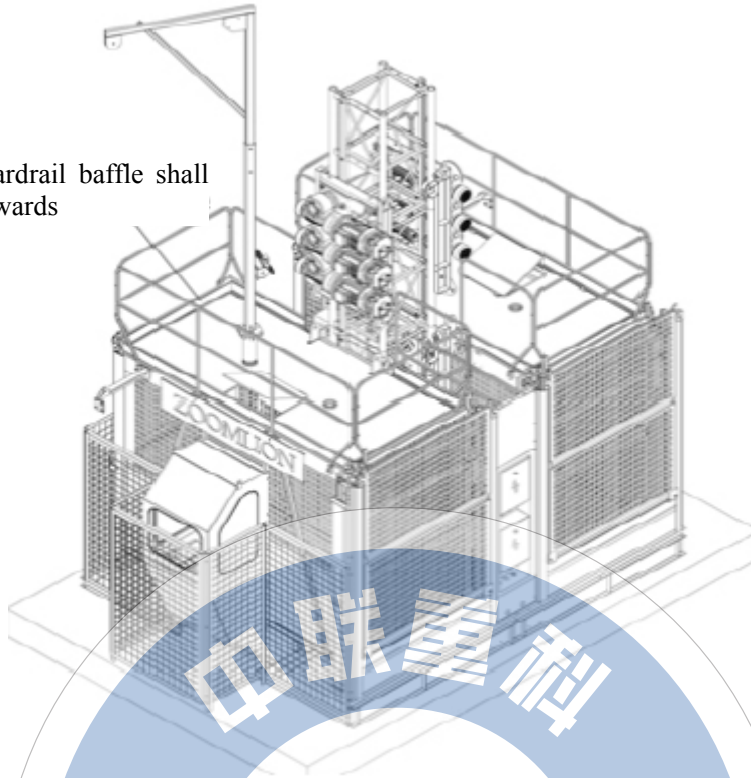


Figure 1.3-7 Erection of Main Structure (SC Construction Hoist)



Figure 1.3-8 Erection of Drive System

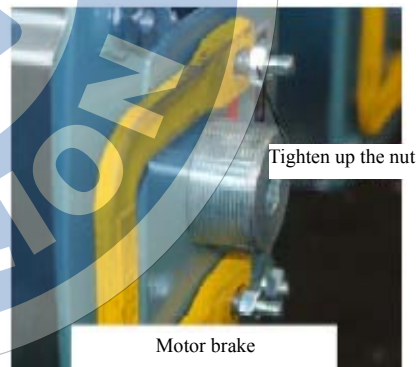


Figure 1.3-9 Domestically-manufactured Motor Brake



Figure 1.3-10 NORD motor brake

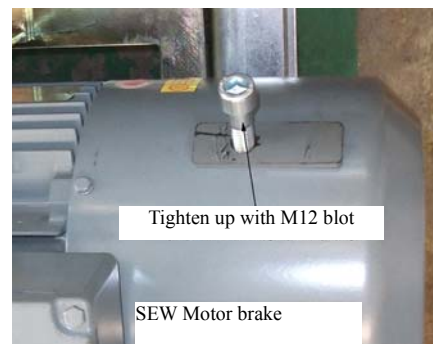


Figure 1.3-11 SEW motor brake

The connection method for construction hoist with single connection point between driven system and cage is below:

- (1) Hoist the driving body to the upward side of the cage, adjust the clearance of the driving pinion and rack, the clearance between all rollers and main chord and the clearance between back rollers and the reverse side of rack, then use pin axle to connect the single lug plate of the driving body and the two lugs plate of the connecting rod, see Figure 1.3-16;
- (2) Slowly put down the driving body, and use sensor pin (weight sensor) to connect the lifting plate of cage and connecting rod, in order to finish the type-T connection of driving body and cage;
- (3) Adjust the clearance of double-rollers, side rollers of cage and main chord, and pay attention to protect the signal outlet of sensor pin so as to avoid breakdown.

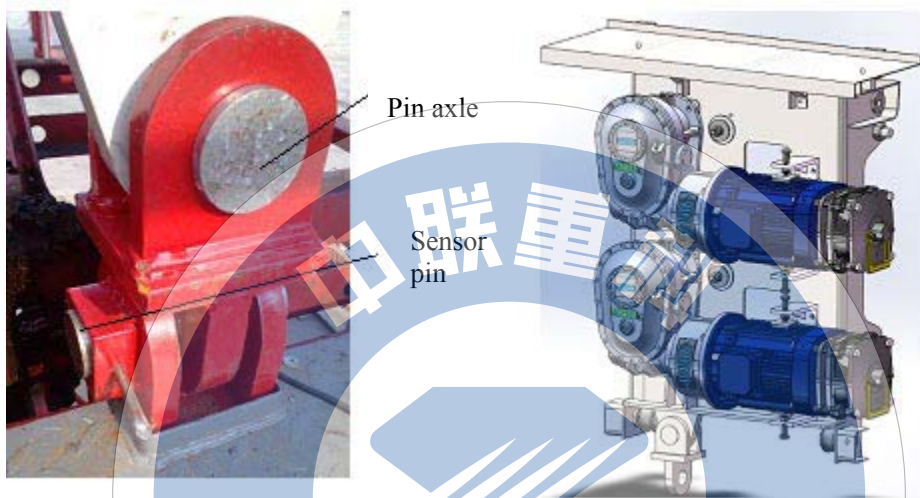


Figure 1.3-16 Schematic Diagram for Type-T Connection

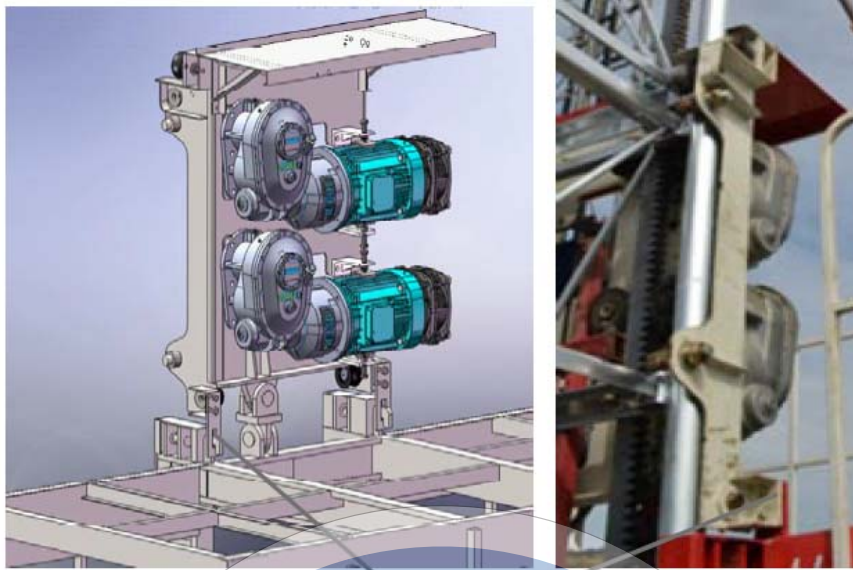
Note

When testing, the adjustment requirements of clearance of pinion and rack, and the clearance of roller and main chord are as follows:

- (1) The back lash between the pinion and rack shall be 0.2~0.5mm;(for construction hoist with two motors driven system, the value should be between 0.5~0.8mm);
- (2) The back lash between the guide wheel and rack shall be 0.2~0.5mm;
- (3) The clearance between all rollers and vertical tube of mast section shall be 0.5mm.

Warning

For construction hoist using single lifting point connection method, after the drive system connecting with cage through single hoist point, make sure the safety pulling plate is installed onto the driving bracket, using it along with the safety anchorage plate of cage to achieve the function of safety protection.



Safety pulling plate
Installation diagram for safety pulling plate

1.3.5 Height Increase of Mast

(1) Assemble three mast sections on the ground with bolts in accordance with the pre-tightening torque of $300\text{N}\cdot\text{m}$, use the lifting tool to lift it up onto the installed mast section, and then connect them with the connecting bolts in accordance with the pre-tightening torque of $300\text{N}\cdot\text{m}$;

(2) After the height of mast is increased to 10.5m, please set up the first mast tie at the position about 9m above the ground, use theodolite or other testing instrument to inspect the overall verticality of mast in two vertical directions (The error in verticality of mast shall be no more than 5mm), and then continue to increase the height to 15m.



Note

When the erection position is relatively high and the wall thickness of main chord of mast section is of different specification, the inspection on mast is as indicated in Figure 2.1-3 in Chapter 4 “Preparation”.

1.4 Erection of Lower Limit Stopper on Mast and Electrically-driven Trial Operation

(1) As for in-cage operation, please operate the variable-frequency speed-regulation construction hoist with low-speed gear, move the hoist (with rated load) until the bottom of cage is at the same level as doorsill, press down the emergency stop button, install the lower limit cam and limit switch cam (Both the lower limit cam and limit switch cam are fixed onto the frame of mast section with hook-shaped bolts; the erection position of limit switch cam shall ensure that it will act before the cage touches the buffer spring).

The variable-frequency speed-regulation construction hoist shall be equipped with deceleration limit cam, which

shall be installed at the position that the lower end face of deceleration limit cam is about 200mm lower than the upper end face of lower limit cam, as indicated in Figure 1.4-2.

(2) The electrically-driven trial operation of hoist may be carried out only after the erection of overload protector and the works specified in step (1) above are completed. Just turn on the power supply, arrange the full-time operator on the cage roof to prudently operate the handle, so as to make the unloaded cage move up and down along the mast for several times, with the running height no more than 5m. It is required that the cage can move smoothly without jump and abnormal noise and the brake can work normally. Thereafter, further inspect the contact conditions between every guide roller and mast as well as the engagement condition between gear and rack.

- The clearance between gear and rack shall be 0.2-0.5mm;
- The clearance of guide wheel and back of rack shall be 0.5mm;
- The clearance between every roller and vertical tube of mast section shall be 0.5mm.

(3) After the unloaded trial operation is successfully completed, place the rated load in the cage, carry out the loaded trial operation, and inspect the heating situation of motor and retarder;

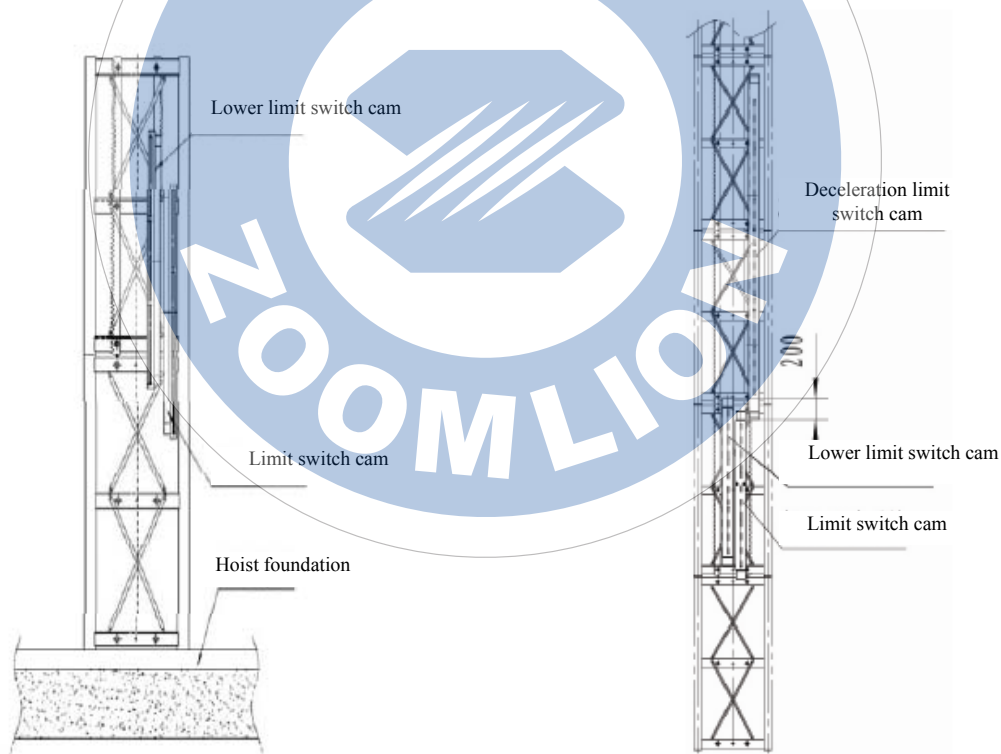


Figure 1.4-1 Erection of Limit cam of ordinary construction hoist

Figure 1.4-2 Erection of Limit cam of Variable-frequency Hoist



Warning

(1) In the course of trial operation, because the upper limit stopper has not been installed on the top of mast, please prudently carry out the operation;

(2) In the course of inspection, the emergency stop button shall be pressed down or the power supply shall be turned off, so as to avoid misoperation.

1.5 Commissioning of Complete Hoist

After the main structure of construction hoist is in place (The height of mast is no more than 15m), the trial operation may be carried out, so as to implement the inspection. Before the inspection, please confirm that the voltage and power of power supply in construction meet the requirements; the leakage protection devices are sensitive and reliable. The running direction of motor in cage shall be correct, and the start and stop of such motor shall be effective; the phase protector, power limiter, upper/lower limiter, door limiter and emergency cut-off switch shall be sensitive and reliable.

1.5.1 Clearance Adjustment for Guide Roller

Adjust the eccentric shaft in roller of drive system and cage, so as to ensure that in relation to mast section, two vertical posts of cage and the posts of drive system are placed symmetrically, and the clearance between every roller and vertical tube of mast section is 0.3-0.5mm, as indicated in Figure 1.5-1. After the adjustment, tighten up all bolts.

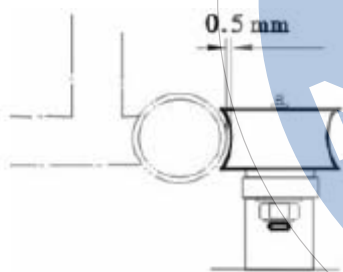


Figure 1.5-1 Clearance Adjustment for Roller



Figure 1.5-2 Adjustment of Gear-rack Backlash

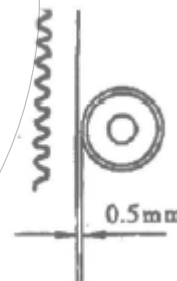


Figure 1.5-3 Adjustment of Back Rolls-rack Clearance

1.5.2 Adjustment of Gear-rack Backlash

As for every gear running on rack, please ensure that the specified gear-rack backlash is satisfied. In the course of inspection, just use the compression method to inspect the backlash, and the value shall be 0.2-0.5mm, as indicated in Figure 1.5-2. After the adjustment, tighten up all bolts.

