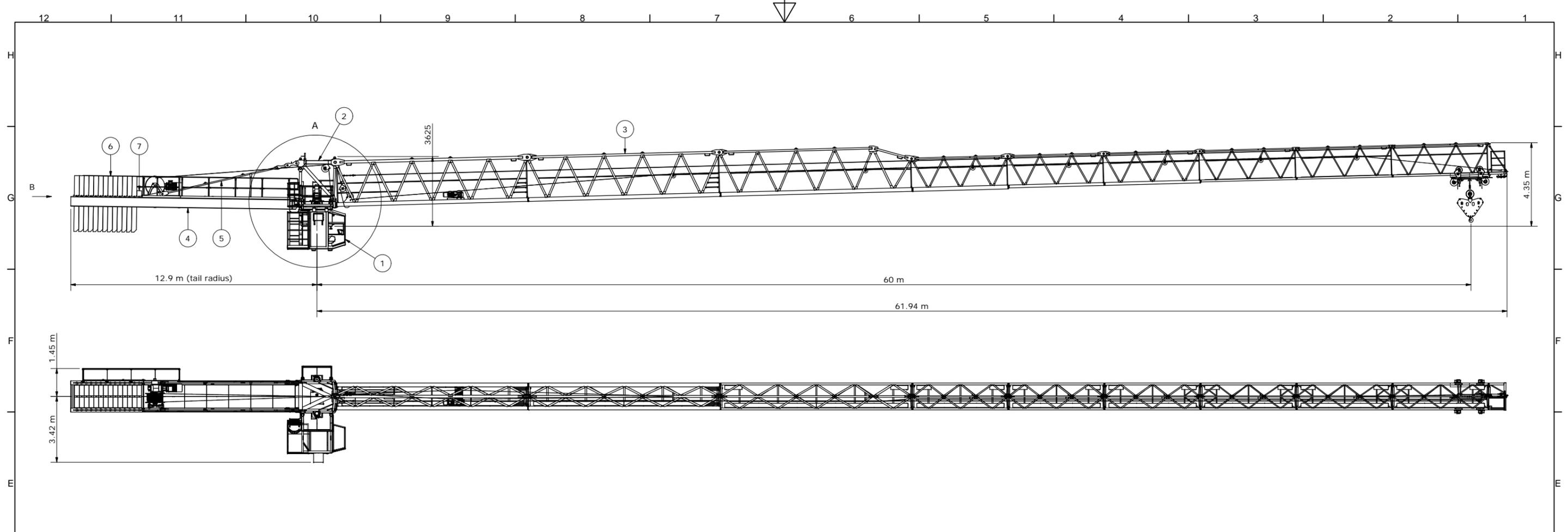
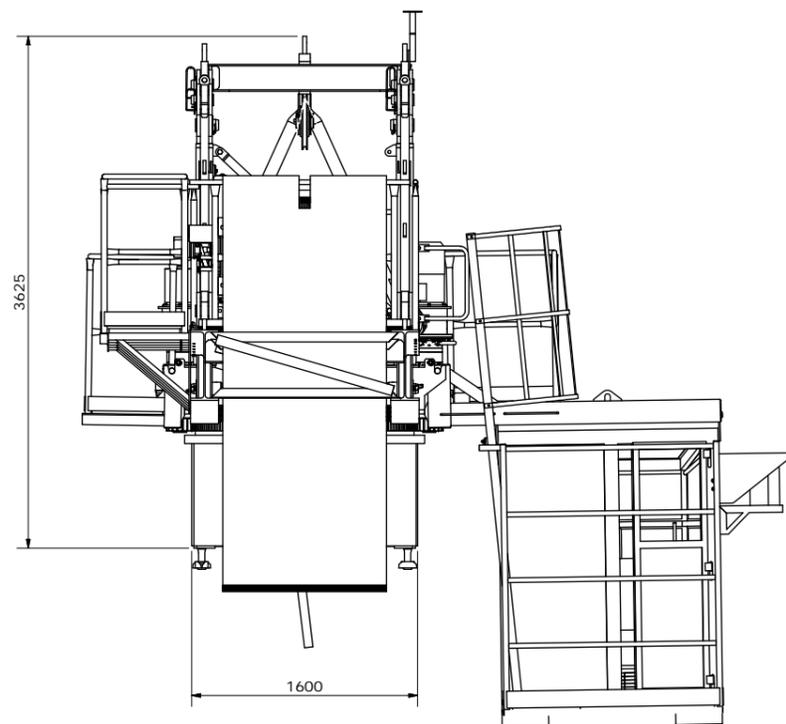
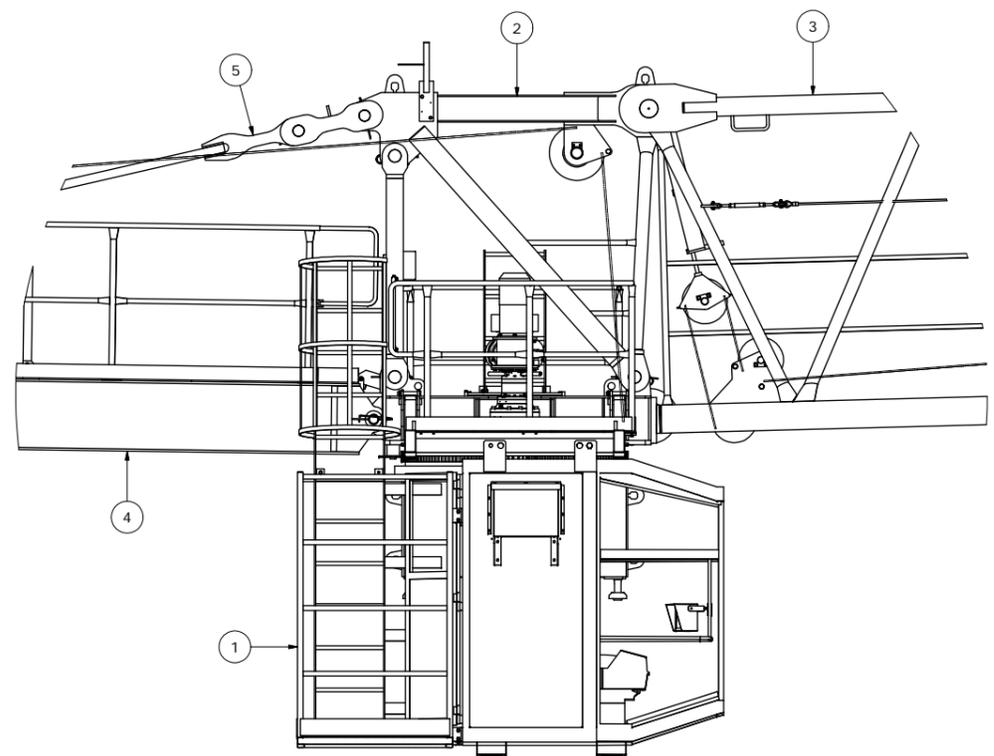


| Designation | Identification | No. of pages |
|---|-----------------------|---------------------|
| Main assembly Drawing | C1-00.00063000-00 | 1 |
| Safety instruction | 4509-02 | 1 |
| General hints | 4861-00 | 2 |
| Site requirements | 4503-00 | 1 |
| Supply installation | 4541-00 | 1 |
| Stock area | 4504-00 | 1 |
| Delivery | 4507-00 | 1 |
| Delivery / Erection damage | 4506-00 | 1 |
| Pre-erection responsibility | 4502-01 | 3 |
| Pre-erection checks | 4511-00 | 2 |
| Faults | 4555-00 | 1 |
| Pre-erection on ground | 4951-01 | 1 |
| Bolt torques | 4537-05 | 1 |
| Torque tightening of 2¼" special structure bolt | 5498-02 | 1 |
| Erection guide | 5611-00 | 6 |
| Wire reeving | 5610-00 | 1 |
| Counterweight table | 5585-00 | 1 |
| Fitting of slewing bearing ring | 2059-02 | 2 |
| Tooth clearance for slewing bearing rings | 2011-06 | 1 |
| Torques for slewing bearing ring bolts | 2266-10 | 1 |
| Tests and Inspection after erection | 5507-02 | 1 |
| | | |



