SAFETY INSTRUCTIONS

This instruction does not superseed 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 hight 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 cranage 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.

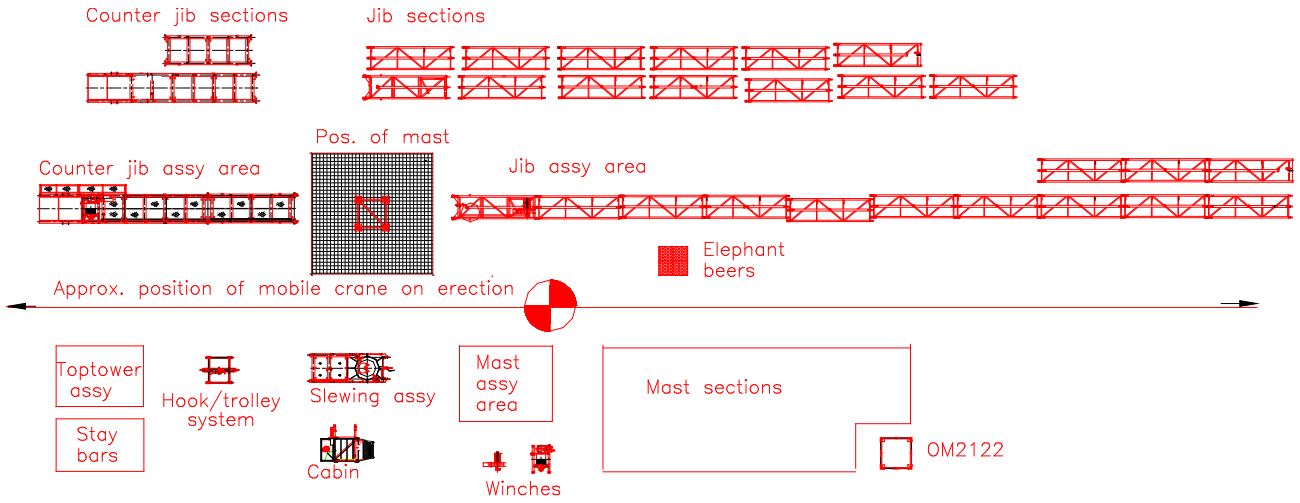
- Portal cranes have a side mounted cable drum and guide roller fitted to lay the cable adjacent to the track on the inside of one side. (Customer order should give any relevant information).

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	-	Information sheet
Expendable base	-	Information sheet
Rail-mounted	-	Information sheet

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.

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 cranage.	Unless otherwise agreed by KRØLL (or agents) KRØLL (or agents) accept no responsibility for on - site loss of delivered goods & tools
6) Certified wire/chain slings.	
7) Site shelter with lockable storage facilities.	
8) Jib support.	**See erection instr.**
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).	Consult KRØLL (or their agents) if these items not available.
11) Hook-fitting calibrated dynamometer and test load blocks.	

C:	
1) **Tools** 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 }	Consult KRØLL (or their agents) if these items will not be available These items should be instantly available, if required; (other-wise, consult KRØLL (or their agents)).
2) Telephone/First-aid equipment.	KRØLL's (or agents') personnel should be informed on arrival at site of location points
3) Site access.	Site clearance permis-sion for KRØLL's (or their agents') personnel.

* **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 kpm	TORQUE Nm	TORQUE ft.lbs.	NOTE
M10	8.8	4.8	48	35	
M12	8.8 10.9	8 9.6	80 96	58 70	8.8 – BOLTS:
M14	8.8	12.5	125	90	Norm: DIN 931/933
M16	8.8 10.9	20 25	200 250	145 180	Finish: Bright zinc (fzb)
M18	8.8	27	270	195	Can be used direct from the packing.
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	10.9 – BOLTS:
M27	8.8 10.9	98 125	980 1250	710 905	Norm: DIN 6914/6915/6916
M30	8.8 10.9	132 165	1350 1650	975 1195	Finish: Hot zinc (fzv)
M33	8.8	185	1850	1340	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	Finish: Hot zinc (fsv)
M45	**10.9**	**664**	**6640**	**4800**	**Finish: Black, DIN 931**
M45	10.9	475	4750	3435	Nut: RG-1100 grease, (KEMA)
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 2¼"x6UN special Krøll bolts

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

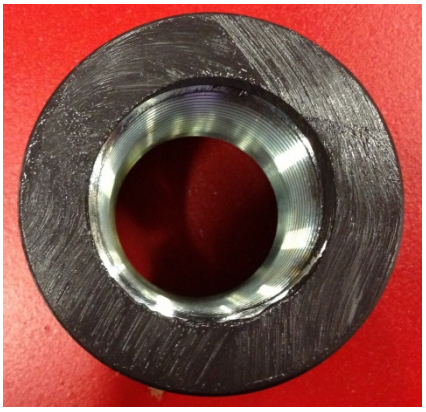
Tightening procedure

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.

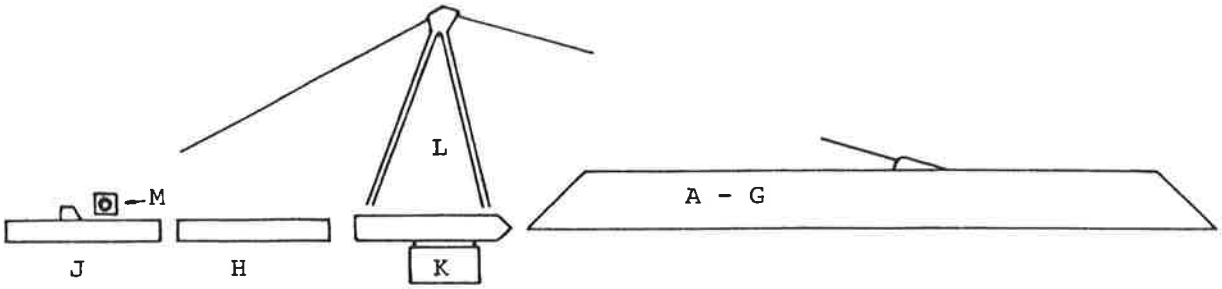
Checking procedure

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

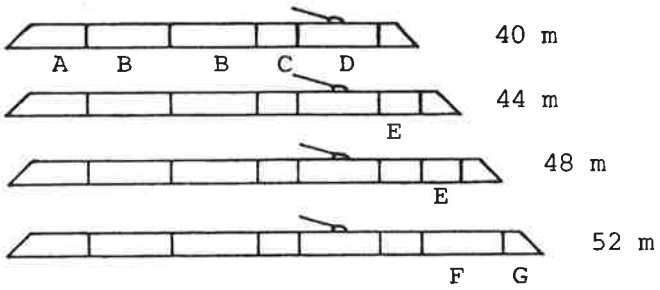
- Insert the bolt into the bolt hole. Fit the nut and hand-tighten.
- Use an impact wrench and gentle strokes with a hammer to pre-tighten the nut. There will be a significant sound when there is full contact between the bolt, the structural steel and the nut.
- Mark both the bolt (if the head is not 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.