1.5.3 Adjustment of Back Rolls -Rack Clearance

The back rolls on construction hoist shall be placed symmetrically in relation to center of back of rack. The erection clearance between back rolls and rack shall be 0.5mm, as indicated in Figure 1.5-3. After the adjustment, tighten up all bolts.

1.5.4 Adjustment of Trolley

Place the trolley of construction hoist on ground, adjust the eccentric shaft of guide wheel of trolley, and make sure that the clearance between guide wheel and rail is 0.5mm. Please ensure that, when pushing and pulling the trolley with hand, the trolley shall move smoothly without jam.

If selecting free debugging trolley, don't need to adjust the guide pulley of trolley. After installing, only need to make sure the trolley running flexibly and no blocking.

Warning

When carrying out erection or adjustment under the cage, please firstly cut off the main power supply, and then uphold the bottom of cage with a rigid support, so as to avoid the accident caused by sliding of cage!

1.5.5 Full Lubrication of Construction Hoist

The lubrication of construction hoist shall be carried out in accordance with the requirements in the maintenance manual.

Note

The contents of 1.5.4-1.5.5 shall be implemented after the complete hoist is installed.

1.6 Drop Test

1.6.1 Requirements for Use of Overspeed safety device

(1) When the overspeed safety device is delivered from factory, it has been properly adjusted and sealed up. Therefore, don't randomly disassemble the overspeed safety device;

(2) In the course of drop test, if the overspeed safety device can't act normally (i.e., the braking is not realized within the specified distance), please identify the cause or re-adjust the overspeed safety device;

(3) If any abnormal situation occurs to the overspeed safety device (e.g., any part is damaged), please immediately cease the use and replace it with a new one;

(4) After the overspeed safety device acts, please rest it in accordance with the provisions; otherwise it is prohibited to start the hoist;

(5) Don't fill any oily substance into the overspeed safety device, including lubricating oil.

1.6.2 Instructions on Drop Test

(1) As for the hoist which is installed for the first time, the hoist which is transferred from a construction site and is re-installed, and the hoist which has been overhauled, please carry out the drop test. As for the hoist in normal use, the drop test shall be carried out every three months or in accordance with the local provisions;

(2) According to the national standard of China, after one year from the date on which the overspeed safety

device is delivered from factory (The date stated on nameplate or test report shall apply) shall be sent back to the manufacturer for inspection (including those which have not been used in such one year), and thereafter be sent back to the manufacturer for inspection every year, and may be used only after it is confirmed as qualified through inspection. The service life of overspeed safety device is 5 years.

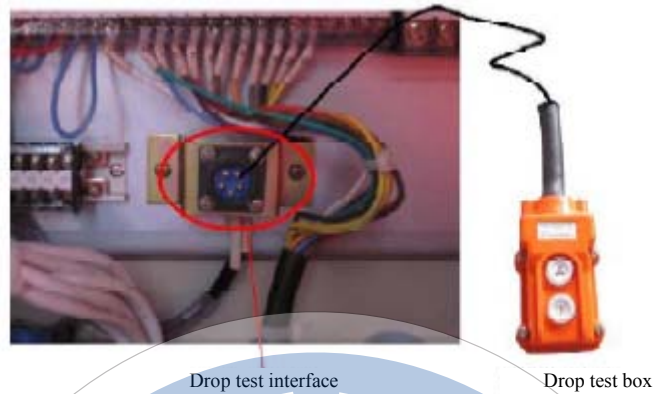


Figure 1.6-1 Interface of Drop Test

1.6.3 Method of Drop Test

- (1) Increase the height of mast to about 15m, and install a mast tie at the position about 9m away from base frame 9m (applicable to SC construction hoist) or 6m and 12m from base frame respectively (applicable to SC industrial hoist);
- (2) Load the rated weight on the hoist;
- (3) Cut off the main power supply of power box on base frame base enclosure, use the test cable to short-connect the inching switch of overspeed safety device, and as indicated in Figure 1.6-1, insert the drop test box (5-core aviation plug) into the interface in electrical control cabinet;
- (4) Pass the drop test button box through the door and place it on the ground, and ensure that in the course of drop test, the cable will not be jammed, and close all doors;
- (5) Turn on the main power switch; press down the button “UP” on the drop test button box so as to move the drive system to about 10m above the ground 10m (Please ensure that the drive system will not go beyond the top);
- (6) Press down and hold the “drop” button, and then the cage will drop freely. After it drops for a certain distance, the overspeed safety device will act so as to lock up the cage. Under normal circumstance, the braking distance of cage is 0.15-1.40m. In case of any special circumstance, please contact the Company;

Note

In the course of drop test, no person may stay in the cage. If the cage still does not stop when it drops freely to about 3m above the ground, please immediately release the button so as to stop the cage, and then inch the button “Drop”, so as to slowly lower the cage onto the ground, and identify the cause.

- (7) Press the button “UP” and move the cage up for about 0.2m, so as to reset the centrifugal block of

overspeed safety device;

(8) Inch the button “Drop”, so as to slowly lower the cage down to the ground, and then remove the test cable. At this time, the cage can't be started. Remove the drop test box, and reset the overspeed safety device in accordance with the method specified in 1.6.4.



Note

(1) As for every inching operation, the drop distance of cage may not exceed 0.2m; otherwise the speed limiter will act again;

(2) After the drop test is completed, please remove the test cable!

1.6.4 Resetting of Overspeed safety device

(1) After the overspeed safety device acts, please adjust the overspeed safety device, so as to get it reset. Before the overspeed safety device is rest, it is absolutely prohibited to operate the construction hoist;

(2) Except for drop test, before the overspeed safety device is reset, please firstly identify the cause for action of overspeed safety device, and also confirm that:

- The electromagnetic brake of motor shall work normally;
- The gear pair and coupling shall be in good conditions;
- The cage guide roller, back rolls and rack shall work normally;
- The gear and rack shall be in good conditions and normally engaged with each other;
- The inching switch in overspeed safety device shall work normally (Before the resetting, the cage shall not be started if the moving-up command is given).

(3) After the inspection for resetting is successfully completed, please firstly cut off the power supply, and then reset the overspeed safety device in accordance with the following procedure:

- Remove the screw 1 and cover 2;
- Remove the screw 3;
- In the direction as indicated by the sign on end of overspeed safety device, use the special spanner 5 and the pry 4 to loosen the nut 7, until the end of pin 6 is at the same level with the end of overspeed safety device. At this time, the circuit of final limit switch is closed;
- Mount the screw 3 and cover 2;
- As for the overspeed safety device which has release mechanism on its end, please also remove the cover 9;
- If possible, tighten up the stud 8 with hand, use tool to tighten up the stud 8 for another 30°, and after hearing the sound “coo” in the overspeed safety device, fully loosen the stud 8;

- Mount the cover 9;
- Turn on the power supply, and move the cage up for 0.2m, so as to return the overspeed safety device to normal state.

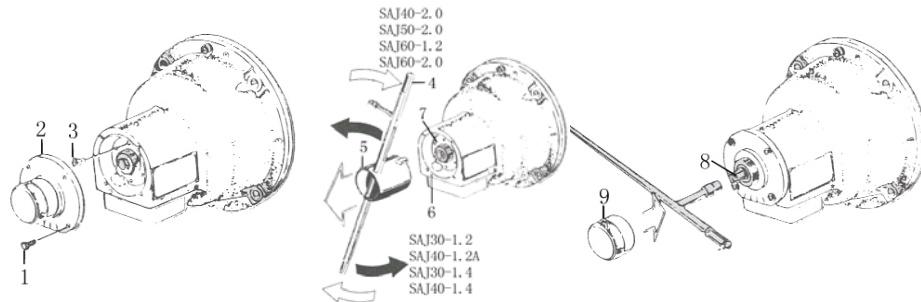


Figure 1.6-2 Diagram for Resetting of Overspeed Safety Device


Note

After the drop test is completed, disconnect the connecting plug from button box.

1.7 Height Increase of Mast (Erection of Mast Tie) and Erection of Upper Limit Stopper

1.7.1 Height Increase of Mast

After the above adjustment procedure is completed and the drop test is successfully completed under rated load conditions, the height of mast may be increased.

(1) Before the erection, please place the mast sections, the mast ties and the cable guiding devices to be installed on the solid and dry ground beside the base enclosure;

(2) If the mast sections are of different specifications, implement the height increase in accordance with the “Configuration Diagram for Wall Thickness of Main Chord of Mast section” in Figure 2.1-3 in Chapter 4 “Preparation”;

(3) The height increase procedure for mast is detailed as follows:

- Insert the plug of jib into the socket on cab, lower down the lifting hook of jib, and hook up the lifting lug of mast section;
- Use the mast section lifting tool to hook up one mast section, lift the mast section onto the cage roof and properly place it (No more than three mast sections may be placed on cage roof every time);
- Start the hoist, and when the top of drive system approaches the top of mast, inch the hoist until the top of drive system is about 300mm away from the top of mast;

- Press down the emergency stop button, so as to prevent any accident;
- Lift up one mast section, and apply the lubricating grease on the interface of main pipe of such mast section. Lift up the mast section to the top of mast, align it with the connection hole on lower mast section, and tighten up all bolts with the tightening torque no less than 300N•m;
- Repeat the operation above, until the mast reached the required erection height;
 - ① When the height of mast is increased, the mast tie shall be installed in accordance with the requirements;
 - ② The upper port of four main chords on highest mast section shall be equipped with rubber sealing cover;
 - ③ If appropriate lifting equipment is available in the construction site, please assemble 3 or 4 mast sections on the ground in accordance with the requirements, and then directly lift them onto the top of mast for erection.
- Whenever the mast is increased by about 10m, please use the theodolite or other testing instruments to inspect the verticality of mast in two vertical directions. The requirements on verticality deviation are indicated in Table 1.7-1. Once the deviation exceeds the limit, please carry out adjustment in time.

Table 1.7-1 Verticality Deviation of Mast

| Mast Height (m) | $h \leq 70$ | $70 < h \leq 100$ | $100 < h \leq 150$ | $150 < h \leq 200$ | $h > 200$ |
|----------------------------|--------------------------------------|-------------------|--------------------|--------------------|-----------|
| Verticality deviation (mm) | No more than 0.5/1000 of mast height | ≤ 35 | ≤ 40 | ≤ 45 | ≤ 50 |


Note

- (1) When the cage is operating, it is prohibited to hang the mast section on jib;
- (2) In the course of erection, the cage roof operation mode shall be adopted;
- (3) The operation personnel on cage roof shall pay attention to safety, and prevent the cage from colliding with mast tie and other components;
- (4) When connecting the mast sections, please ensure that the disalignment between vertical tubes of upper and lower mast sections is no more than 0.5mm.

1.7.2 Erection of Upper Limit Stopper of Mast

After the height increase of mast is completed, install the upper limit switch cam and limit switch cam (as

indicated in Figure 1.7-1). The erection position of limit switch cam shall meet the following requirements:

(1) If the rated speed is lower than or equal to 0.85m/s, the erection position of limit switch cam shall ensure that, after the limit switch is activated; there is at least 1.8m safety distance for cage roof. In addition, as for any component or equipment in cage which is higher than the cage, there shall be at least 0.3m safety distance above such component or equipment;

(2) If the rated speed is higher than 0.85m/s, the erection position of limit switch cam shall ensure that, after the limit switch is activated, there is at least $(1.8+0.1V^2)$ m safety distance for cage roof, where V means the rated speed. In addition, as for any component or equipment in cage which is higher than the cage, there shall be at least 0.3m safety distance above such component or equipment;

(3) The erection position of upper limit switch cam shall meet the following requirements: In normal working state, after the upper limit switch touches the upper limit cam, the distance between the arm of limit switch and the lower end of limit switch cam is 150mm;

(4) In addition to upper limit switch cam and limit switch cam, the variable-frequency speed-regulation construction hoist shall also be equipped with deceleration limit cam, of which the erection position shall be as follows: the upper end face of deceleration limit cam is about 200mm higher than the lower end face of upper limit cam, as indicated in Figure 1.7-1.

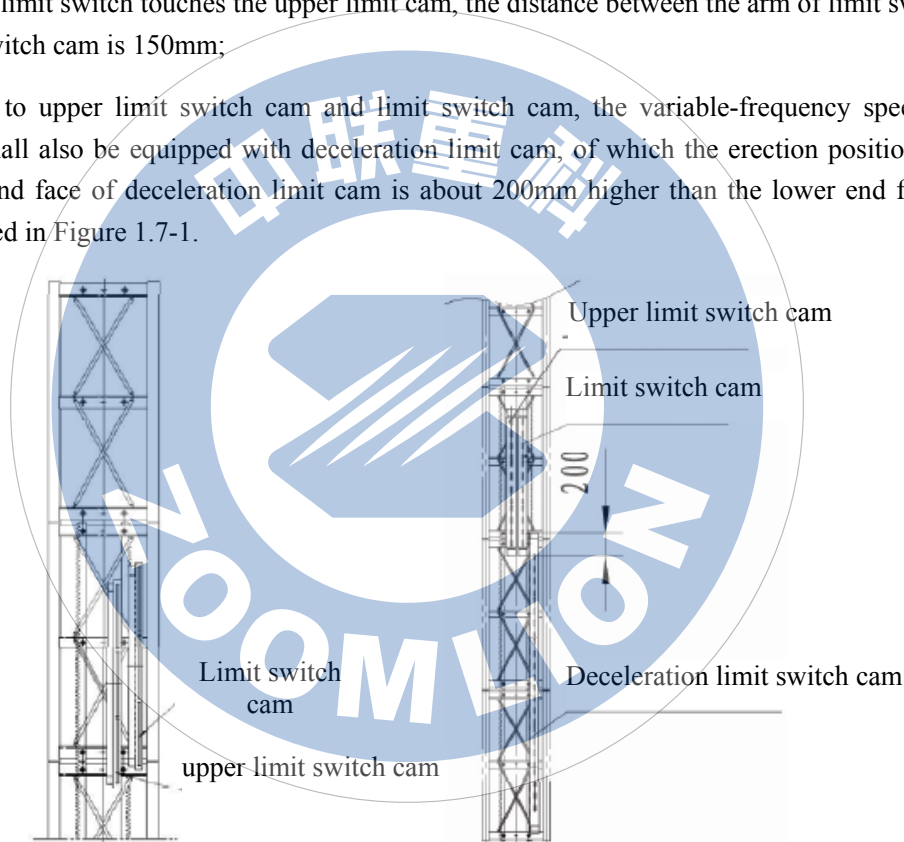


Figure 1.7-1 Erection Diagram for Limit cam

1.8 Erection of Mast Tie

The erection of mast tie shall be carried out in the same pace with the height increase of mast, and the operation personnel shall get familiar with all contents of Chapter 4 “Preparation”, understand the requirements on installed distance of mast tie and maximum free end height of cable guiding device, master the connection requirements and adjustment method for various components of mast tie to be installed.

