



Especificaciones técnicas — Catálogo 2018

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1. Overview

1.1 Brief Introduction

·QTK40 Quick Erecting Tower Crane is a new type of tower crane for building construction developed by Institute of Building Mechanization China Academy of Building Research.

·The crane is wholly hauling, quickly erecting, vertically and horizontally transporting mechanical equipment for construction hoisting of detached buildings, seven storey civil buildings. If the crane raise the boom, it can be suitable for ten storey civil buildings. In addition, the crane can be also used for transporting and stacking goods on many occasions such as workshops, goods yards, stations, docks, etc., as well as mobile lifting and transporting machinery. (Figure 1)

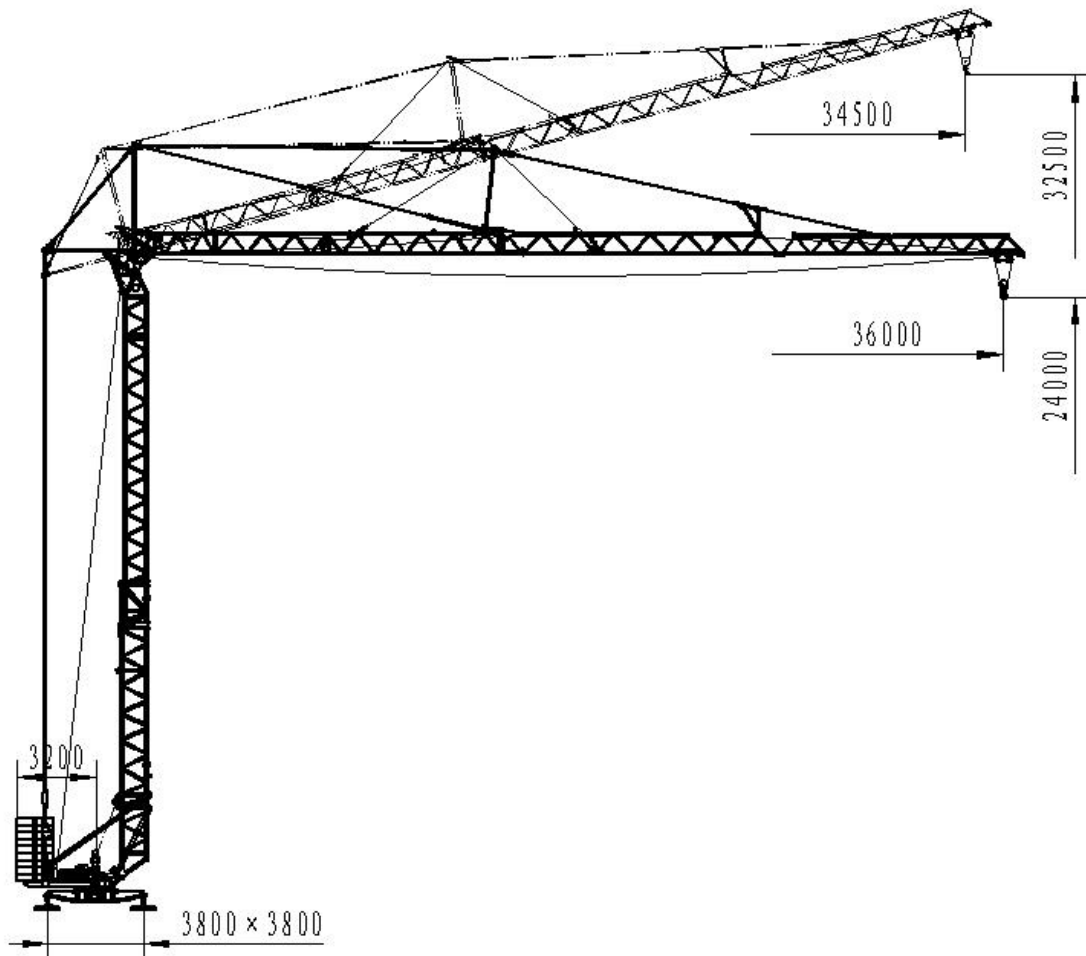


Figure 1

1.2 Main Features of QTK40

The remarkable feature of the crane is wholly hauling and quickly erecting. The crane can be hauled to the construction site by a tractor through crane's folding mechanism. With the help of two works, mechanism itself and a small truck crane, such as eight ton's truck crane, the erecting works of standing tower up, tower's extending, boom's spreading in the air and counterweight's loading can be finished in a few minutes. In addition, there are other features of the crane as follow:

- After extending the inner tower to the right place, the inner tower can be automatically locked or released.
- At the same time of the tower's extending, the boom can be automatically spread and folded in the air.
- At the any slewing angles from 0 degree to 360 degrees, the work can be done for tower's expanding and contracting, air boom's spreading and folding, counterweight's loading and uploading.
- The whole erecting work only need one hoister and one steel rope pulley system.
- There are two exchanging devices of orbit walking mechanism and fixed support feet device for being adapted to different purposes and enlarging the application range.
- The boom can be raised to 15 degrees from the horizontal plane for increasing the lifting height. When the boom is raised, the maximum weight is 1100kg.
- The frequency control for speed is used in lifting mechanism, slewing mechanism and walking mechanism. Shift with load for changing the speed is permitted.
- Torque motor and normally closed brake is used in slewing mechanism. At non working state, the brake can be opened by the worker. During starting and braking, the slewing mechanism runs smoothly and steadily.
- All the safety devices are equipped fully, sensitively and reliably.

1.3 Technical Performance

1.3.1 Parameter

Lifting Moment	k N·m.	400
Rated Lifting Capacity (Level Boom/15°Upwards)	t	1.1~4.0/1.1
Working Radius (Level Boom/15°Upwards)	m	4~36/4~34.5
Lifting Height (Level Boom/15°Upwards)	m	24/32.5
Orbit Distance×Axle Distance	m	3.8×3.8
Working Wind Level	level	6
Dead Weight	t	14.63
Counterweight	t	25.38
Tail Slewing Radius	m	3.2
Running Distance of Cable Drum	m	Left 20,Right 20
Rail Model	kg/m	43
Total Power	kW	25.9

1.3.2 Speed and Motor Power

Mechanism	Unit	Speed		Motor Power
Lifting Mechanism	m/min	$\alpha=2$	$\alpha=4$	11 kW
		0~29	0~14.5	
Pulling Mechanism	m/min	9.0		4 kW
Luffing Mechanism	m/min	20/30		2.2/1.5 kW
Walking Mechanism	m/min	0~24		2×1.5 kW
Slewing Mechanism	r/min	0~0.65		55 N·m

1.3.3 Lifting Performance of QTK40

Ratio of Hoisting Steel Wire Ropes $\alpha = 4$

R (m)	4-11	12	14	16	18	20	22
Q(kg)	4000	3654	3106	2696	2377	2122	1913
R (m)	24	26	28	30	32	34	36
Q(kg)	1739	1591	1465	1356	1260	1175	1100

Ratio of Hoisting Steel Wire Ropes $\alpha = 2$

R (m)	4-21	22	23	24	25	26	27	28
Q(kg)	2000	1913	1822	1739	1622	1591	1526	1465
R (m)	29	30	31	32	33	34	35	36
Q(kg)	1408	1356	1306	1260	1216	1175	1137	1100

15° jib upwards ($\alpha = 2$)

Working Radius R (m)	Maximum takeoff weight Q (kg)	maximum height of lift H (m)
3.5~34.5	1100	32.5

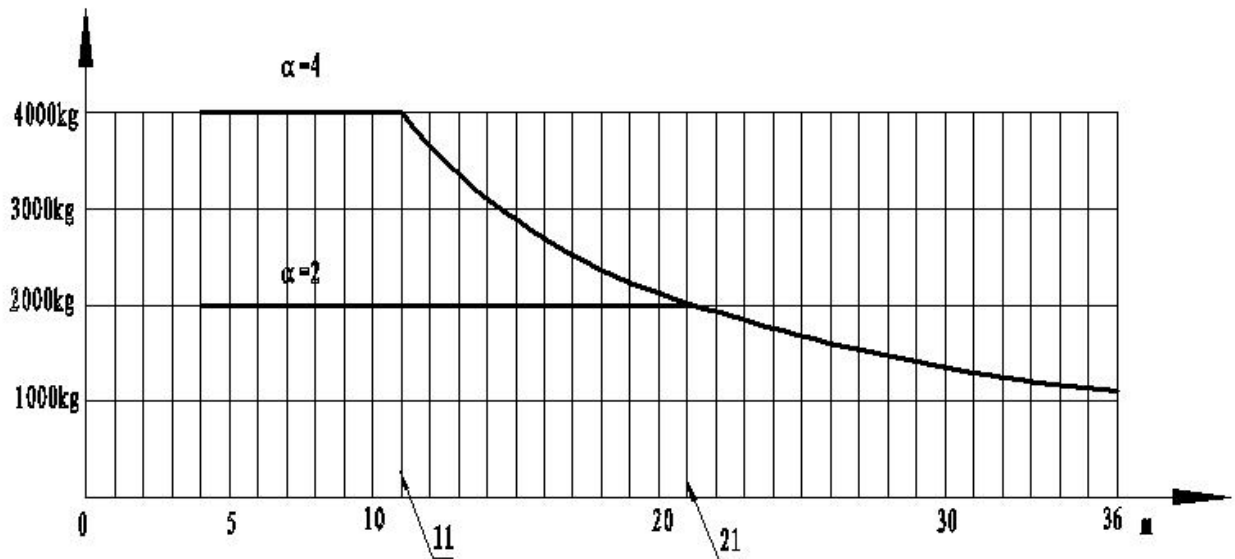


Figure 2: Characteristic Chart of lifting capacity and working radius

1.4 Main transit parameter

1.4.1 Railway Transport (Figure 3)

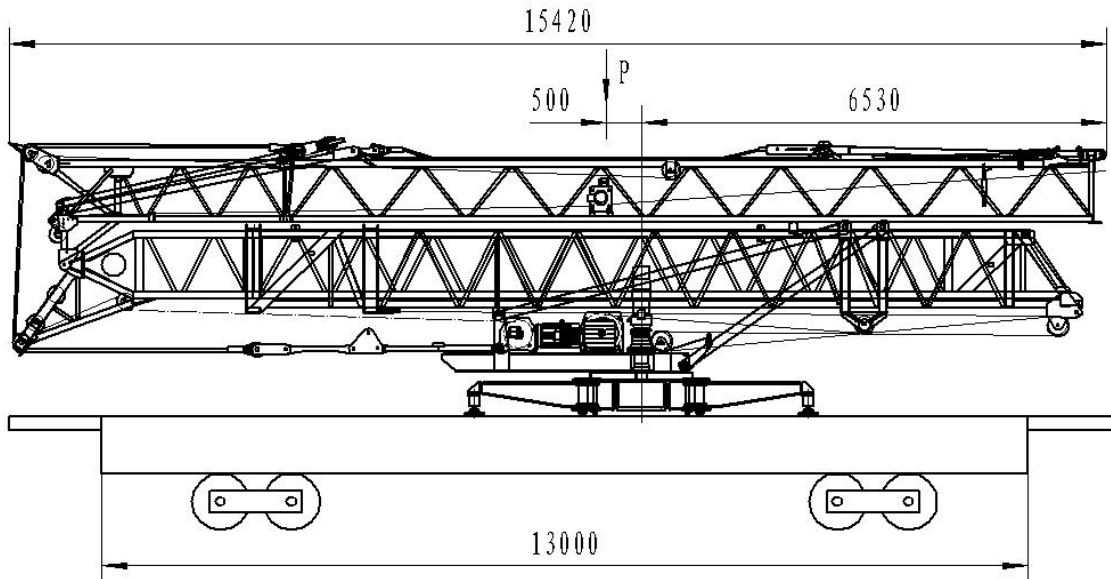


Figure 3

The total weight of the crane is about 16 tons, not including the tractor, and the center of gravity is about 0.5m away from the center of rotation.

Attention!

The below parts of QTK40 must be removed in order not to exceed limitation during railway transportation.

- The hauling mechanism of road transport.
- The track walking mechanism.
- Retracting Fixed supporting feet.
- For other matters, please refer to packing requirements and shipping list.

1.4.2 Road Transport (Figure 4)

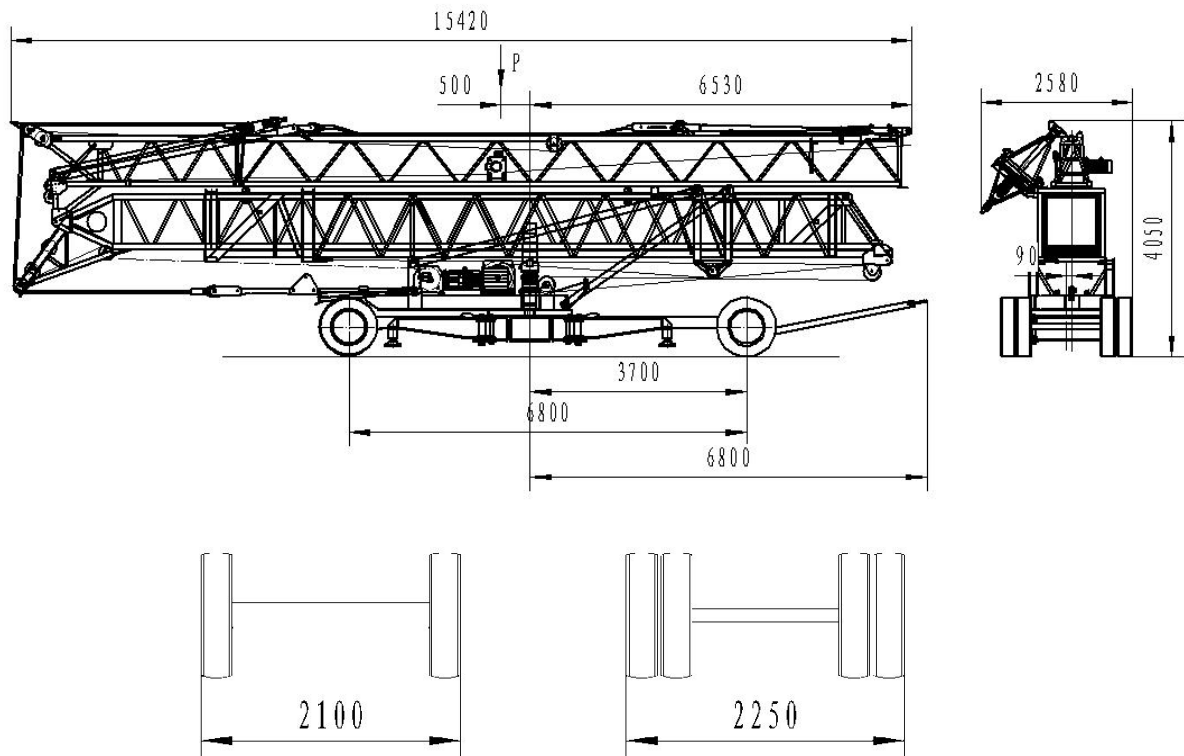


Figure 4

Tyre Load Chart

	Axle Load (t)	Tyre	
		Model	Number
Front Hauling	5380	9.00R20	2
Back Hauling	9250	9.00R20	4

1.5 Linkage Control Instruction

The linkage control panel is connected with the control box through a 24 core cable to realize long distance operation. The platform panel is shown as follows: (Figure 5)

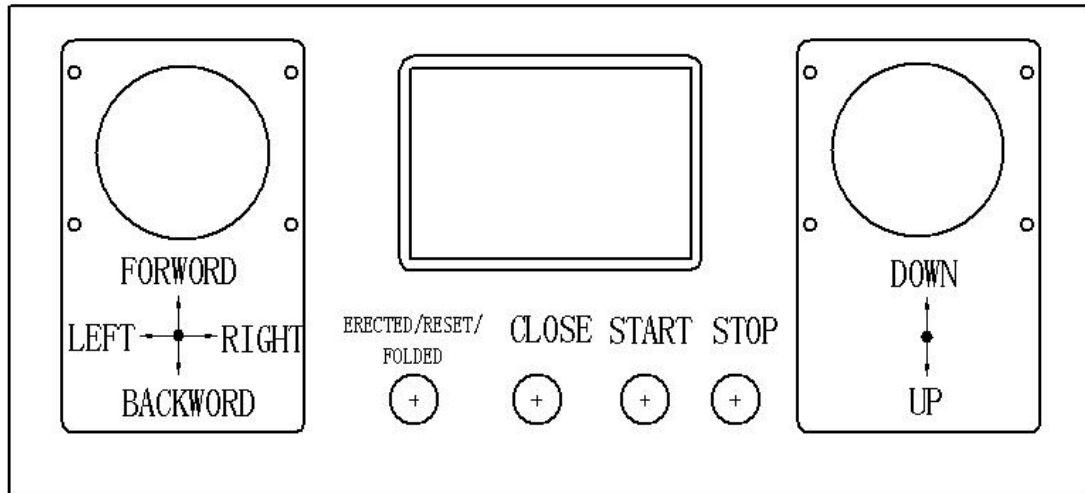


Figure 5

START: Turn on the control loop power button.

STOP: Emergency stop button for cutting off control circuit power supply in case of accident.

CLOSE: Button for hoisting height limitation during tower erection or dismantling.

ERECTED/RESET/FOLDED: Tower erecting/Zero position/Tower retracting.