Jib Combinations Standard

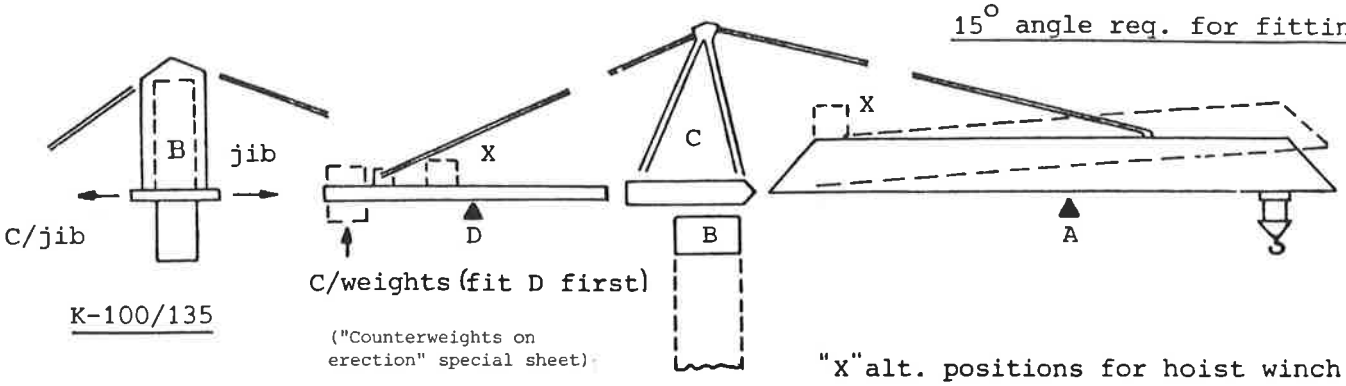


Jib Inner Section "A" includes the trolley winch.

Section	L(m) B(m) H(m)	m^3	kg.
A Jib Inner 8 m	8.02 x 1.48 x 2.04	24.21	2100
B Interm. 8 m	8.02 x 1.48 x 2.04	24.21	1400
C Interm. 4 m	4.02 x 1.48 x 2.04	12.14	760
D Eye 8 m	8.02 x 1.48 x 2.18	25.80	1400
E Outer 4 m	4.02 x 1.48 x 2.02	12.02	570
F Outer 8 m	8.02 x 1.48 x 2.02	24.00	1050
G Tip 4 m	4.20 x 1.48 x 2.20	13.33	450
H C/Jib Inner	6.00 x 1.23 x 0.77	5.68	1000
J C/Jib Outer	6.00 x 1.23 x 0.92	6.78	1020
K Slewing Unit	4.85 x 2.20 x 2.70	28.81	7800
L Tower Folded	7.70 x 1.35 x 0.68	7.06	1800
M Standard Hoist Winch Module Uncrated:			
75 HP AC	2.7 x 2.20 x 1.64	9.74	2200
✱ 125 HP AC	2.71 x 2.4 x 1.64	10.67	2750

✱ End Platform Removed.

Other parts can be boxed or packed into sections.



The crane is supplied with the module hoist winch fitted at one of the "X" positions, see crane sheet. On K-100 and K-135 the winch is always on the counterjib.

FOR MOBILE CRANE HOOK CAPACITY ADD ON WEIGHT OF SLINGS ETC.

For the hook height of the mobile crane add 12 m min. (K-100 to K-400) or 18 m min. (for K-800-1800) to the known height under hook of the erected KROLL machine.

If adequate mobile capacity is available, to slewing B can be added tower C, also cabin and beams.

A. Jib weight includes part stays, trolley winch, wire, trolley/hook, hoist wire - WITHOUT THE HOIST WINCH MODULE.

B. Slewing weight included slewing ring and mast head (without cabin).

C. Tower weight includes part stays.

D. Counter jib weight includes part stays - WITHOUT THE HOIST WINCH MODULE.

TYPE/REACH	m	Kg. A	Kg. B	Kg. C	Kg. D	D. Radius m
K-100	-36	4200	6500	-	1800	14
	40	4500				
	44	4800				
K-135	40	8200	7200	-	1800	14
	44	8600				
K-154	36	8200	5800	2900	2500	15.3
	40	8700				
	44	9200				
	48	9700				
K-200 K-250	40	10700	7800	2900	2500	15.3
	44	11300				
	48	11800				
	52	12300				
K-400	35	16400	12500	5800	4000	15
	40	17600			6100	21
	45	20200			10300	27
	50	21500				
	55	22500				
	60	24800				
	65	25800				
	70	27000				

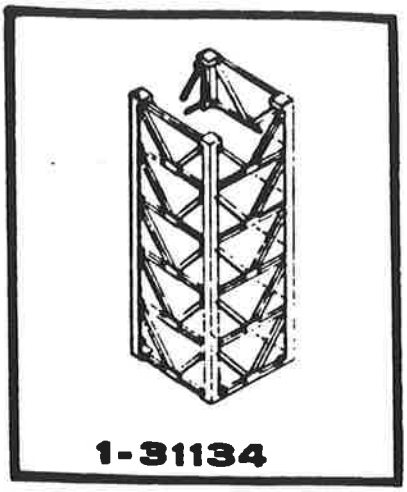
TYPE/REACH	m	Kg. A	Kg. B	Kg. C	Kg. D	D. Radius m
K-800-60t Hook Assy	42	29800	21000	9100	7200	22
	48	31600				
	54	33300				
30t Hook Assy	60	34000			9800	28
	66	35600				
	72	37500				
K-1800-65		49500*	33000	14500	14200	36

*incl.6800 for combined hoist/trolley winc

Type 3 - 600 kg
4 - 1400 -
5 - 1600 -
6 - 1800 -
} Cabin plus Beams and access (can be added to B)