As for the lifting method of mast tie, please refer to the lifting method of mast section, and use the jib on cage roof to lift the mast tie or use the cage to transport the mast tie. When using the cage to transport the mast tie, it is also

required to adopt the cage roof operation mode.

The user may, in light of on-site use requirements, select the I-type, II-type, III-type, IV-type or V-type mast tie; the mast ties may be fixed onto steel tower, concrete floor slab of building, force-bearing wall, force-bearing beam or force-bearing steel structure, but may not be fixed onto any non-force-bearing structure such as scaffold. The erection procedures for various types of mast tie are detailed as follows.

Note

- (1) When installing the mast tie, all cotter pins shall be in open state;
- (2) All bolts shall be tightened up;
- (3) In the course of erection, the emergency stop button shall be always pressed down.

1.8.1 Erection of Mast Ties of SC Construction Hoist

1.8.1.1 Erection of Type-I Mast Tie

- (1) Use four M16 bolts or M16 U-bolts to fix the rear connecting rod of mast tie onto the angle steel on upper and lower frame of mast section (The rear connecting rod shall be placed symmetrically), and don't tighten up the bolts excessively, so as to facilitate the adjustment of position;
- (2) Use class-8.8 M24 bolt to fix the erection seat of mast tie onto the building;
- (3) Use M20 bolts to connect the connecting tube, rear connecting rod and rotary pin shaft with the erection seat;

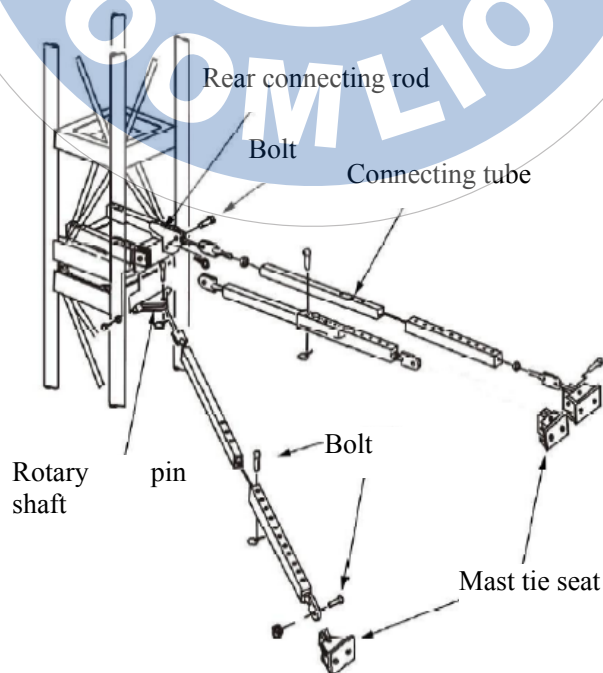


Figure 1.8-1 Erection Diagram for I-type Mast Tie

(4) In accordance with the requirements, correct the verticality of mast and the levelness of mast tie;

(5) After the correction is completed, tighten up all connecting bolts. Thereafter, slowly start the hoist, and ensure that the cage and counterweight don't interfere with the mast tie.



Note

(1) The permissible maximum horizontal inclination of mast tie is $\pm 8^\circ$, namely 144: 1000;

(2) The Type-I mast tie is only applicable to single-cage hoist of which the installed height of mast is no more than 300m.

1.8.1.2 Erection of II-type Mast Tie

The main difference between quick-installed II-type mast tie and original II-type mast tie is that: All the positions which were originally connected with M24×90 bolts are upgraded to $\Phi 24$ pin shaft 2 and D-type safety pin, so that the erection is more convenient and quick, as indicated in Figure 1.8-2. The erection process of quick-installed II-type mast tie is as follows:

(1) Use four M16×90 bolts or M16 U-bolts to fix the rear connecting rod of mast tie onto the angle steel on upper and lower frame of mast section (The rear connecting rod shall be placed symmetrically), and don't tighten up the bolts excessively, so as to facilitate the adjustment of position;

(2) Use the class-8.8 M24 bolt to fix the mast tie seat onto the building;

(3) Use the $\phi 24$ pin shaft 2 to connect the small connection bracket with rear connecting rod, and the install D-type safety pin;

(4) Use the $\phi 20$ pin shaft 1 to connect the small connection bracket with large connection bracket, and install the cotter pin. After the erection, the cotter pins shall be in open state;

(5) Use the $\phi 24$ pin shaft 2 to connect the front connecting rod with mast tie seat, install the D-type safety pin, and connect the front connecting rod with connection bracket clamp;

(6) Install the adjustable connecting rod between mast tie seat and large connection bracket. The adjustable connecting rod shall be connected with $\phi 20$ pin shaft 1 and cotter pin, and the adjustable connecting rod, large connection bracket and front connecting rod shall be connected with $\phi 24$ pin shaft 2 and D-type safety pin;

(7) In accordance with the requirements, correct the verticality of mast and the levelness of mast tie;

(8) After the correction is completed, tighten up all connecting bolts. Thereafter, slowly start hoist, and ensure that the cage and counterweight don't interfere with the mast tie.

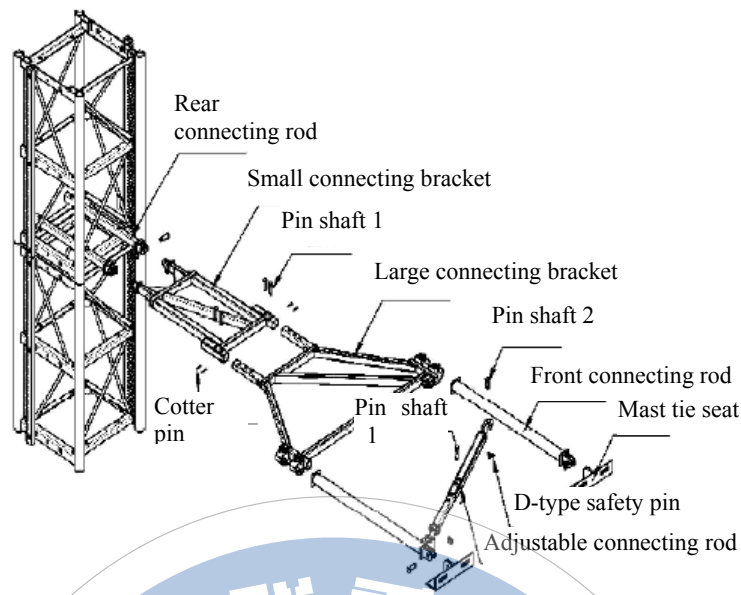


Figure 1.8-2 Erection Diagram for II-type Mast Tie

Note

The permissible maximum horizontal inclination of mast tie is $\pm 8^\circ$, namely 144:1000.

1.8.1.3 Erection of III-type Mast Tie

- (1) Install the $\phi 76$ vertical tube, make the end with gap face upwards, and insert the expansion clamp between two tubes, so as to tighten up the bolts;
- (2) Install the bracket 2 between mast and $\phi 76$ vertical tube at the position about 9m above the ground, and then install one at the interval of every 9m;
- (3) Between $\phi 76$ vertical tube and building at the position about 300mm above or below the bracket 2, install one bracket 1 and one sway brace at the interval of 9m;
- (4) Install a channel-steel connection bracket at every floor station platform, and use the level meter to ensure the levelness. If the distance between two floor stations is too long, please ensure that a channel-steel connection bracket is installed at the interval of 3m;
- (5) Install one bracket 2 or 3 at the position no more than 300mm above or below the channel-steel connection bracket;
- (6) By adjusting the bracket 1, correct the verticality of mast. The pulling device such as wire rope may be used to carry out the adjustment;
- (7) After the erection, please inspect and confirm that all bolts are properly tightened up;
- (8) Inspect and make sure that there is no interference or collision between cage or other moving components and mast tie.

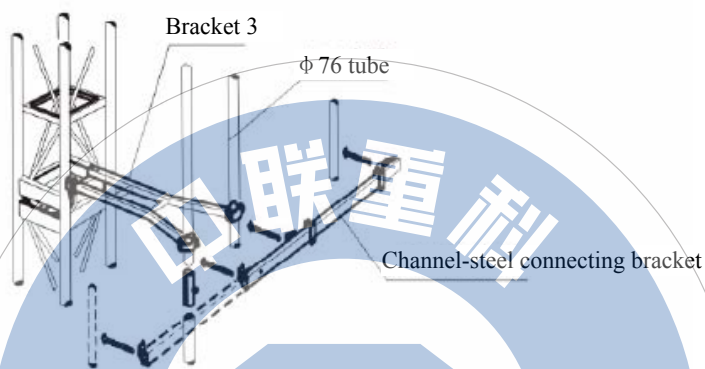
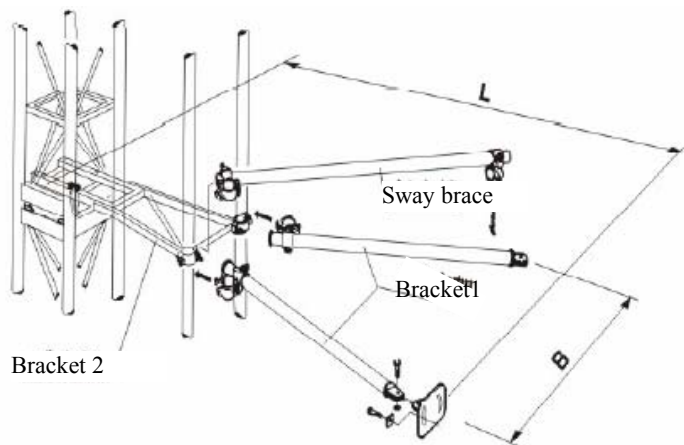


Figure 1.8-3 Erection Diagram for III-type Mast Tie


Note

- (1) The permissible maximum horizontal inclination of mast tie is $\pm 8^\circ$, namely 144:1000;
- (2) If the total installed height of mast exceed 150m, it is not advised to adopt the Type-III mast tie.

1.8.1.4 Erection of IV-type Mast Tie

(1) Use four M16 bolts or M16 U-bolts to fix the rear connecting rod of mast tie onto the angle steel on upper and lower frame of mast section (The rear connecting rod shall be placed symmetrically), and don't tighten up the bolts excessively, so as to facilitate the adjustment of position;

(2) Use M24 bolts to fix the mast tie onto the building;

(3) Use bolts to connect the connection bracket and rear connecting rod with mast tie seat. The connection between connection bracket and rear connecting rod is realized with M16 bolts; the connection between connection bracket and mast tie seat is realized with $\phi 24$ pin shaft and D-type pin;

(4) Correct the verticality of mast and the levelness of mast tie in accordance with the requirements;

(5) After the correction is completed, tighten up all connecting bolts, slowly start the hoist, and ensure that

the cage and counterweight don't interfere with the mast tie.

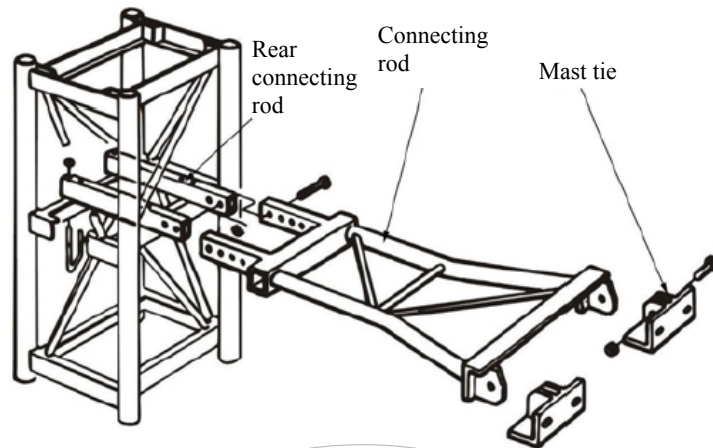


Figure 1.8-4 Erection Diagram for IV-type Mast Tie



Note

The permissible maximum horizontal inclination of mast tie is $\pm 8^\circ$, namely 144:1000.

1.8.1.5 Erection of V-type Mast Tie

(1) Use four M16 bolts to fix the rear connecting rod of mast tie onto the angle steel on upper and lower frame of mast section (The rear connecting rod shall be placed symmetrically), and don't tighten up the bolts excessively, so as to facilitate the adjustment of position;

(2) Assembling the connection bracket of V-type Mast Tie. According to the attached distance, connecting the adjustable connecting rod I with connection bracket by pin B20x95, and locking pin B20x95 by cotter pin. Then connecting the mast tie seat with adjustable connecting rod I by pin, and locking the pin by D-type pin. Then connecting adjustable connecting rod II by pin, and locking the pin by D-type pin.

(3) Fine turning the attaching distance by adjusting the adjustable screw.

(4) Use M24 8.8 stage bolts to fix the mast tie onto the building;

(5) correct the verticality of mast and the levelness of mast tie in accordance with the requirements;

(6) After the correction is completed, tighten up all connecting bolts, slowly start the hoist, and ensure that the cage and counterweight don't interfere with the mast tie.