FORWORD/BACKWORD: Trolley forward/ Trolley backward.

LEFT/RIGHT: Boom left turn/Boom right turn.

UP/DOWN: Hook up/ Hook down.

2. Container Shipment and Crane Assembly

2.1 List of Goods

2.1.1 Attachment File

- The attachment files include "Operating Instructions", "Product Qualification Certificate" and "List of Goods".
- The attachment files are packaged in plastic bags and packed in packing box for attachment spare parts.

2.1.2 Packing List

Serial	Drawing	Item	Number	Package	Note
1	H4	Hook Assembly	1	General	
2	K40.2	Crane carriage	1	General	
3	K40.3	Boom	3	General	Boom 1,2,3
4		Luffing Mechanism	1	General	
5	K40.4	Pull Rod Support System	1	General	
6	K40.5	Tower Body	2	General	Inner and Outer tower body
7	K40.6	Rear Inhaul Cable	1	General	
8	K40.7	Erecting Rod 1	2	General	One on each side
9	K40.8	Erecting Rod 2	2	General	One on each side
10	K40.9	Counterweight		Made by User According to the Drawing	
11	K40.10	Pulling Mechanism	1	General	
12	K40.11	Lifting Mechanism	1	General	
13	K40.12	Slewing Mechanism	1	General	
14	K40.13	Slewing Platform	1	General	
15	K40.14	Chassis	1	General	
16	K40.15	Driving Trolley	2	Box	
17	K40.16	Driven Trolley	2	Box	
18	K40.17	Electronic Control	1	General	
19	K40.18	Front Axle	1	Nude	
20	K40.19	Rear Axle	1	Nude	
21		Cable Drum	1	Box	

2.2 Preparation for Assembly

2.2.1 Receiving and Inspecting

·Each part of the crane must be checked carefully as soon as quickly after received, for confirming loss and damage of parts. Because the parts are easily lost and damaged in transport, in order not to affect safe operation and structural strength, it is important to find loss and damage in transport before installation. Any loss and damage is found, the user must immediately contact the manufacturer for repairs or replacement.

·The inspection should be done following the checklist.

★ Check that the shipment is complete according to the shipping list and shipping specifications.
★ Write down and describe all the loss and damages.
★ The parts must be properly supported to avoid sludge and water stains when stored locally.
★ The structural deformation is not allowed.
★ The crane rope must be clean, well lubricated and stored in rolls.
★ All connecting pins, washers and fasteners must be in place and lubricated properly, and can be installed at any time.
★ Repair scratch area paint.

2.3 Crane Assembly

2.3.1 Chassis Assembly

·Spread the leg of the chassis and put them on the square timber. Lock the legs with four groups of $\phi 35 \times 175$ pins and gourd pins, and make the legs level.(Figure 6)

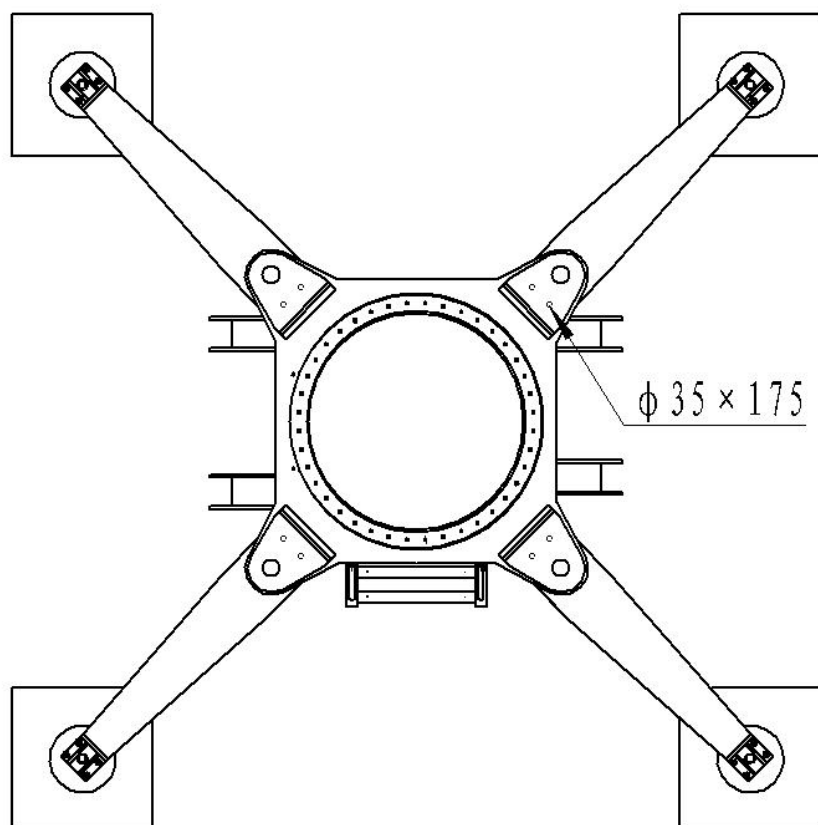


Figure 6

2.3.2 Installation of rotary table and mechanism

·Lift the up slewing platform and put it on the right place of the chassis slewing bearing. Connect the up slewing platform to the slewing bearing with M24x180 high strength bolts of grade 10.9. The tightening torque of the bolt is 1000N·m.(Figure 7)

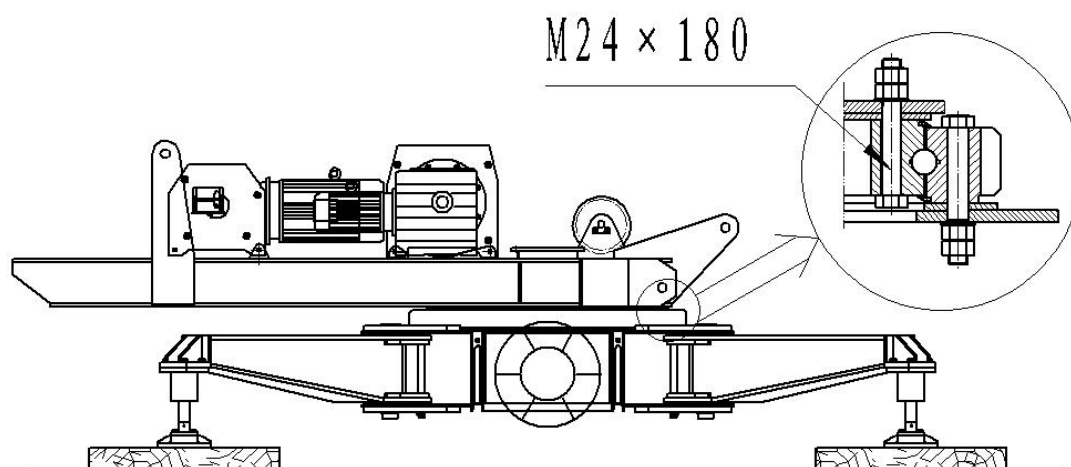


Figure 7

- Connect the slewing mechanism to the up slewing platform with M16x60 bolts.(Figure 8)

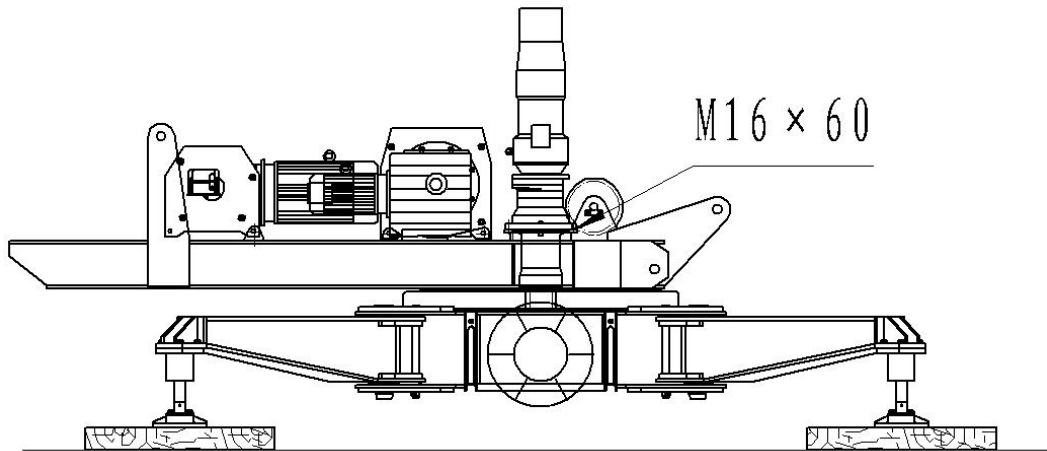


Figure 8

2.3.3 Assembly and installation of the tower body

- Remove the $\phi 35 \times 95$ pins to separate the outer tower body from the lower section of the inner tower body. Pull the lower section of the inner tower body out of the outer tower body about 2m, and connect the upper and lower section of the inner tower body with four M24x340 high strength bolts of grade 8.8, the tightening torque is 710N· M. Fix the pulley frame on the outer tower body with two M12x35 bolts. After completing the above work, pull the lower section of the inner tower body to the initial position, and fix it to the outer tower body with $\phi 35 \times 95$ pins and gourd pins.(Figure 9)

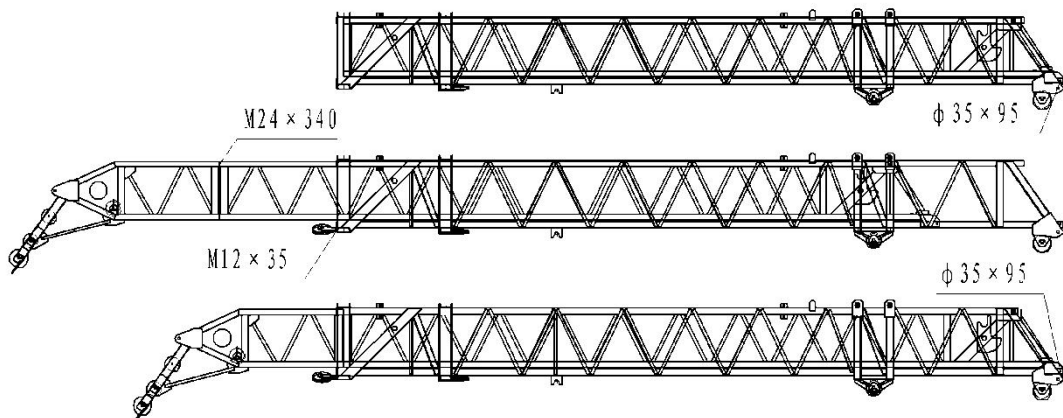


Figure 9

- Connect and fix the four erecting rods to the above assembled tower body with slotted nut and cotter pin at the position G. Pull up and bind the erecting rods securely to the tower body with lead wire.(Figure 10)

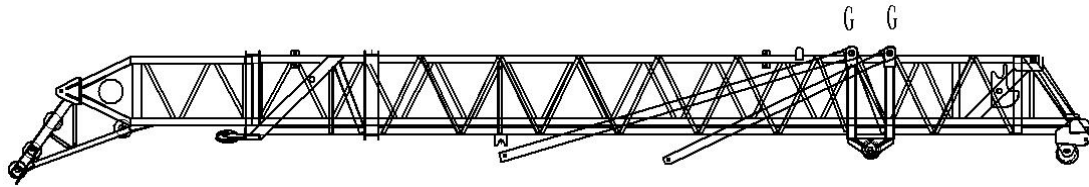


Figure 10

Lift the above finished assembly wholly and smoothly. Connect it to the up slewing platform through $\phi 55 \times 270$ pins for the longer erecting rods and $\phi 55 \times 290$ pins for the shorter erecting rods, and lock them with cotter pins. Put down the tower body slowly until the back plate K stuck on $\phi 55 \times 270$ pins. (Figure 11)

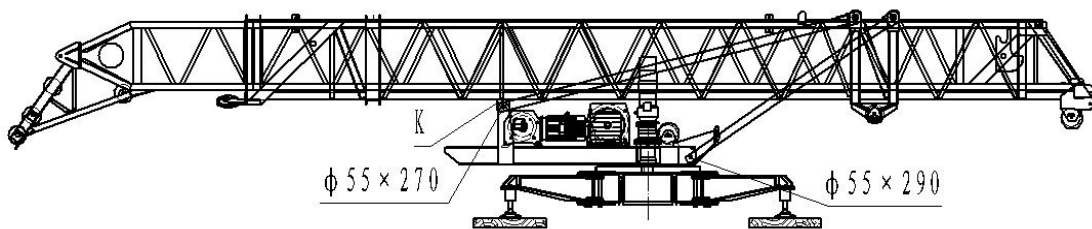


Figure 11

2.3.4 Threading of the erecting wire rope

Pulling drum 1 → Rope-aligning sheave 8 → Pulley 9 → Pulley 16 → Pulley 7 → Pulley 15 → Pulley 6 → Pulley 14 → Pulley 5 → Pulley 13 → Pulley 4 → Pulley 12 → Pulley 3 → Pulley 11 → Pulley 2 → Pulley 10 → Pulley 17 → Pulley 24 → Pulley 18 → Pulley 25 → Pulley 19 → Pulley 26 → Pulley 20 → Pulley 29 → Pulley 23 → Pulley 28 → Pulley 22 → Pulley 27 → Rope-end fixing wheel 21. (Figure 12)

Note: The outside G of the rope-end fixing wheel 20 is the fixed position for the rope end of folding boom.

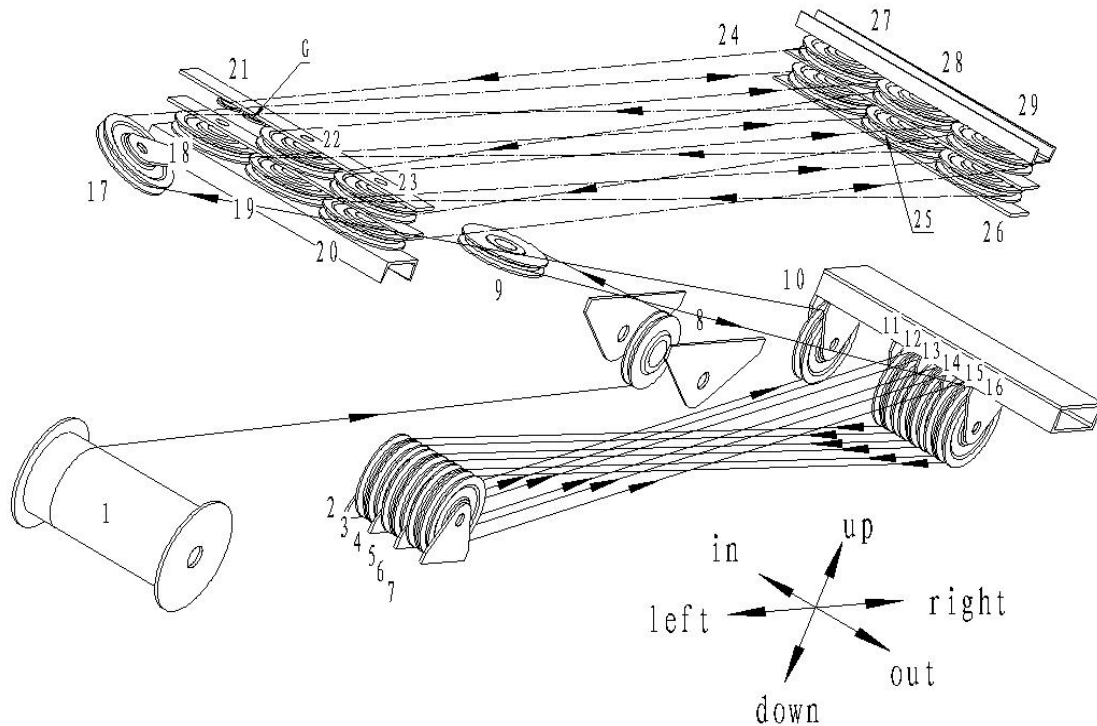


Figure 12

Serial	Name	Position	Wire rope winding	Note
1	Pulling drum	Up slewing platform	Upward	
8	Rope-aligning sheave	Middle and lower part of the outer tower body	Upward	
9	Pulley	Middle and upper part of the outer tower body	Outward	
16	Pulley	The seventh pulley of the pulley block at the bottom of the outer tower body	Downward	
7	Pulley	The sixth pulley of the pulley block of the up slewing platform	Downward	
15	Pulley	The sixth pulley of the pulley block at the bottom	Downward	

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		of the outer tower body		
6	Pulley	The fifth pulley of the pulley block of the up slewing platform	Downward	
14	Pulley	The fifth pulley of the pulley block at the bottom of the outer tower body	Downward	
5	Pulley	The fourth pulley of the pulley block of the up slewing platform	Downward	
13	Pulley	The fourth pulley of the pulley block at the bottom of the outer tower body	Downward	
4	Pulley	The third pulley of the pulley block of the up slewing platform	Downward	
12	Pulley	The third pulley of the pulley block at the bottom of the outer tower body	Downward	
3	Pulley	The second pulley of the pulley block of the up slewing platform	Downward	
11	Pulley	The second pulley of the pulley block at the bottom of the outer tower body	Downward	
2	Pulley	The first pulley of the pulley block of the up	Downward	

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		slewing platform		
10	Pulley	The first pulley of the pulley block at the bottom of the outer tower body	Upward	
17	Pulley	The inclined pulley at the top of the outer tower body	Upward	
24	Pulley	The first pulley of the lower pulley block at the bottom of the inner tower body	Outward	
18	Pulley	The first pulley of the lower pulley block at the upper of the outer tower body	Outward	
25	Pulley	The second pulley of the lower pulley block at the bottom of the inner tower body	Outward	
19	Pulley	The second pulley of the lower pulley block at the upper of the outer tower body	Outward	
26	Pulley	The third pulley of the lower pulley block at the bottom of the inner tower body	Outward	
20	Pulley	The third pulley of the	Outward	

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		lower pulley block at the upper of the outer tower body		
29	Pulley	The third pulley of the upper pulley block at the bottom of the inner tower body	Inward	
23	Pulley	The second pulley of the upper pulley block at the upper of the outer tower body	Inward	
28	Pulley	The second pulley of the upper pulley block at the bottom of the inner tower body	Inward	
22	Pulley	The first pulley of the upper pulley block at the upper of the outer tower body	Inward	
27	Pulley	The first pulley of the upper pulley block at the bottom of the inner tower body	Inward	
21	Rope-end fixing wheel	The first fixing wheel of the upper pulley block at the upper of the outer tower body		The locking rope include three rope clips.