A (1 : 25)

From rear (jib not shown) (1 : 25)



| Item | Drawing/part no. | Title | Length | Type/quality | Pcs | Weight | Total weight |
|------|------------------|-----------------------------|--------|---------------|-----|--------|--------------|
| 8 | xxx09.16812450 | Hoist wire Ø12, 450m | | Eurolift 2160 | 1 | 320 | 320 |
| 7 | C2-72.00062021 | Counterweight block 500 kg | | | 1 | 500 | 500 |
| 6 | C2-72.00062020 | Counterweight block 2000 kg | | | 13 | 2000 | 26000 |
| 5 | C2-09.00063004 | Rear stays assembly | | | 1 | 597 | 597 |
| 4 | C1-04.00063003 | Counterjib assembly | | | 1 | 5030 | 5030 |
| 3 | C1-02.00063001 | Jib assembly, 60 m | | | 1 | 10868 | 10868 |
| 2 | C1-04.00063005 | Tip lower assembly | | | 1 | 982 | 982 |
| 1 | C1-03.00063006 | Slewing/masthead assembly | | | 1 | 5843 | 5843 |

| | | | | |
|--|-------------------|---------------------------------------|----------------------------------|------------------------------------|
| DESIGN : 150507 HK | PROJ. : K230F | CRANE TYPE | QTY | ASSEMBLY DRAWING |
| DRAWN : 150507 HK | CHECK : 150507 JL | SCALE : 1 : 100 | SURFACE AREA : 50141 kg | SURFACE TREATMENT : MATR. : DIM. : |
| REPLACES : | REPLACED BY : | ORIGINATES FROM : | TITLE : K230F top crane assembly | PARTS LIST : |
| KRØLL CRANES A/S NORDKRANVEJ 2 3540 LYNGE DENMARK PHONE: +45 48 187400 FAX: +45 48 188807 E-mail: kr@kranes.dk Web: www.kr@kranes.dk | | DRAWING NO.: C1-00.00063000-00 | | |

SAFETY INSTRUCTIONS

This instruction does not supersede any local regulations for the safety of work.

Before erection and starting of the plant as well for the operation and maintenance, strictly follow the instruction manual.

It is prohibited to remain under the suspended load or within the working radius of the slewing platform.

The assembly area is to be made safe. When working in heights, a harness is to be worn and used.

No loose parts on the suspended crane parts to be found.

Wind load has a considerable influence on crane stability. Due to this crane assembly and climbing operations are only to be carried out up to **wind speeds of 12.5 m/s equivalent to 45 km/t**, and telescoping operation is only allowed up to 10 m/s (36km/t).

Disregarding these warnings can cause serious damage, physical injuries or death.

ASSEMBLY CONDITIONS

Before assembly during unstable weather conditions, it is recommended to check the weather forecast to ensure that the assembly can be safely completed.

Before commencing any assembly, remove any protection from machined or non-painted surfaces.

Before beginning work, all assembly instructions should be studied in detail to avoid time and material losses, and not to endanger human life.

Before using bolts and nuts, note any special requirements for bolt torque's during preassembly in the erection guide.

The crane base foundation should be prepared, together with any other responsibilities of the Purchaser outside the contents of the crane order, i.e. counterweight blocks, etc.

All concrete work carried out should have sufficient curing time before being put into use.

For assembling the crane it is necessary to employ a mobile crane. Lifting height is dependent on the necessary or wanted height under hook of the tower crane. Details on the single weights and mounting heights, and of the required height under hook for the mobile crane are found in erection section. Differences in level on the site to mobile crane (mounting height) must be considered.

Before start of assembly, make sure that the **ballast blocks available corresponds with the specification for weight and dimensions**. If necessary they must be weighed again. All blocks are to be marked legibly with their actual weight.

Before assembly the crane, parts are to be inspected by an expert (experienced erector) in order to ensure high security and trouble-free erection.

Level sections of i.e. jibs off the ground for preassembly. Use for example planks or sleepers.

For guidance and advise of assembly procedures for tower cranes and for training of not yet sufficiently experienced personnel, KRØLL or representatives will upon request delegate specialists.

Tower cranes are to be erected or dismantled under experienced guidance always. The crane should be operated by experienced personnel only. Observe in particular the manufacturer's instructions for operation and keep one set of these instructions always at site.

WARNING!

When erecting, observe all relevant **accident prevention rules** and be sure about particular **local rules**. Make safe erection area. During erection and maintenance operations a safety belt must be used and worn.

Failure to observe this warning is dangerous and can lead to serious material damage as well as to physical injuries under certain circumstances resulting in death.

Works on the electric systems may be carried out only by experienced electrician.

We strongly recommend a detailed study of all erectional hints and instructions before the job is started, to avoid time- and material losses and to not endanger the life or health of human beings.

Before start of erection, the erector in-charge has to make sure together with the engineer in-charge at site, that the **ballast stones available correspond to the weight and dimensions of the Krøll regulations**. If necessary, they must be weighed again. All stones are to be marked legibly with their actual weight.

Before erection the crane components have to be inspected by an expert (experienced erector) in order to ensure highest security and trouble-free erection.

Wind loads have a considerable influence on the stability of cranes. Therefore the wind force during erection must not exceed **wind speed of 12.5 m/s corresponding to 45 km/h**.

To ensure a safe crane erection it is strongly recommended to inquire about the forecasts for the erection time from authorized or official weather stations, before erection is started.

Deviations from the above instructions require a consultation of the manufacturer giving a detailed description of circumstances, as well as an approval by the local authorities.

For crane erection without climbing equipment:

Preassemble the necessary tower elements and type acc. to tower configuration (see Technical Data section 1) on the ground. Observe capacity of mobile crane. Place tower elements on the first tower element, pin and secure.

For crane erection with climbing equipment:

Place tower element acc. to tower configuration, but at least the number of tower elements as given for the basic erection, pin and secure (for further assembly see description of climbing device – separate manual).

The climbing frame is an erectional means only. It is not supposed to remain on the crane for normal operation.

If frequent climbs are necessary for operational reasons, you must inquire the crane data for towers with climber from the manufacturer.

A climber increases the wind attack area, the wheel pressures and other data, while the possible height under hook is slightly reduced.

The following points should be noted (and made available):

- The receiving area for the shipment should be firm, well drained, and with good access roads allowing for a turnround for articulated vehicles.
- Timber blocks (e.g. rail ties) for the support of parts on delivery.
- Tarpaulins (sheets) for covering parts (mainly electrical).
- Mobile crange for unloading.
- Pre-assembly areas designated.
- Crew shelter, office and tool storage facilities.
- Electr. supply point for power tools, welding sets, etc.
- Electr. supply point for floodlighting (if required).
- Welding and cutting equipment in case of transport damage.
- KRØLL CRANES A/S (or their agent's) personnel should be informed on arrival of first-aid and telephone locations, together with any security arrangements made.
- Site access clearance should be obtained for them, together with any other relevant information.