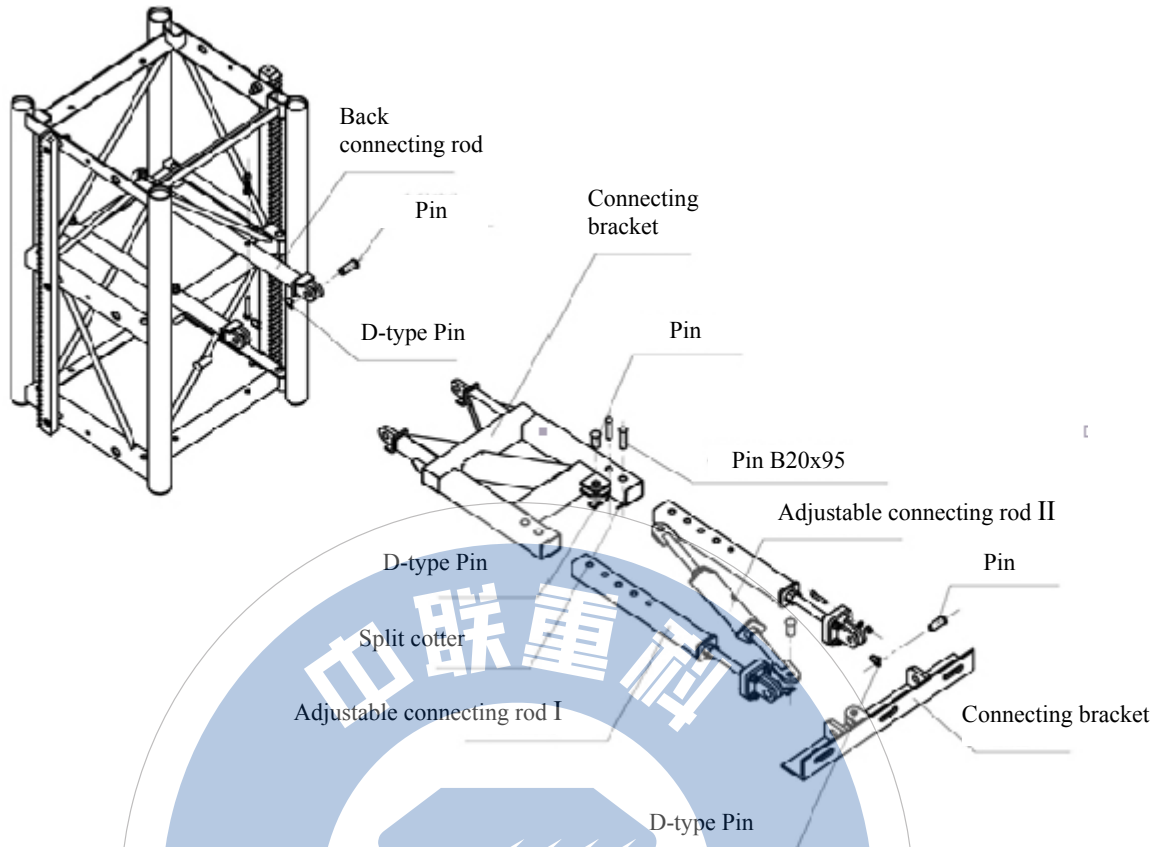


Figure 1.8-5 Erection Diagram for V-type Mast Tie


Note

The permissible maximum horizontal inclination of mast tie is $\pm 8^\circ$, namely 144:1000.

1.9 Erection of Cable Guiding Device

On the basis of lifting height, the cable guiding device falls into the following types: cable drum type and trolley type.

1.9.1 Erection of Cable Drum and Cable Guiding Device

- (1) After completing the 1.1-1.3 erection, install cable drum;
- (2) Use the lifting tool to hang the cable on cable drum, as indicated in the figure below;

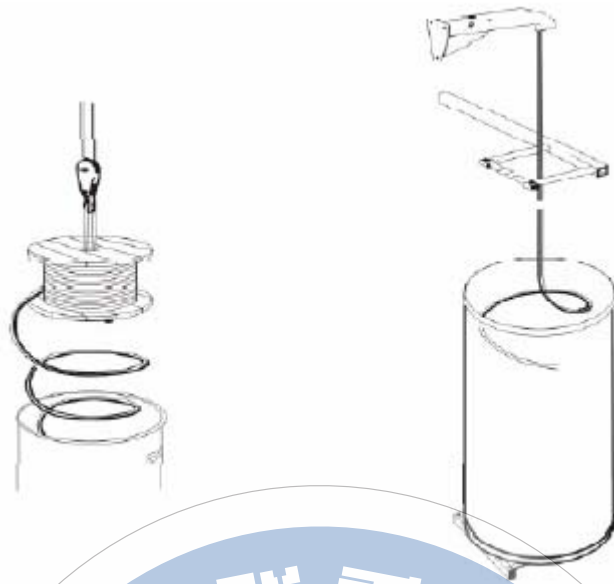


Figure 1.9-1 Erection Diagram for Cable Drum

- (3) Release about 5.2m cable, so as to connect the cable to the power box;
- (4) Pull out the cable from bottom of cable drum, draw it to the power box, and don't connect it immediately;
- (5) Place the cable round by round clockwise into the cable drum, and make efforts to maintain every round in the same size, with the diameter slightly less than that of cable drum;
- (6) Fix the cable onto the cable arm, and connect the cable connector to the corresponding connecting terminal;
- (7) Connect the cable to power box, and then start the hoist, so as to inspect whether the cable is coiled as indicated in Figure 1.9-2;

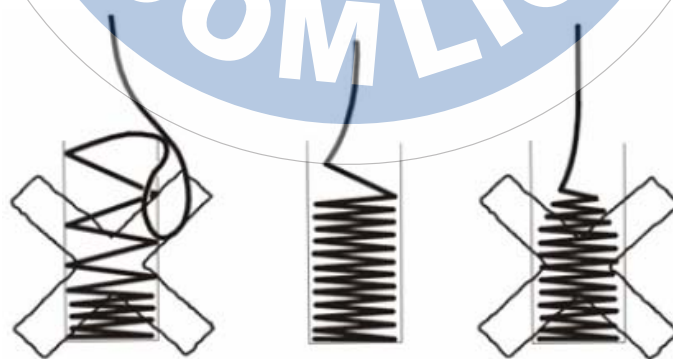


Figure 1.9-2 Diagram for Retraction and Release of Cable

- (8) In the course of height increase of mast, please install the cable guiding device, at the erection position as indicated in Figure 1.9-3;
- (9) Adjust the position of cable guiding device and cable arm, and ensure that the cable is located at the center of U shape of cable guiding device.

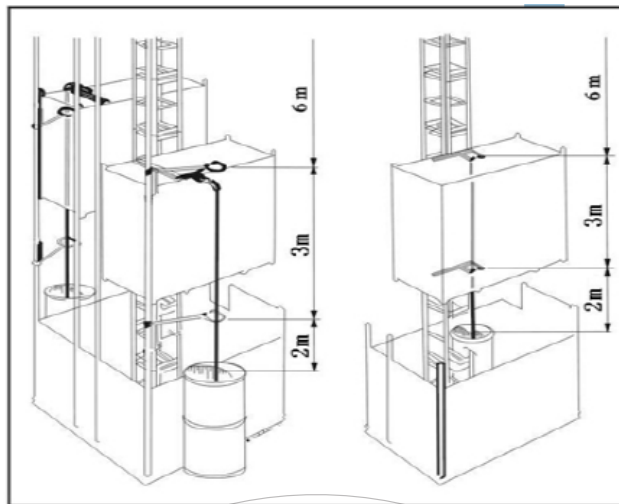


Figure 1.9-3 Arrangement Diagram for Cable Guiding Device

1.9.2 Erection of Trolley-type Cable Guiding Device of Single-cage Hoist

1.9.2.1 Erection Procedure under Circumstance that Power is Supplied by One Cable

(1) Complete the supply of power to cage as specified in 1.4; while installing, due to the free hanging cable in the process, personnel shall be assigned to pull and send cable on the ground in order to prevent the cable from contortion.

(2) Move the cage to the lowest position, cut off the main power supply, and disconnect the cable from external power supply;

(3) Coil up the cable, place it on the cage roof, vertically lower down one end of the cable from the cage, and connect it to the power box along the surface of underpan;

(4) Turn on the power supply, move up the cage and release the cable at the same time, and fix the cable into the mast at the interval of 1.5m;

(5) If the installed height of mast is less than one half of pre-determined total height plus 3m, just move the cage to the top of mast, and install the cable fixing support on highest mast section of mast. If the installed height of mast is no less than one half of pre-determined total height plus 3m, move the cage to the half height of mast, and install the cable fixing support at the height which is one half of pre-determined total height plus 1m;

(6) Fix the cable onto the cable-mounting bracket (Figure 1.9-4c);

(7) Slowly lower down the cage, and install a cable guiding device at the interval of 6m; When installing the cable guiding device, please make sure that the plates of trolley bracket on both sides and the cage cable arm can pass through the rubber plates of guide bracket;

(8) When the cage moves down to the same level as the doorsill, use a rigid support to uphold the cage (Make sure that erecting the trolley under cage is not dangerous);

(9) Cut off power supply, remove the end of cable from cable arm in the cage, and maintain it in freely vertical state (If it is found that the cable can't suspend freely, the erection personnel shall straighten it up);

- (10) On one side of the trolley, remove two rollers, and install the trolley under the cage;
- (11) When re-installing the roller, just tighten up the screws with hand;
- (12) Adjust the shafts of rollers, so as to maintain the clearance between roller and vertical tube at 0.5mm;
- (13) Try to pull the trolley and make sure that the trolley is not jammed;
- (14) Pass the free end of cable which has been straightened in step (9) through the trolley, and re-connect it into the connecting box in cage. Please ensure that the cable will not twist;

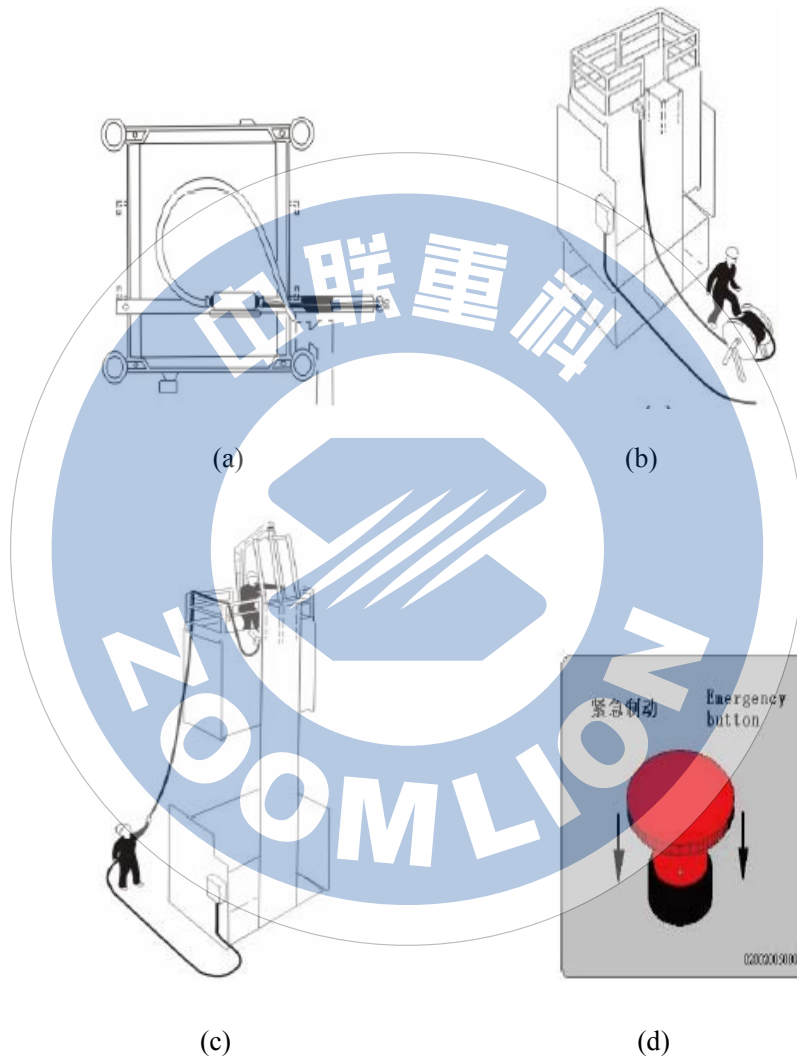


Figure 1.9-4 Schematic Diagram for Cable Guiding Device (Single-cage Hoist with Power Supplied by One Cable)

- (a) Use the cable to connect the cage and power box; (b) Straighten the cable; (c) Install the cable to the fixed cable bracket; (d) Carr out trial operation

(15) Remove the support under cage;

(16) Without lifting up the trolley, pull up the cable straightly on cage roof, and then lift up the cable again, so as to make the trolley contact with the bottom of cage. Thereafter, lower down the cable by one half of its length, and get it fixed by clamp on incoming wire bracket of cage, and fix the cable;

- (17) Coil up the remaining cable, and fix it onto the safety base enclosure on cage roof;
- (18) Turn on the main power switch, and ensure that the cable is connected correctly;
- (19) Operate the hoist, and install the remaining cable guiding device.

1.9.2.2 Erection Procedure under Circumstance that Power is Supplied by Two Cables

(1) In the course of erection, it is the accompanying cable which supplies power to the cage;

(2) Move the cage to the lowest position, use the jib to place the fixed cable on the cage roof, pass a shaft or tube through the cable coil and fix it on the cage roof, and make it easy for the cable to be released;

(3) Implement the step (5) in 1.9.2.1;

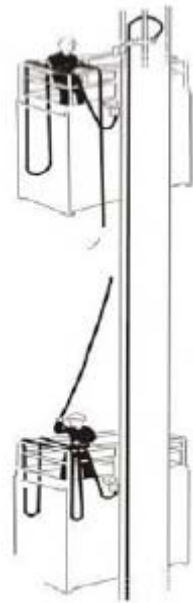
(4) Arrange another erection personnel to remove the accompanying cable from base frame power box at the bottom, and pull the accompanying cable onto the cage roof;

(5) Connect one end of the fixed cable to the middle connecting box, vertically lower the other end to the underpan, and then connect the cable to the power box along the surface of underpan, and use the adhesive tape to fix the remaining cable onto the mast (position of fixed cable bracket), and ensure that the cable does not interfere with the moving components such as cage;

(6) Connect one end of accompanying cable (the end removed from power box) to the middle connecting box;

(7) Slowly move the cage downwards, install a clamp at the interval of 1.5m, fix the cable onto the mast and install a cable guiding device at the interval of 6m. When installing the cable guiding device, please make sure that the two side plates of trolley bracket and the cage cable arm can pass through the rubber plates of guide bracket;

(8) Implement the steps (8)-(19) in 1.9.2.1, and please note that the cable referred to in Steps (8)-(19) is accompanying cable.



1.9.3 Erection of Trolley Type Cable Guiding Device of Double-cage Hoist

1.9.3.1 Erection Procedure under Circumstance that Power is Supplied by One Cable

(1) Move the two cages to the lowest position, use a rigid support to uphold the right cage (Please ensure that the erection of cable pullet under the cage is not dangerous);

(2) Remove the cable of right cage, and use the lifting equipment to lift the cable of right cage onto the left cage;

(3) Start the left cage, and implement the step (5) in 1.9.2.1;

(4) Vertically lower one end of the cable to the underpan via the right cable-mounting bracket, connect the cable to the power box along the surface of underpan, and then also vertically lower the other end down to the

ground;

(5) Slowly move the left cage downwards, install a clamp at the interval of 1.5m, fix the section of cable of right cage between cable-mounting bracket and power box onto the rail, and install a cable guiding device at the interval of 6m. When installing the cable guiding device, please make sure that the two side plates of trolley bracket and the cage cable arm can pass through the rubber plates of guide bracket;

(6) Move the left cage to the lowest position, implement the steps (10) -(19) in 1.9.2.1, so as to complete the erection of trolley type guide device of right cage;

(7) in accordance with the method specified in this section, use the right cage to complete the erection of left cage trolley guide device.