2.3.5 Assembly and installation of the Boom

Note 1: The hoist cables should be binded on the upper chord of the boom when lifting single boom. It is permitted that the hoist cable is binded before the sway rods or after the sway rods, but not permitted in the middle of the sway rods.(Figure 13)

Note 2: Two hoist cables are used, whose diameter should be met to the weight and volume of the assembly.

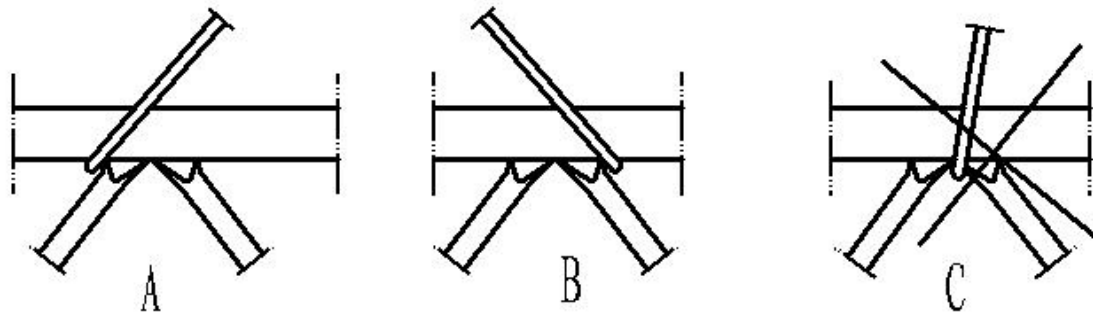


Figure 13

·Assemble the front section and back section of the first boom with one $\phi 45 \times 110$ pin and two $\phi 35 \times 170$ pins on the ground, and pad them. (Figure 14)

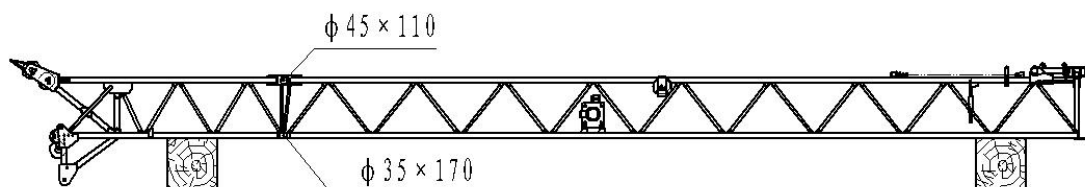


Figure 14

·Install tail A frame, over wheel group, two rigid pull rods, thin wire rope(effective length is 360mm), intermediate support frame, rear inhaul cable, $\phi 32$ inhaul cable, 9025mm long $\phi 24$ inhaul cable and the longest $\phi 24$ inhaul cable. (Figure 15)

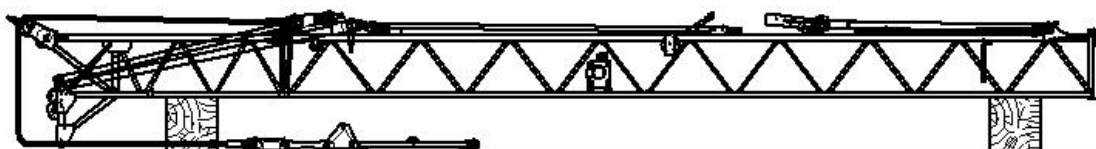


Figure 15

·Lift the second boom and align it to the cross connector of the head of the first boom, connect them with $\phi 45 \times 215$ pin and lock with round nuts. (Figure 16)

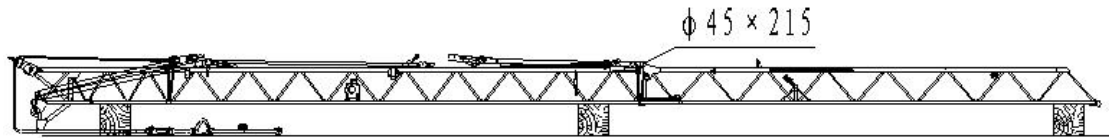


Figure 16

- Insert the trolley from the second boom.
- Connect the third boom to the second boom with $\phi 35 \times 160$ pins and lock with round nuts. Connect the tripod to the second boom with $\phi 35 \times 135$ pin and lock with round nut. (Figure 17)

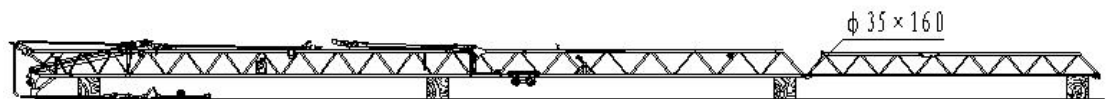
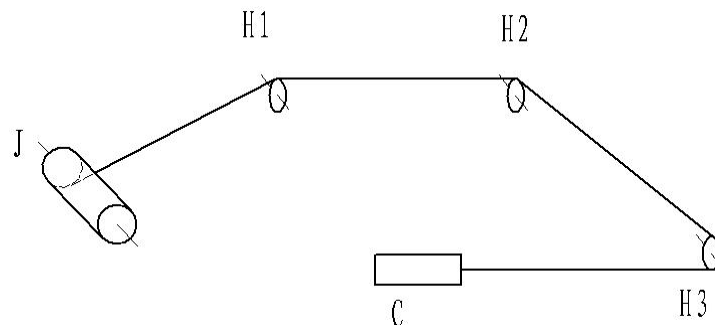
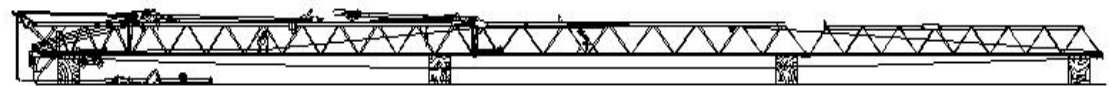


Figure 17

- Switch on the power supply of the luffing mechanism.
- Push the trolley to the root of the first boom and thread the front luffing rope, note that the rope comes out from the lower side of the drum. (Figure 18 and Figure 19)



J:Luffing drum; H1:Boom pulley 1; H2: Boom pulley 2;
H3:Boom end pulley; C: trolley

Figure 18

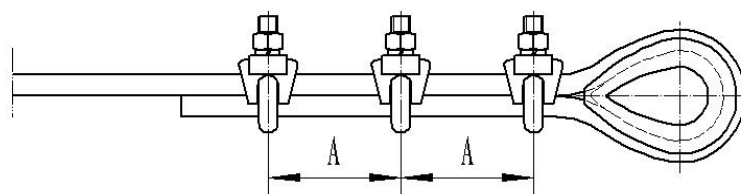


Figure 19

Note 1: The distance A is 6 to 7 times of the diameter of the wire rope.

Note 2: The strength of the fixing position is at least 80% of the wire rope's strength.

·Drive the trolley to the front and thread the back luffing rope. Drive the trolley forward and backward for adjusting the front and back limits. (Figure 20)

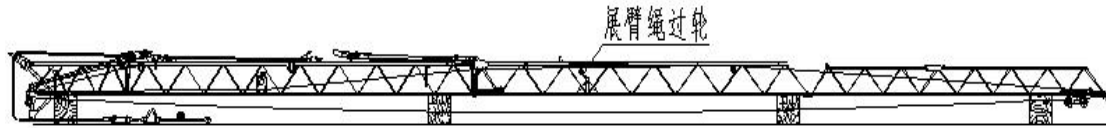


Figure 20

- Drive the trolley back to the position of **the spreading-boom rope's over wheel of the second boom**, and relieve two trolley's fixed rope end after temporarily fixing the trolley with lead wire.
- Remove the connecting pin for the boom 1,2 and3.
- Lift the second boom smoothly and turn it sideways to 90 degrees. Push the trolley to the root of the second boom and fix it with lead wire temporarily.
- Turn the third boom sideways close to the second boom, and make the bottom of the two booms touch. Connect them with $\phi 35 \times 160$ pins and lock with slotted nuts and cotter pins. Then bind the lower chords of the two boom together with lead wire. (Figure 21)

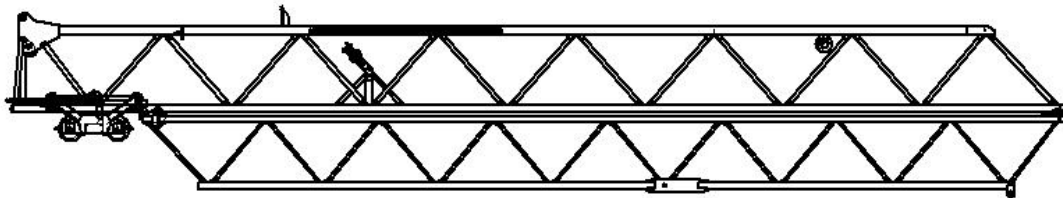


Figure 21

- Lift the assembly of the second boom and the third boom along with the trolley, and put them onto the top of the first boom. Connect above assembly to the first boom with $\phi 45 \times 215$ pin and lock with round nut. (Figure 22)

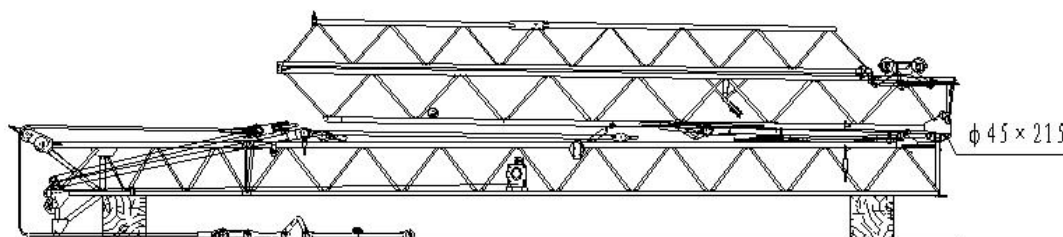


Figure 22

- Insert the telescopic pin of the first boom to the corresponding ear plate hole of the second boom through operating the crane's inching. (Figure 23)

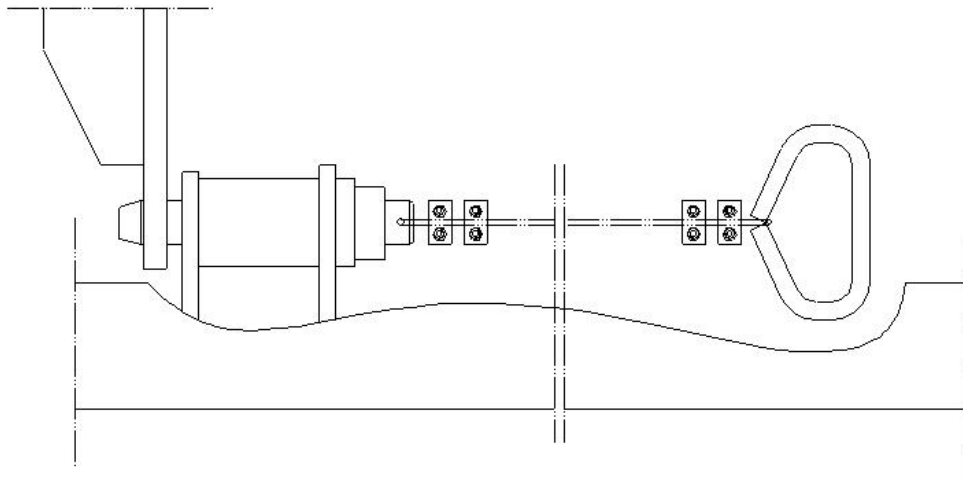
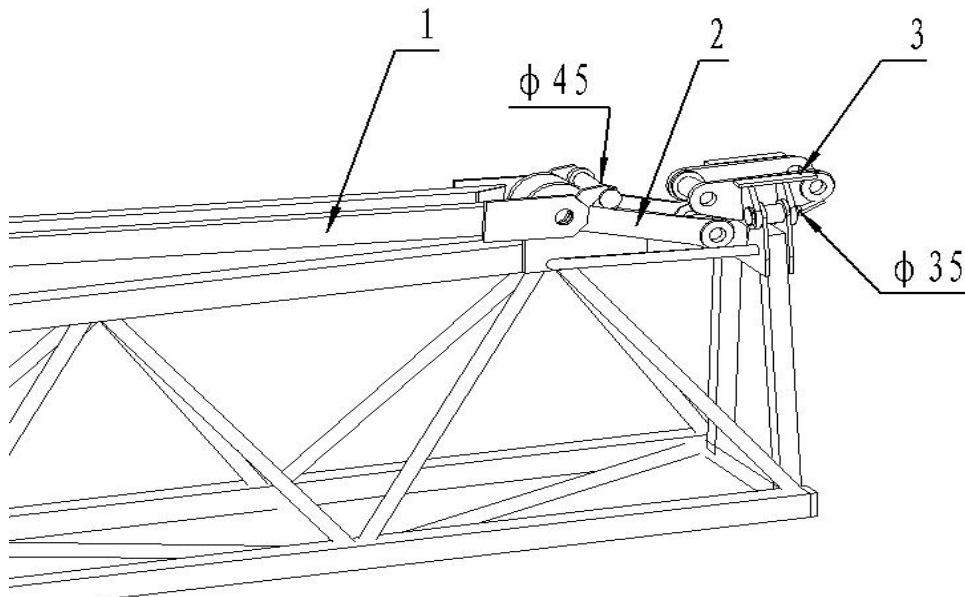


Figure 23

·Remove the $\phi 45 \times 255$ connecting pin between the first boom and pulling plate, and let the pulling plate hang naturally and stuck in the small inclined supporting rod of the first boom. Insert the removed pin to ear plate hole on the two pulling plate the moment that the baffle on the supporting rod is above the pin. (Figure 24)



1.Supporting rod; 2.Pulling plate; 3.Connecting frame

Figure 24

·Remove $\phi 35$ locking pin for flipping on the head of the first boom. Turn the second boom and the third boom in place against the first boom for setting barrier device ,and bind with lead wire. Connect the luffing rope end and the trolley. (Figure 25)

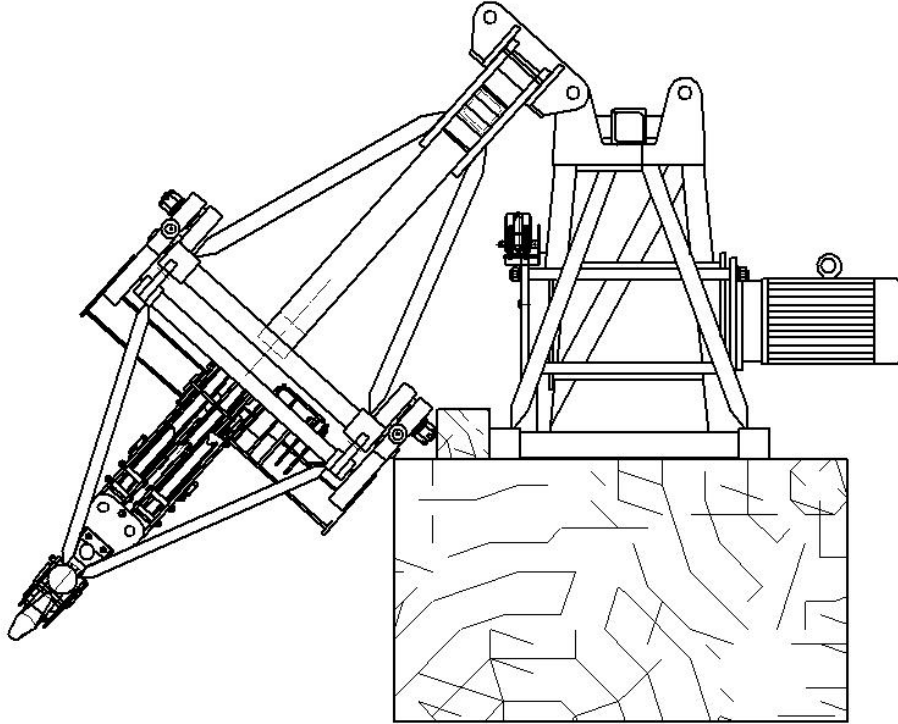


Figure 25

·Lift the boom wholly and align the shaft hole at the root of the boom with the corresponding shaft hole at the top of the tower body. Insert $\phi 55 \times 1030$ pin and lock with round nut. Connect and fix the rear Inhaul Cable to the up slewing platform with $\phi 55 \times 150$ pin, and lock with cotter pin. (Figure 26)

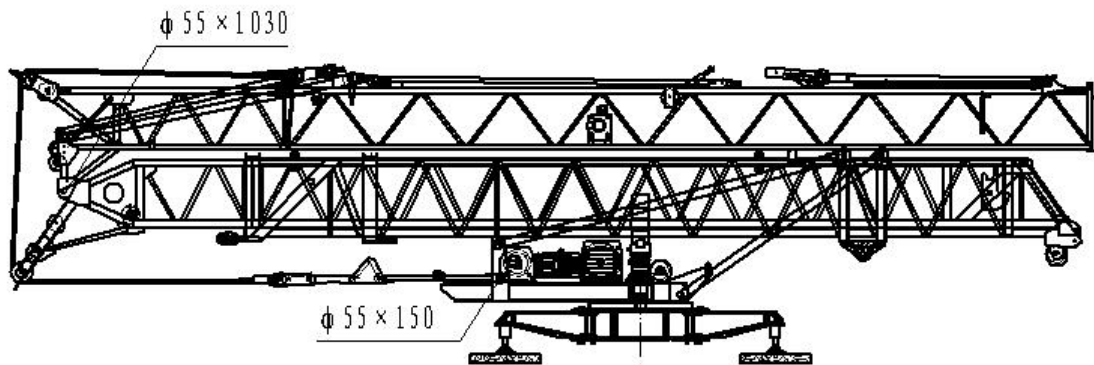


Figure 26

·Thread the luffing wire rope and fix it at the original rope end.