- If a trailing el. supply cable is fitted - to prevent wear a fine sand bed or leveled steel plates should be laid between the tracks for the cable to be towed on.
- The trailing cable will normally enter the crane structure on the track centre line.
- A trailing cable is not recommended for curve running cranes.
- If a cable drum is fitted, it's position is on the track centre line. For curve running crane fit guides to the rail ties within the curve.
- Portal cranes have a side mounted cable drum and guide roller fitted to lay the cable adjacent to the track on the inside of one side. (Customer order should give any relevant information).

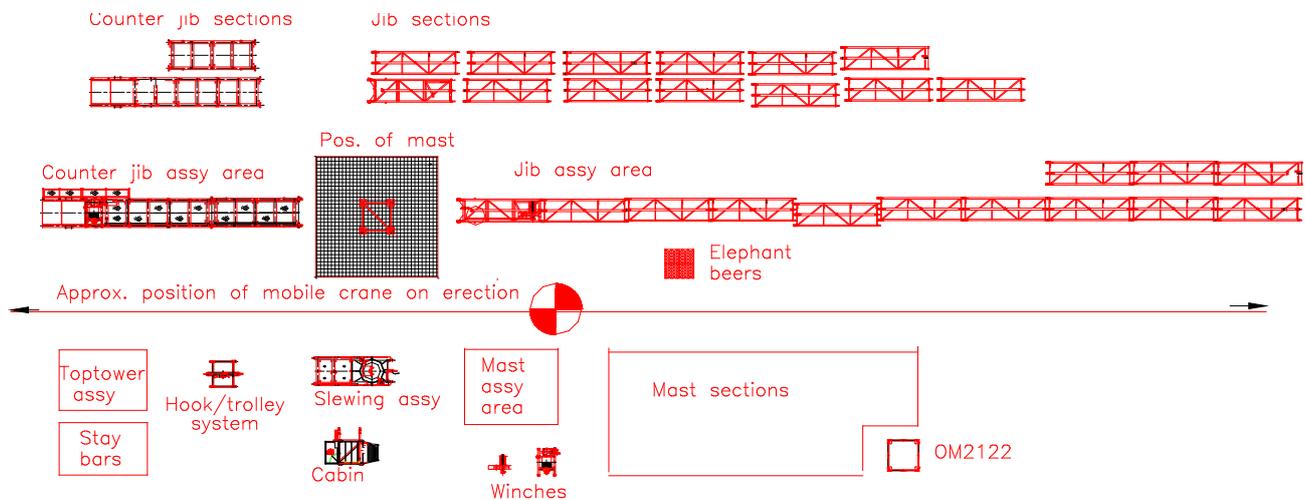
Combination cranes can be supplied with different hoist winch units within the same crane type. The dimensioning of main fuses and feeder cables depends on the winch equipment and not the crane type. It is important that the supply voltage is correct to ensure proper functioning of the crane.

Note :

KRØLL supply feeder cable to base of crane mast only, (whitout a connection box) or to the cable drum.

The crane parts are delivered in packed units and cases (collie).

- On unloading, use sling points indicated. Certain parts have sling eyes welded on.
- Support all material on timber blocks.
- Consult the assembly drawing and lay parts out in the order of assembly, especially the jib and counter jib sections.
- Unpack parts consigned inside major structural sections before laying them out in assembly order. In certain instances they can be ladders, platforms or railings belonging to the section they are packed into.
- Leave clear travelling roads and sub-assembly areas.
- Cover motors and electrical equipment with sheets.
- Plan the arrangement so that mobile carnage can operate from a near stationary position or be moved in a straight line only. A study of the erection sequence will enable a final layout plan to be made.



- Check the delivery against the packing shipping list.
- Do not open cases and leave contents - especially cardboard box packings - exposed to the weather.
- Remove tools, packed electronic equipment, instruction books, etc., to secure, dry places.
- **NOTE:** All damaged parts.
- The normal KRØLL CRANES A/S colour scheme is red for the structure, yellow for electrical panels, motors, trolleys and hook assemblies and the operator cabin.

Parts painted blue are for use on erection, and (according to purchase order) may be returnable.

- Check the bolt lists.

This information applies both to transport and erection and in particular to all main structural members.

- A check should be made as material is received and reports made of apparent damage.

- Consult sheets -
 - 2029 Delivery servicing
 - 2017 Structure servicing
 - 2003 Electrodes
 - 2002 Steel quality

- Further information may be found on any relevant drawings in the erection or service manuals - or on any special requirement material forwarded in accordance with supply requirements.

- It should be noted that after repair, the damage area/component must be checked and passed by an authorized and qualified inspector. A detailed record must be made and kept with the crane log book.

Main structural member repairs must not be subjected to final erection, until a "Passed Inspection" notification in writing is given.

PRE-ERECTION RESPONSIBILITY OF THE PURCHASER IS AS FOLLOWS:**A:**

- 1) Counterweight blocks have been prepared and are on site.
- 2) Ballast blocks (when required) have been prepared and are on site.
- 3) Test load blocks are weight-checked, marked and on site.
- 4) Crane base is prepared
 - Bottom cross -
 - Expendable base -
 - Rail-mounted -
- 5) Crane main electr. supply point is installed in a position near erection area.
- 6) Electr. supply point for power tools, welding set, etc. (if required).
- 7) Electr. supply and floodlights (if required).
- 8) Tarpaulins for covering parts (mainly electr.) if delay between delivery and erection.
- 9) Timber blocks for support of parts on delivery.

Information sheet
Information sheet
Information sheet

NOTE:

KRØLL main electr. installation is from the electr. panel out to all motors & control gear. Feeder cable size & length required is as ordered.

B:

- 1) Cleared site with space to lay out parts on delivery.
- 2) Unloading area space for mobile crane.
- 3) Firm access road for long road delivery vehicles with turn-out area, or road, if possible.
- 4) Purchaser's/contractor's own labour available (if required).
- 5) Booking of mobile crane.
- 6) Certified wire/chain slings.
- 7) Site shelter with lockable storage facilities.
- 8) Jib support.
- 9) Hoist rope reel support (if required).
- 10) Steel plate approx. 3 x 250 x 800 mm (3/16 x 10 x 32 ins.) for levelling (applies to bottom-cross cranes).
- 11) Hook-fitting calibrated dynamometer and test load blocks.

Unless otherwise agreed by KRØLL (or agents) KRØLL (or agents) accept no responsibility for on - site loss of delivered goods & tools

See erection instr.

Consult KRØLL (or their agents) if these items not available.

C:

| | |
|--|---|
| <p>1) <u>Tools</u></p> <ul style="list-style-type: none"> 3-ton pull lift 20-ton hydr. jacks (2) Crowbars (2) Electr. drill 20 mm (3/4") cap. Hand wrench & die for anchor bolt threads (applies to bottom-cross cranes). Wrenches & spanners up to 1 in. and 24 mm. Welding set } Gas cutting equipment } Disc grinding equipment } <p>2) Telephone/First-aid equipment.</p> <p>3) Site access.</p> | <p>Consult KRØLL (or their agents) if these items will not be available</p> <p>These items should be instantly available, if required; (other-wise, consult KRØLL (or their agents)).</p> <p>KRØLL's (or agents') personnel should be informed on arrival at site of location points</p> <p>Site clearance permission for KRØLL's (or their agents') personnel.</p> |
|--|---|

*** THE CRANE TOOL BOX IS FOR MAINTAINING THE MACHINE AND DOES NOT PROVIDE FOR THE REQUIREMENTS ON AN ERECTION CREW.**

**PRE-ERECTION CHECKS TO BE CARRIED OUT BY KRØLL'S (OR AGENT'S)
TECHN. ASSISTANT****A: EXPENDABLE-BASE-MOUNTED CRANES**

- Check** - The foundation pad has had sufficient curing time.
- Mast bolt diagonal centres.
 - With a level, the mast bolt block connection surfaces.
 - There is a min. of 400 mm (15¾") between underside of mast bolt block and the foundation top.