1.9.3.2 Erection Procedure under Circumstance that Power is Supplied by Two Cables

(1) Move two cages to the lowest position, and place a rigid support under the right cage (Please ensure that the erection of cable pullet under the cage is not dangerous);

(2) Remove the accompanying cable of right cage, and use the lifting equipment to lift up the accompanying cable of right cage and fix the cable onto the left cage;

(3) Start the left cage, and implement the step (5) in 1.9.2.1;

(4) Implement the step (5) in 1.9.2.2;

(5) Connect one end of accompanying cable (the end removed from power box) to the middle connecting box, and lower the other end slowly down to the ground along the mast;

(6) Implement the steps (6)-(8) in 1.9.2.1, so as to complete the erection of right cage trolley guide device;

(7) In accordance with the method specified in this section, use the right cage to complete the erection of trolley type guide device of left cage.

1.9.4 Height Increase of Cable guiding device

If after the height of mast is increased, the installed height of cable rack is less than one half of height of mast plus 3m, then before increasing the height of mast again, please move up the cable rack. The method is detailed as follows:

(1) Release the remaining cable which is coiled up on the cage roof (When releasing the cable, move the cage to the lowest floor), and then lock up the cable again; if the hoist uses the cable of one specification, the length to be relaxed shall equal three times the height whereby the cable-mounting bracket moves up; if the cables of two specifications are used for the hoist, the length to be relaxed shall equal two times the height whereby the cable-mounting bracket moves up.

(2) Move the cage upwards until the distance from cable-mounting bracket equals the length leased, and fix the cable and trolley onto the cable arm, so that no force is applied onto the cable-mounting bracket;

(3) Move the cage to the position of cable-mounting bracket, and confirm that the cable between cable-mounting bracket and power box is firmly fixed. If the cables of two specifications are used for the hoist, just relax the cable which is coiled up at the position of cable-mounting bracket, with the length to be relaxed equaling the height whereby the cable-mounting bracket moves up;

- (4) Dismantle the cable mounting bracket, move the cage to the new erection position of cable-mounting bracket, and then install the cable-mounting bracket;
- (5) Connect the cable to the cable-mounting bracket;
- (6) Slowly return the cable and trolley to free state;
- (7) Slowly move the cage, and inspect whether there is interference or collision between components.

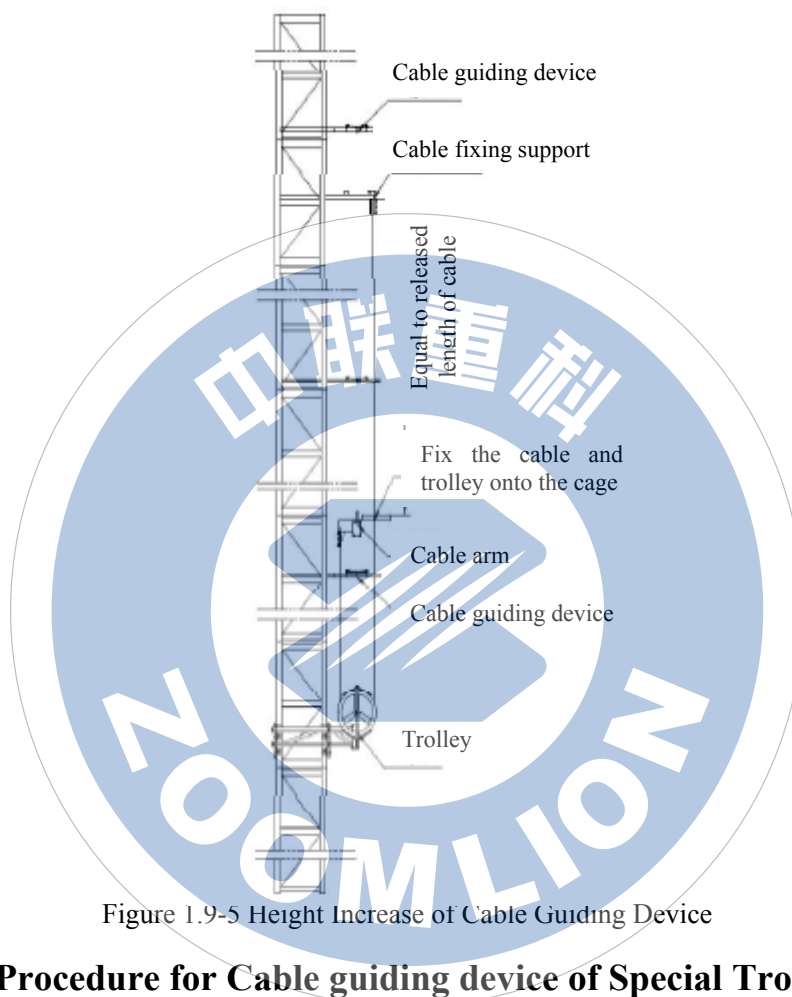


Figure 1.9-5 Height Increase of Cable Guiding Device

1.9.5 Erection Procedure for Cable guiding device of Special Trolley Rail

- (1) On the ground, release all accompanying cables from the cable drum;
- (2) Fix the cable arm onto the erection position on cage with bolts;
- (3) Pass one end of the accompanying cable through the cable arm, and connect it to the connecting box in the cage; connect the other end to the power box on base frame and base enclosure (See Figure 1.9-4). In the course of wiring, be sure to cut off the main power supply!
- (4) Turn on the main power switch. In accordance with the erection procedure, increase the height of mast and install the mast tie, and install the cable guiding device;
- (5) Fix the first section of trolley rail to the bottom of mast with two connecting rods. Fix one end of the connecting rod with bolt and trolley rail, and fix the other end with bolt and mast section frame. Install the trolley on trolley rail, and make it stay at the bottom of mast (See Figure 1.9-6a);

(6) Increase the height of trolley rail, connect it to the trolley rail with bolts, and fix it with connecting rod and mast at the interval of 4.5m (The connection method is the same as above). If adjustment is required, the adjusting washers can be placed between connecting rod and mast frame. Before tightening up the connecting bolts of upper and lower trolley rails, please inspect the clearance of connector of trolley rail, and ensure that such clearance is no less than 1mm and no more than 3mm;

(7) Pre-tighten up the guide plates of cable guiding device one by one, until the contact force is 10.20N (when the leaf spring is used);

- As for double-cage hoist, fix the cable guiding device A/B onto trolley rail with bolts at the interval of about 3m (See Figure 1.9-6b);
- As for single-cage hoist, the installed distance between every pair of cable guiding devices A and B on trolley rail shall be about 6m;
- The erection of cable guiding devices A and B shall ensure that the cage support can pass between the two guide plates;
- Increase the height of trolley rail until it equals the one half of the maximum installed height of mast minus 4.5m.

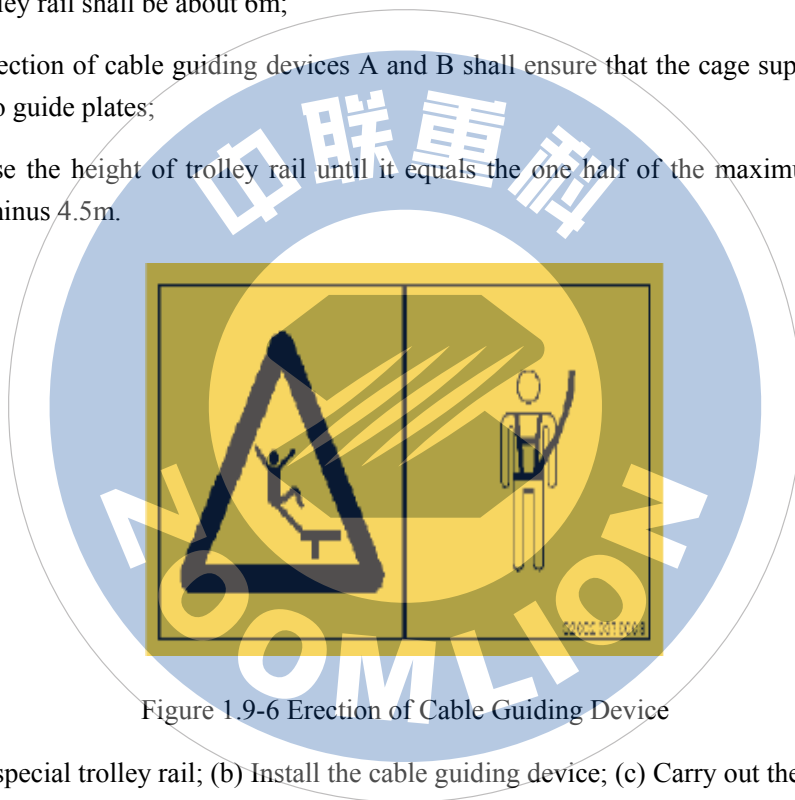


Figure 1.9-6 Erection of Cable Guiding Device

(a) Install the special trolley rail; (b) Install the cable guiding device; (c) Carry out the trial operation;

(8) Place the fixed cable on cage roof, and release the cable which is long enough to be connected with the ground power box. Thereafter, gradually move the cage up, release the required fixed cable, and use cable clamp to fix the cable onto mast at the interval of 1.5m, until it reaches the position which is about 1.5m above the top of trolley rail. In addition, fix the end of cable onto the mast, coil up the remaining cable, hang it onto mast and bind it firmly;

(9) Install the cable-mounting bracket at the position which is 1.5m above the top of trolley rail, and connect the upper end of fixed cable to the connecting box on cable-mounting bracket;

(10) Cut off the main power supply, disconnect one end of accompanying cable from the connecting terminal of connecting box in cage, fix one end of the dismantled accompanying cable with the clamp, and connect it to the connecting box on cable-mounting bracket. Thereafter, release the accompanying cable on the incoming wire rack of the cage, and slowly make it suspended down from the cable-mounting bracket;

(11) By means of manual release of brake, make the cage move down slowly under the action of gravity, and place the hung accompanying cable into the cable guiding device B/C;

(12) Remove the other end of accompanying cable from the ground power box, and then fix the cable;

(13) Fix one end of accompanying cable removed from ground power box onto the cable arm, and then connect it to the terminal of connecting box in the cage. Stop the trolley at the position about 0.5m above the ground, bind the excessive accompanying cable onto the base enclosure on cage roof, and turn on the main power supply (See Figure 1.9-6c);

(14) On the mast above the trolley rail, a cable guiding device A shall be installed at the interval of about 9m;

(15) Lubricate the shaft of rail and trolley with grease.

1.9.6 Erection Procedure for Cable Guiding Device under Circumstance that Trolley Rail is Increased Section by Section

In the course of sectional erection of construction hoist, when the height of mast is less than one half of the expected height of mast, the installed height of trolley rail shall be 4.5m lower than the top of mast. If the first-time installed height of mast is 30m, the trolley rail shall be installed to the height of 25.5m. As for the cable guiding device installed in accordance with this height, when the height of mast is increased to $25.5+25.5-4.5=46.5\text{m}$, it is only necessary to install a cable guiding device A on the mast above the trolley rail at the interval of 6m, and it is unnecessary to extend the fixed cable and accompanying cable. Only when the height of mast exceeds 46.5m, the fixed cable and accompanying cable must be extended. Similarly, the height of trolley rail shall be increased to the position which is 4.5m below the top of mast. Increase the height of trolley rail until it equals the one half of the maximum installed height of mast minus 4.5m. The detailed erection steps are as follows:

(1) Stop the cage at the top of trolley rail, slightly release the cable clamp on cable arm on cage, pull out a section of the remaining accompanying cable on cage roof, make sure that the length of pulled-out section is equal with the height of mast to be increased, and then re-tighten up the strap clamp of cable.

(2) Lower down the cage, loosen the fixed cable bound on mast, and pull the remaining fixed cable onto the cage roof. Mount the unloading tool onto the accompanying cable under cable-mounting bracket, and then hang the cable up onto the cable arm. Slight move up the cage, apply all the weight of accompanying cable onto cable arm, remove the cable-mounting bracket from mast, and place it on the cage roof (See Figure 1.9-7);



Figure 1.9-7 Cable-mounting Bracket

- (3) Move up the cage section by section, use the cable clamp to fix the cable onto the mast at the interval of 1.5m, until it is only 3m away from the top of mast. Thereafter, install the cable-mounting bracket, and coil up the excessive fixed cable and hang it on the mast;
- (4) Remove the unloading tool of accompanying cable which is hung on the cage rack;
- (5) Increase the height of trolley rail to the position which is 1.5m below the cable-mounting bracket, and install the cable guiding devices A, B and C in accordance with the original requirements.



Warning

- (1) The operation of cage shall be controlled in the cage. The erection personnel on cage roof shall stand at safe position;
- (2) In the course of erection, please always press down the emergency stop button; in the course of wiring, please cut off the main power supply.

1.10 Erection of slide wire

- (1) Take out the buckles from the two slide wire fixed assemblies, and install them on the angle steel of the second and third mast section bottom, and install anti-dropping device on the mid of the first mast section. These fixed assemblies and anti-dropping device need to be installed in the center of the mast section.



Figure 1.10.1



Figure 1.10.2

(2) Install two slide wires on fixed assembly (big head down), and insert current collector from bottom. When installing slide wire, the junction of the two wires should be malposition to avoid interruption and convenience to maintain. When installing current collector, the arrow should be upwards. For single cage only need one slide wire.

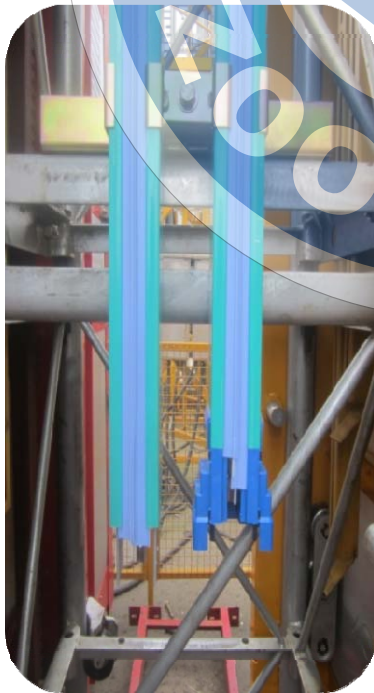


Figure 1.10.3



Figure 1.10.4

(3) For 16mm² slide wire: the main wire access into the terminal following the phase sequence, and insert to the bottom of the first slide wire. Then install support slide way, and adjust bolts on anti-dropping device to against it. Adjust the height of the slide wire to make sure distance between the junction position and mast section is 8~10cm, shown as figure 1.10.5 and figure 1.10.6.