2.3.6 Threading of the spreading-boom wire rope

Rope-end fixing wheel 1 → Pulley 2 → Pulley 3 → Pulley 4 → Pulley 9 → Pulley 5 → Pulley 10 → Pulley 6 → Pulley 11 → Pulley 7 → Pulley 12 → Pulley 8 → Pulley 13 → Pulley 14 → Pulley 16 → Rope-end fixing wheel 15. (Figure 27)

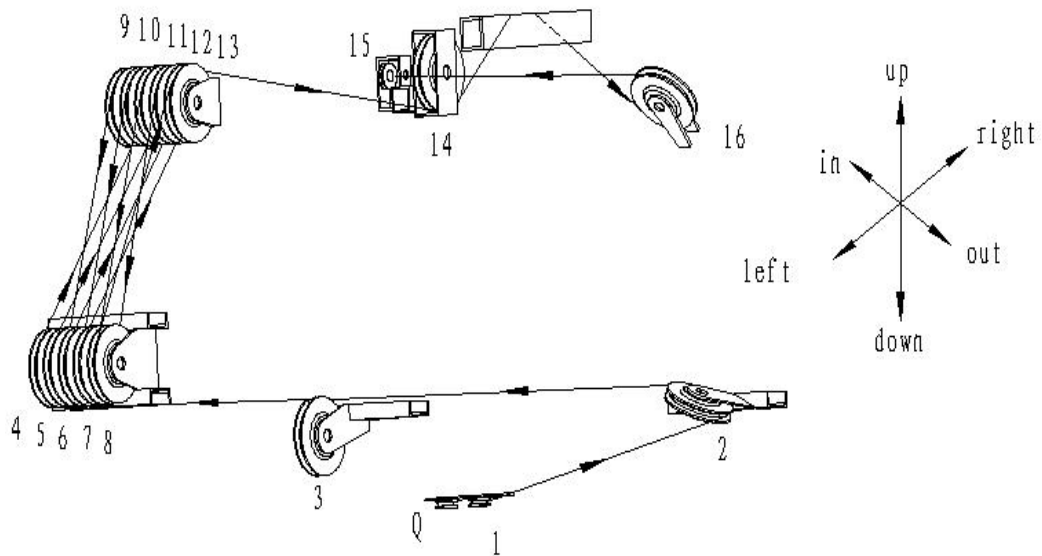


Figure 27

Serial	Name	Position	Wire rope winding	Note
1	Rope-end fixing wheel	Outer tower body		The locking rope include four rope clips.
2	Pulley	On the bottom beam of inner tower body	Inward	
3	Pulley	Upper section of inner tower body	Upward	
4	Pulley	The first pulley of the middle pulley block at the top of the inner tower body	Leftward	
9	Pulley	The first pulley of the pulley block at the root of the boom	Leftward	
5	Pulley	The second pulley of the middle pulley block at the top of the inner tower body	Leftward	
10	Pulley	The second pulley of the pulley	Leftward	

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		block at the root of the boom		
6	Pulley	The third pulley of the middle pulley block at the top of the inner tower body	Leftward	
11	Pulley	The third pulley of the pulley block at the root of the boom	Leftward	
7	Pulley	The fourth pulley of the middle pulley block at the top of the inner tower body	Leftward	
12	Pulley	The fourth pulley of the pulley block at the root of the boom	Leftward	
8	Pulley	The fifth pulley of the middle pulley block at the top of the inner tower body	Leftward	
13	Pulley	The fifth pulley of the pulley block at the root of the boom	Leftward	
14	Pulley	Middle part of the boom 3	Downward	
16	Pulley	Middle part of the boom 2	Outward	
15	Rope-ended fixing wheel	Middle part of the boom 3		The locking rope include four rope clips.

2.3.7 Threading of the lifting wire rope

Lifting drum → Lifting pulley of the inner tower body 2 → Pulley at the root of the boom 3 → Cross bar of the boom 4 → Cross bar of the boom 5 → Trolley pulley 7 → Trolley pulley 11 → Hook pulley 9 → Trolley pulley 6 → Hook pulley 8 → Trolley pulley 10 → Wedge Sleeve of the boom 12. (Figure 28)

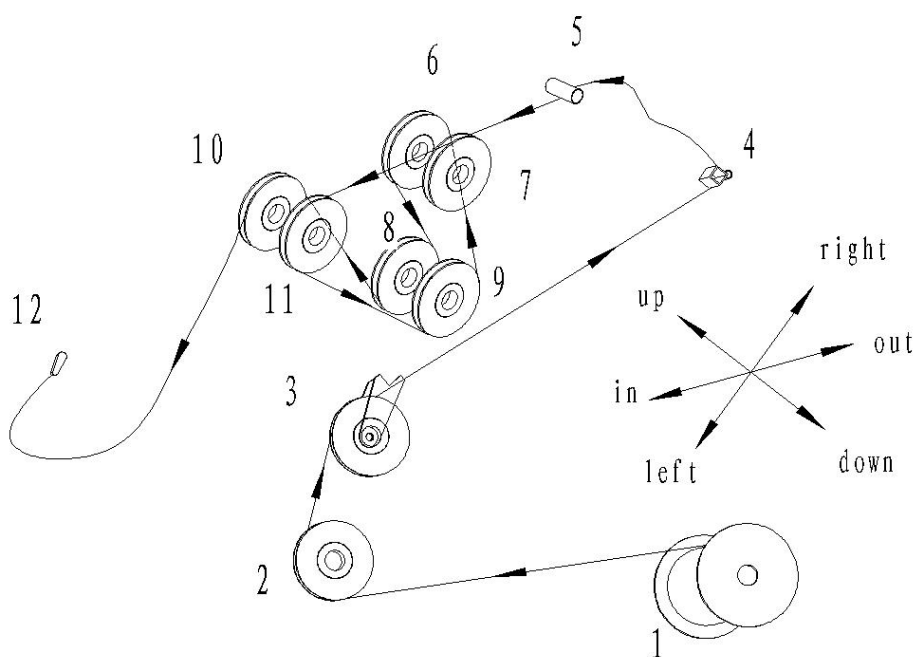


Figure 28

Serial	Name	Position	Wire rope winding	Note
1	Lifting drum	Slewing platform	Upward	
2	Pulley	On the top of the inner tower body	Leftward	
3	Pulley	At the root of the boom 3	Upward	
4	Pulley	beam 55x55 of the boom 3	Rightward	
5	Pulley	Steel pipe $\phi 60$ of the boom 2	Downward	
7	Pulley	The first pulley on the right of the trolley	Upward (not threading)	
11	Pulley	The first pulley on the left of the trolley	Leftward	

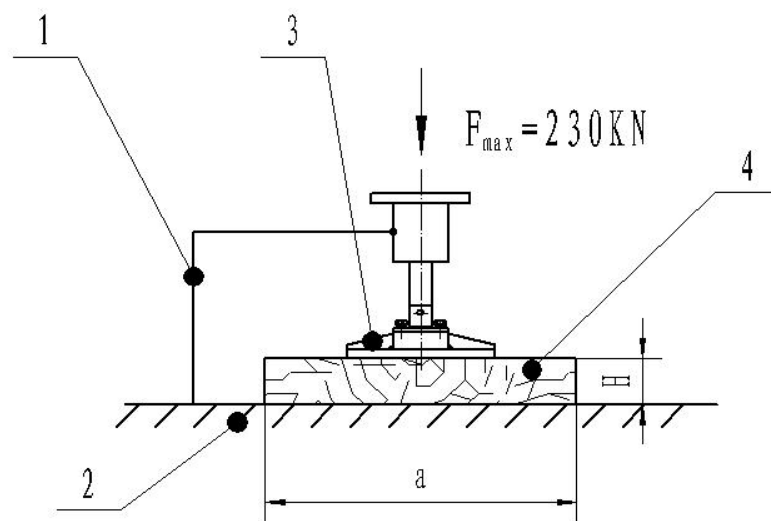
Manual for QTK40 Self Erecting Crane

9	Pulley	Lower layer of the hook	Rightward	
6	Pulley	The second pulley on the right of the trolley	Leftward	
8	Pulley	Upper layer of the hook	Leftward	
10	Pulley	The second pulley on the left of the trolley	Upward	
12	Wedge Sleeve	The front of the boom 1		The locking rope include three rope clips.

2.3.8 Others: Install remaining pulling cables and tripod.

3. Requirements for Base and Counterweight

3.1 Foundation Condition for Fixed Installation



1. Grounding as required by relevant regulations
2. Tamping foundation
3. Supporting foot at the bottom of the crane
4. Anti-skid wooden board

Figure 29

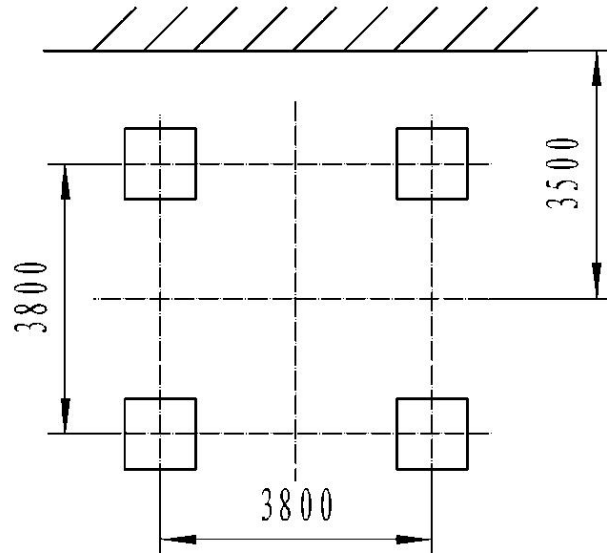


Figure 30

The size of the wood padding

Ground bearing capacity (MPa)	$a \times a(\text{m})$	H (mm)
0.1	1.65×1.65	120—150
0.2	1.15×1.15	120—150
0.3	0.95×0.95	120—150

3.2 Foundation Conditions of Track Installation (Figure 31)

- The maximum wheel pressure is 230kN.
- The maximum permitted width of rail surface is 70mm.

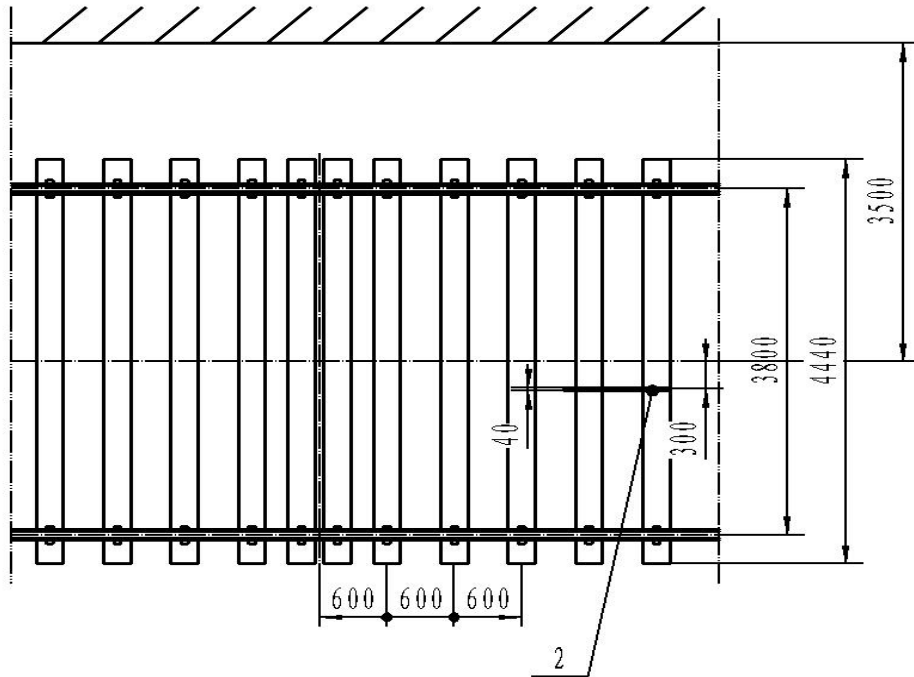


Figure 31

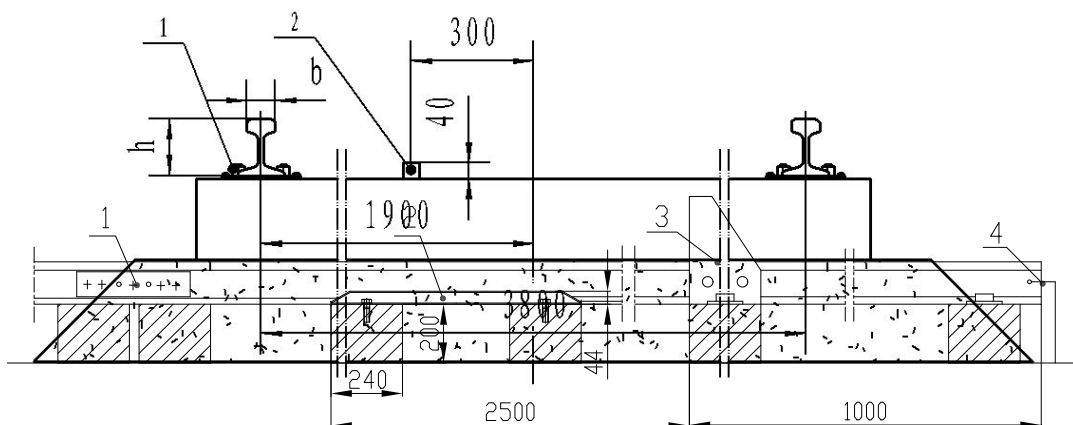
1. Connect the fishplate with 50mm² copper wire. (User self-made)
2. Limiter touching block (User self-made)
3. Track terminal blocking iron (User self-made)
4. Grounding as required by relevant regulations.

3.2.1 Rail specification: 43kg/m (GB/T 181-1963)

3.2.2 The minimum distance between the track center line and the building edge is 3.5 meters, including scaffolding and similar facilities.

3.2.3 Track technical condition

- Track subgrade must be flat and tamped for that the bearing capacity of subgrade is not less than 0.1Mpa. The joint position of the two rails should be staggered over 1.5 meters for each other.
 - The size of the ballast for macadam paving should be the range 5cm to 8cm and the paving height should be not less than 250mm.
 - The following requirements shall be met after installation of crane track.
- ★ The vertical and horizontal slopes are not greater than 1/1000.



- ★ The gauge error is not greater than the nominal value of 1/1000 and its absolute value is not greater than 6mm.
- ★ The clearance of rail joint is not greater than 4mm and the height difference of the two rail's top at the joint is not greater than 2mm.
- Both ends at the top of the rail should be equipped with travel switch baffle and terminal block. The distance between the baffle and the block should be not less than 2.5m, and the distance between block and rail end shall be not less than 1m.
- The track shall be connected to the good electrical grounding device.
- Within 15m length of track from one end of the track, the tamped surface and the top surface of the sleeper must be located at the same horizontal level to ensure the crane smoothly enter into the site.
- When the crane hauled to the parking site, the front and back hauling wheel should be in between the two sleepers, where the surface should be filled and tamped. When the front and back hauling wheel pressed on the ground, the surface should be 30~50mm higher than the surface of the sleeper.

3.3 Requirements for Counterweight

- The counterweight should be made by the customer according to the dimension and the position of locating sleeve and lifting hole, which are shown in the drawings. In order to ensure the quality of counterweight, it is permitted to change the dimension for height and arrangement for concrete iron, but it must be avoided of counterweight's breaking and crushing during lifting the counterweight.
- There are nine pieces of counterweight in total, whose surface should be smooth and tidy. The strength grading of concrete should be not less than C25. The weight of each counterweight is 2860kg, and the weight error of each counterweight is not more than $\pm 1\%$. The outline dimensions of the counterweight is shown in figure 32.