B: BOTTOM-CROSS (B-X) MOUNTED CRANES

- Check** - The foundation pad has had sufficient curing time.
- Cast-in anchor bolt centres.
 - Cast-in anchor bolt height.
 - Clearance under the cross within the mast area.
 - Level of the base at anchor bolt position.
 - Packing plate available if required for levelling.
 - Hand wrench & die available for anchor bolt threads.

C: RAIL-MOUNTED CRANES

- Check** - Rail bed, bed drainage, sleeper type, sleeper quantity per meter (yard).
- Source of rail bed calculation.
 - Rail joints (fish-plate, bolts, tools available), rail joint alignment & sleeper support.
 - Rail to sleeper fitting, rail head (on used rails), rail spacing tie rods.
 - Earthing arrangement, end buffers, electr. stop arrangement.
 - Position/installation of power cable pick-up.
 - Power cable bed (if trailing cable), provisions for power cable if curve-running.
 - Special instructions for position of bogie motors, cable, drum, access ladder.
 - Number of ballast blocks on site, dimensions, quality, marked-up weight, total weight, quantity required.

D: ALL CRANES

- Check** - Pre-erection information complied with:
- Weather conditions likely for the period of erection, site drainage, equipment protection.
 - Power supply, also whether to be drawn on by other equipment.
 - Counterweights on site, dimensions, quality, marked-up weight, total weight, quantity required.
 - Parts for transport damage.
 - Parts against packing lists.
 - Booking of adequate size mobile crane (hooks & slings).
 - Availability of contractor labour.
 - Required lubricants are on site.
 - Crane tool box on site.
 - Storage or transport defects/deficiencies of any supplied tool items (e.g. hydr. torque wrench).
 - Storage or transport defects/deficiencies of any climbing/telescoping equipment.
 - Storage or transport defects/deficiencies of any KRØLL (or agents) hired-out equipment (e.g. mech./hydr. erection equipment).
 - Electrical equipment for transport/storage damage.
 - Weather/storage deterioration of any items.
 - For long jib cranes, provision for wind ballasting.
 - Test loading equipment available.
 - Suspension ropes with shackles and sufficient capacity.

KNOWN INSTALLATION FAULTS WHICH HAVE OCCURRED BECAUSE OF NONE OR INSUFFICIENT PRE-PLANNING.

FOUNDATIONS

Base tilt when crane is in operational use because of no checking of ground holding pressure.

BALLAST AND COUNTERWEIGHTS

Concrete not to specification. Blocks cumble with weathering.

Blocks removed too early from forms and blocks stacked leaning, upright or on uneven ground - results in blocks are bowed or twisted and cannot be fitted.

RAIL TRACKS

Tracks not designed to carry the given max. corner load.

Used rail of different type laid-result steps at rail joints.

Rail curve laid with inclination.

No support at rail joints, fishplates loose or only part of bolt quantity fitted - result rail spring as the crane moves over the joint.

Before beginning the work place solid wood or beams on the ground for the individual components to avoid sinking into the ground.

- Slewing table and masthead. Consult the drawing in the assembly drawings section.

Machined contact faces on slewing bearing ring and mast head must be cleaned. After cleaning the contact faces should be lightly oiled.

- Use only the supplied spec. stud bolts, nuts and washers. Apply a thin coat of Molykote paste 1000 to the thread of the stud bolts.
- Support the slewing frame on the ground allow a space to the stud bolts. Fit all the stud bolts with one nut and washer in the holes in the slewing frame. Fit the nut and washer as shown on the drawing.
- Lift the slewing frame vertical and carefully lower it into the slewing bearing inner ring. The filler plug for the balls (which is located on the inner ring) should be positioned approx. 90 degr. from the boom centre line. Fit the stud bolts with washer and nut.
- Tighten all nuts lightly.
- Tighten all inner ring stud bolts crosswise with the torque tool (which must be well adjusted). Tight to 100% torque.
- Grease then the slewing bearing ring in accordance with INFO. SHEET 4762 in the maintenance section.

Drivers cabin/platform. Consult the drawing in the assembly drawings section.

- Lift and mount the cabin to the support frame and make up railings and remaining equipment.

BOLT TORQUES - NOT APPLICABLE TO SLEWING BEARING RING BOLTS

| THREAD | QUALITY | TORQUE | | | NOTE |
|------------|-------------|------------|--------------|--------------|---|
| | | kpm | Nm | ft.lbs. | |
| M10 | 8.8 | 4.8 | 48 | 35 | <u>8.8 – BOLTS:</u> Norm: DIN 931/933 Finish: Bright zinc (fzb) Can be used direct from the packing. |
| M12 | 8.8 10.9 | 8 9.6 | 80 96 | 58 70 | |
| M14 | 8.8 | 12.5 | 125 | 90 | |
| M16 | 8.8 10.9 | 20 25 | 200 250 | 145 180 | |
| M18 | 8.8 | 27 | 270 | 195 | |
| M20 | 8.8 10.9 | 39 45 | 390 450 | 280 325 | |
| M22 | 8.8 10.9 | 51 65 | 510 650 | 360 470 | |
| M24 | 8.8 10.9 | 66 80 | 660 800 | 480 580 | |
| M27 | 8.8 10.9 | 98 125 | 980 1250 | 710 905 | |
| M30 | 8.8 10.9 | 132 165 | 1350 1650 | 975 1195 | |
| M33 | 8.8 | 185 | 1850 | 1340 | <u>10.9 – BOLTS:</u> Norm: DIN 6914/6915/6916 Finish: Hot zinc (fzv) Nut Molykote-greased (MOS2) |
| M36 | 8.8 10.9 | 240 285 | 2400 2850 | 1735 2060 | |
| M39 | 8.8 | 310 | 3100 | 2240 | |
| M42 | 8.8 | 380 | 3800 | 2750 | |
| M45 | 8.8 | 475 | 4750 | 3435 | |
| M45 | 10.9 | 664 | 6640 | 4800 | |
| M45 | 10.9 | 475 | 4750 | 3435 | |
| M48 | 8.8 | 570 | 5700 | 4025 | |
| 5/8" UNC | 8.8 | 21 | 210 | 145 | |
| 3/4" UNC | 8.8 | 34 | 340 | 245 | |
| 7/8" UNC | 8.8 | 52 | 520 | 370 | |
| 1" UNC | 8.8 | 75 | 750 | 545 | |
| 1 1/4" UNC | 8.8 | 87 | 870 | 630 | |
| 1 1/2" UNC | 8.8 | 152 | 1520 | 1090 | |
| 2"-6 UN | 9.9 | 300 | 3000 | 2170 | |
| 2 1/4" UN | 9.9 | - | - | - | See Inf. Ref. 5498 |

Torques for slewing bearing ring bolts:

Info No. 2266

Torque tightening of 2 1/4" x6UN special Krøll bolts

The bolts are used for connecting main structural units (mast, jib and counterjib sections)

Tightening procedure

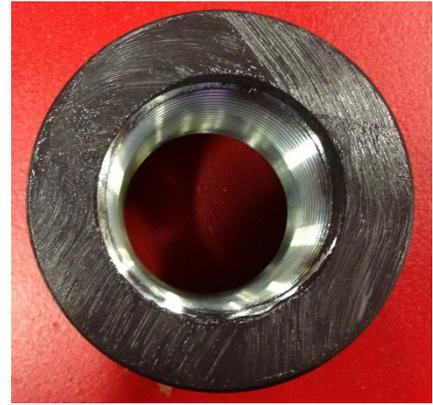
Always check the thread before use.