For 25 mm² and 35 mm² slide wire: the main wire access into the terminal following the phase sequence. Then install support slide way, and adjust bolts on anti-dropping device to against it. Adjust the height of the slide wire to make sure distance between the junction position and mast section is 8~10cm, shown as figure 1.10.7 and figure 1.10.8.

The main wire is installed outside of the slide wire. The diagonal of the mast can't interfere with junction.



Figure 1.10.5



Figure 1.10.6



Figure 1.10.7



Figure 1.10.8

(4) Install the two installing plate on the column of cage, and install the junction box of guider on this plate. The current collector must be placed on the middle position of the guider installing area. And then access main wire and current collector into junction box following the phase sequence.



Figure 1.10.9



Figure 1.10.10

(5) Install fixed assemble respectively on the angle steel of the fourth and fifth mast section bottom, then install the second slide wire, and butt joint with the first slide wire. And lock waterproof strip fastening at the waterproof strip connection position.



Figure 1.10.11



Figure 1.10.12

(6) Power on and test running, no loss phase and fault phase, running up and down and current collector running smoothly and steady. When adding mast section, install fixed assembly on every mast section, and install one slide wire every two mast sections, and install anti-dropping device every 18m (six slide wires).



Figure 1.10.12


Note

- (1) Guider can't press to waterproof strip, the gap between them is about 5mm.
- (2) After installing junction box, the dirt board should be installed above the junction box to protect it at once.
- (3) After adding mast section at every turn, the bottom joint must be covered well by waterproof cover.

2. Dismantling

2.1 Preparatory Procedure for Safe Dismantling

Before the dismantling, the construction personnel shall read, understand and master the detailed provisions in Chapter 2 "General Provisions" relating to dismantling, and implement the following procedure:

- (1) All persons entering into the dismantling site shall comply with the ten work safety rules;
- (2) The safety warning area shall be set up in dismantling site, and specific person shall be appointed to carry out supervision;
- (3) The construction personnel may not wear hard-bottom shoes or high-heel shoes, shall wear the tight-fitting and convenient clothing, and shall fasten the safety belt;
- (4) When carrying out overhead operation such as erection or dismantling of mast sections, the overhead operation personnel shall find a safe and appropriate position on their respective post, fasten the safety belt, and lock up the safety hook;
- (5) As for dismantling of construction hoist, the discarded ropes and lifting equipment may not be used. The

dismantled bolts, pin shafts and cotter pins shall be properly kept;

(6) As the sections of construction hoist are reduced, it is absolutely prohibited to carry out the operation such as vertical transportation;

(7) As the sections of construction hoist are reduced, please inspect whether the guide wheel of cage and lower mast section fits closely from time to time.

2.2 Preparation Phase for Dismantling

(1) Before dismantling the construction hoist, please inspect the operation of every mechanism, and carry out dismantling only after all mechanisms are confirmed as normal;

(2) Before dismantling the construction hoist, please inspect the foundation and attachments of construction hoist, and carry out dismantling only after the foundation and attachments are confirmed as normal;

(3) Clean up the construction site, and ensure that the ground in construction site is level, firm and free from any obstacle;

(4) Make sure that there is no high-voltage cable in air within construction site. If there is any high-voltage cable, the confirmation from the relevant department shall be obtained;

(5) The dismantling contractor shall prepare the procedure documents such as *Clarification Form for Dismantling of Construction Hoist* and *Organization Program for Dismantling of Construction Hoist*, and go through the relevant review & approval formalities;

(6) The dismantling contractor shall prepare the detailed technical program for dismantling of construction hoist.

2.3 Implementation Phase for Dismantling

(1) The construction personnel shall read and get familiar with the operating instructions and dismantling program of the construction hoist to be dismantled, and ensure that the whole dismantling process is implemented in accordance with the relevant provisions relating to the construction hoist to be dismantled;

(2) Urge the relevant personnel who enter into the construction site to comply with the safety rules of construction site;

(3) In light of the on-site construction conditions and in accordance with the provisions relating to height decrease, decrease the height of construction hoist to the designated level, and dismantle the relevant attachments;

(4) In accordance with the dismantling procedure of construction hoist to be dismantled, safely carry out the dismantling of construction hoist step by step;

(5) In the course of dismantling of construction hoist, please carefully inspect the connection and tightening conditions of components, identify and eliminate problems in time, and ensure that the hoist works safely and reliably in the course of dismantling;

(6) After dismantling the construction hoist, please pack up and transport all components in time, and properly implement the works for reuse or warehousing and maintenance of such components.

2.4 Dismantling Procedure

The dismantling procedure of construction hoist is basically the reversed erection procedure (Please refer to the erection procedure in this Chapter), and only the following procedure is highlight here.

2.4.1 Dismantling of SC100 and SC200 Construction Hoists

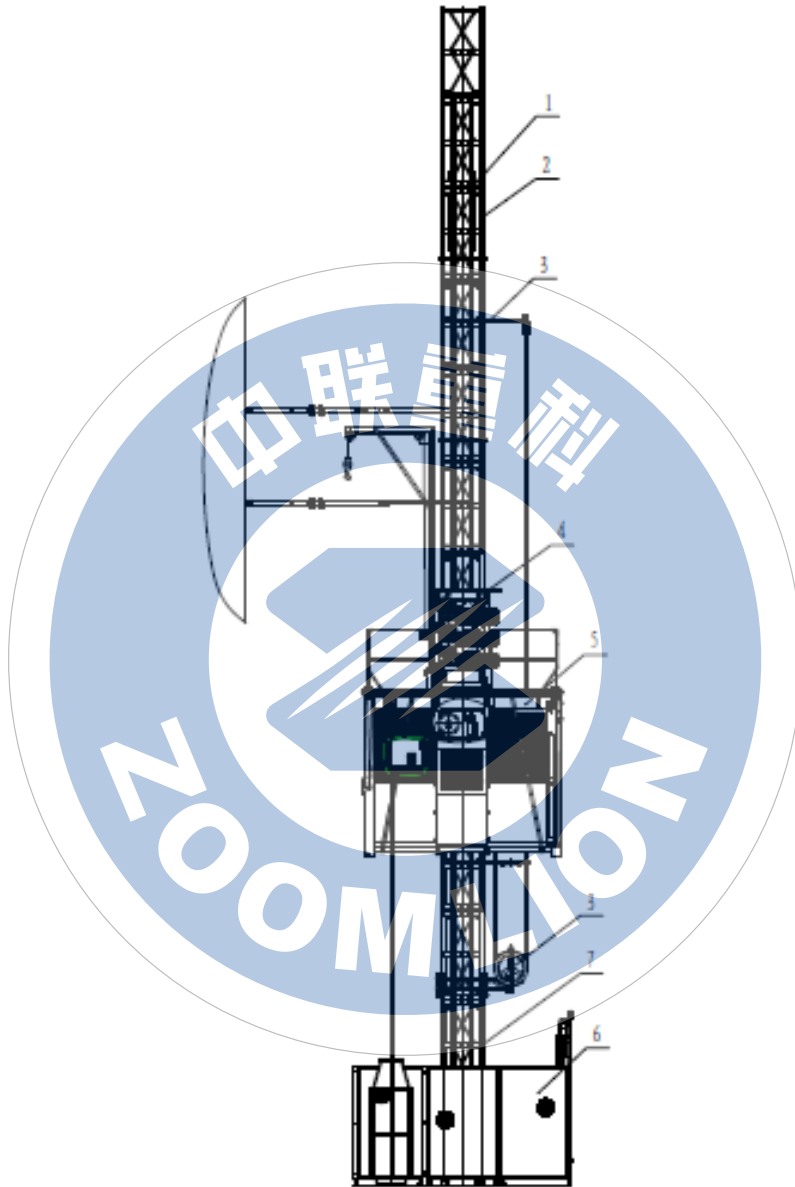


Figure 2.4-1 Diagram for Dismantling Sequence of SC100 and SC200 Construction Hoists

The dismantling steps of construction hoist are detailed as follows:

- (1) Dismantle the limit stoppers on top of mast;
- (2) Dismantle the mast section;
- (3) Dismantle the trolley and cable guiding device;
- (4) Dismantle the drive system;

- (5) Dismantle the cage;
- (6) Dismantle the base enclosure;
- (7) Dismantle the lowest three mast sections and base frame.

2.4.1.1 Dismantle the limit stoppers on top of mast

- (1) Mount the jib on cage roof;

(2) Take the cage roof operation box (The cage roof operation button of variable-frequency speed-regulation construction hoist is integrated into the electrical control cabinet on cage roof) to the cage roof for carrying out the dismantling;

(3) Move the cage to the top of mast, dismantle the upper terminal stopping switch stopper, deceleration limit stopper (variable-frequency speed-regulation construction hoist) and power final limit switch stopper.

2.4.1.2 Dismantle the mast sections

- (1) Loosen the connecting bolts of mast sections;
- (2) By using the electrically-operated jib on cage roof, lift the mast sections to be dismantled into the cage;
- (3) As the mast is reduced, gradually dismantle the mast tie and cable guiding device;

(4) Reserve the lowest mast composed of three mast sections, and then remove the jib, dismantle the buffer spring under cage and the lower terminal stopping switch, deceleration final limit switch, and baffle plate of final limit switch;



When dismantling the mast, please ensure that the guide roller at the highest position of cage is always under the connector of mast (mast sections) to be dismantled and the lifting equipment and jib are in place, and then remove the connecting bolts of mast section!

2.4.1.3 Dismantle the trolley and cable guiding device

When the mast is dismantled to the mast section where the cable-mounting bracket is installed, please dismantle the trolley and cable guiding device.

- (1) Lower the cage to the lowest position, and cut off the main power supply of external power box;
- (2) Dismantle the trolley;
- (3) As the mast is reduced, dismantle the cable guiding device.

2.4.1.4 Dismantle the drive system

- (1) Place two sleepers of appropriate height on the base frame;
- (2) Refer to the method for releasing motor brakes as specified in 1.3.3-(3);
- (3) Release the motor brakes one by one, so as to lower the cage slowly onto the sleepers;

- (4) Cut off the main power supply of ground power box, and disconnect the cable from power box of cage;
- (5) Dismantle the sensing pin of overload protector, and disconnect the drive system from cage;
- (6) Prepare the lorry-mounted crane or tower crane used to lift the drive system;
- (7) Align the lifting equipment with the lifting point of drive system, and then lift the drive system away from mast.

2.4.1.5 Dismantle the cage

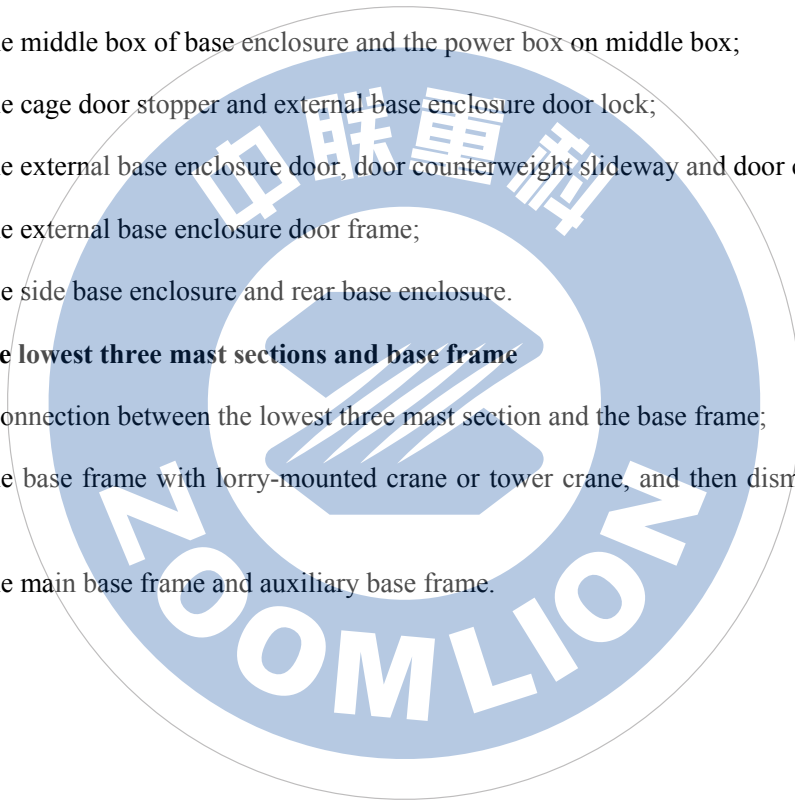
- (1) Refer to the dismantling method for drive system, align the lifting equipment with the lifting lug of cage, and then lift the cage away from mast.

2.4.1.6 Dismantle the base enclosure

- (1) Dismantle the middle box of base enclosure and the power box on middle box;
- (2) Dismantle the cage door stopper and external base enclosure door lock;
- (3) Dismantle the external base enclosure door, door counterweight slideway and door counterweight;
- (4) Dismantle the external base enclosure door frame;
- (5) Dismantle the side base enclosure and rear base enclosure.

2.4.1.7 Dismantle the lowest three mast sections and base frame

- (1) Loosen the connection between the lowest three mast section and the base frame;
- (2) Lift away the base frame with lorry-mounted crane or tower crane, and then dismantle the lowest three mast sections;
- (3) Dismantle the main base frame and auxiliary base frame.