50 HP 2100 kg
75 HP 2200 -
125 HP 3000 -
200 HP DC 4700 -
} Hoist Winch Modules

Mast Section
M 22.1A



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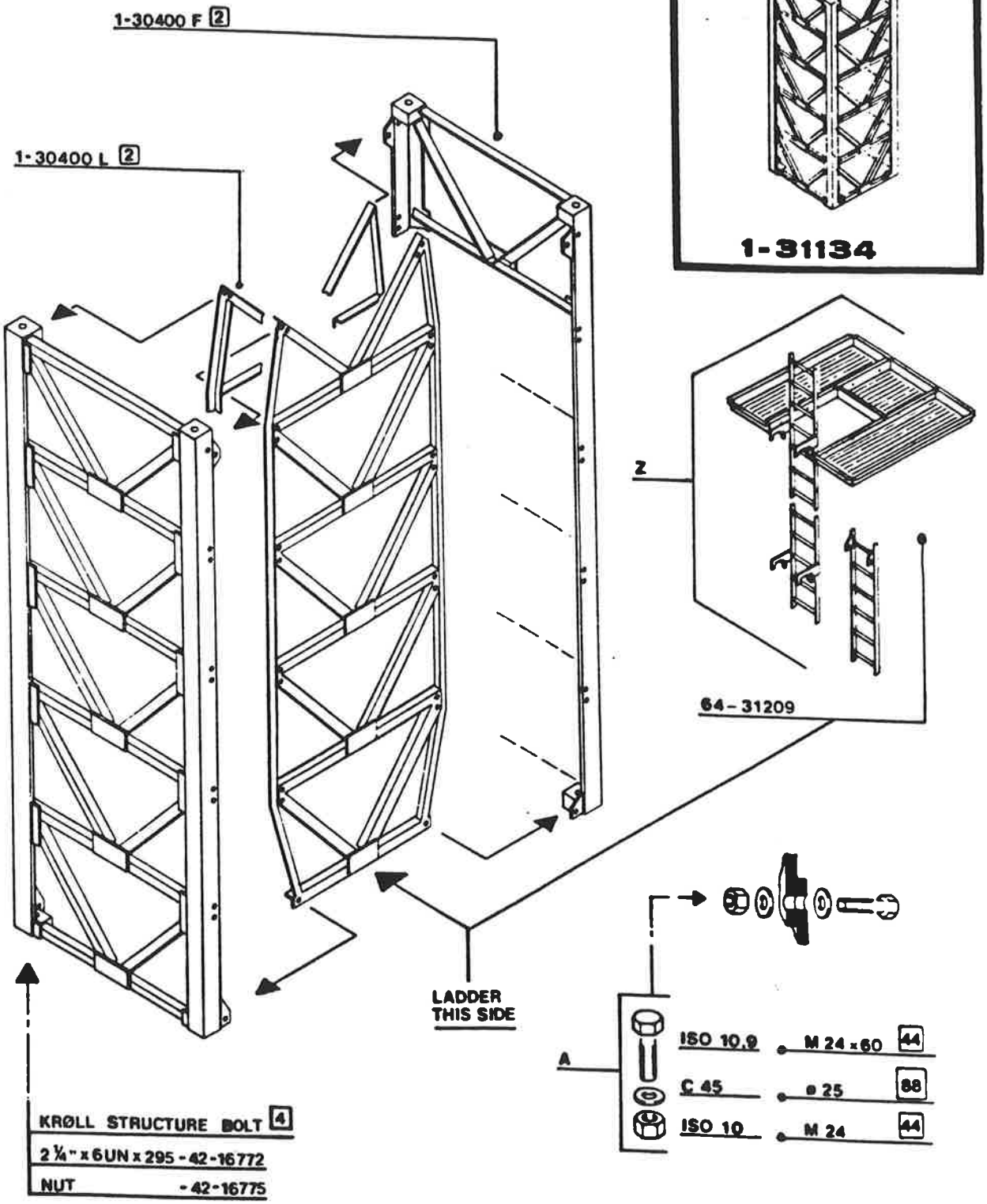
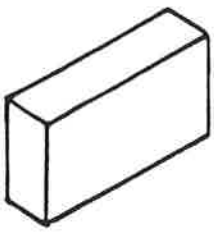




TRANSPORT DIM.
420 x 2220 x 6010 mm
INCL. PLATFORM &
LADDER

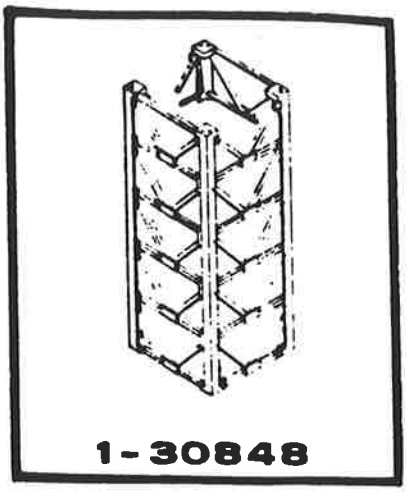
INF. REF.
6133-01

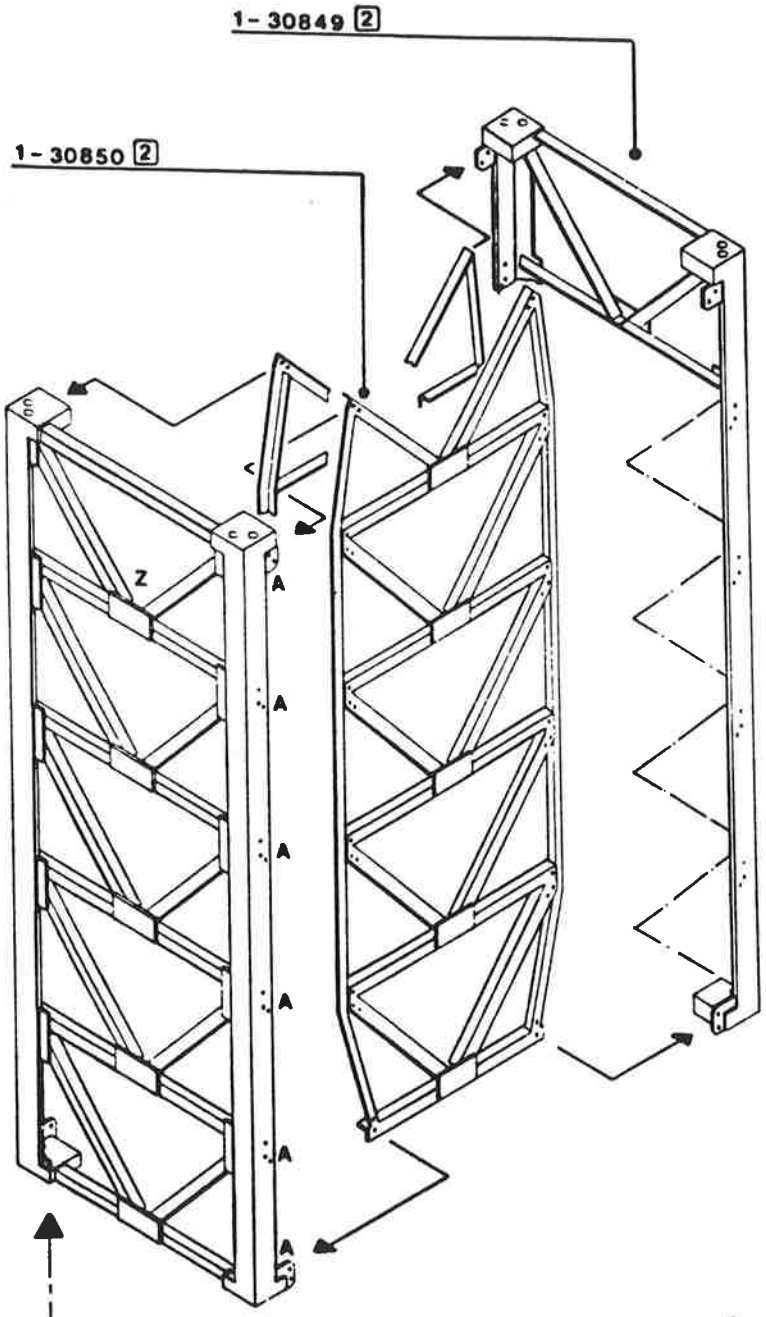
KRØLL GIANT CRANES

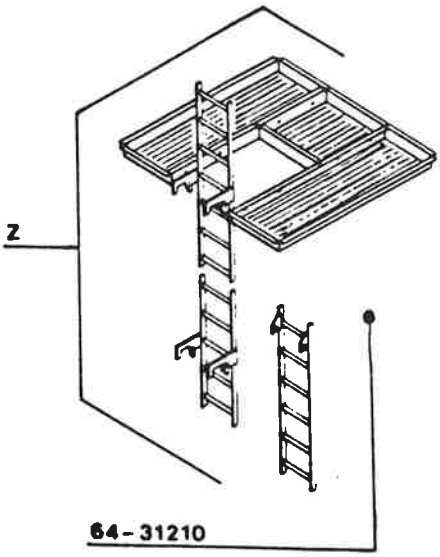
2600 kg

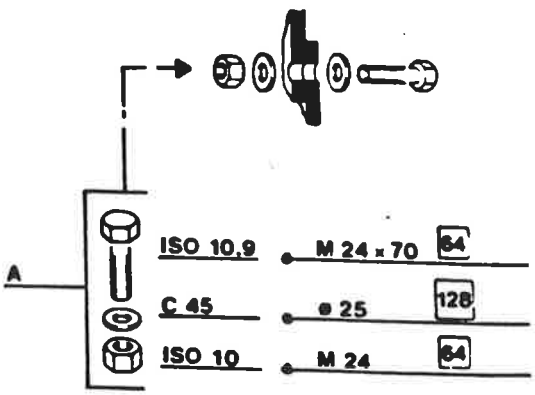
□ = X

Mast Section
M 22.2A

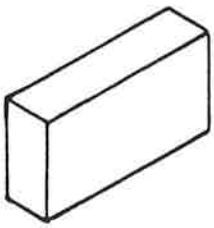








KRØLL STRUCTURE BOLT 8
2¼" UNC - 42-16772
NUT - 42-16775



TRANSPORT DIM.
660 x 2220 x 6010 mm
INCL. PLATFORM & LADDER

INF. REF.
6126-00

4060 kg

□ = X

1

KRØLL GIANT CRANES

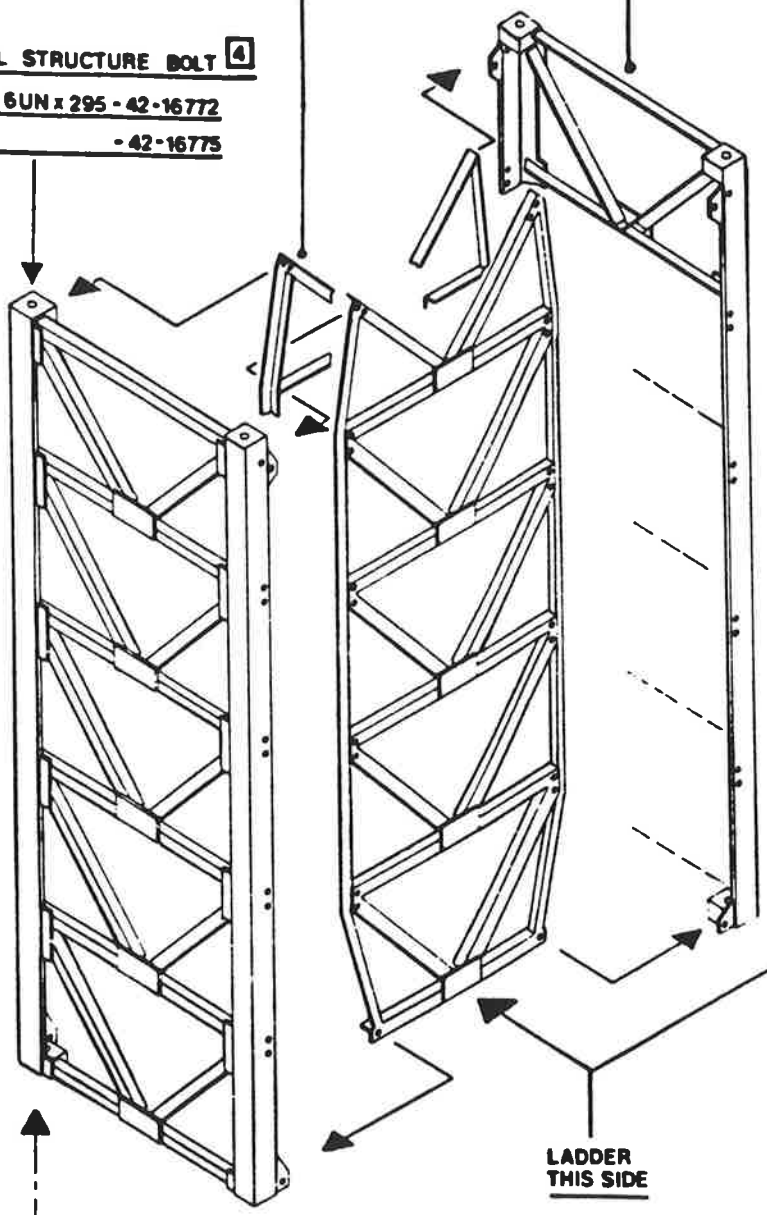
Mast Section
MO 22.1A

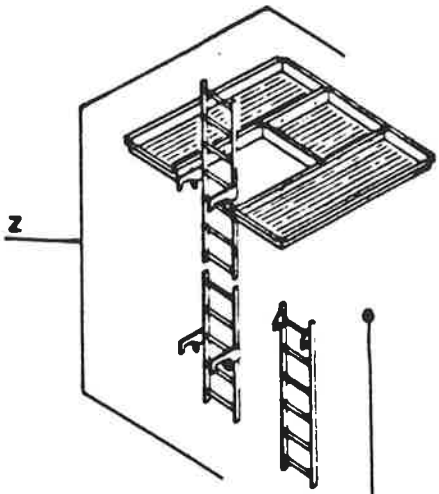
1-31135

1-30222 F [2]

1-30222 L [2]

KRØLL STRUCTURE BOLT [4]
2 ¼"-6UN x 295 - 42-16772
NUT - 42-16775

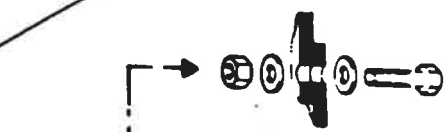


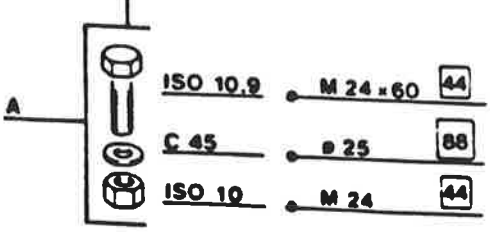


Z

64-31209

LADDER THIS SIDE

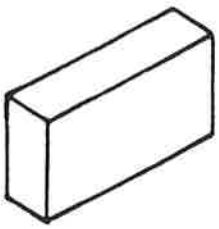




A

ISO 10.9 — M 24 x 60 — [44]
C 45 — ø 25 — [88]
ISO 10 — M 24 — [44]

KRØLL STRUCTURE BOLT [8]
2 ¼"-6UN x 295 - 42-16772
NUT - 42-16775



TRANSPORT DIM.
660 x 2220 x 6010 mm
INCL. PLATFORM & LADDER

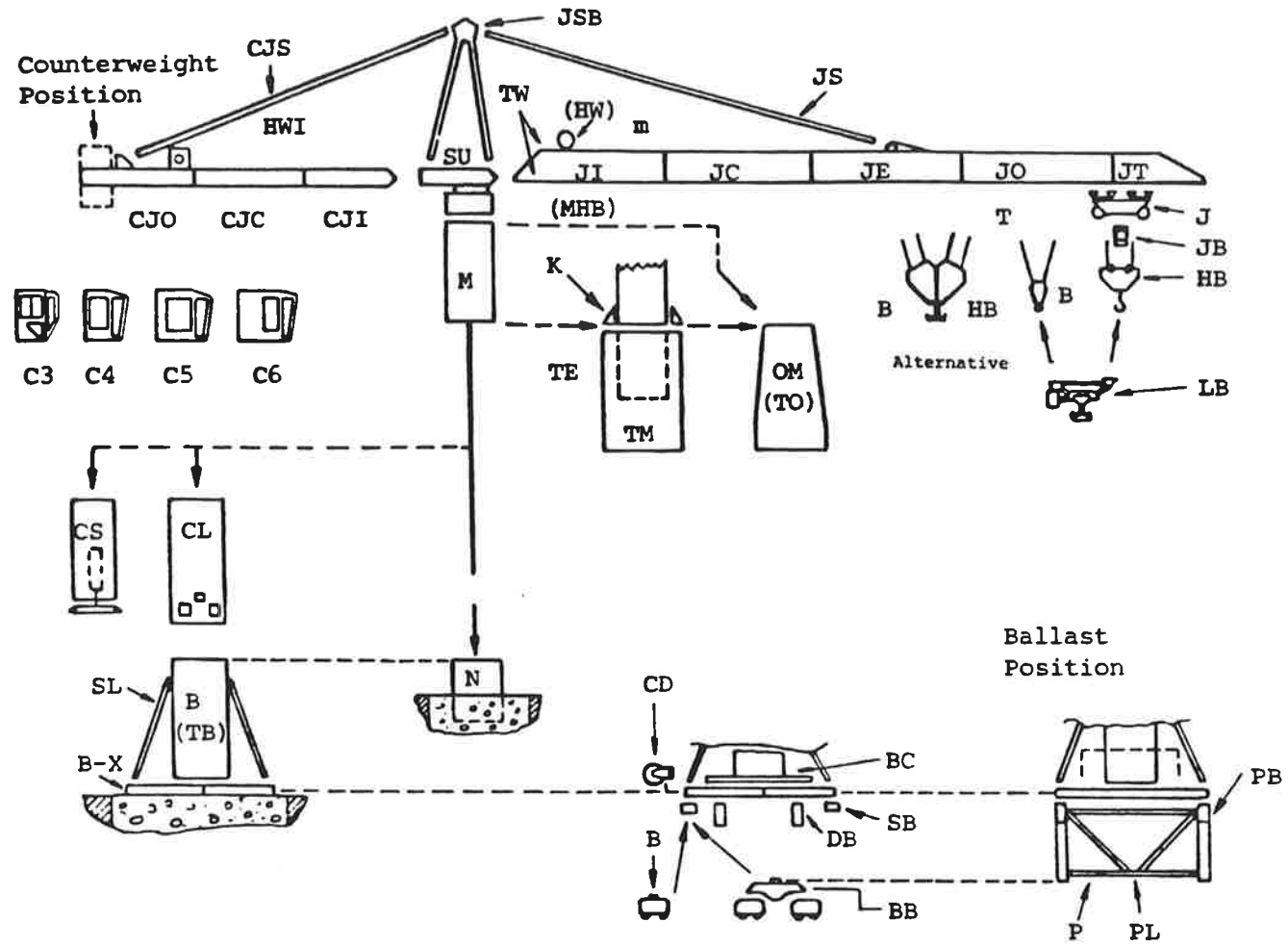
INF. REF.
6137-00

2600 kg

□ = X

1

KRØLL GIANT CRANES



JI - Jib Inner Sections
JC - Jib Centre Sections
JE - Jib Eye Sections
JO - Jib Outer Sections
JT - Jib Tip Sections
JS - Jib Stays
JSB - Jib Stays Balancing Arrangement

CJI - Counter Jib Inner
CJC - Counter Jib Centre
CJO - Counter Jib Outer
CJS - Counter Jib Stays

T - Trolley
IB - Intermediate Block
HB - Hook Block
LB - Lift Beam
B - Block (used with Double Trolley)

HWM - Hoist Winch
(HWN) Hoist Winch altern. pos.
TW - Trolley Winch

TO - Tower
SU - Slewing Unit
(MHB) - Mast Head Box
M - Mast Sections
TM - Telescop Mast Sections
OM) - Transition Section
TO)
K - Knee Blocks
TE - Telesc.Equipment
CS - Climber Section
CL - Climber Section (Mast M22 Type)
B - Bottom Section
(TB) - Bottom Section Tele Mast
SL - Support Legs
B-X - Bottom Cross
N - Expendable Base
(TN) - Expendable Base Tele Mast

BC - Ballast Carrying Beams
SB - Slide Beams (curve running)
DB - Derailment Protection Beams
P - Portal
(PB) - Portal Beams
(PL) - Portal Lattice
CD - Cable Drum
B - Bogies
BB - Bogie Beams

C3 - Cabin Type 3
C4 - Cabin Type 4
C5 - Cabin Type 5
C6 - Cabin Type 6

MAST SYSTEM.

The Krøll Crane mast system is built up of standard, transition, bottom, climbing, telescoping sections and expendable bases.

STANDARD SECTIONS-"M" OR "TM".

These in size order are M 12, 16, 22, TM 160, 120, 122, TM 32, 32S, 32SS, M 50 and M 80. Other than TM 160, 120, 122 which are approx. 2,4 m square, the numerals of the other sections denote their approx. square dimension in meters, i.e. M12 = 1.2 m x 1.2 m sq. M50 = 5 m x 5 m sq. These sections can be used in multiples and form the main height of a mast.

TRANSITION SECTIONS-"O".

"O" is included in the designation of these sections and they form the change from one section to another. Only one is used of each type in a mast, i.e. (M12)-OM1216-(M16) or (TM32)- TO3250 - (M 50). . The transition between a 22 mast and a TM 160/120/or 122 is an MK22 section. The "K" indicating that the section is drilled to accept knee pieces which transfer the loading to the lower section.

BOTTOM SECTIONS "B".

"B" designated sections are the base sections for a mast and are used with a B-X (bottom cross) and support legs. The sections fit under all standard mast sections (M & TM) and transition sections ("O"). The bottom cross (B-X) to which the section is bolted can be anchored to a concrete foundation pad, fitted with bogies for a travelling crane, or be used as the upper member for a portal.

CLIMBING SECTIONS "C" DESIGNATION.

CS12, 16, CL22 are used for climbing a crane within a building construction. The smallest CS12 can be used with a B-X for the initial stages of construction, the other 2 sections can be used in connection with N or B sections.

TELESCOPING EQUIPMENT SECTIONS.

These sections fit inside TM sections. They can be used to increase the mast height of the crane or to dismantle the mast to a height that is convenient for available mobile craneage. Telescoping equipment sections for smaller mast types is built in during the initial erection, but on larger masts it can be added at a later stage and removed after use.

Climbing and telescoping equipment includes the necessary hydraulic pump station, cylinders, beams etc.

EXPENDABLE BASES "N".

"N" designation is given to these sections which are cast into the crane foundation block. Each standard mast section, except TM160 has a complementary expendable base section.

GUIDE TO TOP SECTIONS.

Top mast sections are as follows,

K-100/135 - M12 sections	K-200 - M22 type section	K-800 - M32 section
K-154 - M16 section	K-400 - OM 2432 section	K-1800 - OM 3250 section

GUIDE TO SECTION LENGTH.

Standard (transition) and bottom sections M12, 16 - 4 m long.
M 22, TM 160, 120, 122, TM 32, 32s, 32ss - - 6 m long.
M 50 - 80 - -12 m long

In the larger mast types "N" sections may be supplied in longer lengths. 32 type sections can be in increments of 1.5 m. 50 and 80 types in increments of 3 m. Climbing sections for 12 & 16 type mast are 4 m long. For 22 type mast - 6 m long.

MAST

As a generalization only mast types fitted are,

K-100/135	- M 12	upper sections-	M 16	With transition sections to mast types TM 160-120-122
K-154	- M 16	upper sections-	M 16	
K-200	- M 22	upper section -		
K-400	- OM 2432	upper section -		TM 32 type below
K-800	- TM 32	upper section -		
K-1800	- OM 3250	upper section -	M 50 type below	

The type number approximates to the mast square dimension, i.e. M 12 is 1.2 m x 1.2 m sq., M 32 is 3.2 m x 3.2 m sq. (except for 160, 120, 122 which are approx. 2.4 m x 2.4 m sq.)

SECTION LENGTHS

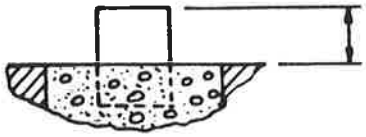
sections type No. 12 and 16 (B,M or climbing sections-CS)	- 4 m long
sections type No. 22 (M, MK or climbing section CL)	- 6 m long
sections type No. 160 (TM only)	- 6 m long
section type No. 120 and 122 (TB or TM)	- 6 m long
section type No. 32 (TB, S - SS or SSS)	- 6 m long
section type No. 50 (B or M)	- 12 m long
transition sections type OM 1216	- 4 m long
type OM 1622, TO 160, TO 120 OM 2432, TO 32	- 6 m long
type OM 3250	- 12 m long

NOTE: M 50 section may be supplied as one only per crane in a 6 or 9 m length.

BASE

EXPENDABLE BASE

"N" SECTIONS.



According to Mast Type

SEE INF. SHEETS "A".

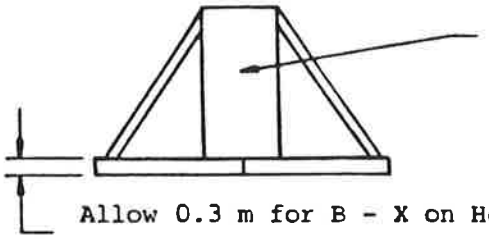
IF A CRANE IS FITTED TO AN EXPENDABLE BASE SECTION A

"B" SECTION MAST TYPE IS NOT FITTED.

BASE CROSS ASSEMBLY

B - X and B Sections

with Support Legs.



B Type

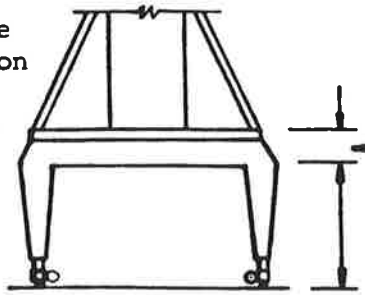
Mast Section

Allow 0.3 m for B - X on Height Calculation.

PORTALS (up to 12 m Rail Guage).

B Type Section

B - X



For Portal Beams and B - X

allow - 1.0 m for 6 m Rail Guage
1.5 m " 9 m " "
2.0 m " 12 m " "

Free Height over Rail Head Nominal 4.8 m

OR AS PER CRANE ORDER.

(Bogie Assembly Height is incl. in the 4.8 m)

BOGIE ASSEMBLIES.

For dimensional details of Bogie Assemblies, track length for erection, construction clearances etc. SEE INF. SHEETS "F".

For a Curve Running Bogie Assembly add 0.5 m to height calculation.

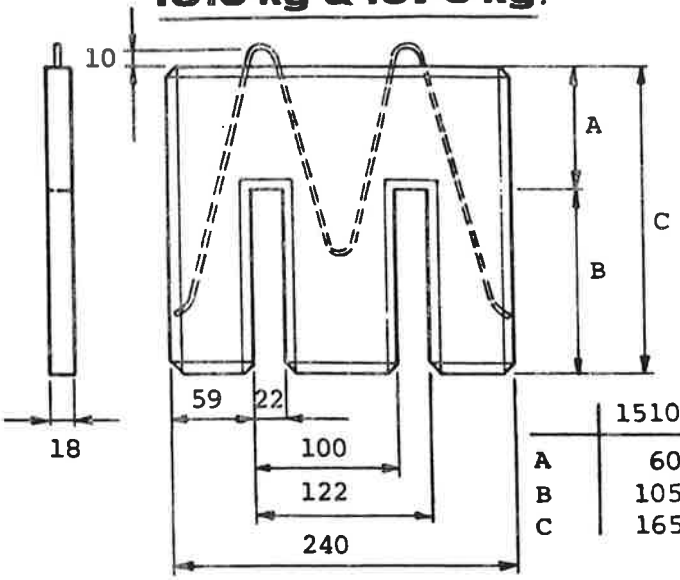
1510 kg & 1970 kg.

Unspecified dimensions
in cm's
Corner should be chamfered

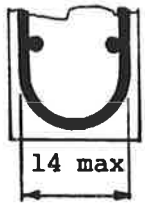
CONCRETE

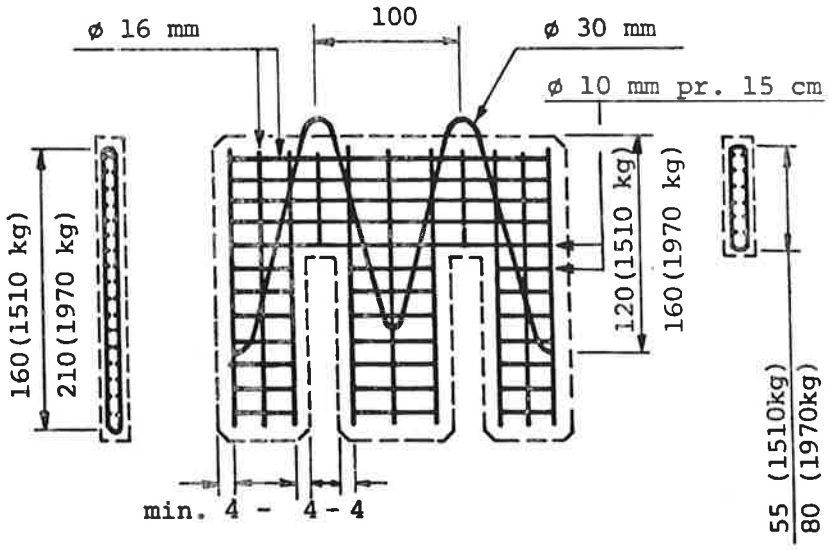
$1m^3$ = 2.35t = 5180 lbs
= 150 lbs/cu.ft approx.
Cube crushing str. = $300kg/cm^2$
Weight tolerance ± 1%

Mark check weight on each block.
Do not remove from form until hard STORE FLAT
Allow 21 days before use.

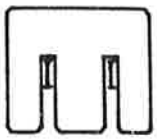


	1510kg	1970kg
A	60	85
B	105	130
C	165	215

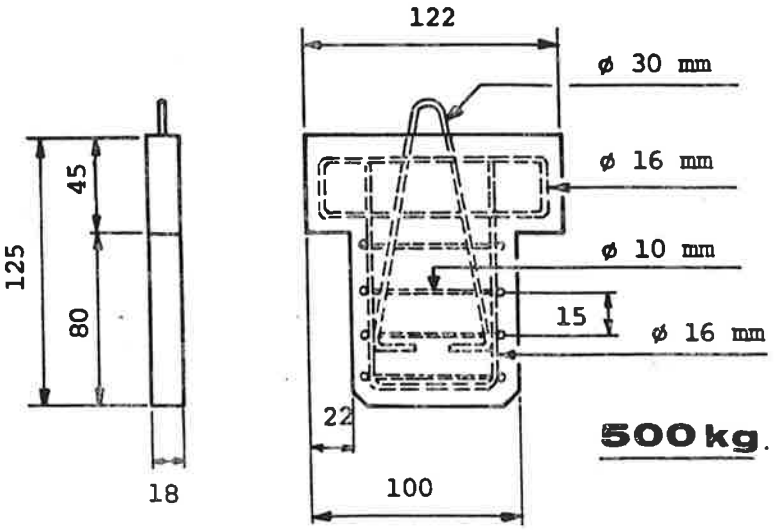




FORM OUTLINE



METHOD OF FITTING
TO C/JIB

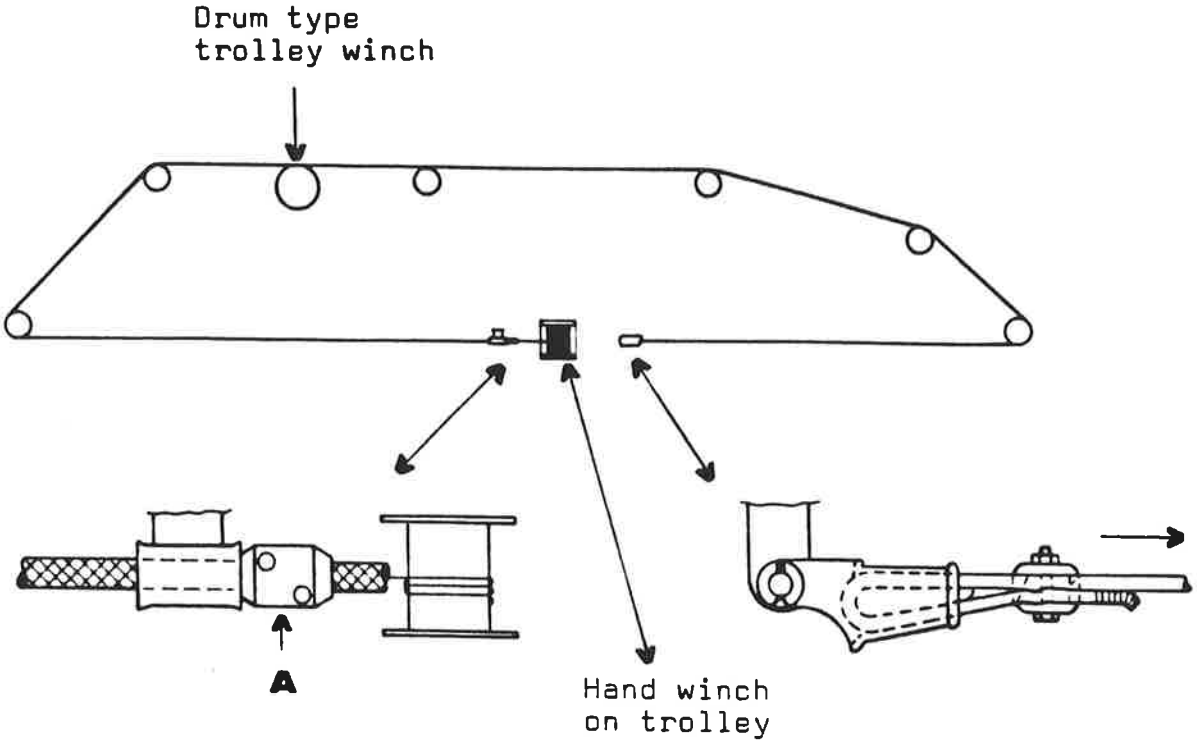


500 kg.

(CRANE TYPES UP TO & INCL. K-200D/250D)

NO. REQUIRED
500 kg – ☐
1510 kg – ☐
1970 kg – ☐

. TROLLEY ROPE REEVING



Reeving should be carried out when the jib is assembled at ground level.

Reeving is as shown on the illustration. The length of rope required and take-up for stretch is controlled at the trolley-mounted hand winch.

THIS HAND WINCH IS ONLY FOR TIGHTENING THE ROPE AND WINDING ON THE LOOSE REMAINING LENGTH!

Note the position of the grip A. This grip fits into a socketed tube to take the rope pull.

After hoist rope reeving and before test loading the crane, tension the trolley rope correctly.

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 mat 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.

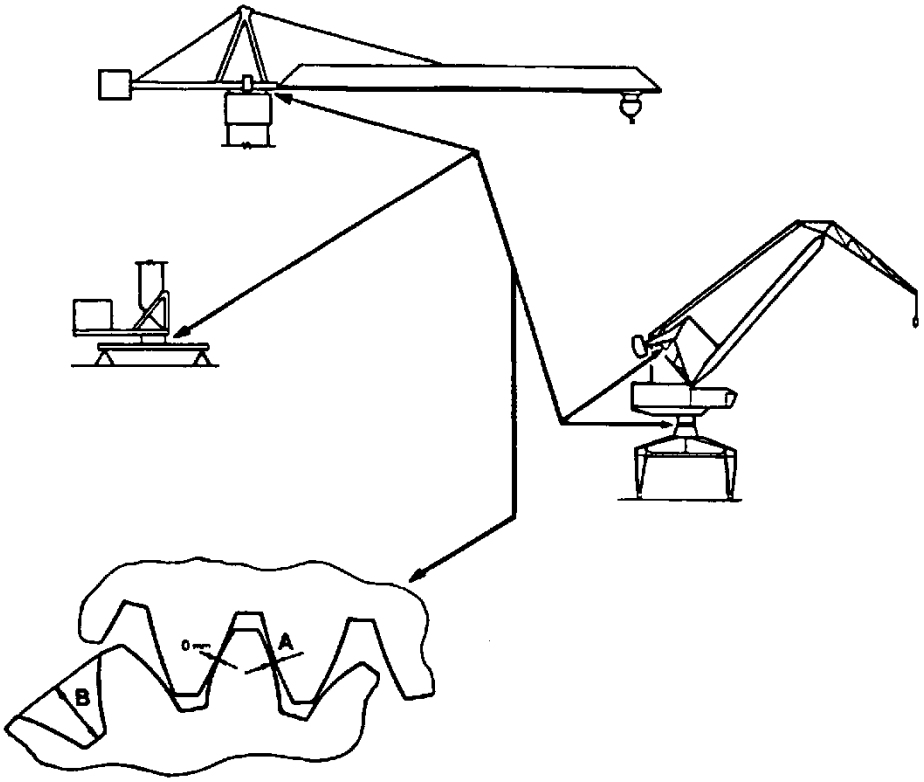
12. Tighten all inner and outer ring bolts crosswise with the torque tool set (which must be well-adjusted). For torque's, see sheet 2266.

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.

Tooth clearance for slewing bearing rings



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

TORQUES FOR SLEWING BEARING RING BOLTS

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.	
K68 / K70	M20	10.9	54	540	388	
K130F	M24	10.9	93	930	680	
K80L/K100L/K125L K154 / K175 K160 / K180 K200D / K250D K200L K230F K320 K330F / K333 K400D	M27	10.9	140	1400	1030	
K365L K420 K430F K500L K550 K560 K630F K800 K1000, to S/N 1517	M30	10.9	185	1850	1340	
K1000, from S/N 1528	M33	10.9	258	2580	1870	
K1500L	M33	10.9	258	2580	1870	FFC slew ring
K1200 K1400 K1800 K2200 K2500 K3000/4000/5000	M36	10.9	330	3300	2390	
MK2480	M45	10.9	634	6340	4677	Ref FFCM dwg: A1-2600.165-A
K10000	M60	10.9	1450	14500	10465	

Applies to all slewing bearing rings both factory installed and 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.	☐	☐	☐
Other faults in structure (write here):	☐	☐	☐
Damage to paint, that needs repair.	☐	☐	☐
Correct torque of bolts in connections between structure parts.	☐	☐	☐
All access ways and workstation are undamaged.	☐	☐	☐
Motors and gears			
Check oil level on all gears.	☐	☐	☐
All wire connections are safe and sound.	☐	☐	☐
Slew ring greasing system is filled and in working order.	☐	☐	☐
Air- and drainholes are free and clean.	☐	☐	☐
Hoist gear and drum are correctly aligned.	☐	☐	☐
Wires			
Wires are free from damage.	☐	☐	☐
Trolley / Hook system			
Test of trolley system.	☐	☐	☐
Test of hook blocks including change of line part reeving.	☐	☐	☐
Control systems			
All control systems are in working order.	☐	☐	☐
Indication and warning systems			
All indication and warning systems are in working order.	☐	☐	☐
Other tests and inspections			
All lubrication points are undamaged.	☐	☐	☐
Test loading carried out acc. to Inf. Ref 2070.	☐	☐	☐