Torque : 2950 Nm

Grease : Molykote G-Rapid Plus paste, or Molykote 1000

- Apply G-Rapid Plus paste to the thread of the bolt using a brush.

Also apply paste to the contact face of the nut:



- Insert the bolt into the bolt hole. Fit the nut and hand-tighten.
- Use a hydraulic torque wrench to tighten the nut to 2950 Nm.

Checking procedure

The preloading of the bolt can be checked (if found necessary) using the angle-of-rotation method.

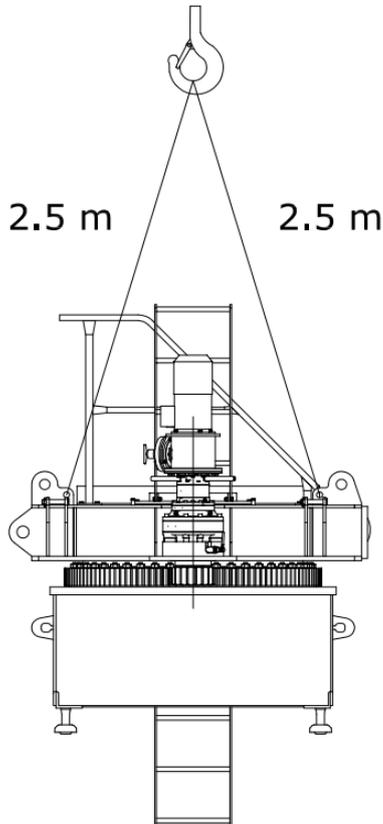
- Insert the bolt into the bolt hole. Fit the nut and hand-tighten.
- Use an impact wrench and gentle strokes with a hammer to pre-tighten the nut. There will be a significant sound when there is full contact between the bolt, the structural steel and the nut.
- Mark both the bolt (if the head is not locked during the torque tightening) and the nut.
- Tighten the nut to 2950 Nm.
- The nut should have turned approx. 115° relative to the bolt head.

Re-use after dismantling

- Clean bolt and nut for grease and dirt.
- Check for damages and cracks. If any doubt – dispose the bolt or nut.
- Check that bolt/nut fits smoothly.
- Apply grease on damaged spots in the chrome plating for corrosion protection.
- Do NOT re-use bolts or nuts older than 10 years.

1. Masthead and slewing assembly

Refer to drawings: C1-03.00063006, Slewing/masthead assembly
 C2-03.00063014, Driver's Cabin assembly
 C3-64.00062154, Cabin rear platform



Slewing and masthead (without driver's cabin)

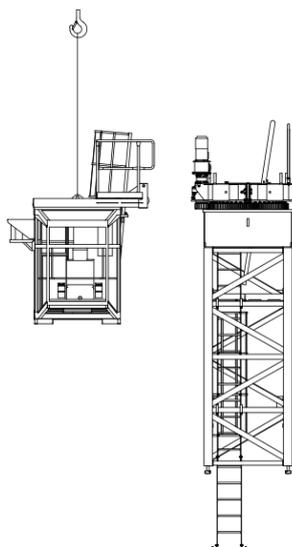
Total weight: 4.7 tons

Slings: 4 x 2000 kg WLL

The slewing table and mast head is supplied as a unit.

Fit the side platform and railing and ladders

The complete slewing and masthead unit can now be lifted and fitted to the crane mast



Driver's cabin and platform

Total weight: 1.2 tons

Slings: 2 x 1000 kg WLL

Fit the driver's cabin to the slewing table

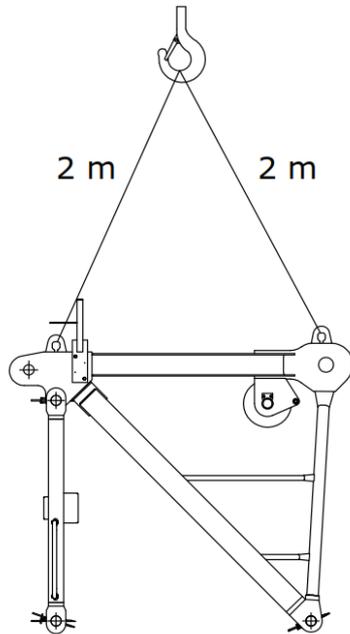
Fit and torque tighten all the mast corner bolts.

2. Top Tower

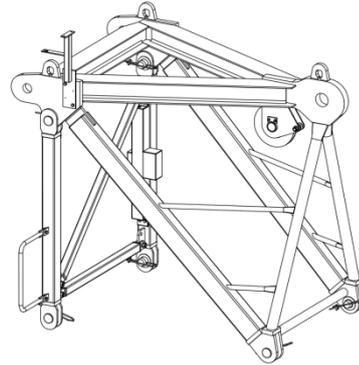
Refer to drawing: C1-04.00063005, Top tower assembly

Lift and fit the top tower on the slewing unit

Total weight: 1000 kg.



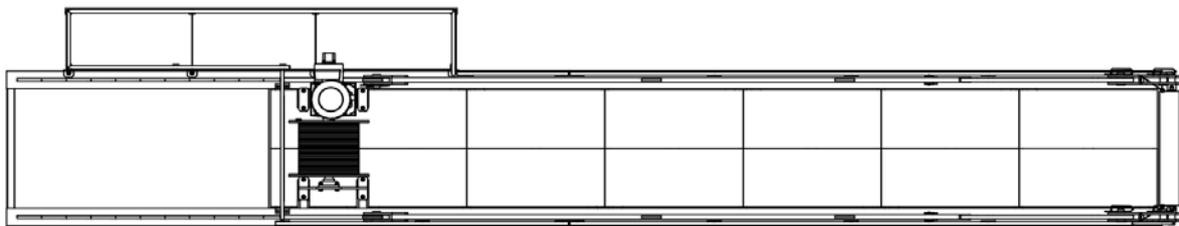
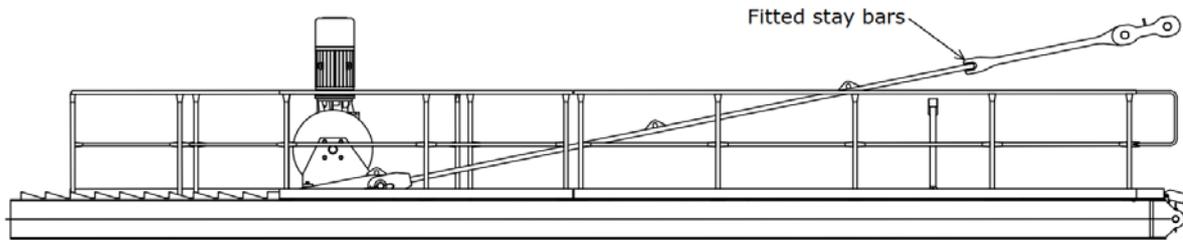
Slings: 3x500 kg WLL



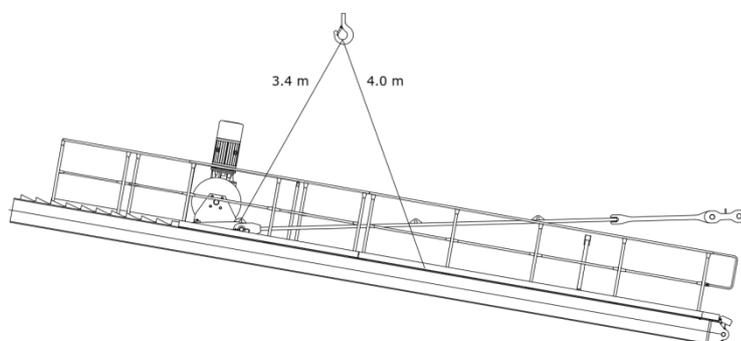
3. COUNTERJIB

Refer to drawings: C1-04.00063003, Counterjib assembly
C2-09.00063004, Rear stays assembly

- Assemble the counter jib sections on the ground. Tighten all bolts to 100% torque.
- Fit and position the rear stays on each side. Place the stays properly to allow easy cotter bolt connections to the stays fitted to the top tower.