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Operation Manual of Construction Hoist (Volume One)

Safety Signs

General Provisions

Brief Introduction

Preparation

Erection and Dismantling

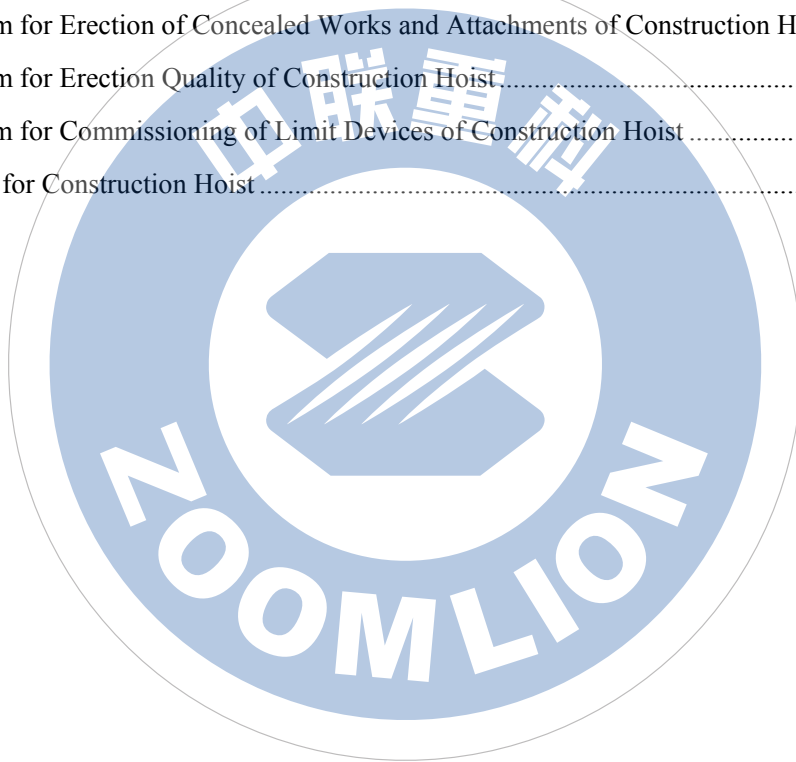
● Annexes



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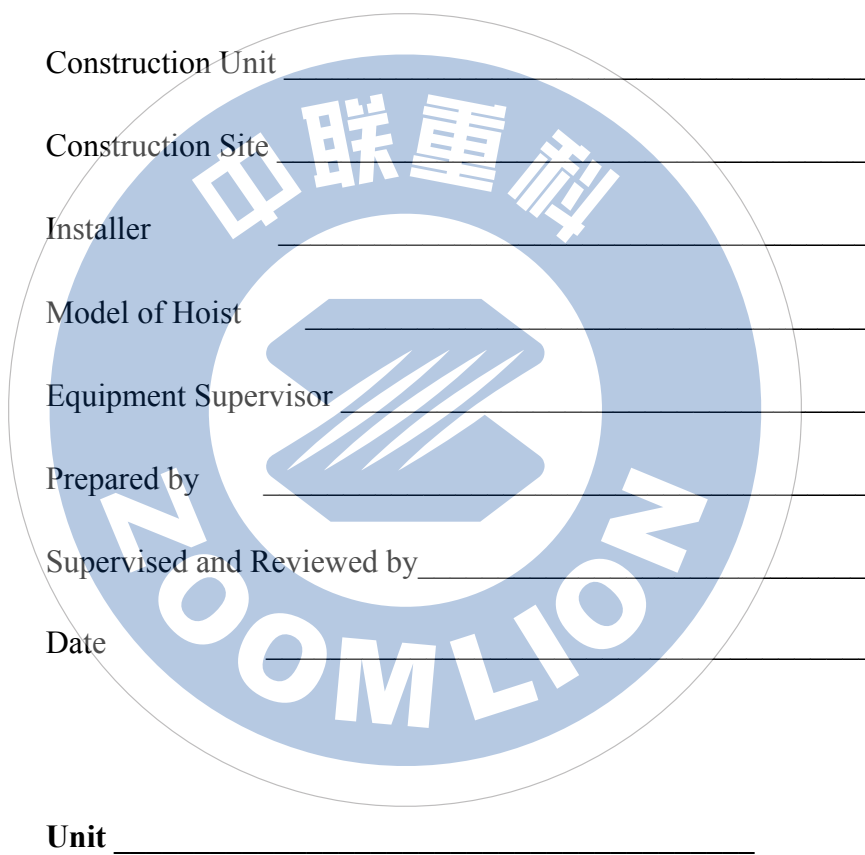
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Technical File for Erection/Dismantling of Construction Hoist



Construction Unit _____

Construction Site _____

Installer _____

Model of Hoist _____

Equipment Supervisor _____

Prepared by _____

Supervised and Reviewed by _____

Date _____

Unit _____

Task Form for Erection of Construction Hoist

S.J.J.B. (01)

| | | | | | |
|--|---------|---------------|----------------------------------|----------------------|--|
| Name of Project | | | Construction Site | | |
| construction Unit | | | Person in Charge of Construction | | |
| Model of Hoist | | Equipment No. | | Installed Height (m) | |
| Planned Erection Date | From to | | Person in Charge of Erection | | |
| Staffing (To be completed by labor dispatcher) | | | | | |
| Chief commander _____ Safety supervisor _____ Operator _____ Electrician _____ | | | | | |
| Hoister _____ | | | | | |
| Mechanic _____ | | | | | |
| Conclusion of Repair/Maintenance: (to be completed by equipment manager) | | | | | |
| Cage: 1. No deformation _____ 2. No bending _____ 3. No crack _____ The concealed works of foundation are accepted _____ | | | | | |
| Mast section: 1. No deformation _____ 2. No bending _____ 3. No crack _____ The mechanisms are accepted _____ | | | | | |
| Mast tie: 1. No deformation _____ 2. No bending _____ 3. No crack _____ All other aspects meet the erection standard _____ | | | | | |
| Note: √ for qualified; × for disqualified | | | | | |
| Actual situation of site as well as plane diagram and three-dimensional diagram of building (The specific drawing may be attached) | | | | | |
| As for erection of hoist, the _____-ton lorry-mounted crane or _____ tower crane is selected. | | | | | |

Date: Received by _____ Equipment Supervisor _____ Completed by _____

Task Form for Dismantling of Construction Hoist

S.J.J.B. (02)

| | | | | | |
|--|---------|---------------|----------------------------------|----------------------|--|
| Name of Project | | | Construction Site | | |
| Construction Unit | | | Person in Charge of Construction | | |
| Model of Hoist | | Equipment No. | | Installed Height (m) | |
| Planned Erection Date | From to | | Person in Charge of Erection | | |
| Staffing (To be completed by labor dispatcher) | | | | | |
| Chief commander _____ Safety supervisor _____ Operator _____ Electrician _____ | | | | | |
| Hoister _____ | | | | | |
| Mechanic _____ | | | | | |
| Conclusion of Repair/Maintenance: (to be completed by equipment manager) | | | | | |
| Cage: 1. No deformation _____ 2. No bending _____ 3. No crack _____ The verticality of hoist is in the permissible range | | | | | |
| Mast section: 1. No deformation _____ 2. No bending _____ 3. No crack _____ The attachments are properly fixed and all mechanisms operate normally | | | | | |
| mast tie: 1. No deformation _____ 2. No bending _____ 3. No crack _____ All other aspects meet the dismantling standard | | | | | |
| Note: √ for qualified; × for disqualified | | | | | |
| Actual situation of site as well as plane diagram and three-dimensional diagram of building (The specific drawing may be attached) | | | | | |
| As for erection of hoist, the _____-ton lorry-mounted crane or _____ tower crane is selected; | | | | | |
| The height of hoist shall be reduced to _____ m for dismantling. | | | | | |

Date: Received by _____ Equipment Supervisor _____ Completed by _____

Clarification Form for Construction Hoist Erection/Dismantling Task

S.J.J.J.B. (03)

| | | | |
|---|---------|----------------------------------|------------------------------|
| Name of Project | | Construction Site | |
| Construction Unit | | Person in Charge of Construction | |
| Model of Hoist | | Equipment No. | Installed Height (m) |
| Planned Erection Date | From to | | Person in Charge of Erection |
| <p>Contents of Clarification:</p> <ol style="list-style-type: none"> 1. All persons entering into the construction site shall comply with the ten work safety rules. 2. The safety warning area shall be set up in construction site, and specific personnel shall be appointed to carry out supervision. 3. In severe weather such as wind velocity higher than 12.5m/s or thunderstorm or snow, the erection/dismantling of construction hoist may not be carried out. 4. The construction personnel may not wear hard-bottom shoes or high-heel shoes, shall wear the tight-fitting and convenient clothing, and shall fasten the safety belt. 5. When carrying out overhead operation such as erection or dismantling of mast sections, the overhead operation personnel shall find a safe and appropriate position on their respective post, fasten the safety belt, and lock up the safety hook. 6. As for erection of hoist, it is absolutely prohibited to use any damaged fastener such as bolt, pin shaft or cotter pin; and it is also prohibited to use any discarded rope or lifting equipment. 7. When adding mast sections to or reducing mast sections from the hoist, it is absolutely prohibited to carry out the operation such as vertical transportation. 8. When adding mast sections or reducing mast sections, please inspect from time to time whether the guide wheel of cage closely fit with the lower supporting mast section. 9. After the mast sections are added to the hoist, please tighten up all fasteners from time to time, and correct the verticality of mast sections in accordance with the provisions. 10. After the addition of mast sections to hoist is completed, please inspect and make sure that all parts are properly tightened and all safety devices are in place. 11. Supplementary Clarification: <hr style="border: 0; border-top: 1px solid black; margin: 5px 0;"/> <hr style="border: 0; border-top: 1px solid black; margin: 5px 0;"/> <hr style="border: 0; border-top: 1px solid black; margin: 5px 0;"/> | | | |

Date: Received by _____ Equipment Supervisor _____ Completed by _____

Organization Program for Erection of Construction Hoist

S.J.J.J.B. (04)

| | | | | | |
|--|------|---------------|----------------------------------|------------------------------|--|
| Name of Project | | | Construction Site | | |
| construction Unit | | | Person in Charge of Construction | | |
| Model of Hoist | | Equipment No. | | Installed Height (m) | |
| Planned Erection Date | From | to | | Person in Charge of Erection | |
| <p>Preparation Phase for Erection:</p> <ol style="list-style-type: none"> 1. Before installing the hoist, please properly maintain all mechanisms, and go through the formalities for quality confirmation. 2. Before installing the hoist, please maintain the paint on steel structures such as mast tie and mast. 3. Clean up the erection site, and ensure that the ground in erection site is level, firm and free from any obstacle. 4. Make sure that there is no high-voltage cable in air within construction site. If there is any high-voltage cable, the confirmation from the relevant department shall be obtained. 5. In accordance with the procedure in S.J.J.J.B. (01) (03), properly go through the formalities for confirmation. 6. Prepare the detailed technical program for erection (attached). | | | | | |
| <p>Implementation Phase of Erection:</p> <ol style="list-style-type: none"> 1. Read and get familiar with the operating instructions and erection program of the construction hoist to be installed, and ensure that the whole erection process is implemented in accordance with the relevant provisions relating to the construction hoist to be installed. 2. Urge the relevant personnel who enter into the construction site to comply with the safety rules of construction site. 3. Organize the construction site for erection, set up the warning area with obvious signs, and arrange specific person to carry out supervision. 4. In accordance with the erection procedure of hoist to be installed, carry out the erection step by step. 5. In accordance with the requirements of on-site construction, comply with the provisions relating to height increase of hoist, and mount additional mast sections to the hoist until the designated height is reached. 6. As for the hoist which reaches a certain height, the relevant attachments shall be installed in accordance with the requirements for use of such hoist. 7. After the hoist is installed, please carefully inspect the connecting and tightening conditions of components, identify and eliminate problems in time, and ensure that the hoist will work safely and reliably. 8. In accordance with the provisions relating to acceptance of hoist, carry out the commissioning work for | | | | | |

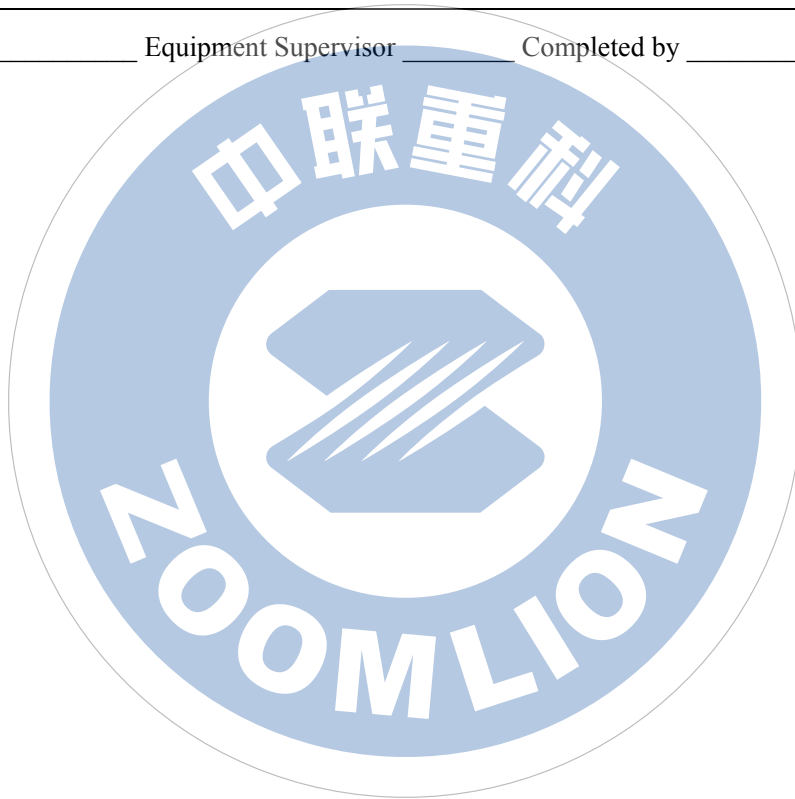
acceptance inspection, and in accordance with the procedure in S.J.J.J.B. (07), properly go through the formalities for acceptance confirmation.