29

4. Requirement for Erecting space

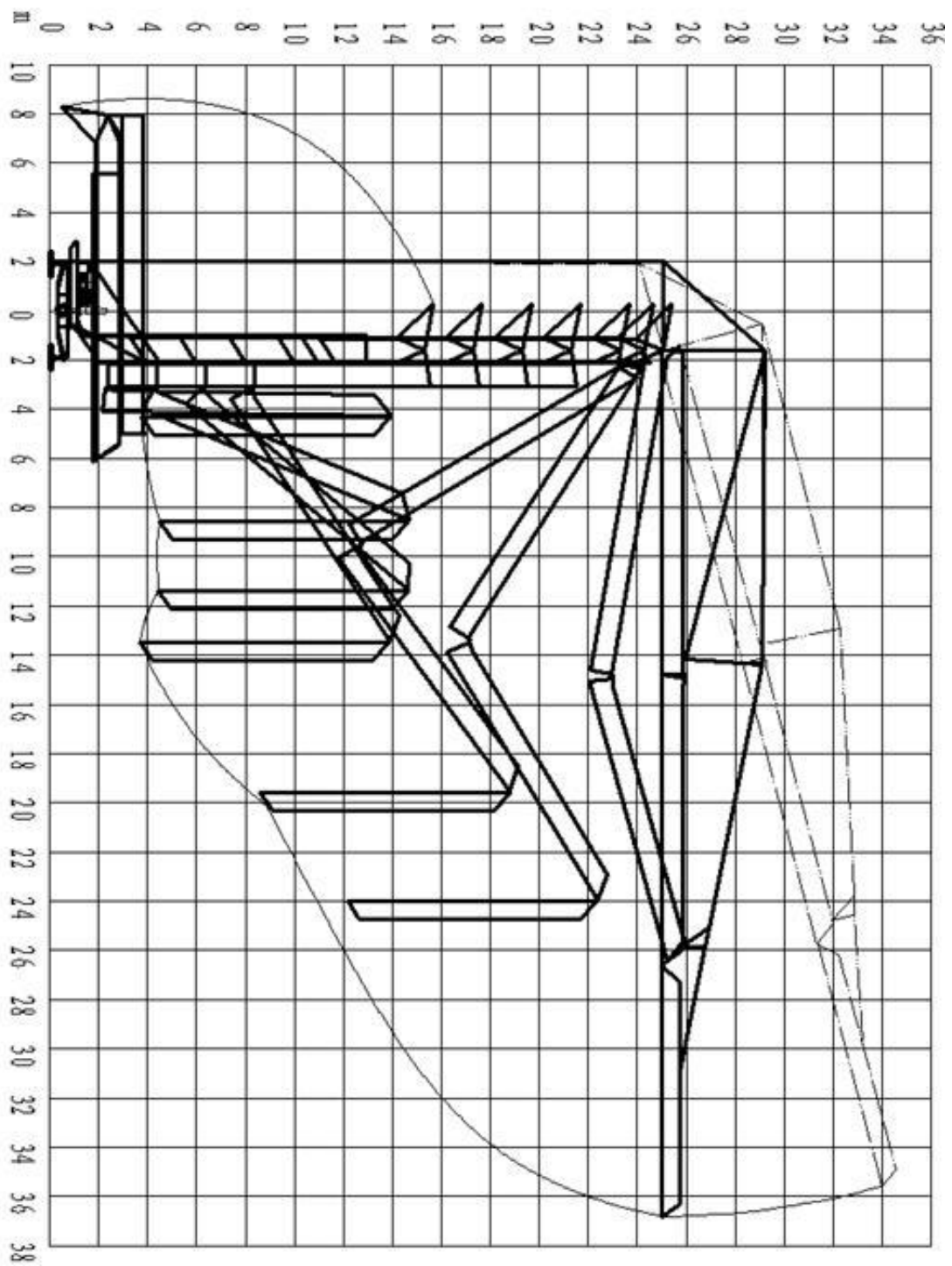


Figure 33

5. Preparation for Erecting

5.1 General

5.1.1 The following points should be considered before crane erecting.

- The crane's components must be inspected to meet the working conditions.
- Suitable truck crane, labour, related tools and so on must be provided.
- The manager for erecting must be assigned incharge of erecting and debugging.

Note: If wind speed exceeds 12m/s or a bad weather is predicted, all the work should be stopped.

5.1.2 The following item must be done for safe operation.

- The truck crane must be docked and supported steadily, ensuring that the truck crane will not turn over during lifting.
- Overload is prohibited.
- Sling should be chosen according to weight of lifting parts and attention should be paid to the lifting position.

5.1.3 The erecting work must be followed by the specified procedure.

5.1.4 In the following description, the pin, high-strength bolts and hinged bolts are made of high strength steel and prohibited to be replaced strictly. The place where clearly required to use gourd pins to lock, must be strictly prohibited to use the cotter pins and other non-standard ways to lock. The place where using the cotter pins to lock, the cotter pins must be fully opened to ensure their effectiveness, and the cotter pins are prohibited to be reused.

5.2 Requirements for Site

- After the crane being hauled to the site, the free area shown in the figure 32 should be provided.

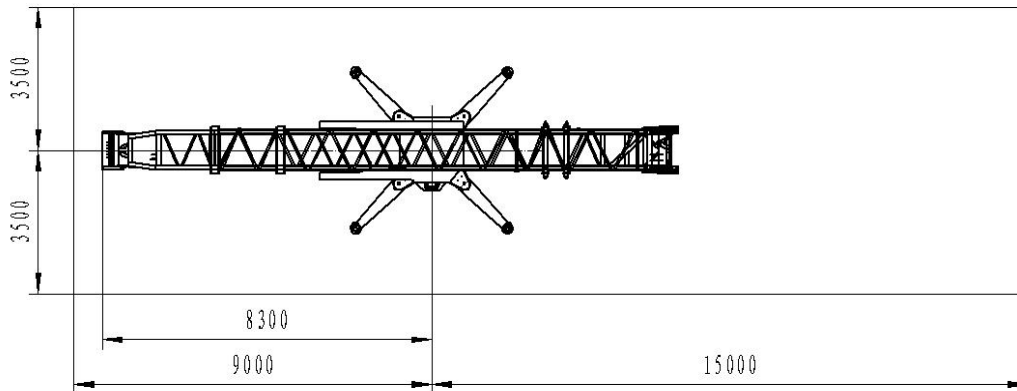


Figure 34

5.3 Preparation for Erecting

5.3.1 Remove all the bound lead wire and release the pulling cable, rope and electrical cable from the boom or tower body. Remove the two bolts (M20×200mm) which connected to the slewing platform and the bottom frame

5.3.2 Fix and level the supporting legs (Figure 35)

·When crane is used as fixed form, each of the four legs is rotated 45°, placed on square timber, connected to the chassis with $\phi 35 \times 175$ pin and gourd pin. Rotate adjusting screw to adjust the ground clearance of the front and back axle to 20-30mm.

·When crane is used as walking on the track, each of the four legs is rotated 45°, connected to the chassis with $\phi 35 \times 175$ pin and gourd pin. Use hydraulic jacks to place the crane on the track and fix the clip rail device.

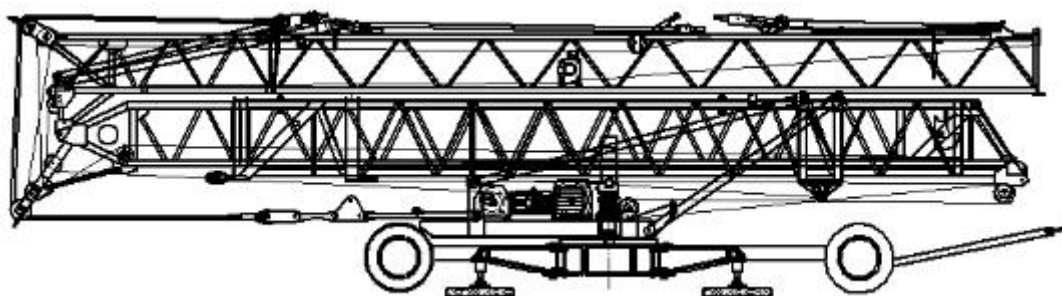


Figure 35

5.3.3 Disconnect the brake line, the indicator line connected to the hauling axle. Remove the connecting pin for the hauling axle and the chassis and withdraw the hauling device. (Figure 36)

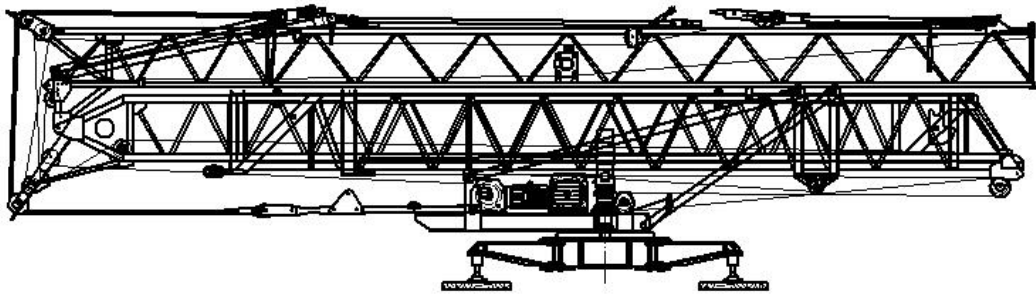


Figure 36

5.3.4 Connect the crane to the ground and then turn on the power. Check whether the power phase sequence and the electrical components are connected and whether there is appearance of loose contacts, if appearing, it must be repaired in time. Set a temporary total power switch at the position for expedient operation.

5.3.5 Check whether the pins are locked firmly, whether the wire ropes are all in the pulley groove and whether the wire ropes for spreading boom are stretched or too loose, if necessary, it can be done to adjust open screw.

5.3.6 Check and understand the electrical control device (Electrical schematic diagrams and wiring diagrams can be seen in the attached drawings)

- All the movements of the crane are controlled by the linkage control panel, and the operator must be familiar with the electrical schematic diagrams and wiring diagrams.

- Check the wiring and electrical components according to the drawing. If there is damage or loose contacts, it must be repaired in time.

5.3.7 Clear all the obstacles which may obstruct the crane's erecting.

5.3.8 The operator must be familiar with erecting procedure.

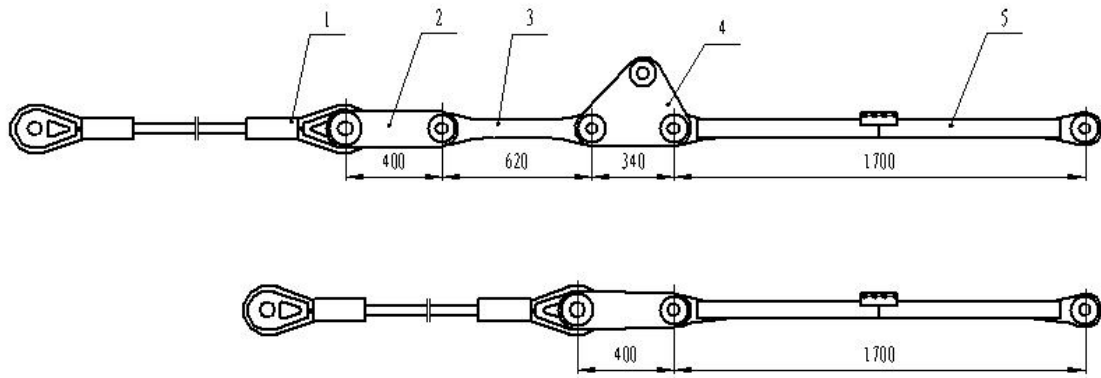
6. Erecting and folding for Crane

6.1 Erecting for Crane

6.1.1 Standing tower up

- Remove all the binding wire before standing up.

- When the crane is used for that the boom is 15° above the horizontal, it is needed to remove the pull rod 3 and triangular plate 4 of the rear inhaul cable, for making the both ends of the transition plate connect to the cable and torque limiter respectively. (Figure 37)



1: Cable; 2: Transition plate; 3: Pull rod; 4: Triangular plate; 5: Torque limiter

Figure 37

Before standing up for erecting tower, it should be done to check the function of the brake.

Inspection method: Pull up the tower body slowly and stop when the tower body is 10mm away from the back supporting shaft, making sure the brake is reliable. In addition, it can be done to fix hook temporarily with lead wire for avoiding hook's scratch during standing the tower up.

6.1.2 Put the linkage control panel to the position for operation, where is far away from the crane and is suitable to observe. Erect the tower slowly until the connecting pin for slewing platform and outer tower body can be inserted (Figure 38). And then insert the gourd pin to the $\phi 55 \times 140$ pin and make sure that it is reliable. During the process, it is needed to release a certain rope from the lifting mechanism. When standing the tower up, press the "CLOSE" button to make the lifting height limiter to be disabled temporarily.

Note 1: If the crane can't be stop because of the electrical fault, the main power supply should be cut off immediately.

Note 2: The rope can not be stuck when standing the tower up.

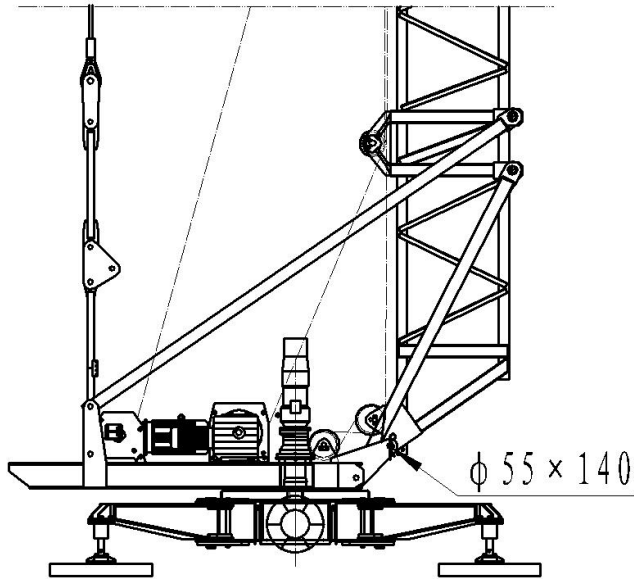


Figure 38

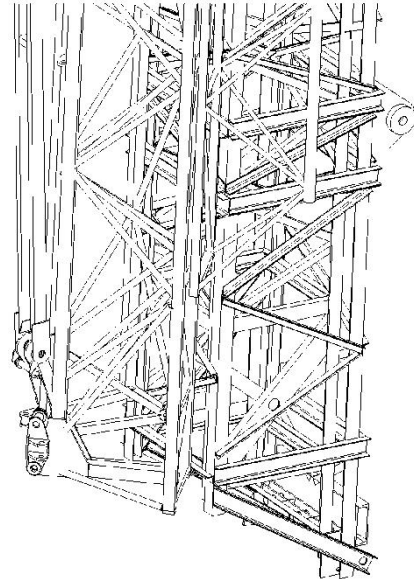


Figure 39

6.1.3 Push the boom 2 and the boom 3 to the predetermined position by manpower and rotate the pulling plate to the right position (Figure 40). Connect the $\phi 45$ pin for the boom 1 and pulling plate, and lock with gourd pin. Connect the $\phi 35$ pin for the boom 1 and the outer side of the connecting frame, and lock with gourd pin. Make the telescope pin to be separated from the ear plate hole of the boom 2 (Figure 41).