- Ensure that the necessary cotter bolts to connect the stays are placed on the counter jib.
- Lift and fit the complete counter jib using the lifting eyes (Counter jib lifting angle is approx. 10 degrees). Make up the cotter bolt connections between the slewing frame and the counter jib.

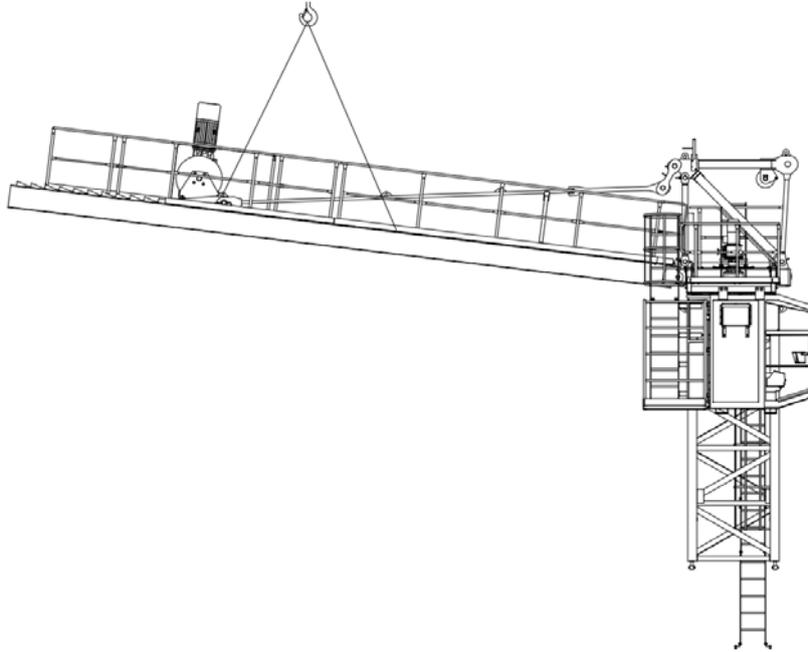


Total lifting weight is approximately

5700 kg

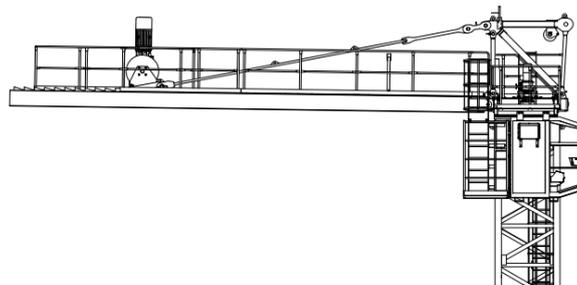
Slings: 4 x 2.000 kg WLL

- Pull – on each side – the stays using a tackle until the final stay connection can be carried out.



- Let the mobile crane ease down the counter jib and check that the counter jib is hanging properly in the stays **BEFORE IT IS RELEASED FROM THE MOBILE CRANE HOOK.**

NOTE: Counterweights are fitted according to the table in the separate sheet.



4. JIB

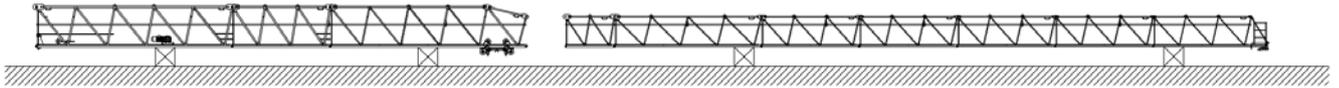
Refer to drawing: C1-02.00063001, Jib assembly, 60m

Refer to INF. REF. 5585, Counterweight table and INF. REF. 5610, Wire reeving.

- The jib root should be supported at a height from ground level to allow clearance for the hoist and trolley ropes, return pulleys, end stops etc.

Inner jib parts

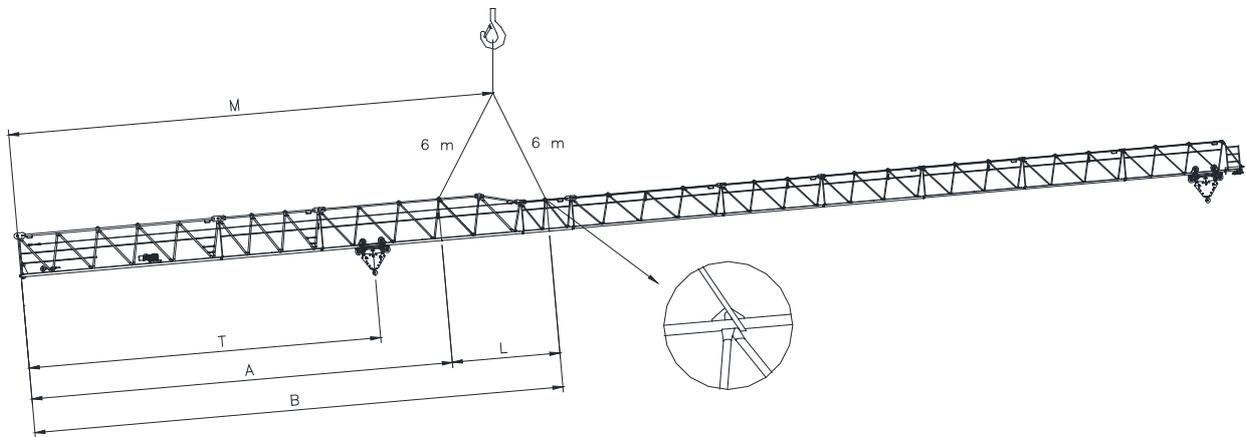
Outer jib parts



- Fit the trolley to the jib in the shown position on the inner jib. The hook system is temporarily fitted to the trolley.
- Tighten all bolts to 100% torque.

Lifting the Jib in one piece.