9. Supplementary construction program: _____

The above organization program for erection has been confirmed

Signature for Dismantling/Erection _____ Signature for Command _____

Date: Received by _____ Equipment Supervisor _____ Completed by _____



Organization Program for Dismantling of Construction Hoist

S.J.J.J.B. (05)

| | | | | | |
|--|---------|---------------|----------------------------------|----------------------|--|
| Name of Project | | | Construction Site | | |
| Construction Unit | | | Person in Charge of Construction | | |
| Model of Hoist | | Equipment No. | | Installed Height (m) | |
| Planned Erection Date | From to | | Person in Charge of Erection | | |
| <p>Preparation Phase for Dismantling:</p> <ol style="list-style-type: none"> 1. Before dismantling the construction hoist, please inspect the operation of every mechanism, and carry out dismantling only after all mechanisms are confirmed as normal. 2. Before dismantling the construction hoist, please inspect the foundation and attachments of construction hoist, and carry out dismantling only after the foundation and attachments are confirmed as normal. 3. Clean up the erection site, and ensure that the ground in erection site is level, firm and free from any obstacle. 4. Make sure that there is no high-voltage cable in air within construction site. If there is any high-voltage cable, the confirmation from the relevant department shall be obtained. 5. In accordance with the procedure in S.J.J.J.B. (02) (03), properly go through the formalities for confirmation. 6. Prepare the detailed technical program for dismantling (attached). | | | | | |
| <p>Implementation Phase of Dismantling</p> <ol style="list-style-type: none"> 1. Read and get familiar with the operating instructions and dismantling program of the construction hoist to be dismantled, and ensure that the whole dismantling process is implemented in accordance with the relevant provisions relating to the construction hoist to be dismantled. 2. Urge the relevant personnel who enter into the construction site to comply with the safety rules of construction site. 3. Organize the construction site for dismantling, set up the warning area with obvious signs, and arrange specific person to carry out supervision. 4. In light of the on-site construction conditions, comply with the provisions relating to reduction of mast sections, dismantle the mast sections until the hoist is reduced to the designated height, and then dismantle the relevant attachments. 5. In accordance with the dismantling procedure of hoist to be dismantled, carry out the dismantling step by step. 6. In the course of dismantling, please carefully inspect the connection and tightening conditions of every component, identify and eliminate problems in time, and ensure that the hoist works safely and reliably in the course of dismantling. 7. In the course of dismantling, clean up, pack up and transport the components in time, and properly implement the works for reuse or warehousing and maintenance of such components. | | | | | |

8. Supplementary construction program: _____

The above organization program for erection has been confirmed

Signature for Erection/Dismantling _____ Signature for Command _____

Date: Received by _____ Equipment Supervisor _____ Completed by _____



Acceptance Form for Erection of Concealed Works and Attachments of Construction Hoist

S.J.J.J.B. (07)

| | | | | | |
|---|---------|---------------|----------------------------------|----------------------|--|
| Name of Project | | | Construction Site | | |
| Construction Unit | | | Person in Charge of Construction | | |
| Model of Hoist | | Equipment No. | | Installed Height (m) | |
| Erection Date | From to | | Person in Charge of Erection | | |
| <p>Acceptance of Concealed Works of Hoist Foundation:</p> <ol style="list-style-type: none"> Whether the bearing capacity of soil layer under hoist foundation meets the requirements for erection and use of hoist. Whether the size of concrete foundation meets the requirements for erection and use of hoist. Whether the reinforcing steel bars in concrete foundation of hoist meets the requirements for erection and use of hoist. Whether the embedded bolt or embedded anchor in concrete foundation of hoist meet the requirements for erection and use of hoist. <p>As for the above acceptance works, the relevant confirmation formalities have been gone through.</p> <p>Signature for Erection: _____ Signature for Command: _____</p> | | | | | |
| <p>Acceptance of Attachments of Construction Hoist:</p> <ol style="list-style-type: none"> Whether the embedded parts of attachments in wall meet the requirements for erection and use of hoist. Whether the size of attachments meets the requirements for erection and use of hoist. Whether the levelness of attachments meets the requirements for erection and use of hoist. Whether the verticality of hoist meets the requirements for erection and use of hoist after the hoist is adjusted. <p>The relevant signature and confirmation formalities for the above acceptance inspection have been gone through.</p> <p>Signature for Erection: _____ Signature for Command: _____</p> | | | | | |
| <p>Attached: Acceptance Report for Concealed Works of Foundation</p> | | | | | |

Date: Received by _____ Equipment Supervisor _____ Completed by _____

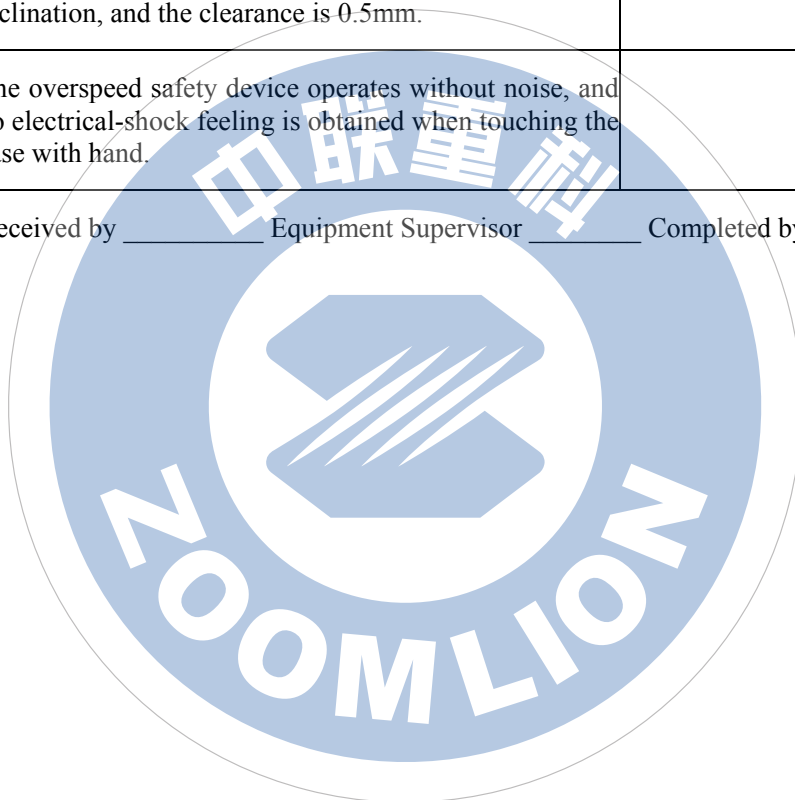
Acceptance Form for Erection Quality of Construction Hoist

S.J.J.J.B. (08)

| | | | | | |
|-------------------------------|---|---------------|----------------------------------|------------------------------|---------------|
| Name of Project | | | Construction Site | | |
| Construction Unit | | | Person in Charge of Construction | | |
| Model of Hoist | | Equipment No. | | Installed Height (m) | |
| Erection Date | From to | | | Person in Charge of Erection | |
| Item | Contents and Requirements | | | Self-inspection | Re-inspection |
| Foundation and base enclosure | The concrete foundation platform is not inclined or cracked. | | | | |
| | There are drainage facilities around the concrete foundation platform. | | | | |
| | The base enclosures are free of deformation, crack and collision/friction with cage; the buffer spring under cage and counterweight is placed correctly. | | | | |
| Cage | There is no deformation, crack or serious rust, the cage operates normally without collision and friction. | | | | |
| | The cage can be started sensitively, and the limit is effective. The counterweight operates normally, without collision and friction. The cable is not damaged and the operation is smooth. | | | | |
| Drive system | The worm gear case is properly lubricated and operates normally, without abnormal noise, oil leakage and overheating situation (The oil temperature does not exceed 100°C) | | | | |
| | The brake acts sensitively and reliably; the clearance between fixed brake disc and rotary brake disc is no less than 0.5mm. | | Actually-measured clearance: | Actually-measured clearance: | |
| | Gear-rack engagement: Maximum wear limit of gear: 35.1mm (common normal | | Wear of gear: | Wear of gear: | Wear of rack: |

| | | |
|--|---|---|
| line); Maximum wear limit of rack: 10.6mm. | | |
| The rack is firmly fixed and properly lubricated, and is not worn beyond the limit. | | |
| The guide wheel is fixed firmly and properly lubricated; the guide is flexible without obvious inclination, the fitting clearance of frontal wheel is 0.5mm; the clearance of side wheel is 0.5mm. | Clearance of frontal wheel: Clearance of side wheel: | Clearance of frontal wheel: Clearance of side wheel: |
| The compression backgear is fixed firmly and properly lubricated, the guide is flexible without obvious inclination, and the clearance is 0.5mm. | | |
| The overspeed safety device operates without noise, and no electrical-shock feeling is obtained when touching the case with hand. | | |

Date: Received by _____ Equipment Supervisor _____ Completed by _____

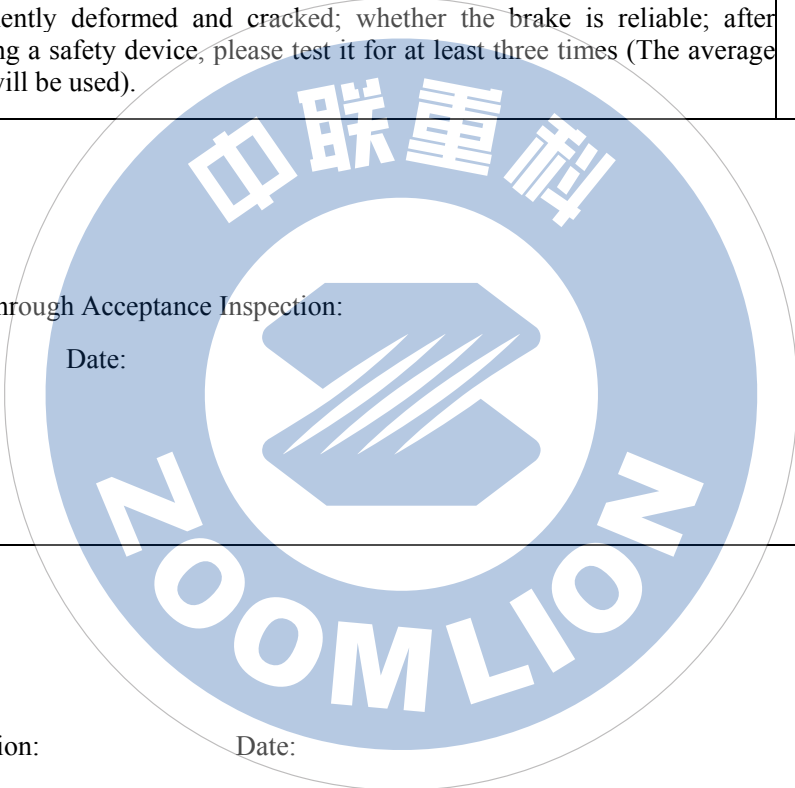


Continued

S.J.J.B. (08)

| Item | Contents and Requirements | Self-inspection | Re-inspection |
|------------------------------|---|--|--|
| Mast section and attachments | The steel structure of mast section is free of obvious deformation or crack; the deviation of mast section is not more than 0.8mm; the verticality deviation of mast is not more than the value specified in Table 1.8-1 in Chapter 6 “Erection and Dismantling”; the fixing bolts meet the standard, and the pre-tightening torque is correct. | Actually-measured deviation: Actually-measured deviation: | Actually-measured deviation: Actually-measured deviation: |
| | The mast tie shall be the standard products; the levelness shall be no more than $\pm 8^\circ$; the mast tie seat shall be connected with bolts. | Actually-measured levelness: | Actually-measured levelness: |
| | The jib on cage roof has been dismantled, and the safe operation in cage and on cage roof may not be affected. | | |
| Electrical system | The lighting devices shall be in good conditions; the electrical bell shall be sensitive and effective | | |
| | The power supply shall be normal, and the operating voltage shall be $380V \pm 5\%$ | | |
| | The contacts of contactor and breaker are in good conditions | | |
| | The control device acts sensitively and reliably | | |
| | The electrical protection devices are complete and reliable | | |
| | The grounding resistance is not more than 4Ω | Actually-measured resistance: | Actually-measured resistance: |
| | The ground insulation resistance of electrical system is not less than $1M\Omega$ | Actually-measured resistance: | Actually-measured resistance: |
| Safety devices | The electrical interlock of base enclosure door is firm, reliable and complete | | |
| | The electrical interlock of cage is firm, reliable and complete | | |
| | The upper/lower limiters are complete, sensitive and reliable | | |
| | The upward/downward braking distance meets the specifications | | |
| | The up/down deceleration final limit switches are | | |

| | | | | | | | |
|--|---|--------|------------|--------|-----------------|--------|---|
| | complete, sensitive and reliable | | | | | | |
| | The overspeed safety device is confirmed as effective through test | | | | | | |
| Trial operation | No Load | | Rated Load | | 125% Rated Load | | Additional remarks: No load: Rated load: 1.25 times rated load: Tester: Test Date: |
| | Weight | Height | Weight | Height | Weight | Height | |
| | | | | | | | |
| | Inspect whether the drive system works smoothly, and whether there is any abnormal noise; whether the hydraulic system leaks (quick type); whether the control system is sensitive and reliable; whether the steel structure is permanently deformed and cracked; whether the brake is reliable; after adjusting a safety device, please test it for at least three times (The average value will be used). | | | | | | |
| Problems Identified through Acceptance Inspection: Inspector: _____ Date: _____ | | | | | | | |
| Correction: Signature for Correction: _____ Date: _____ | | | | | | | |
| Comments of Re-inspection: Signature for Re-inspection: _____ Date: _____ | | | | | | | |
| Inspection | Department | | Signature | | | Date | |



| | | | |
|-----------|---------------------------------|--|--|
| Personnel | Director | | |
| | Person in Charge of Erection | | |
| | Safety Supervision Department | | |
| | Technical Quality Department | | |
| | Equipment Management Department | | |

Date: Received by _____ Equipment Supervisor _____ Completed by _____



Acceptance Form for Commissioning of Limit Devices of Construction Hoist

S.J.J.B. (09)

| | | | |
|---|---------------|--|--|
| Name of Project | | Construction Site | |
| Construction Unit | | Person in Charge of Construction | |
| Model of Hoist | Equipment No. | Installed Height (m) | |
| Erection Date | From to | Person in Charge of Erection | |
| Lower limiter: whether effective _____, distance _____ mm; lower limit stopper: whether effective _____, distance _____ mm Upper limiter: whether effective _____, distance _____ mm; upper limit stopper: whether effective _____, distance _____ mm Base enclosure door limiter: whether effective _____, distance _____ mm | | | |
| Explanation on Situation: Signature of Operator: _____ Date _____ | | Explanation on Situation: Signature for Commissioning: _____ Date _____ | |
| Explanation on Situation: Signature of Director: _____ Date _____ | | Explanation on Situation: Signature of Supervisor: _____ Date _____ | |

Date: Received by _____ Equipment Supervisor _____ Completed by _____

Drop Test Form for Construction Hoist

S.J.J.B. (10)

| | | | | | | |
|-------------------|-------------------|--|---------------------------------------|------------------------------|------------|---------------|
| Name of Project | | | Construction Site | | | |
| Construction Unit | | | Person in Charge of Construction | | | |
| Model of Hoist | | Equipment No. | | Installed Height (m) | | |
| Erection Date | From to | | | Person in Charge of Erection | | |
| Personnel | Post | Test Requirements | | | | |
| 1 | Rated load | (1) | | | | |
| | | (2) | | | | |
| | | (3) | | | | |
| 2 | Counterweight | (1) | | | | |
| | | (2) | | | | |
| 3 | Cage | Lifted height before test: m | | | | |
| 4 | Date of drop test | Rated Speed of Hoist (m/s) | Braking Distance of Safety Device (m) | Left Cage | Right Cage | Other Remarks |
| | | $v \leq 0.65$ | 0.1-1.40 | | | |
| | | $0.65 < v \leq 1.00$ | 0.20-1.60 | | | |
| | | $1.00 < v \leq 1.33$ | 0.30-1.80 | | | |
| | | $1.33 < v \leq 2.40$ | 0.40-2.00 | | | |
| 5 | Weather | Wind velocity during test: | | Temperature during test: | | |
| 6 | Signature | Erection personnel: | | | | |
| | | Test personnel: | | | | |
| | | Operation personnel: | | | | |
| | | Safety officer (construction hoist leasing company): | | | | |

Date: Received by _____ Equipment Supervisor _____ Completed by _____