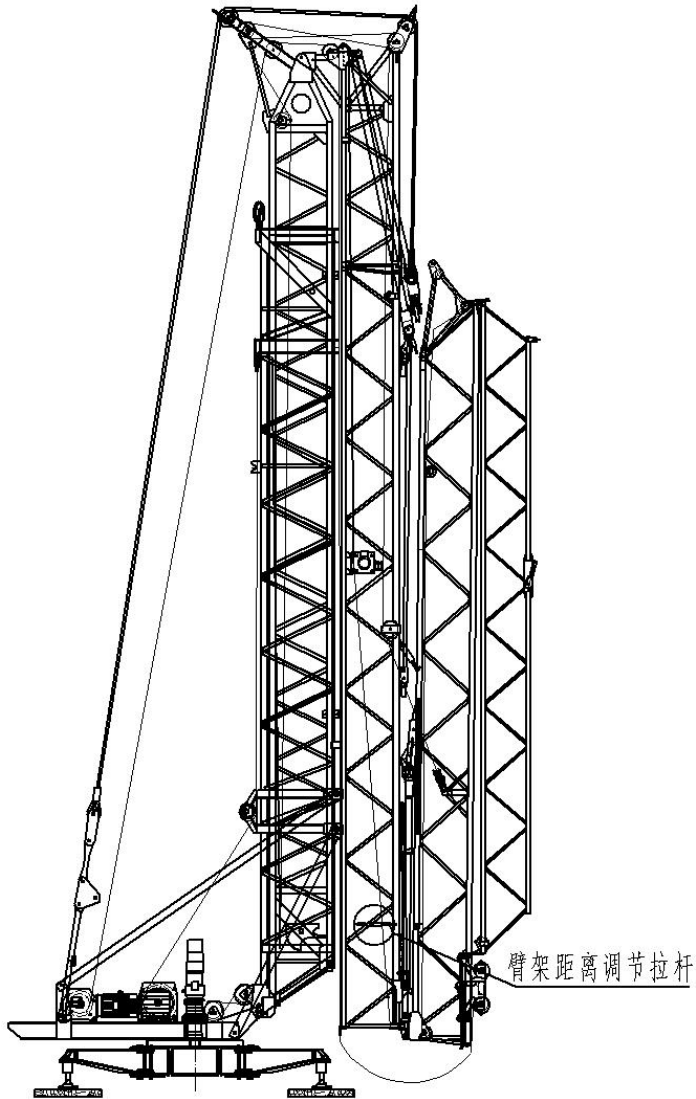


Figure 40

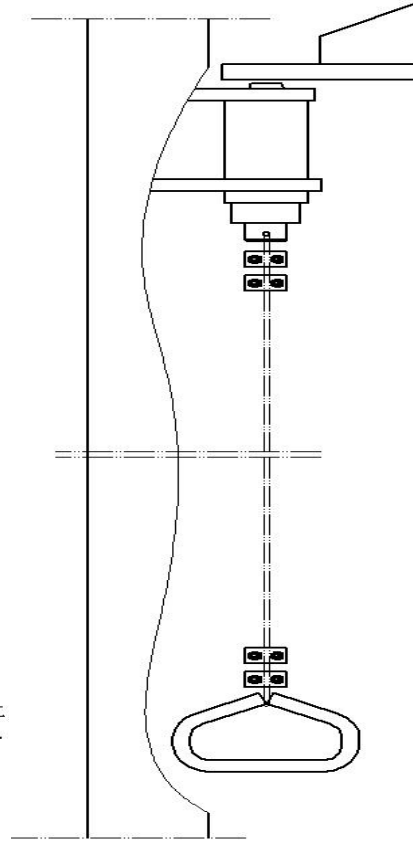


Figure 41

6.1.4 Installation for counterweight: Hoist the six counterweights to the right position with the help of the truck crane and locate them with locating pin. The weight of each counterweight is about 2860kg. All the counterweight must be installed neatly and stably. (Figure 42)

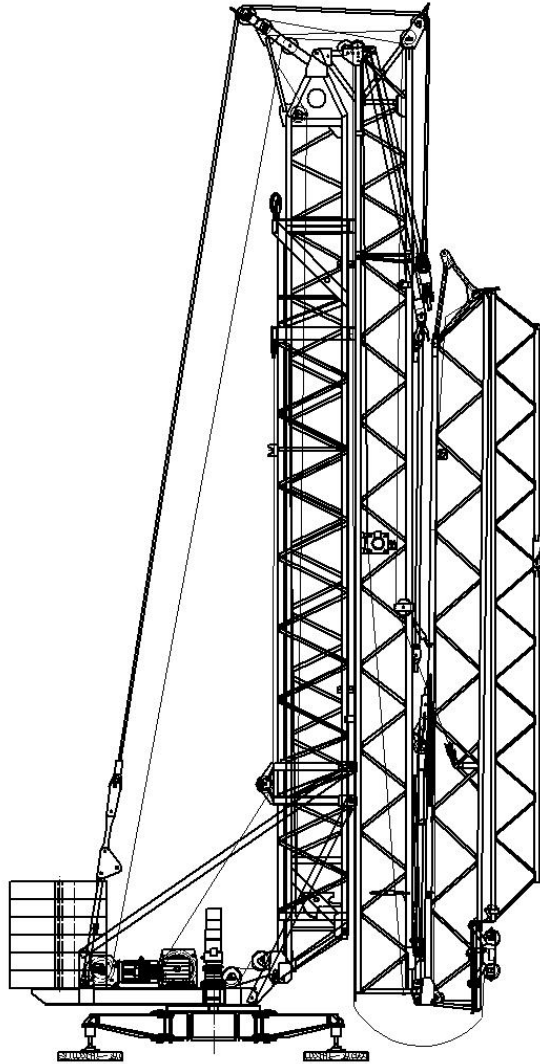


Figure 42

6.1.5 Rising tower and spreading boom in the air

·The following items should be checked before lifting the tower:

- ★Whether the position of the pawl of automatic locking device for inner and outer of the tower body is right.
- ★The rotation of the pawl must be flexible, and whether the pawl can be back to the initial position automatically after a certain angle of rotation.
- ★Whether the trolley luffing rope, hoisting rope and inhaul cables are get stuck.

·After inspecting, remove the the lead wire which be used to fix the hook temporarily and remove the $\phi 35 \times 95$ pins for inner and outer of the tower body.
(Figure 43)

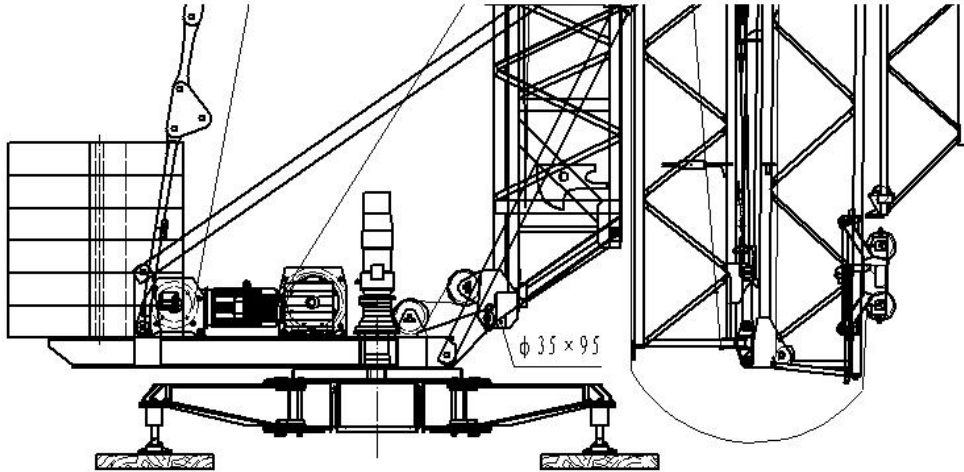


Figure 43

- Rise the tower slowly. And during this process, it is needed to release a certain rope from the lifting mechanism. When standing the tower up, press the "CLOSE" button to make the lifting height limiter to be disabled temporarily.
- Go on rising the tower slowly and spread the boom in the air as showed in the figure 44.

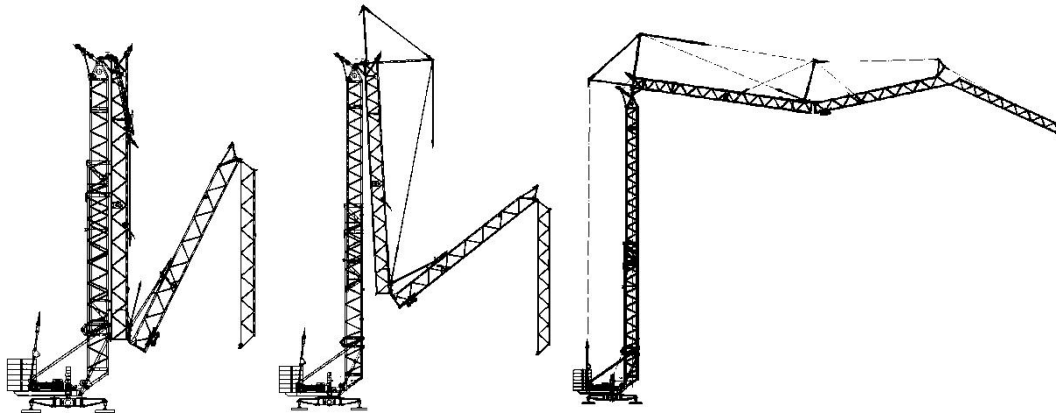


Figure 44

- Until the pawl of the inner tower body is embedded into the position of the horizontal beam on the supporting rod of the outer tower body, shrink the inner tower body downwards for locking the pawl on the horizontal beam. (Figure 45)

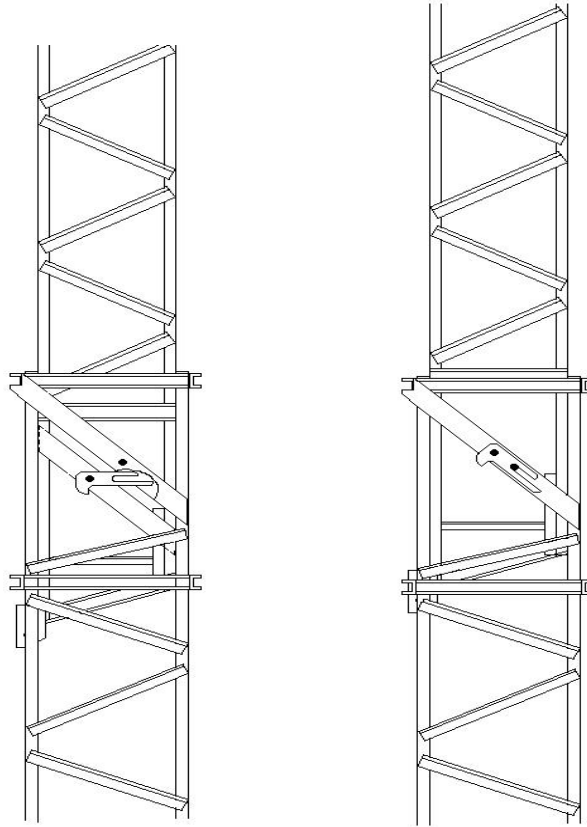


Figure 45

·Thus the process of standing the tower up is completed. (Figure 46)

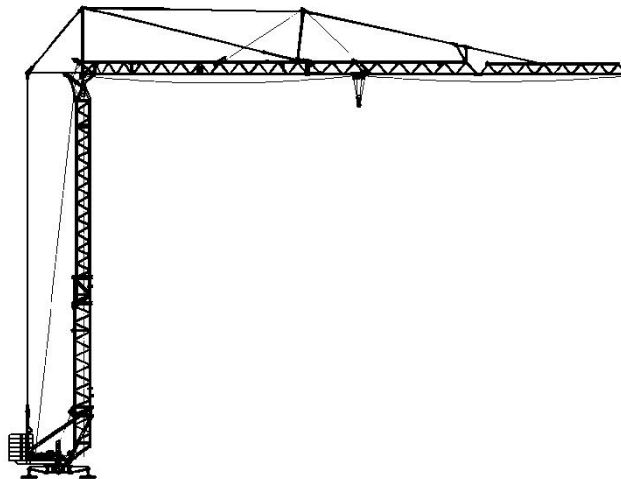


Figure 46

·Install the remaining three counterweights, each of them is about 2860kg.
·Check and adjust the boom. After spreading the boom in the air, it is better that the boom is from 2° to 3° above the horizontal. In order to avoid the wire rope to be stretched in the long use, the boom can be adjusted through the holes of the position A, B,C on the triangular plate of the rear inhaul cable. (Figure 47)

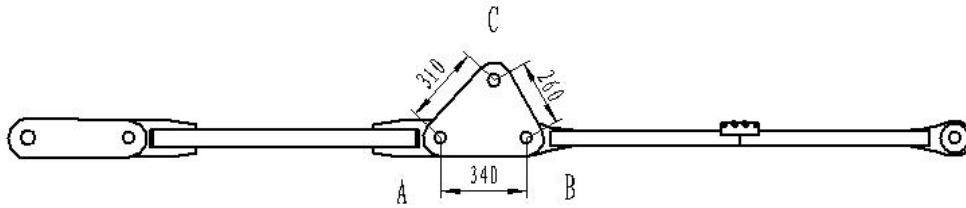


Figure 47

6.2 Folding for Crane

- Check full functions of the lifting brake and the pulling brake before folding for the crane. If necessary, readjust the brakes.
- Press "CLOSE" button to make the lifting height limiter to be disabled temporarily. Start the lifting mechanism and lift the hook at low speed until the hook lean against underside of the trolley lightly.
- Drive the luffing trolley to the position of about 19.7 m away from the center of rotation, where there is spreading-boom over wheel of the boom 2.**
- Start the pulling mechanism to make the inner tower body rising slowly until the locking pawl unlock for separating the inner tower body from the outer tower body.
- Start the pulling mechanism to make the inner tower body retract downward slowly. The boom can automatically retract and fold. During the process, it is also needed to start lifting mechanism to roll wire rope up. (Figure 48)

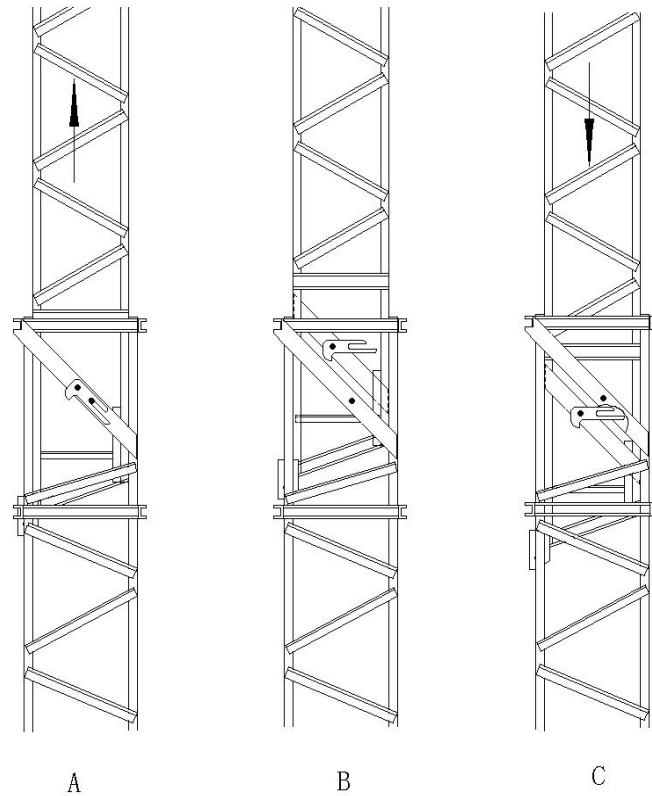


Figure 48

- After the inner tower body shrinks to the predetermined position, align the root holes of the inner and outer tower body. Insert $\phi 35 \times 95$ pins and lock with gourd pins. (Figure 49)

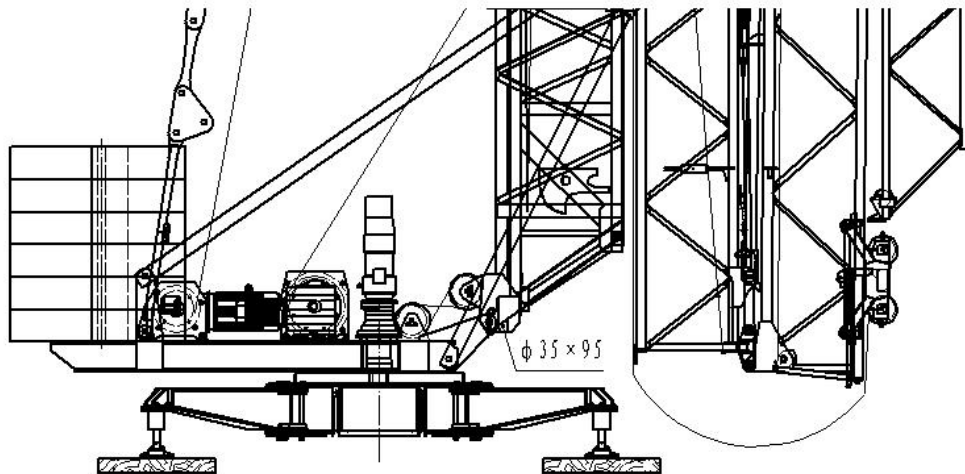


Figure 49

- Remove all counterweight.
- Relieve the end of the upper adjusting device mounted on the boom 1 and fix it on the boom 2. By adjusting the screw, pull the boom 2 to the boom 1 slowly until the telescopic pin on the boom 1 can be smoothly inserted into the hole of the ear plate on the boom 2. (Figure 50)

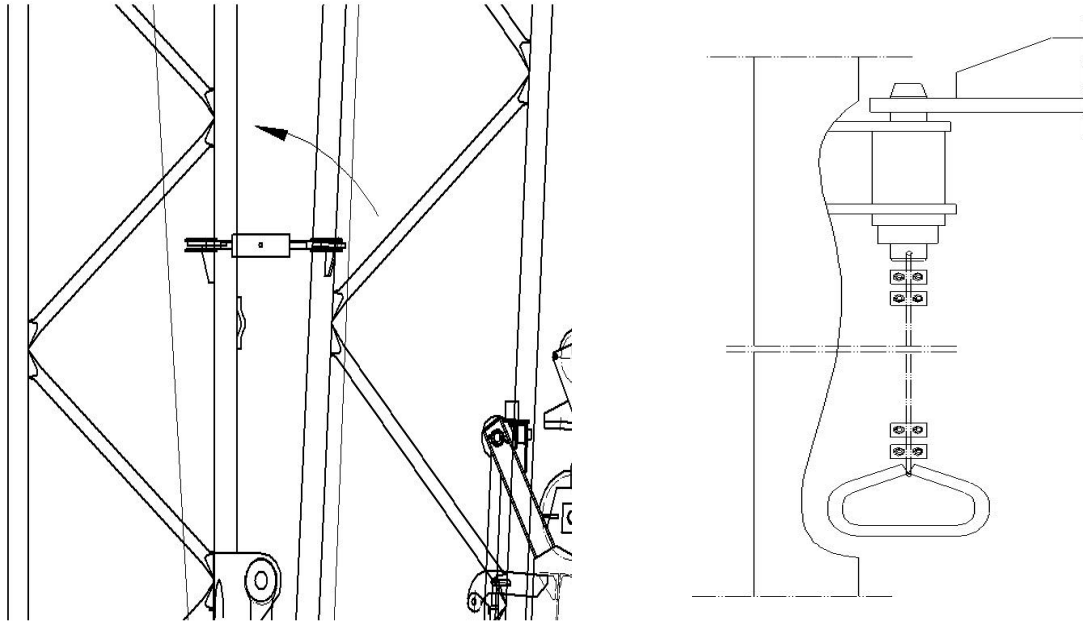


Figure 50

In front of the boom 1, remove the $\phi 45$ pin which are used to connect for the boom1 and pull plate. Rotate the pull plate and put it on the small inclined belly bar of the boom1. Insert above-mentioned $\phi 45$ pin into the $\phi 46$ hole of the pull plate. Remove the $\phi 35$ pin for the boom 1 and the outside of the connecting frame (Figure 51). Push the boom 2 and boom 3 onto the one side of the boom 1 and put them on the bracket of the outer tower body by manpower (Figure 52).

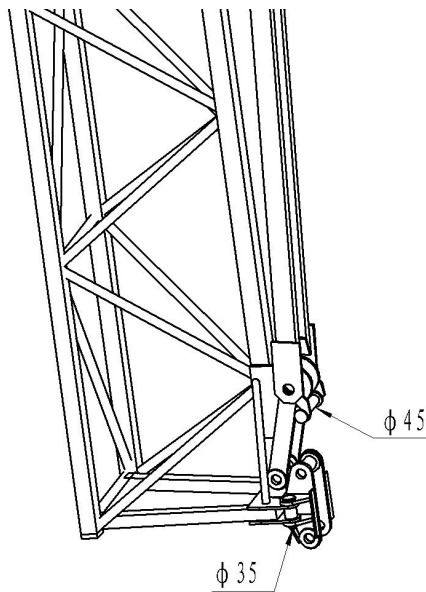


Figure 51

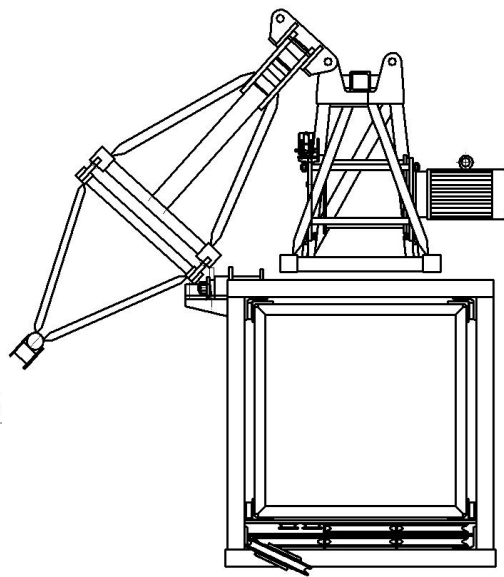


Figure 52

·Remove the $\phi 55 \times 140$ pin for the outer tower body and the up slewing platform (Shown in figure 38). Start the pulling mechanism and put the tower body on the up slewing platform.(Figure 53)

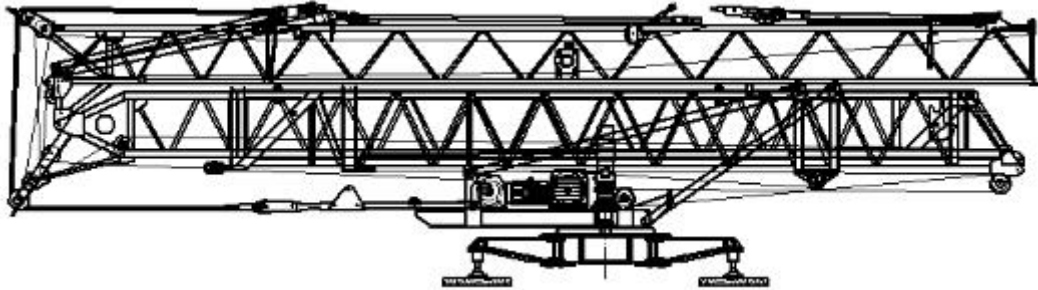


Figure 53

6.3 Notice for erecting

- During erecting the tower, if the brake fails, it is important to keep calm, and continue to start the pulling mechanism towards the original direction. Drive motor and resist the external force by the rotating torque of the mechanism itself.
- During erecting the tower, it should be careful to observe the action. If there are abnormal phenomenons such as stoping aned blocking, it should be to stop in time,and then fold the tower. Only after solving the problem, the operation of erecting tower can be continued.
- It should be to check all the parts carefully before erecting tower. All the pulley of the tower should roll flexibly and should not be blocked.
- When erecting the tower, loose pulley should be in the middle of the pulley shaft and should be partial to the rope side of the drum for reducing the rope angle of wire rope , keeping the wire rope and the drum in a vertical state.
- When erecting the tower for the first time, it is necessary to add the right amount of lubricating oil to the relative sliding position of the inner and outer tower body, for reducing the resistance during erecting the tower.

7. Operation for Crane

7.1 Adjustment for Safety Protection Device

Note: The safety protection device must be adjusted before operating the crane.

7.1.1 Torque limiter

7.1.1.1 Action principle

The torque limiter is mainly composed of plate-form spring made by two flat steels and four stroke switches. The torque limiter is respectively connected to the up slewing platform and the rear inhaul cable with the pins. When the crane is working, the plate-form spring is deformed. When the lifting torque exceeds the specified value, the plate-form spring is deformed and the stroke switch is triggered to cut off the power supplies of the lifting mechanism's rising loop and luffing mechanism's external luffing loop, and then the hook can only be permitted to fall and the trolley can only be permitted to run inward.

7.1.1.2 Adjustment for torque limiter (Figure 52)

Four types of adjustment for lifting torque limiter: 100% constant range and variable weight, 100% constant weight and variable range, 90% pre-alarm, 80% cutting off high-speed outward amplitude.

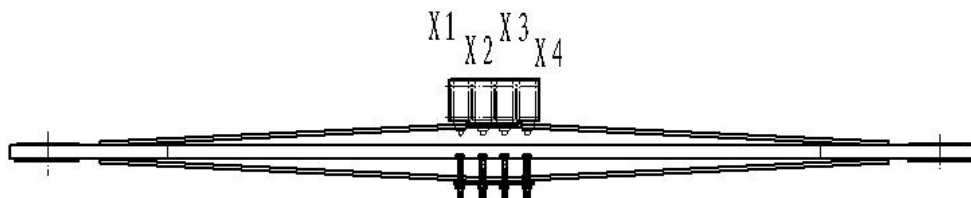


Figure 52

·The test method of constant range and variable weight is as follows:

(a) At the maximum working range R_0 , normal working speed and lifting rated capacity Q_0 , the torque limiter should not act and the lifting action can be normally executed. After falling the load to the ground and adding the load to the 110% rated capacity Q_0 , the torque limiter should act to limit the lifting action and alarm signal should be sent for lifting the load at low speed.

(b) At 0.7 time of the maximum rated capacity ($0.7Q_m$) and corresponding permissible maximum working range ($R_{0.7}$), repeat (a) test.

·The test method of constant weight and variable range is as follows:

- (a) Measure and mark the maximum working range ($R_m, 0.8R_m, 1.1R_m$) on the ground corresponding to no-loading and maximum rated capacity (Q_m) .
- (b) At a small range and lifting maximum rated capacity (Q_m) about 1m higher the ground, the torque limiter should act to cut off the power supplies of the luffing mechanism's external luffing loop and the lifting mechanism's loop for slowly driving the trolley from R_m to $1.1R_m$, and the alarm signal should be sent. Drive the trolley to the initial position and drive the trolley to run from small range to big range at the normal speed. When the trolley arrives at the $0.8R_m$, the speed is changed to low speed. When the trolley arrives to the position from R_m to $1.1R_m$, the torque limiter should act to cut off the power supplies of the luffing mechanism's external luffing loop and the lifting mechanism's loop, and the alarm signal should be sent.
- (c) Measure and mark the maximum working range ($R_{0.5}, 0.8R_{0.5}, 1.1R_{0.5}$) on the ground corresponding to no-loading and 50% maximum rated capacity ($0.5Q_m$) .
- (d) Repeat (b) test.

Range (m) and Load(t):

L(m)	Rang	R0	R0.	R	R0.	Q0	1.1Q	0.8R _m ~1.1	0.8R _{0.5} ~1.1
36	$\alpha=2$	36	29	21	36	1.1	1.21	16.8~23.1	28.8~36
	$\alpha=4$	36	15.4	11	21.1	1.1	1.21	8.8~12.1	16.88~23.21

7.1.2 Adjustment for lifting capacity limiter

7.1.2.1 Action principle

The deformation of the sensor is directly proportional to the external force in the elastic range of the special weighing sensor. The resistance strain foils are attached to the sensor and constitute balanced bridge. When the object is subjected to external force, the resistance strain foils are deformed and the resistance value is changed. Thus the bridge will be out of balance and output the weak voltage signal, which is in direct proportion to the external force. The signal is amplified and is sent to the microprocessor CPU after converted from analog to digital. The CPU compares the digital signal to the predetermined values and obtains the required signals, such as full load alarm and overload signal. The lifting capacity limiter outputs a pulse signal, which is equal to the load at the same time. This pulse signal will be used to provide weight

information to other electronic devices. When the lifting mechanism is working and once the load exceeds the limit, the sensor returns a electric signal and the electronic control system cut off the power of lifting mechanism's up loop for that the hook can only fall.

7.1.2.2 Adjustment of hoisting weight limiter

1) Flat arm working

(1) Setting of 100% lifting weight: Put the trolley within the radius of 11m, without load on the hook, then set the lifting weight as 0(Zero). Upload to 4000kg and then set the lifting weight as 4000kg, when the hook can normally lift. Set the maximum lifting weight as 4400kg, when the lifting weight exceeds, lifting is not available and only falling is allowed, at the same time continuous and clear audible alarm could be heard.

Inspection: Lifting weight of 4000kg, the hook can normally lifting and falling. Upload to 4400kg, lifting with both low speed and high speed is not available, only falling is allowed and continuous and clear audible alarm could be heard. Repeat this at least three times.

(2) Setting of 90% lifting weight: Put the trolley within the radius of 11m, without load on the hook, then set the lifting weight as 0(Zero). Upload to 3600kg and then set the lifting weight as 3600kg, when the hook can normally lift. Set 3600kg as the 90% lifting weight limitation, continuous and clear audible alarm could be heard when the lifting weight exceeds.

2) 15°jib upwards

(1) Setting of 100% lifting weight: Put the trolley within the radius of 34.5m, without load on the hook, then set the lifting weight as 0(Zero). Upload to 1100kg and then set the lifting weight as 1100kg, when the hook can normally lift. Set the maximum lifting weight as 1200kg, when the lifting weight exceeds, lifting is not available and only falling is allowed, at the same time continuous and clear audible alarm could be heard.

Inspection: Lifting weight of 1100kg, the hook can normally lifting and falling. Upload to 1200kg, lifting with both low speed and high speed is not available, only falling is allowed and continuous and clear audible alarm could be heard. Repeat this at least three times.

(2) Setting of 90% lifting weight: Put the trolley within the radius of 34.5m, without load on the hook, then set the lifting weight as 0(Zero). Upload to

990kg and then set the lifting weight as 990kg, when the hook can normally lift. Set 990kg as the 90% lifting weight limitation, continuous and clear audible alarm could be heard when the lifting weight exceeds.

7.1.3 Multiple-purpose limiter

3 kinds of limiters: DXZ-4/6 hooking height limiter, DXZ-4/F (i=600) trolley travel limiter and DXZ-4/3 slewing limiter.

7.1.3.1 Adjustment procedures

a. Dismantle the upper cover, check and screw down 2-M3x55 screws

b. Unscrew M5 nuts

c. Drive the mechanism under control to an designed position (without load) to meet the requirements. At this time, the micro-switch should make transient change-over corresponding to the action of this mechanism adjust the corresponding axle(Z) to make the memory gear (T) press down the micro-switch (WK) contact.

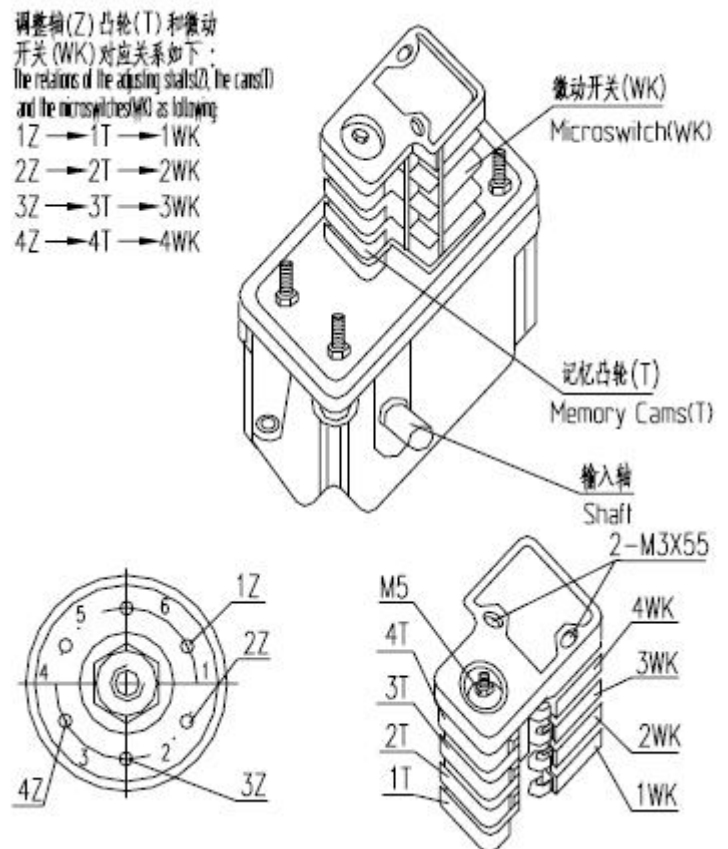
d. Screw down M5 nuts (be sure of screwing them down, otherwise foul-up memory will occur).

e. Make the mechanism operate under no-load condition again and again

several times to check memorized positions for accuracy (repeat the above adjustments in case of deviations).

f. Make sure that the position is as specified. Screw down M5 nuts and re-cover the casing.

g. After the mechanism working normally, check at certain interval the memory control position for deviations. Correct the deviations if any.



7.1.3.2

Adjustment for hook height limiter (adjusting procedures according to item 7.1.3.1)

- a. Adjust at no-load conditions. Press down micro-switches (1WK, 2WK) by finger to check the rising micro-switch or lowering micro-switch for correct action.
- b. Adjust axle (1Z) to make cam (1T) act and press down micro-switch (1WK) for changing. Screw down M5 nuts. This is done when the minimum distance from trolley to hook is not smaller than 0.8m in hoisting to its extreme limit.
- c. Customers can adjust the lower limit by 2WK so as to avoid operation errors and make the hoisting hook stop lowering movement before the hook touching the ground (no less than 3-round steel ropes on the wire drum).

The adjustment method is the same as item 7.1.3.1

7.1.3.3 Adjustment for slewing limiter (the same procedures as item 7.1.3.1)

- a. Adjust the slewing limiter while the jib is at erection position (power cable at free status).
- b. Adjust under no-load condition. Press down the micro-switch (WK) by finger to check the switch for left and right control.
- c. Slew to the left for 540° (1.5 rounds). Follow the item 7.1.3.1 to adjust the axle (4Z) to make the cam (4T) move to achieve transient changing by the micro-switch (4WK). Screw down M5 nuts.
- d. Rotate 1080° right (3 rounds). Follow item 7.1.3.1 to adjust the axle (1Z) to make the cam (1T) move to achieve transient changing by the micro-switch (1WK). Screw down M5 nuts.
- e. Check if the left and right slewing is correct.

7.1.3.4 Adjusting Method for radius (trolleying) limiter (the same procedures as item 7.1.3.1).

7.1.3.4.1 Outward travel at lower speed and extreme position limiting at the jib tip: Drive the trolley at the position of 2m away from the jib tip buffer. Adjust the axle (2Z) to turn the memory cam (2T) to enable the micro-switch (2WK) for action. (Enable simultaneous overlap of the cam (3T) to the cam (2T) to avoid speed reduction interference before braking). Screw down M5 nuts. Drive the trolley to the position of 200mm away from the jib tip. Follow the procedures to

adjust the axle (1Z) to rotate (1T) to make the micro-switch (1WK) act. Screw down M5 nuts.

7.1.3.4.2 Inward travel and extreme position limiting at the jib tip: The adjustment method is the same as item 7.1.3.4.2, carry out speed reduction adjustment and position limiting at the jib root (32-3T-3WK, 42-4T-4WK) at 2m and 200mm awa.

7.1.3.4.3 Check and correct.

7.2 Operation Safety Regulations for QTK40

1. Out of range of the crane, a minimum safety space of 0.5m is required to avoid crashing building or other objects.

2. The rail track must be firmly installed on foundation with enough carrying capacity.

3. A complete inspection to the crane by professionals before the first operation is obliged to be done.

4. Inspect the regular operating crane by professionals at least once a year according to real conditions.

Besides, inspections during each erection are needed.

5. Record all the details of each inspection and place them on file.

6. The crane operator must be very familiar with the operation manual and obey commands of coordinators.

7. The operator should inspect the brake and emergency devices before operating. Pay attention to the status of crane and observe the troubles easy to happen again and again. When the crane endangers the safety, the operator should adjust the position of crane and report all the problems to the administrative department. Be sure to instruct the next shift and record the problems so that the crane can be exactly repaired in time.

8. Dragging vehicles or other objects is prohibited.

9. Emergency braking is not allowed in normal situation.

10. The crane is not allowed to over load. The adjustable load moment limiter should conform with the condition of crane.

11. Slow erecting and unfolding of crane is obligatory. Rotate with low speed during normal operation and sudden reversal is not allowed.

12. Look out and cooperate with each other when several cranes work in the same area.

13. The operation of the pulling mechanism, lifting mechanism, slewing mechanism and luffing mechanism should be gentle, and the operation shall be converted from low speed to high speed, and the operating handle should not be pushed quickly from static or low speed to medium speed or high speed.

14. Lifting one weight by multiple cranes, the operators should cooperate with each other and obey the specially-assigned person who takes in charge.

15. Maintenance is allowed only when the crane is parking.

16. One fixed operator must be assigned to each crane and others are not allowed to operate the crane.

17. Personnel transportation by the crane is prohibited.

People are not allowed to stand under the jib.

18. Pulling objects obliquely is prohibited.

19. All the terminal switches must be flexible and reliable.

Limit block on the rail must be up to standard.

A butting iron must be installed at the end of the rail.

20. A specially-assigned person takes charge of safety supervision during erecting, dismounting and maintenance of crane.

21. Crane with malfunctions is not allowed to work.

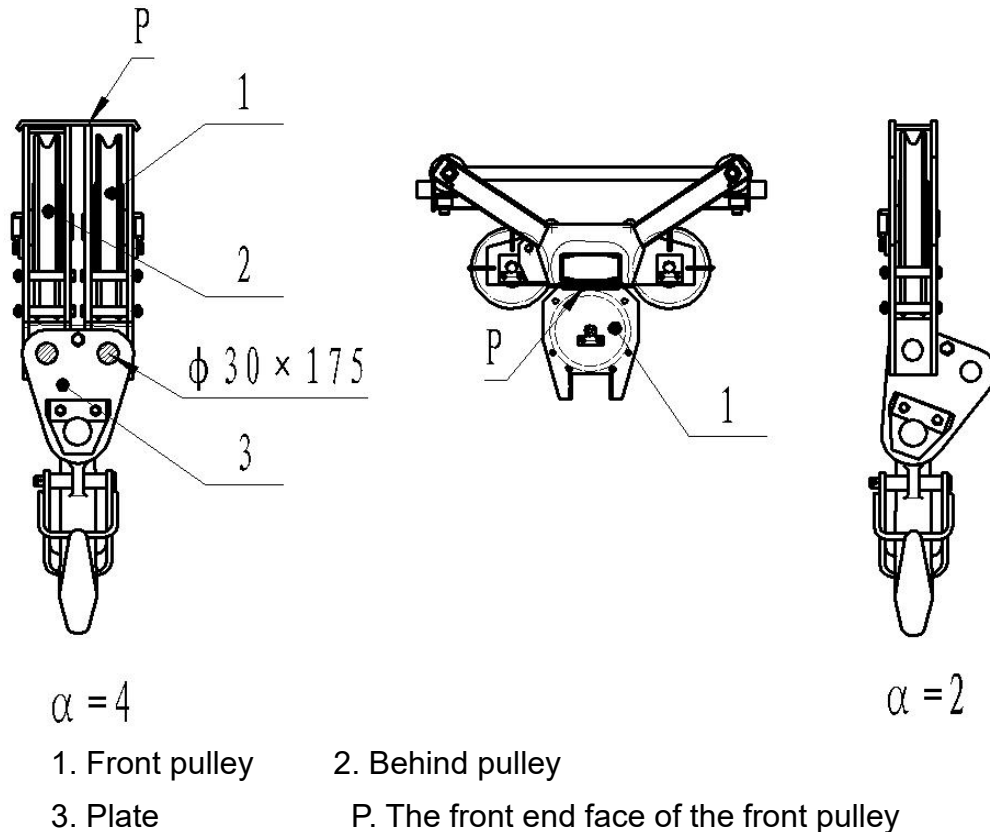
22. Only specific trained operator is allowed operator the crane.

7.3. Multiplying transform

According to the requirements of lifting speed and arm bracket angle of elevation 15, the machine has two ways of use, two times and four times. When the weight exceeds 2000 kg, the four multiplying power must be used, and the arm frame elevation angle 15 can only work at the two multiplying power. The transformation of the two and four rate is realized by the connection and separation of the hook group before and after. The lift height limiter must be readjusted after the hook rate change.

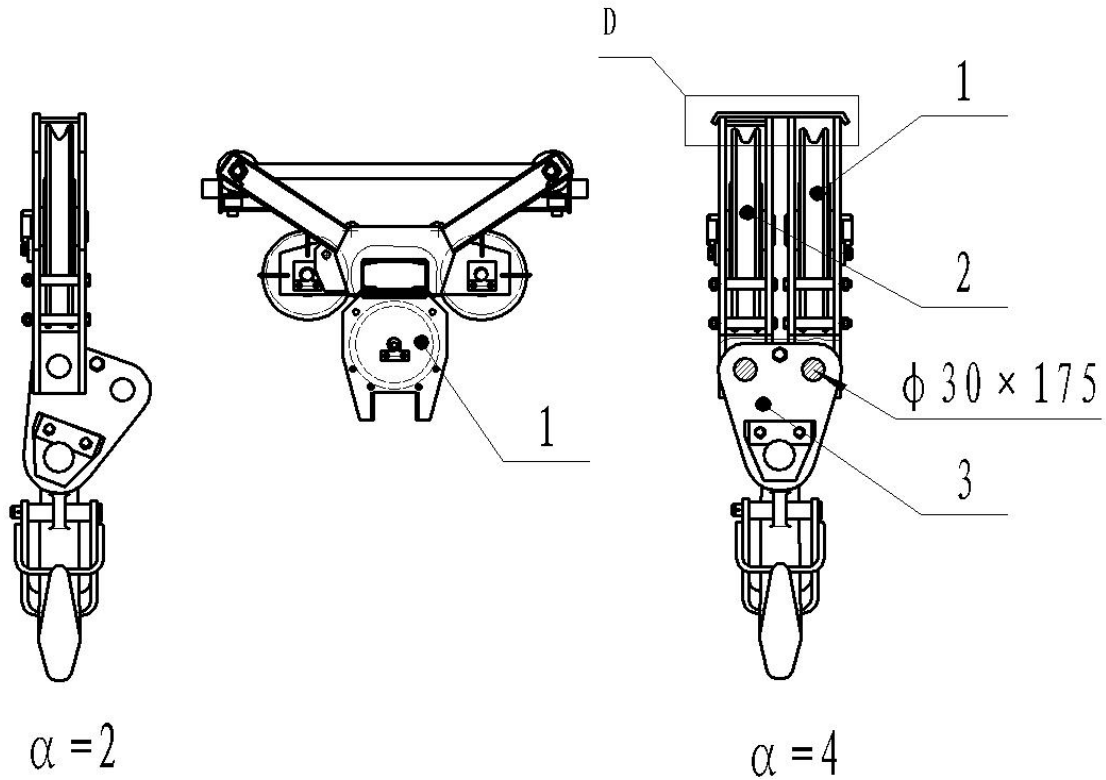
7.3.1 The transformation method of four-rate variable two-rate.

Put the lifting hook onto the ground (or building), remove the $\Phi 30 \times 175$ pin which connected to the front pulley 1 and the connecting plate 3. Start the hoisting winch slowly lift the front pulley 1 to the lower part of the car, until the lower part of the front end face of the front pulley is attached to the lower part of the car, so that the conversion work of the four multiplying ratio is completed.



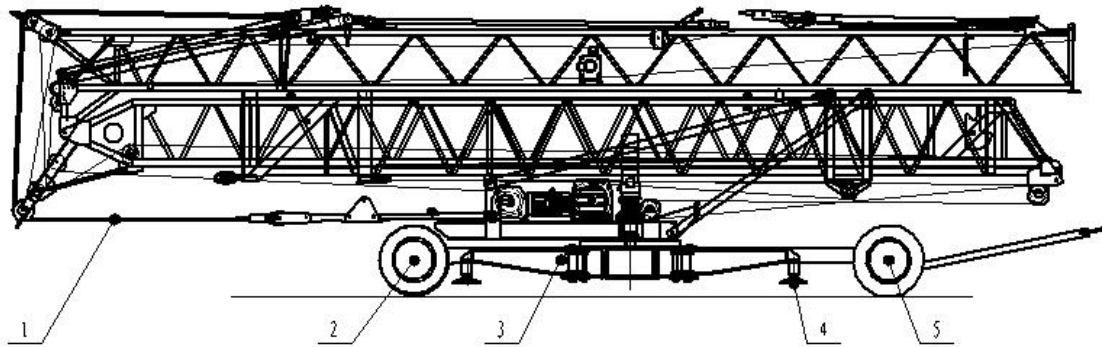
7.3.2 The transformation method of two-rate variable four-rate.

Put the lifting hook onto the ground (or building), hoist the winch to continue descent movement, where the front pulley 1 falls, align the front pulley 1 with the rear pulley 2 at the D, connect the pulley 1 with the connecting plate 3 with $\phi 30 \times 175$ pin, start the hoisting winch slowly to lift the hook, and finish the conversion work of the second multiplying power conversion.



1. Front pulley 2. Behind pulley
3. Plate D. Alignment

8. Preparation for transport



1. Bind the jibs, the jib and tower body, lifting hooks and crane carriage tightly with galvanized wires.
2. Hang the tail wire rope (1) and other loose ropes, electric cables on an appropriate place of the tower body. Be sure that these cables and ropes are fixed neatly and tightly.

3.Connect the rotary platform and chassis with 2 bolts (M20×200mm) to avoid structures' deformation during road transportation.

4. The leg (3) is extended to the backing plate in normal working state, then the front axle (5) and the rear axle (2) are respectively connected to the bottom shelf respectively by the hydraulic jack.
- 5.After last step, rotate the adjustment screw to rise up the bottom support foot (4), rotate each leg to 45° directions, and connect to the bottom by the pin shaft of the ϕ 35x 175 and then lock it.
6. Pneumatic braking pipes should be well connected with the braking system of the haulage truck.
7. Taillight of the rear axle should be well connected with the haulage truck.
8. Be sure that the haulage bar is well connected and tyres are aerated to requirements.
9. Only after examination and confirmation of reliable connections of every part can the QTK40 be hauled.
10. The maximum towing speed is 25km/h.

9. Care & Maintenance for QTK40

9.1 Care & Maintenance for Mechanical equipment

1. Regular inspections and adjustments of every brake should be taken. Refer to the related parts of "Adjustment of Brakes" for more details.
2. Lubricant oil of reduction gearboxes should be renewed according the appendix. Look out the oil level when oiling to avoid excessive or insufficient oil. Examine the oil level regularly during crane operation and add oil at any time if it is insufficient.
3. External gears, bearings, hinge pins, bolts and all the steel wire ropes must be lubricated according to the appendix.
4. Change the steel wire ropes according to the appendix if breakage and loose strands of steel wire ropes do not meet relevant regulations. Care& maintenance and scrappage of steel wire ropes must strictly conform with Chinese National Standard <GB5144-94>.

5. Inspect all the bolts regularly and tighten them once they loosens. All the hinge pins must be locked by expanded cotter pins or calabash pins.
6. Examine the working status of all the systems regularly. Eliminate the malfunction as soon as possible.
7. Joint bolts of slewing bearing must be screw up with enough pre-tightening moment. The rated pre-tightening moment is $900\text{N}\cdot\text{m}$ and its tolerance is no more than +8%. Inspect its pre-tightening moment at the first 100 and 500 working hours and then regular inspection should be taken in every 1000 working hours.
8. If welded joint cracks, repair it in case of without load. E5016 welding rods are recommended.

If the rod bends, measures of straightening and strengthening should be taken in case of without load.

If paints come off, painting should be done after rust cleaning.

9.2 Care & Maintenance for metal structure

1. Try to prevent component deformation and collision damage in transportation.
2. Must be regularly serviced and maintained to prevent corrosion during using.
3. Inspect the structural connection bolts, welds and the members for damage, deformation and looseness.
4. Spray paint every one-two years.

9.3 Daily maintenance table of tower crane

No.	Lubricating location	Lubricant specifications	Lubricating method & duration
1	Reducer of hoisting winch Reducer of Pulling winch Reducer of travelling winch	Winter:HJ-20 Machine oil Summer:HJ-40 Machine oil	Add filtered grease after working for 240 hrs, and change the grease after working for 1500hrs
2	Rolling bearing	ZG-III Calcium-based grease	Grease the bearings

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			each after they work for 160 hrs, Clean them once after half a year.
3	Motor bearing	Winter: Calcium-based grease ZG- II Summer: Calcium-based grease ZG- V	Change the grease after working for 1500 hrs
4	Wire rope	Graphite Calcium-based grease	Grease the rope each after overhaul or medium maintenance
5	Pulleys	Winter: Calcium-based grease ZG- II Summer: Calcium-based grease ZG- V	Change the grease after working for 240 hrs
6	Reducer of trolleying mechanism Reducer of slewing mechanism	HJ-40 Machine oil	Add filtered grease after working for 240 hrs, and change the grease after working for 1500 hrs
7	Gear of the slewing system	Winter: Calcium-based grease ZG- II Summer: Calcium-based grease ZG- V	Add the grease after working for 56 hrs

9.3 List of wire rope

No.	Name	Diameter (mm)	Length (m)	Quantity	Model
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1	Luffing rope (Front)	7.7	66	1	7.7NAT6×19+FC1770
2	Luffing rope (Behind)	7.7	47	1	7.7NAT6×19+FC1770
3	Unfold rope	14	67	1	14NAT6×19+ FC1770
4	Hoisting rope	11	170 (Non - rotating)	1	4V×39S+5FC
5	Pulling rope	13	263	1	13NAT6×37+ FC1770
6	Wire rope I	32	9.97	1	32NAT6×19+ FC1870
7	Wire rope II	24	24.45	1	24NAT6×19+ FC1870
8	Wire rope III	24	9.025	1	24NAT6×19+ FC1870
9	Wire rope IV	24	9.29	1	24NAT6×19+ FC1870
10	Wire rope V	24	5.125	1	24NAT6×19+ FC1870

11	Wire rope VI	40	21.535	1	40NAT6×19+ FC1870
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10 List of purchased parts

10.1 List of bearing

Standard number	Model	Quantity	Location
GB/T301-1995	51209	1	Lifting Hooks
GB/T276-1994	6208-Z	4	Lifting Hooks
GB/T276-1994	6207-Z	8	Crane carriage
GB/T276-1994	6004-Z	8	Crane carriage
GB/T276-1994	6208-Z	8	Crane carriage
GB/T276-1994	6006-Z	8	Jib
GB/T276-1994	6309-Z	8	Jib
GB/T276-1994	6309-2Z	6	Jib
GB/T301-1995	51205	1	Jib
GB/T276-1994	6210-Z	4	Pull rod support system
GB/T276-1994	6011-Z	2	Jib
GB/T276-1994	6209-Z	30	Tower Body
GB/T276-1994	6209-2Z	10	Tower Body
GB/T276-1994	6309-2Z	14	Tower Body
GB/T276-1994	6208-Z	2	Tower Body
GB/T288-1994	22210	1	Pulling System
GB/T288-1994	22210	1	Hoisting System
GB/T276-1994	6209-Z	12	Slewing Platform
JB/T2300-1999	011.35.1250	1	Chassis
GB/T283-1994	NJ314E	2	Driving Trolley
GB/T283-1994	NJ314E	2	Driven Trolley

10.2 The list of institutions

Hoisting System	Motor	Model	YEJ160M-4
		Power	11KW
		Rotational speed	1460 r/min
	Reducer	Model	KL87A
		Speed ratio	31.4
	wire rope model / Rope - holding capacity		11NAT6x19W+FC1770 96m
	Limiting device		DXZ-4/6
Pulling system	Motor	Model	YEJ132M1-6
		Power	4.0KW
		Rotational speed	960 r/min
	Reducer	Model	KL97A
		Speed ratio	164.3
	wire rope model / Rope - holding capacity		13NAT6x19W+FC1770 181 m
Slewing system	Motor	Model	YLEW112L-55-6B1
		Locked moment	55 N·m
		Rotational speed	1000 r/min
	Reducer		XX4-80.168
	Limiting device		DXZ-4/3

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Luffing Mechanism	Model		QTB3.0E
	Motor	Model	YDEJ100L-4/6
		Power	2.2/1.5 KW
		Rotational speed	1420/940 r/min
	Limiting device		DXZ-4/6
	wire rope model / Rope - holding capacity		7.7NAT6x19W+FC1770 38m
Driving Trolley	Motor	Model	YEJ90L-4
		Power	1.5KW
		Rotational speed	1400 r/min
	Reducer	Model	GKAT77
		Speed ratio	58.44
The worktable and the control box			