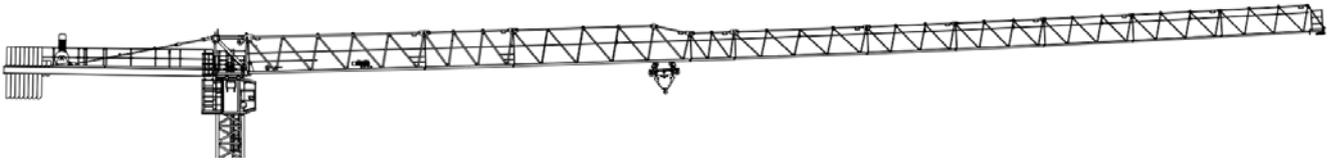
Angel of the jib: 5 degrees.



| | Mobile crane M [m] | Inner sling A [m] | Outer sling B [m] | Sling distance L [m] | Trolley placement T [m] | Weight in mobile crane incl. 10% safety [tons] | Number of slings x SWL |
|--------|--------------------------|----------------------------|-------------------------|-------------------------------|----------------------------------|---|---------------------------------|
| 30.0 m | 14.0 | 11.9 | 16.1 | 4.2 | 14.4 | 8.4 | 2 x 3.0 t |
| 35.0 m | 15.0 | 11.9 | 18.1 | 6.2 | 4.9 | 9.2 | 2 x 4.0 t |
| 40.0 m | 17.0 | 13.9 | 20.1 | 6.2 | 8.8 | 9.9 | 2 x 4.0 t |
| 45.0 m | 19.0 | 15.9 | 22.1 | 6.2 | 15.1 | 10.5 | 2 x 4.0 t |
| 50.0 m | 21.0 | 17.9 | 24.1 | 6.2 | 25.1 | 11.0 | 2 x 4.0 t |
| 55.0 m | 21.0 | 17.9 | 24.1 | 6.2 | 4.2 | 11.4 | 2 x 4.0 t |
| 60.0 m | 23.0 | 19.9 | 26.1 | 6.2 | 13.9 | 11.8 | 2 x 5.0 t |

- Make up the bolt connections between the top tower and the jib.
- Ease off the mobile crane and check that the jib is hanging properly **BEFORE IT IS RELEASED FROM THE MOBILE CRANE HOOK.**
- Reeve the trolley rope. See the wire reeving diagrams.
- Reeve the hoist rope. See the wire reeving diagrams.

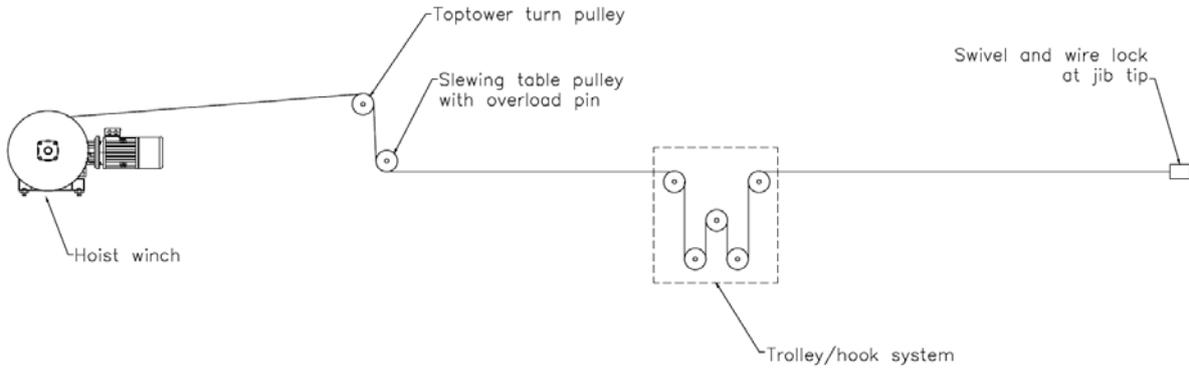
NOTE: Disconnect the electrical end stop shaft from the drum shaft.



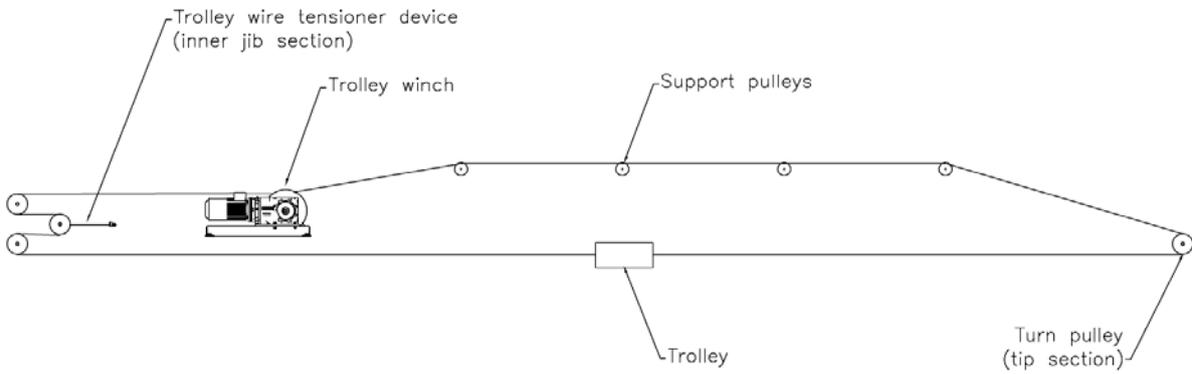
5. FINAL STAGES

- Make up all electrical connections. Reconnect the height/depth stop drive on the hoist motor.
- Carry out an inspection. Check connection bolts between units for 100% torque.
- Check the painting for erection damage.
- Check all motions and check the line part change-over system.
- The crane is now ready for operational check and adjustment.
- Before the crane is ready for takeover, inspect according to INF REF. 5507.

HOIST



TROLLEY



| Jib length [m] | Blocks before jib is mounted | | Blocks after jib is mounted | Total blocks | | Total block mass [kg] |
|-------------------|---------------------------------|------------------|-----------------------------------|-----------------|------------------|--------------------------|
| | 500 kg [pcs] | 2000 kg [pcs] | 2000 kg [pcs] | 500 kg [pcs] | 2000 kg [pcs] | |
| 30,0 | 0 | 4 | 5 | 0 | 9 | 18000 |
| 35,0 | 0 | 4 | 6 | 0 | 10 | 20000 |
| 40,0 | 0 | 4 | 7 | 0 | 11 | 22000 |
| 45,0 | 0 | 4 | 8 | 0 | 12 | 24000 |
| 50,0 | 1 | 4 | 8 | 1 | 12 | 24500 |
| 55,0 | 0 | 4 | 9 | 0 | 13 | 26000 |
| 60,0 | 1 | 4 | 9 | 1 | 13 | 26500 |

Blocks before jib is mounted:

Are placed before the jib is mounted. Note: Not to be left on the crane over night.

Blocks after jib is mounted:

Are placed after the jib is mounted.

For further information:
See the erection guide.

1. Machined contact faces for slewing bearing rings on mast head and slewing frame must be cleaned. The surface should be smooth, even and plain. Remove rust, paint, burrs at bolt holes, etc., using a steel brush, emery cloth or similar.
2. The contact faces should be lightly oiled after cleaning.
3. Remove paint, rust, burrs, etc., from the supporting surfaces of the bolt head and nut. Note that the bolt heads/nuts must abut the supporting surfaces.
4. Do not fit used bolts. Only special bolts and lightly oiled nuts are to be used. Apply a thin coat of Molykote Paste 1000 to the thread of the nuts before fitting.
5. Remove the protective coating (red or blue) from the contact faces of the slewing ring using a solvent. Be careful when cleaning to prevent the solvent from entering the bearing.
6. Fit two eye bolts equally spaced on the inner ring bolt circle, lift the slewing ring and carefully lower it onto the machined contact face of the mast head. Fit the bolts with loose nuts.
NOTE: - Each bolt is to be fitted with a washer both under the head and also under the nut.
7. The contact faces of the mast head and slewing bearing ring must be checked for out-of-flatness by inserting a feeler gauge between the mating surfaces both from outside and inside. The permissible out-of-flatness depends on the length of any unevenness; up to 200 mm length = 0.1 mm max., up to 500 mm length = 0.2 mm max. If the deviation exceed these values, the supporting surface must be machined to prevent distortion of the bearing when the bolts are tightened. If machining is not possible, then an air-hardening plastic grout should be used, see special information sheet.
8. Suspend the slewing frame on the hook so that it is vertical when lifted. Lift the slewing frame and carefully lower it onto the slewing bearing inner ring. The filler plug for the balls (which is located on the inner ring) should be positioned approx. 90 deg. from the jib centre line. Turn the slewing frame until the teeth marked in green of the bearing are in mesh with the slewing pinion of one of the gearboxes. Fit the bolts with loose nuts.
NOTE: - Each bolt is to be fitted with washers both under the head and also under the nut.
9. Check out-of-flatness between slewing frame and slewing bearing ring as described in para. 7.
10. Check tooth clearance at the point marked in green, see sheet 2011.

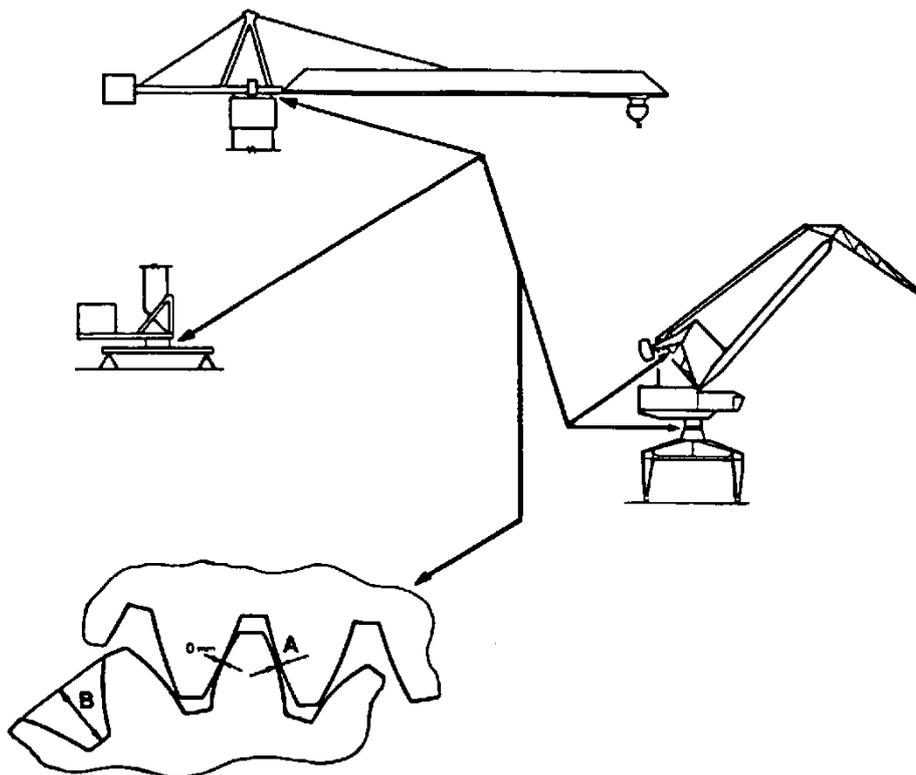
11. Tighten all nuts lightly.

12. Tighten all inner and outer ring bolts crosswise with the torque tool set (which must be well-adjusted). For torque's, see sheet 2266.

13. Grease the slewing bearing ring in accordance with sheet 5413.

On the first erection of a crane fitted with a new slewing bearing ring a test run with no load on the hook should be carried out by slewing the jib to the right/left for approx. 2 hrs. and checking the motors for uniform current consumption. Then, the crane should be test loaded followed by re-tightening of all bolts.

The crane is now operational.



| MODULE | A = mm |
|-----------------------|------------------------|
| 8 and 10 14 and 16 | 0.6 - 1.0 0.8 - 1.4 |
| | B = mm |
| 8 | approx. 17 |
| 10 | 22 |
| 14 | 29 |
| 16 | 34 |

The tooth clearances given on this sheet **ONLY** apply to new slewing rings/rack segments and pinions. In all other cases, adjustment should be based on the distance from centre line slewing ring/segment to centre line pinion. Please consult **KRØLL CRANES A/S** for information.

When mounting/exchanging slewing bearing rings and gear units on the slewing assembly, the clearance in tooth mesh should be measured at the point on the slewing ring which is marked with a green spot. If the clearance at this point is correct, the tooth mesh will be correct over the full diameter. If the mark cannot be found, at least 4 checks at equidistant points should be taken. The tooth clearance for rack segments should be checked at 3 points, i.e. at the centre plus 0.5 m (20") from both ends. The tolerance given is the minimum.

First, fit the slewing bearing ring on the slewing table/undercarriage of the crane, then check the tooth clearance for each slewing gear unit and, finally, tighten the slewing bolts.

Tighten the bolts crosswise, first with 20%, then with 60% and finally with 100% of the max. torque.

For mounting/exchange of slewing bearing rings, see info. sheet 2059.

The bolts and nuts are supplied with a black finish and lightly oiled thread. A thin coat of Molykote Paste 1000 should be applied to the thread of the nuts before fitting.

| CRANE TYPE | THREAD | GRADE | TORQUE | | | REMARKS |
|---|--------|-------|--------|-------|---------|------------------------------------|
| | | | kpm | Nm | ft.lbs. | |
| K-68 | M20 | 10.9 | 54 | 540 | 388 | Ref FFCM drawing: A1-2600.165-A |
| K-130F | M24 | 10.9 | 93 | 930 | 680 | |
| K-154/175 K-200D K-200L K-300/320/333 K-400D | M27 | 10.9 | 140 | 1400 | 1030 | |
| K-420 / K-365L K-550 / K-500L K-560 K-600 K-800 K-1000 | M30 | 10.9 | 185 | 1850 | 1340 | |
| *K-1000 | M33 | 10.9 | 258 | 2580 | 1870 | |
| K-1200 K-1400 K-1800 K-2500 | M36 | 10.9 | 330 | 3300 | 2390 | |
| K-3000/4000/5000 | M45 | | 634 | 6340 | 4677 | |
| MK-2480 | M60 | 10.9 | 1450 | 14500 | 10465 | |
| K-10000 | | | | | | |

* From S/N 1528

Applies to all slewing bearing rings supplied as a spare part.

This test and inspection programme is Krølls requirements. It is not an official test for approval of the crane.

The programme consists of inspection of parts, and control / adjustments of the control and indication systems.

Some of the points can be inspected / verified during erection, i.e. correct torque of bolts, while most is to be checked after erection.

Any point checked for repair should be accompanied by a specification of what needs to be repaired, where on the crane.

| | N.A. | Rep. | OK |
|---|--------------------------|--------------------------|--------------------------|
| Steel Structure Inspection | | | |
| Dents, or bend members in any part of the steel structure. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Other faults in structure (write here): | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Damage to paint, that needs repair. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Correct torque of bolts in connections between structure parts. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| All access ways and workstation are undamaged. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Motors and gears | | | |
| Check oil level on all gears. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| All wire connections are safe and sound. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Slew ring greasing system is filled and in working order. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Air- and drainholes are free and clean. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Hoist gear and drum are correctly aligned. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Wires | | | |
| Wires are free from damage. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Trolley / Hook system | | | |
| Test of trolley system. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Test of hook blocks including change of line part reeving. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Control systems | | | |
| All control systems are in working order. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Indication and warning systems | | | |
| All indication and warning systems are in working order. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Other tests and inspections | | | |
| All lubrication points are undamaged. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Test loading carried out acc. to Inf. Ref 2070. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |