Operating instructions for load turning devices ROTOMAX® Typ R

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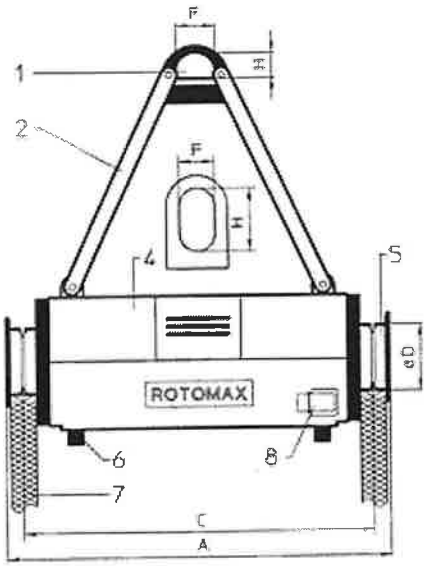
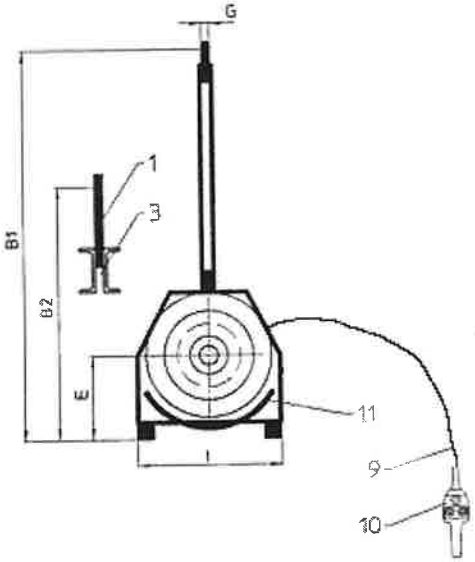




Explanation of the positions:

1. Suspension eye
2. Standard suspension
3. Short suspension (optional equipment)
4. Metal housing
5. Drive wheel
6. Support feet
7. Load slings
8. CEE-plug, five-pin
9. Control cable
10. Command panel
11. Safety bows for load slings

Technical specifications ROTOMAX® Type R

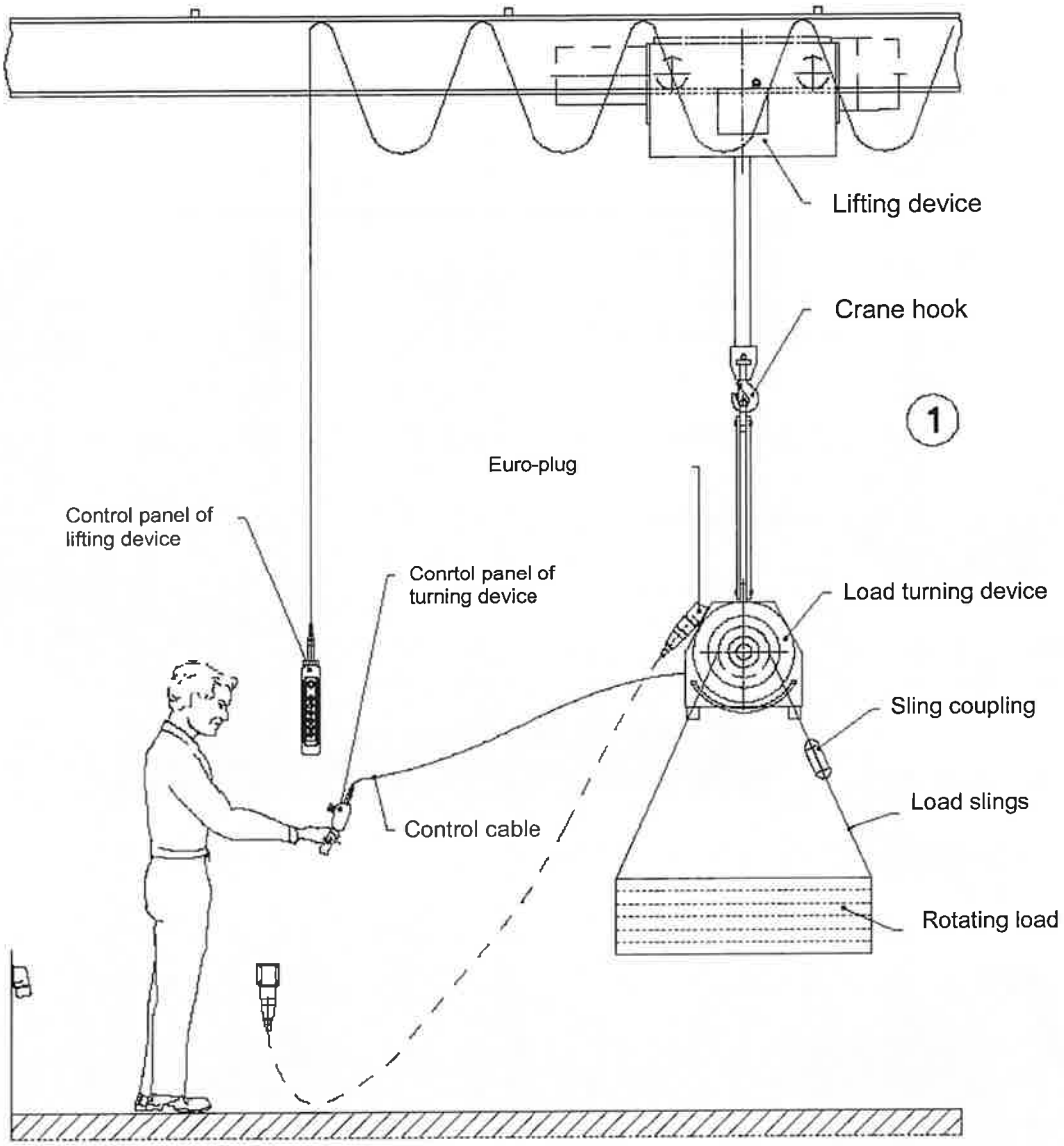
Type	Capacity	A	B1	B2	C	D	E	F	G	H	I	Output / ED (duty cycle)	Torque	Turning speed	Weight (without load slings)
	kg	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	KW / %	Nm	rpm	kg
R 1000/0.6		710	770	-	600	210	265	120	25	80	455	0,4/10	825	2,5	190
R 1000/1.1	1000	1210	1240	805	1100	210	265	120	25	80	455	0,4/10	825	2,5	235
R 1000/2.0		2110	-	865	2000	210	265	120	25	200	455	0,4/10	825	2,5	450
R 2000/0.6		710	770	-	600	210	265	120	25	80	455	0,4/10	825	2,5	190
R 2000/1.1	2000	1210	1240	805	1100	210	265	120	25	80	455	0,4/10	825	2,5	235
R 2000/2.0		2110	-	865	2000	210	265	120	25	200	455	0,4/10	825	2,5	450
R 3000/0.6		710	770	-	600	210	265	120	25	80	455	0,4/10	825	2,5	190
R 3000/1.1	3000	1210	1240	805	1100	210	265	120	25	80	455	0,4/10	825	2,5	235
R 3000/2.0		2110	-	865	2000	210	265	120	25	200	455	0,4/10	825	2,5	450
R 5000/0.6		710	770	-	600	210	265	120	25	80	455	0,7/10	1650	2,5	200
R 5000/1.1	5000	1210	1240	805	1100	210	265	120	25	80	455	0,7/10	1650	2,5	255
R 5000/2.0		2110	-	865	2000	210	265	120	25	200	455	0,7/10	1650	2,5	470
R 10000/1.5		1665	1880	1165	1500	406	545	100	60	160	635	0,75/40	3540	2,5	1000
R 10000/2.0	10000	2165	-	1225	2000	406	545	100	60	160	635	0,75/40	3540	2,5	1150
R 10000/3.0		3165	-	1265	3000	406	545	100	60	160	635	0,75/40	3540	2,5	1350
R 20000/2.0	20000	2415	1650	1355	2000	406	545	150	50	240	635	2 x 0,75/40	2 x 3540	2,5	1500
R 20000/3.0		3415	-	1455	3000	406	545	150	50	240	635	2 x 0,75/40	2 x 3540	2,5	1900
R 30000/3.0	30000	3450	-	1750	3000	406	660	150	60	320	920	2,2/40	10280	2,7	2650

Operating instructions for load turning devices ROTOMAX®

Contents

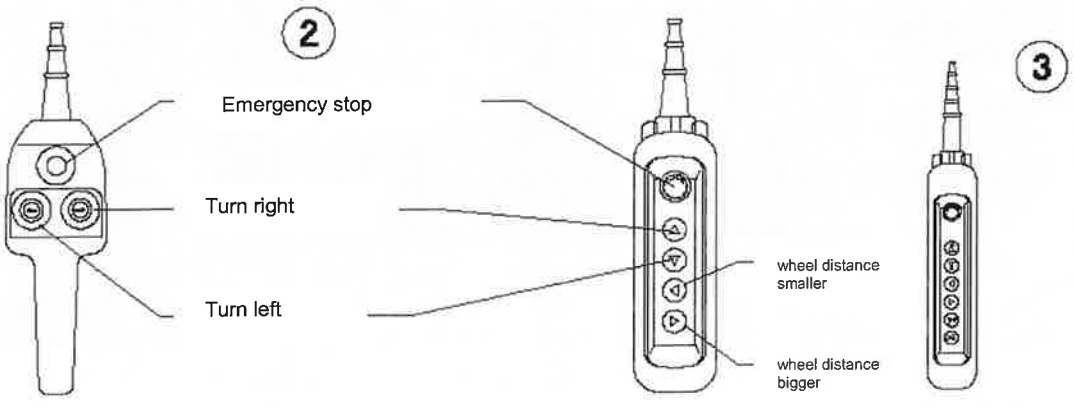
Please observe the relevant local rules for accident prevention!

Illustrated operation instruction

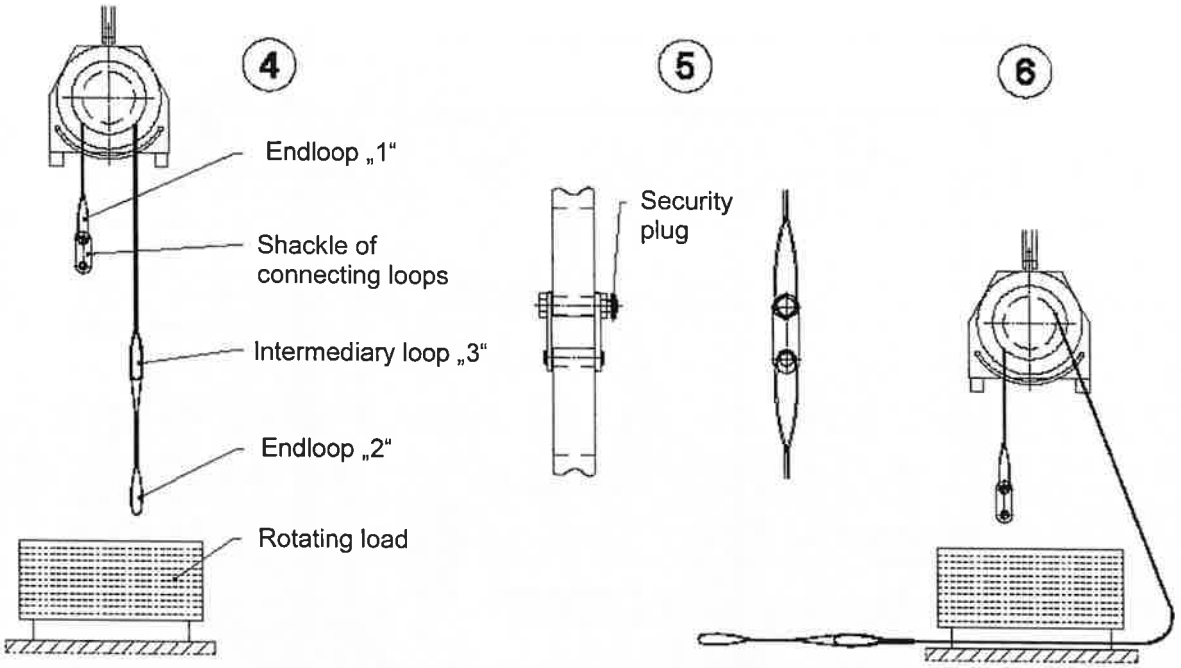


Pendant of turning device

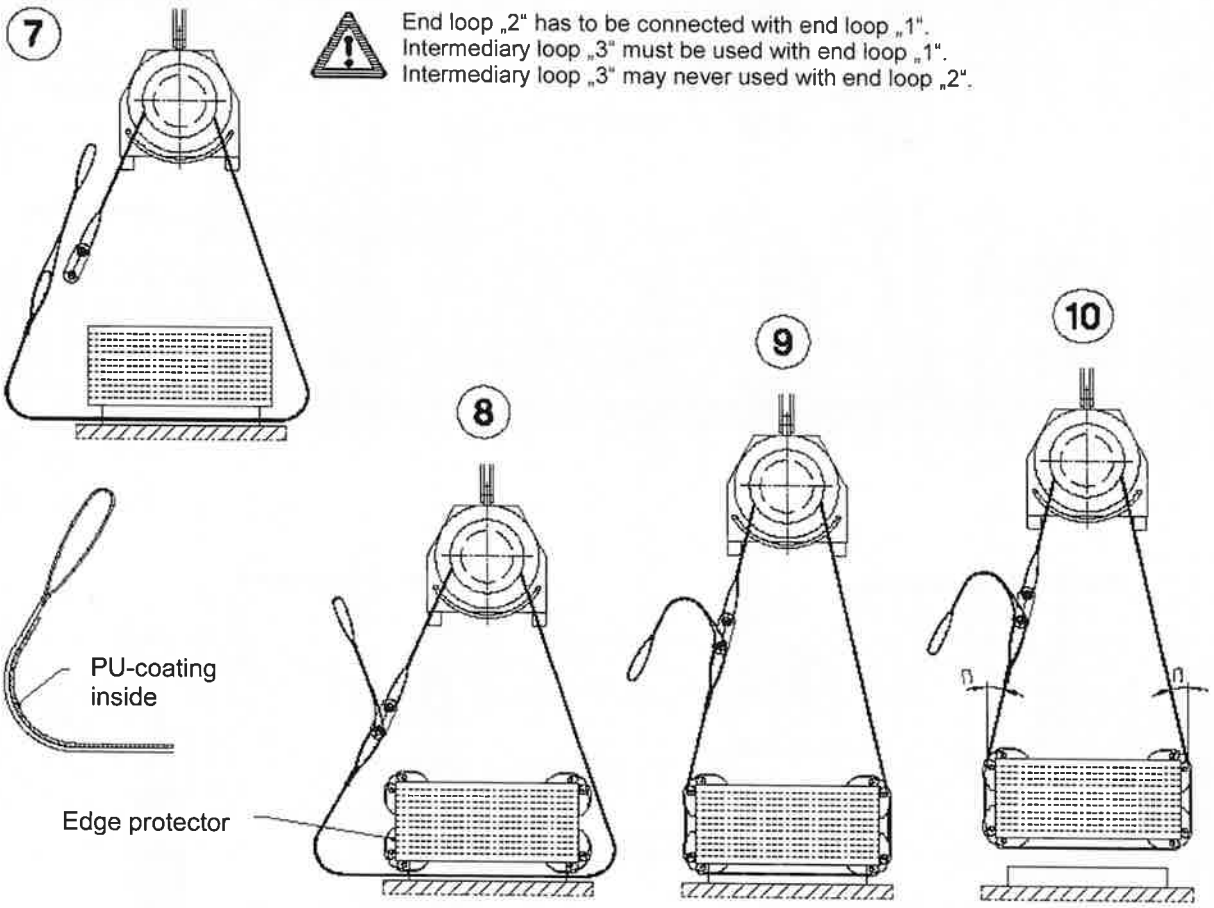
Pendant of lifting device



C10-0101-4



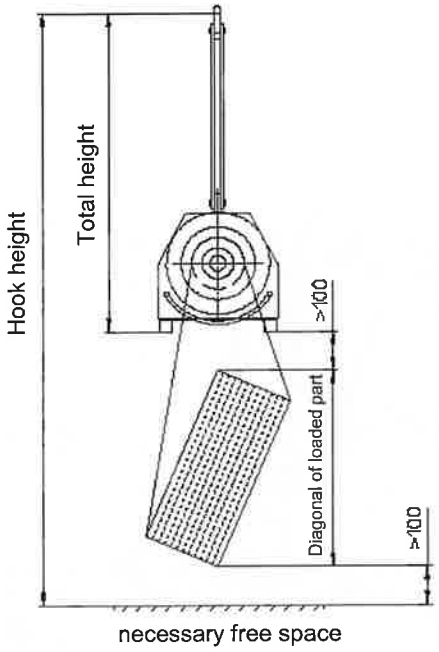
End loop „2“ has to be connected with end loop „1“.
Intermediary loop „3“ must be used with end loop „1“.
Intermediary loop „3“ may never used with end loop „2“.



Max. angle of slings ß
see type plate

Edge and sling protectors

(11)



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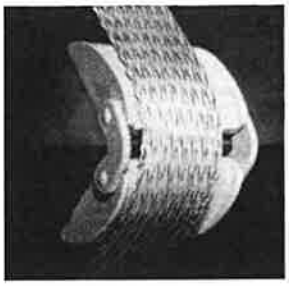

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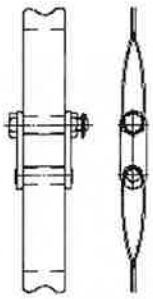
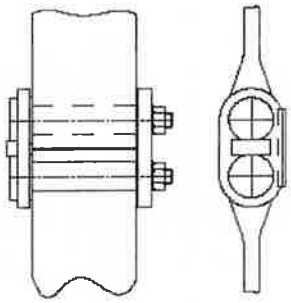


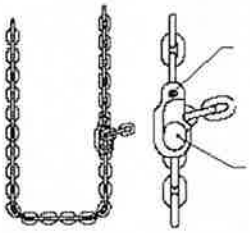
PES-sling coupling by shackle

(14)



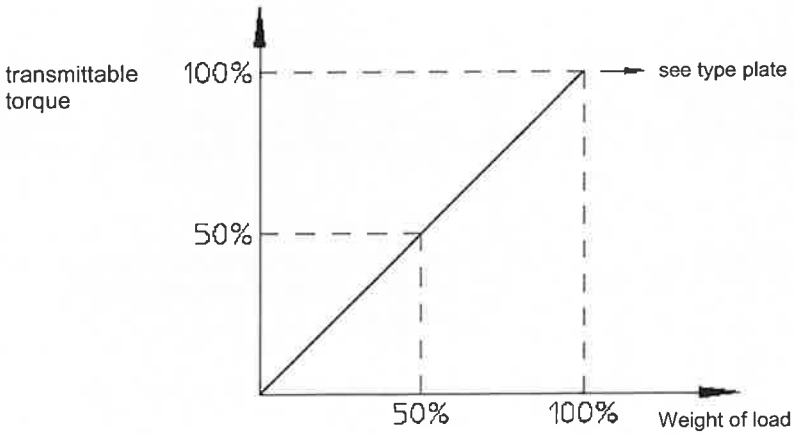
Wire rope belt connecting lock

(15)



Chain connecting claw

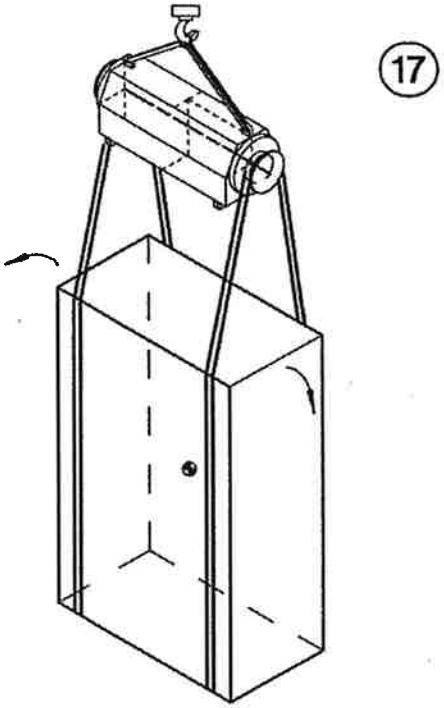
(16)



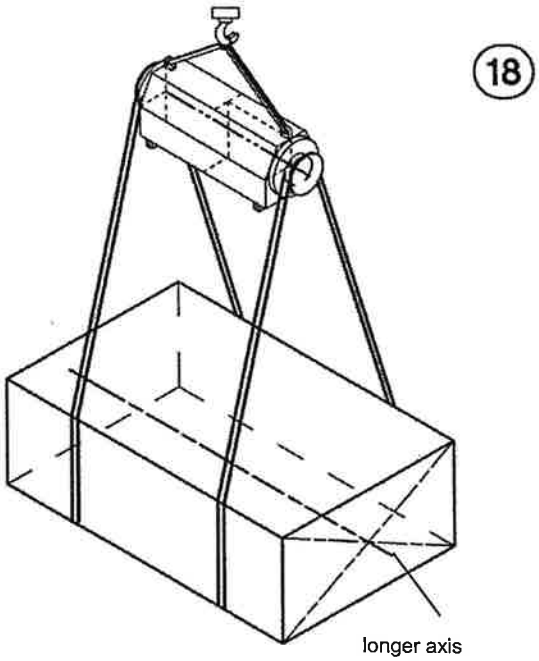
For flat slings:
The transmittable torque is proportional to the weight of the rotating load

Stop! Danger!
Not like this

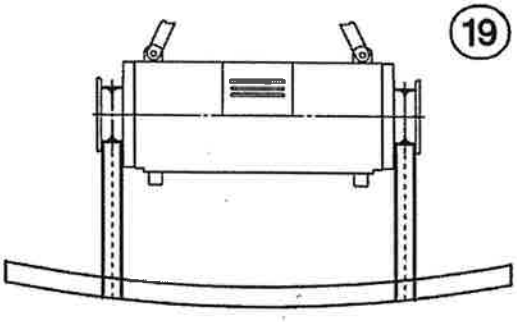
but like this!



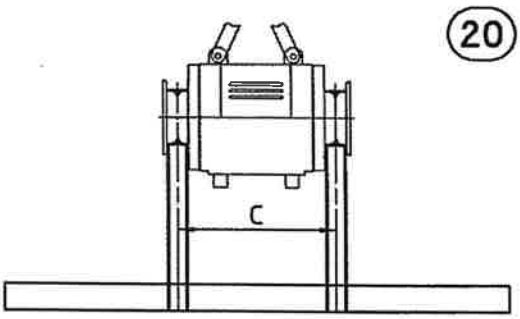
The position of the load is not stable
DANGER! Rotating load may slip out of the slings!



Load must be rotated the longer axis
Rotating load must be in a stable position



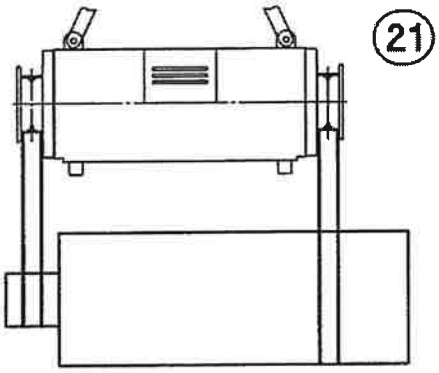
Rotating load must be sufficiently stiff.



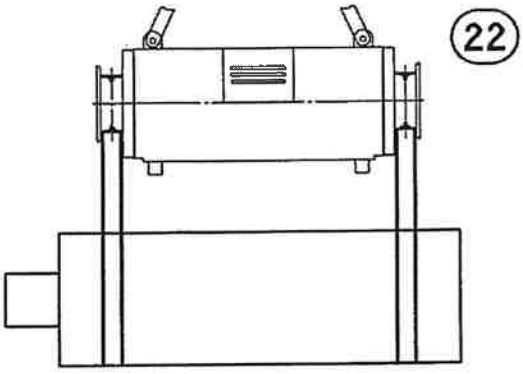
Observe length of the turning load!
Oversized workpieces may lead to instability.

Stop! Danger!
Not like this

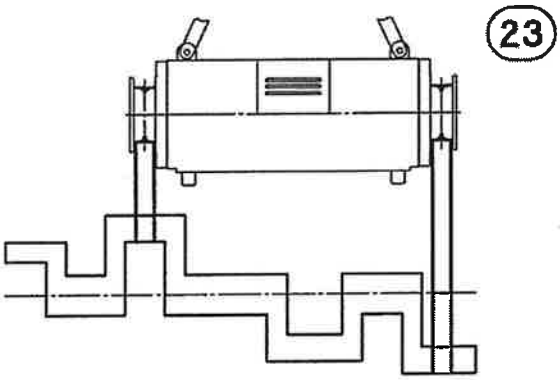
but like this!



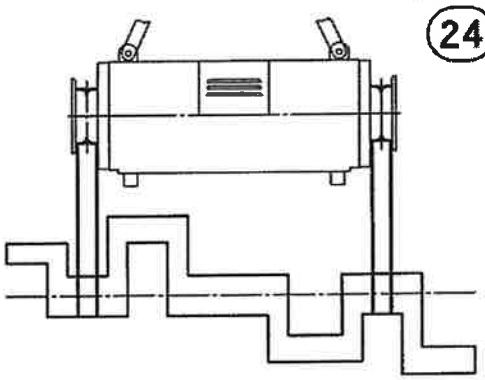
Different lengths of slings at each end of the load

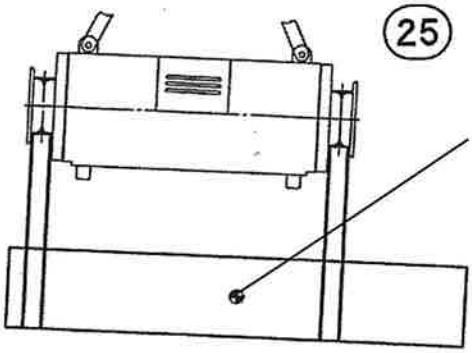


Same lengths of slings at each end of the load

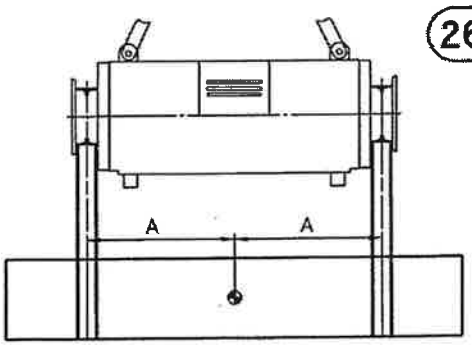


DANGER: Axis of rotation is not identical at the ends of the load





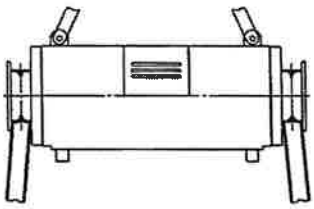
Load turning device is not centred over the centre of gravity



Load turning device is correctly centred over the centre of gravity

Stop! Danger!
Not like this

but like this!



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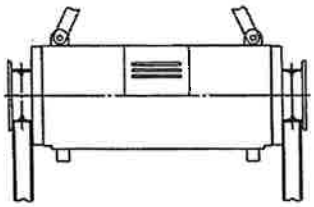
Slings not parallel
Action: Resling the load



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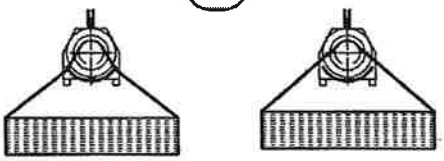
Slings parallel to each other



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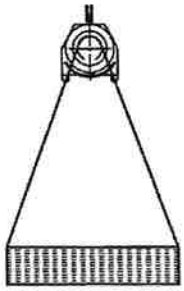
Angle of slings is over maximum.
Unallowable chafing of slings on the guides.
Slings are not within guides.
Action: Use longer slings.



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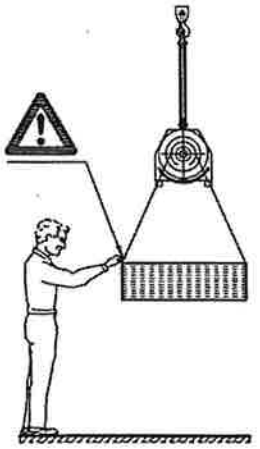
Load slings must be within the safety bows



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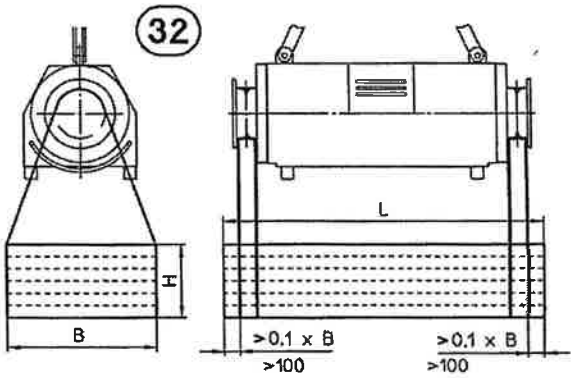
Danger of squashing hands etc.



Sufficient overhang required.

**Stop! Danger!
Not like this**

but like this!

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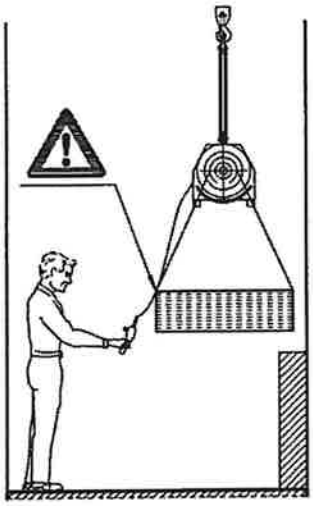

- Safety distances for operator and load are not observed
- Control cable may chafe against the load
- The load may touch the wall

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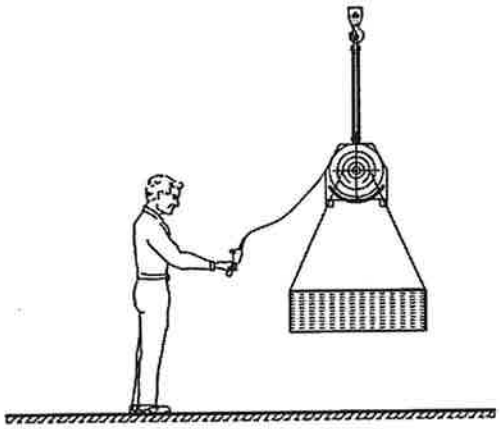

- sufficient safety distances are observed
- Rotate the load close to the floor

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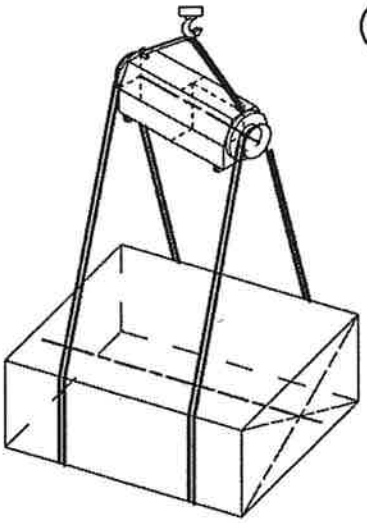

Axis of rotation of the load is twisted
to the axis of rotation of the turning device

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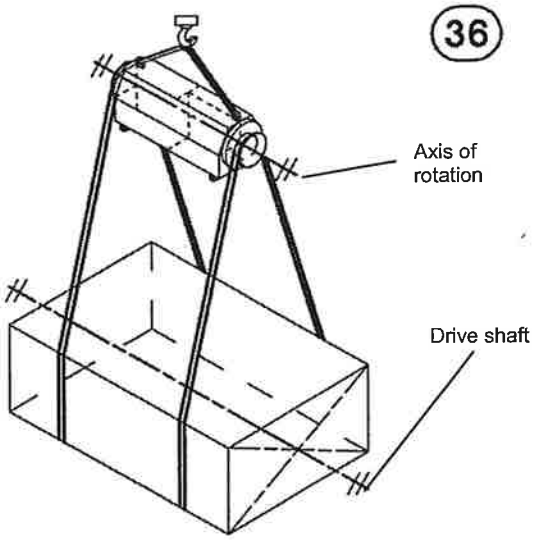
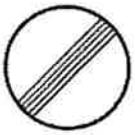
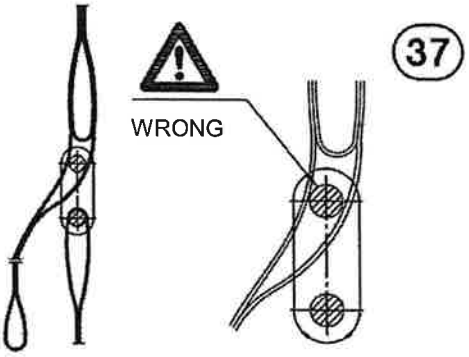


Axis of rotation of the load is exactly parallel to
the axis of rotation of the turning device

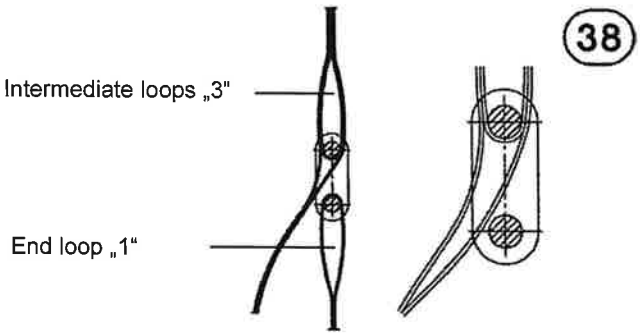
Stop! Danger!
Not like this



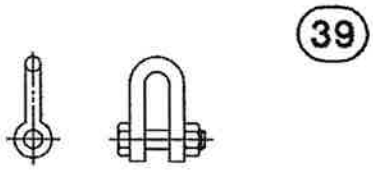
but like this!



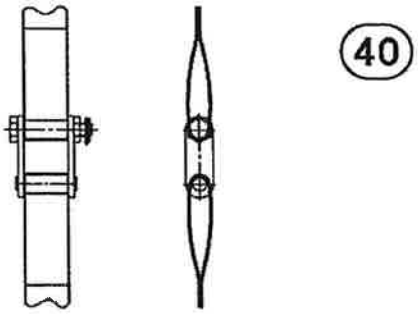
Shackle incorrectly installed,
the shackle is not in the intermediary loop



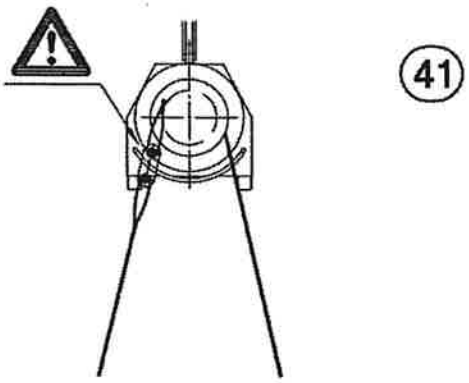
Shackle is correctly installed



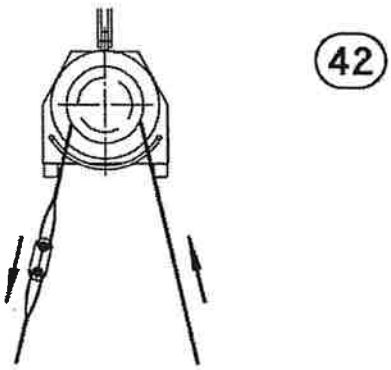
The slings may not be connected with usual shackles



Only original slings and couplings (shackles etc.) of the manufacturer are to be used.

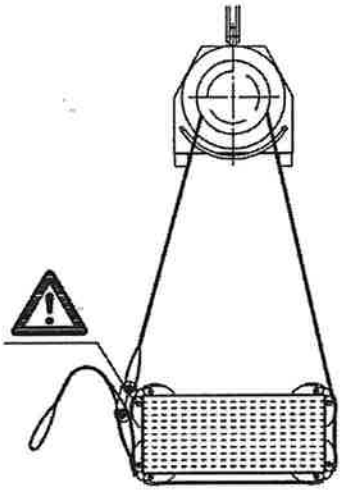


Slings and couplings may never run over the drive wheel and safety bows



Stop! Danger!
Not like this

but like this!



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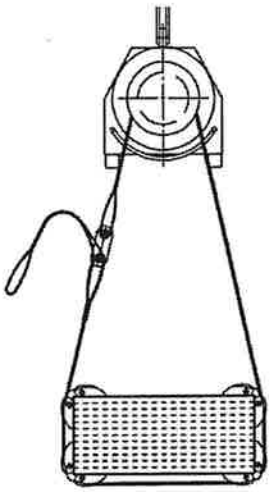

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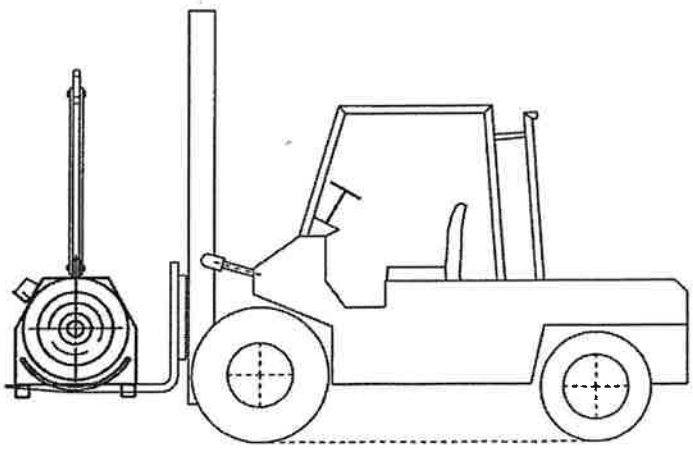
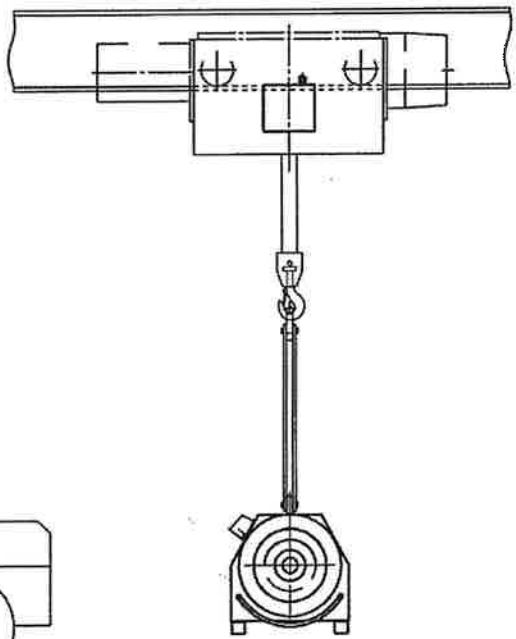
Connection buckles are not allowed to run over the edges of the load

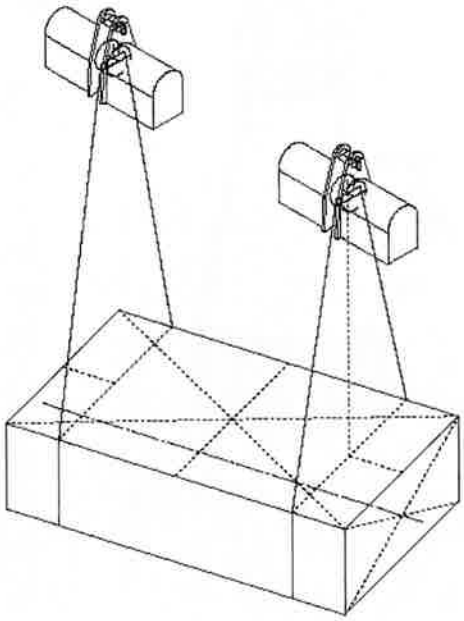




Stop! Danger!
Not like this

but like this!

45



Rotatory axis of the part to be turned is twisted against the drive axle of the load turning device

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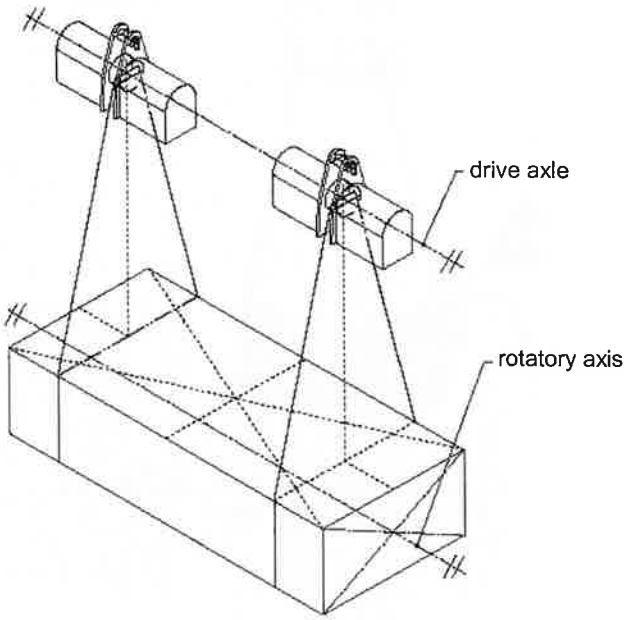


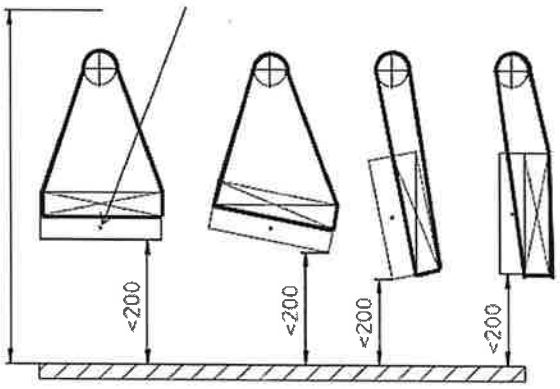
Rotatory axis of the part to be turned is exactly aligned under the drive axle of the load turning device

Stop! Danger!
Not like this

but like this!

47

centre of gravity



The centre of gravity is outside the slings

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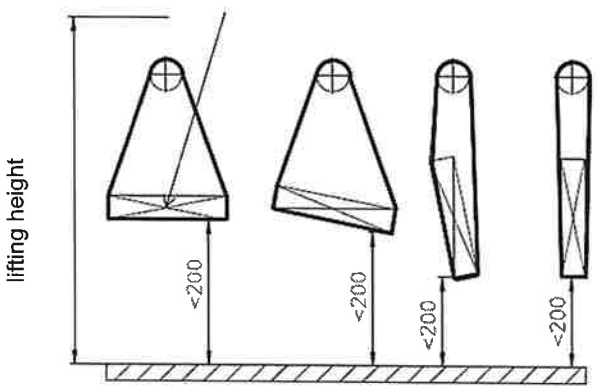
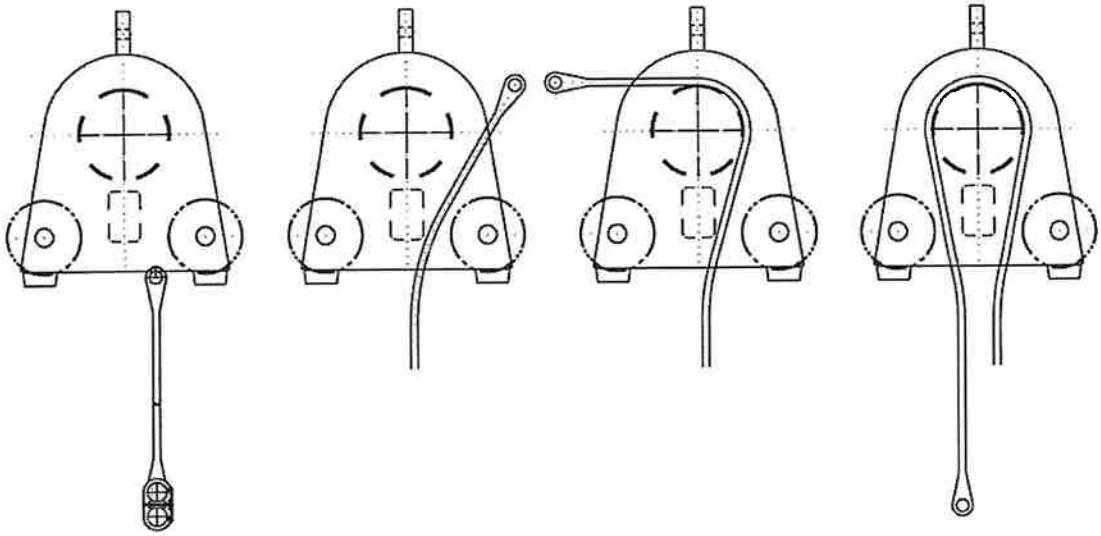
centre of gravity



The centre of gravity must be in every position of the load within the slings

Load turning device with pulleys: How to put on belts



Load turning devices will run perfectly only if you strictly follow these instructions. In cases of non-observance, any warranty will be rejected.

Load turning devices may only be operated by authorized and qualified user.

In order to assure a safe handling of the load turning device, the operator has to dispose of sufficient experience and know- how.

Therefore, new or unusual goods to be turned (regarding form, shape, surface, weight, stiffness etc.) should be handled with care and each operation should be planned and carried out carefully!

1) Use conforming to specifiation

- EC declaration of conformity is to hand and CE-label attached to the device.
- Only for specified purpose of loads to be turned.
- Loads to be turned must be sufficiently stiff. Belts shall be all around the load.
- Crane hooks must be sufficiently strong.
- Weight of the load and dead weight of the device shall not exceed the crane capacity.
- The torque of the load turning device shall be higher than the torque of the load to be turned.
- Only suitable for loads with invariable centre of gravity with regard to its external dimensions (not suited for liquids, granulates etc.).
- Admissible ambient temperature + 5° C up to + 40° C.
- Maintain safety distances for operator as well as for the load to be turned to objects in the surrounding.
- Keep out of operation area during turning.
- As general requirement, safe handling specific to the operating location must be guaranteed.

2) Legal requirements

Put out and observe instruction

Put out and observe national safety regulations

3) List of hazards acc. to EN ISO 12100

Pos.	Hazards	Pos./Part of body	Solution/Warning
1	- Location	Persons	Warning notice on turning device
	- of masses and stability	Operator/other persons	Training/education
	- of masses and acceleration	Operator/other persons	Training/education
	- insufficient mechanical stability	Operator/other persons	Observe operating instructions
	- machine part or work piece	Operator/other persons	Observe operating instructions
1.1	Crushing	by the load/ operator/ other persons	Keep safety distances
	Crushing	by the load/ operator/foot	Keep safety distances
	Crushing	by the load/ operator/hand	Keep safety distances
	Crushing	by slide	Keep safety distances
	Crushing	of cables	Keep safety distances
1.2	Shearing	by load slings	Keep safety distances
1.4	Impact	by rotating load/ operator/ other persons	Keep safety distances Do not touch turning device, rotating load, load slings during turning operation
1.6	Impact	Pending of the load/ operator/other persons	Keep safety distances
1.8	Friction	load slings/operator/other	Lack of friction between load slings and rotating load and between load slings and driving wheel (e.g. moisture, dirt), respectively
1.10	Slipping-out of parts	Load/operator/ other persons	Keep safety distances
1.11	Stability	Foundation /floor/ operator	Leave danger areas if possible, lower load immediately deposit load on good bearing soil only.
1.12	Slipping, stumbling, falling down	Insufficient safety/ operator	Keep clear service ground, ensure sufficient steadiness
2 2.1	Electrical endangering Electrical contact	Damaged insulation of el. conductors/operator	Stop operation, disconnect current, replace conductors
2.4	External effect	p. ex. other conveyors/ operator	Carefully watch crane, load and area
7	Material (oils greases, lubricants)	Slewing drive/ operator/other persons	See special operating instructions for drives
7.2	Fire and explosion	el. driven turning devices	Device not suitable for hazardous location
8.4	Insufficient local lighting	Operator/other persons	Ensure sufficient visibility
8.6	Human error	Operator	Training, attention, concentration

Pos.	Hazards	Pos./Part of body	Solution/Warning
10 + 10.3	Energy supply trouble, malfunction of control system	Operator/other persons	Operate emergency stop and take measures for trouble elimination, respectively
10.5	Spinning of the load and driving wheels respectively	Operator	Increase friction between driving wheel and load sling and load, respectively, e.g. use coated belts
11.	Failure/wrong arrange-ment of protective measures	Operator	Take all measures to reduce danger potential
11.1 + 11.2	Protective equipment	Operator/other persons	Check protective equipment
11.3	Starting and stopping equipment	Operator	Pull plug before maintenance on turning device
11.4+ 11.5	Safety signs/signals information- and warning equipment	Label /operator	Keep labels well legible
11.6	Switch-off devices energy supply	Emergency stop / operator	Check function prior to start of work
11.7	Emergency measures	Working area/contractor	Push emergency stop to minimize potential accidents

4) Control-/safety devices

Pendant control box (Fig.2)

What is it? The pendant control box includes all control functions of the load turning device.

Where is it? The pendant control box hangs down from the load turning device.

How does it work? All control functions will be activated by pressing the buttons

Contrary functions are blocked against each other.

Do not try to push contrary function buttons simultaneously (danger of damage).

Avoid inching operations.

Emergency stop

The emergency stop is activated by pressing the mushroom push button switch (emergency switch). Pressing the emergency stop deactivates all functions of the load turning device, pulling it into its initial position deactivates the switch and all operating functions are available again.

5) Load slings belts, chains

- Load slings can be belts or chains.
- Load slings may only run over the special surfaces of the driving wheels.
- Do not use twisted or entangled slings.
- Load slings shall be of the same length on either side of the load to be turned (Fig. 22, 24).
- Prior to start of handling operations, check all slings for defects.

- Safely connect together the ends of the slings. (Secure by means of buckles or chain connectors for instance) (Fig. 5, 38 + 40).
- The shortening claw for chains shall be fitted with a rubber element for safety purposes.
- Buckles, hooks, claws etc. are not allowed to run over the driving wheel (Fig. 42).
- For maximum angle of inclination of the load slings see type plate (load slings shall always be within the safety bows and may not chafe) (Fig. 30).
- Slings and wheels shall be dry and clean.
- Use edge protectors in case of sharp edges (Fig. 12).
- Only use original parts of the manufacturer (slings, buckles etc.)(Fig. 40).

5.1 Belts

- There are two kinds of slings: Slings in endless or divided design.
- For loads up to 40,000 kgs PES belts are usually used.
- For loads higher than 40,000 kgs wire rope belts are used. (steel reinforced belts)
- In general, devided PES belts have 2 end loops and 2 intermediate loops for shortening the belt (Fig. 4).
- Devided wire rope belts have only 2 end loops; shortening is not possible.
- The PES belts in divided design are connected by means of buckles (Fig. 13 + 14).

5.2 Chains

- There are two kinds of chains: Chains in endless or divided design.
- Chains in divided design have to be connected with shortening claws. (Fig. 15)
- Chain links have to be regularly lubricated (e. g. chain spray).
- When attaching the chain, the welding seam of the chain must point outward.
- The chains must not run twisted into the chain wheel.

5.3 Storage of the slings

- Slings must be stored in a dry and moderately warm atmosphere.
- Protect the slings from direct sunlight and mechanical damages.
- Store or dry the device away from any heat sources (e.g. open fires or warm areas).

5.4 Replacement of slings

Repairs of the slings and sling couplings shall only be carried out by the manufacturer.

Please refer to safety regulations according to BGR500-2.8.

The replacement of turning media must always be carried out in pairs!

- In addition, replace woven slings if there are
  - damages of the tissue (cuts, breaks etc.) which exceed 10 % of the sling diameter.
  - defect load carrying seams.
  - deformations caused by high temperatures (for instance by friction or radiation).
  - defects resulting from chemical substances.

Moreover, defect fittings/accessories, i.e. deformed, cut, broken fittings, imply immediate replacement of slings/fittings.

- Chains have to be replaced in case of:
  - a broken chain link.
  - hairline cracks or corroded spots that may reduce the load capacity.
  - deformation of a chain link.
  - decrease of average chain link diameter of more than 10 % less than the nominal diameter.
  - lengthening of the nominal size about more than 3 % referring to 11 chain links.

6) Load

- The weight of the load shall not exceed the rated load capacity.
- The loads must be suitable for rotation process with regard to both, form and surface (Fig. 18, 22, 24).
- Do not rotate slippery, wet, oily or dusty goods (danger of slipping).
- Loads with sharp edges have to be protected by edges protectors (Fig. 12).
- Do not put down the load onto the slings.
- Do not put down the load onto electric cable or other utility pipework.
- The load to be turned must be sufficiently stiff in both main axes (Fig. 20).
- The external shape of the load may never be deformed by the forces exercised by the slings.
- The torque of the load must be below the torque of the load turning device (Fig. 16).

7) Putting into operation and splicing the load

- The load turning device shall not be used beyond the rated capacity.
- The permissible torque of loads with eccentric centres of mass is to be observed (Fig. 16).
- The load turning device has to be attached to suitable crane hooks with sufficient capacity.
- Position load turning device above centre of gravity of load (Fig. 26).
- Connect power supply and check direction of rotation.
- In case of load turning appliances with adjustable wheel, adjust working distance.
- In case of type RVM, the drive wheel distance is adjusted manually within a certain grid. The drive wheels are locked with a locking pin. After adjusting, the drive wheels have to be locked properly.
  In case of type RVE, the drive wheel distance is adjusted by push of the buttons outside/inside.
- The drive wheels must have the same distance to the center of gravity of the load to be turned.
- Position the belts on the wheels (Fig. 4).
- If coated PES belts are used, the coated surface shall be turned towards wheels and load.
- Put belts around the load (Fig. 6 -9).
- Connect belts together by means of buckles or shortening claws.
- Observe safe distance to good's edges (at least 0,1 times of the load width, however not less than 100 mm (Fig. 32).
- Slowly lift the good (Fig. 10).
- Keep load in the horizontal position.
- Correct position, if load to be turned is in an inclined position.
- Keep power cables away from the rotation area (Fig. 34).

8) The operation of turning the good

- Make sure that no obstacles what so ever may handicap the handling operations.
- Observe safety distances (Fig.34).
- Turning operations are only allowed close to the floor.
- Axis of rotation of the good may not be twisted against the axis of rotation of the turning device. Before starting the operation, the load must be in a perfectly immobile position (Fig.36).
- Ensure that projecting parts of the load do not touch down or beat against any obstacle.
- The torque of the good must be inferior to the torque of the load turning device / danger of slipping (Fig.16).
- Sharp edges of the turning loads must be protected by edge protectors (Fig.12).
- Load slings must not be twisted.

- Load must be about the same for both load slings. The load is then in a horizontal position.
- Never touch load turning device, load slings or turning load during rotation (Fig.31).
- To initiate the turning operation, press buttons right/left. (Fig.2)
- Control the belt/chain running on the load to be turned and on the drive wheels.
- If the belts run against the side flanges of the drive wheels, set down the load and attach the belts again.
- If the load runs into an inclined position during the turning process, set down the load and attach the belts/chains again.
- The operation of turning shall not be overwhelmed by any other movement.
- The load to be turned shall not drop down on the belts.
- **The loads to be turned must always be in a stable and horizontal position.**

9) Electrics

- Load turning appliances are to be connected to power supply systems in accordance with VDE 0100 only.
- Operation voltage see type plate
- Control voltage see type plate
- Power supply cable, control cable and control panel may not chafe or be damaged.
- The directions of movement are indicated by symbols on the control panel. The movements are stopped when the respective buttons are released (dead man circuit).
- When changing the socket, check again the direction of rotation.
- Pulling on the control panel or control cable is not permitted, even if they are provided with strain-relief devices.
- Avoid inching operations. Too frequent inching operations will accelerate the increase of temperature of the drive.
- Load turning devices are suitable for intermittent operations.
- Please observe the duty cycle and the class of protection.

10) Putting out of operation

a) normal, daily procedure

- Pull out the mains plug.
- Roll up the control cable.
- Detach slings from the turning appliance.
- If necessary, clean slings and store them in a dry, moderately warm atmosphere. (Storage see 4.3)
- Store the device in a safe manner.

b) Putting out of operation in case of emergency

- Correct direction of rotation or interrupt turning movement immediately – if necessary, push the red emergency button (if this action minimizes potential danger).
- Lower down the load turning device and deposit the good in a stable and safe position.
- Goods which suddenly lose their stiffness while turning can be returned to their initial position (when noticed in time.)
- Lower down the load and deposit it in a stable and safe position.

11) Important Prohibtions!

Is not allowed

- to pull loads in an inclined position or to haul them.
- to lift and turn loads that exceed the rated capacity of the appliance.
- to stay within the danger area.
- to leave the device unattended during rotation.
- to turn loads with instable centres of gravity (liquids, granulates etc.).
- to deposit material on instable and uneven floor.
- to turn sharp-edged work pieces without edge protectors.
- to touch the load turning device, slings or loads during the turning operation.
- to turn unsuitable material that is for example too slippery, not stiff enough, too short (long, wide) etc.. Neither is it allowed to turn material with extremely different shapes at the two ends or goods requiring a higher eccentric torque than the rated torque of the load turning device.

12) Additional explanatory indication

- As a general requirement, safe operations in accordance with the locally prevailing conditions must be guaranteed.
- The operating instructions of drives, lifting devices and equipment have to be observed.
- The operator must have an adequate view of the operations.
- Observe number of operations and duty cycles.
  Non-observance may overload the drives.
- Avoid lifting loads too quickly and/or in a jolting manner.
- To this end, lifting and lowering movements are to be carried out carefully, wherever possible at slow speed.
- Sudden manoeuvrings must be avoided, as the resultant oscillation of the load may cause it to slip out of the slings.
- Protect drive, electrical system, cables and slings from moisture and damages.
- Take care that nobody is crushed or injured by the turning load.
- The load has to be set down in a stable position.
- Proceed systematically and concentrate on the work.

13) Taking our of operation

In case of non-observance of the required inspections and maintenance

a) Refer to 4.4, load slings

b) Load turning device

- In cases of damage, wear, abrasion etc. that can not be repaired/removed - see maintenance instructions -
- If the theoretical remaining life of 2000 hours is used up

	Working hours (h)	Remaining hours (h)
Total life		2000
1. Working year		
2. Working year		
3. Working year		
4. Working year		
5. Working year		
6. Working year		
7. Working year		
8. Working year		
9. Working year		
10. Working year		

Fundamental safety instructions

1.1 Warnings and symbols

The following signs and designations are used in the manual to designate instructions of particular importance:

Important (refers to special information how to use the machine/plant most efficiently)

Attention (refers to special information and/or orders and prohibitions directed towards preventing damage)

Danger (refers to orders and prohibitions designed to prevent injury or extensive damage)

1.2 Basic operation and designated use of the machine/plant

1.2.1 The machine/plant has been built in accordance with state-of-the-art standards and the recognized safety rules. Nevertheless, its use may constitute a risk to life and limb of the user or of third parties, or cause damage to the machine and to other material property.

1.2.2 The machine/plant must only be used in technically perfect condition in accordance with its designated use and the instructions set out in the operating manual, and only by safety-conscious persons who are fully aware of the risks involved in operating the machine/plant. Any functional disorders, especially those affecting the safety of the machine/plant, should therefore be rectified immediately.

1.2.3 The machine/plant is designed exclusively for the lifting and slewing of loads. Using the machine/plant for purposes other than those mentioned above (such as for pulling loads) is considered contrary to its designated use. The manufacturer /supplier can-not be held liable for any damage resulting from such use. The risk of such misuse lies entirely with the user.

Operating the machine within the limits of its designated use also involves observing the instructions set out in the operating manual and complying with the inspection and maintenance directives.

1.3 Organizational measures

1.3.1 The operating instructions must always be at hand at the place of use of the machine/plant, e.g. by stowing them in the tool compartment or tool-box provided for such purpose.

1.3.2 In addition to the operating instructions, observe and instruct the user in all other generally applicable legal and other mandatory regulations relevant to accident prevention and environ-mental protection.

These compulsory regulations may also deal with the handling of hazardous substances, issuing and/or wearing of personal protective equipment, or traffic regulations.

1.3.3 The operating instructions must be supplemented by instructions covering the duties involved in supervising and notifying special organizational features, such as job organization, working sequences or the personnel entrusted with the work.

1.3.4 Personnel entrusted with work on the machine must have read the operating instructions and in particular the chapter on safety before beginning work. Reading the instructions after work has begun is too late. This applies especially to persons working only occasionally on the machine, e.g. during setting up or maintenance.

1.3.5 Check - at least from time to time - whether the personnel is carrying out the work in compliance with the operating instructions and paying attention to risks and safety factors.

1.3.6 For reasons of security, long hair must be tied back or otherwise secured, garments must be close-fitting and no jewellery - such as rings - may be worn. Injury may result from being caught up in the machinery or from rings catching on moving parts.

1.3.7 Use protective equipment wherever required by the circumstances or by law.

1.3.8 Observe all safety instructions and warnings attached to the machine/plant.

1.3.9 See to it that safety instructions and warnings attached to the machine are always complete and perfectlylegible.

1.3.10 In the event of safety-relevant modifications or changes in the behaviour of the machine/plant during operation, stop the machine/plant immediately and report the malfunction to the competent authority/person.

1.3.11 Never make any modifications, additions or conversions which might affect safety without the supplier's approval. This also applies to the installation and adjustment of safety devices and valves as well as to welding work on load-bearing elements.

1.3.12 Spare parts must comply with the technical requirements specified by the manufacturer. Spare parts from original equipment manufacturers can be relied to do so.

1.3.13 Replace hydraulic hoses within stipulated and appropriate intervals even if no safety-relevant defect has been detected.

1.3.14 Adhere to prescribed intervals or those specified in the operating instructions for routine checks and inspections.

1.3.15 For the execution of maintenance work, tools and work-shop equipment adapted to the task on hand are absolutely indispensable.

1.3.16 The personnel must be familiar with the location and operation of fire extinguishers.

1.3.17 Observe all fire-warning and fire-fighting procedures.

1.4 Selection and qualification of personnel - Basic responsibilities

1.4.1 Any work on and with the machine/plant must be executed by reliable personnel only. Statutory minimum age imits must be observed.

1.4.2 Employ only trained or instructed staff and set out clearly the individual responsibilities of the personnel for operations, set-up, maintenance and repair.

1.4.3 Make sure that only authorized personnel works on or with the machine.

1.4.4 Define the machine operator's responsibilities - also with regard to observing traffic regulations - giving the operator the authority to refuse instructions by third parties that are contrary to safety.

1.4.5 Do not allow persons to be trained or instructed or persons taking part in a general training course to work on or with the machine/plant without being permanently supervised by an experienced person.

1.4.6 Work on the electrical system and equipment of the machine/ plant must be carried out only by a skilled electrician or by instructed persons under the supervision and guidance of a skilled electrician and in accordance with electrical engineering rules and regulations.

1.4.7 Work on chassis, brake and steering systems must be performed by skilled personnel only, specially educated for such work.

1.4.8 Work on the hydraulic system must be carried out only by personnel with special knowledge and experience of hydraulic equipment.

1.5 Safety instructions governing specific operational phases

1.5.1 Standard operation

1.5.1.1 Avoid any operational mode that might be prejudicial to safety.

1.5.1.2 Before beginning work, familiarise yourself with the surroundings and circumstances of the site, such as obstacles in the working and travelling area, the soil bearing capacity and any barriers separating the construction site from public roads.

1.5.1.3 Take the necessary precautions to ensure that the machine is used only when in a safe an reliable state. Operate the machine only if all protective and safety-oriented devices, such as removable safety devices, emergency shut-off equipment, sound-proofing elements and exhausters, are in place and fully functional.

1.5.1.4 Check the machine/plant at least once per working shift for obvious damage and defects. Report any changes (incl. changes in the machine's working behaviour) to the competent organization/person immediately. If necessary, stop the machine immediately and lock it.

1.5.1.5 In the event of malfunction, stop the machine/plant immediately and lock it. Have any defects rectified immediately.

1.5.1.6 Start the machine from the driver's seat only.

1.5.1.7 During start-up and shut-down procedures always watch the indicators in accordance with the operating instructions.

1.5.1.8 Before starting up or setting the machine/plant in motion, make sure that nobody is at risk.

1.5.1.9 Before starting work or travelling with the machine, check that the braking, steering, signalling and lighting systems are fully functional.

1.5.1.10 Before setting the machine in motion always check that the accessories have been safely stowed away.

1.5.1.12 In condition of poor visibility and after dark always switch on the lighting system.

1.5.1.15 Always keep at a distance from the edges of building pits and slopes.

1.5.1.16 Avoid any operation that might be a risk to machine stability.

1.5.2 Special work in conjunction with utilization of the machine/plant and maintenance and repairs during operation; disposal of parts and consumable

1.5.2.1 Observe the adjusting, maintenance and inspection activities and intervals set out in the operating instructions, including information on the replacement of parts and equipment. These activities may be executed by skilled personnel only.

1.5.2.2 Brief operating personnel before beginning special operations and maintenance work, and appoint a person to supervise the activities.

1.5.2.3 In any work concerning the operation, conversion or adjustment of the machine and its safety-oriented devices or any work related to maintenance, inspection and repair, always observe the start-up and shut-down procedures set out in the operating instructions and the information on maintenance work.

1.5.2.4 Ensure that the maintenance area is adequately secured.

1.5.2.5 If the machine/plant is completely shut down for maintenance and repair work, it must be secured against inadvertent starting by:

- locking the principal control elements and removing the ignition key and/or
- attaching a warning sign to the main switch

1.5.2.6 Carry out maintenance and repair work only if the machine is positioned on stable and level ground and has been secured against inadvertent movement and buckling.

1.5.2.7 To avoid the risk of accidents, individual parts and large assemblies being moved for replacement purposes should be carefully attached to lifting tackle and secured. Use only suitable and technically perfect lifting gear and suspension systems with adequate lifting capacity. Never work or stand under suspended loads.

1.5.2.8 The fastening of loads and the instructing of crane operators should be entrusted to experienced persons only. The signaller giving the instructions must be within sight or sound of the operator.

1.5.2.9 For carrying out overhead assembly work always use specially designed or otherwise safety-oriented ladders and working platforms. Never use machine parts as a climbing aid. Wear a safety harness when carrying out maintenance work at greater heights.

Keep all handles, steps, handrails, platforms, landings and ladders free from dirt, snow and ice.

1.5.2.10 Clean the machine, especially connections and threaded unions, of any traces of oil, fuel or preservative before carrying out maintenance/repair. Never use aggressive detergents. Use lint-free cleaning rags.

1.5.2.11 Before cleaning the machine with water, steam jet (high-pres-sure cleaning)or detergents, cover or tape up all openings which - for safety and functional reasons - must be protected against water, steam or detergent penetration. Special care must be taken with electric motors and switchgear cabinets.

1.5.2.12 Ensure during cleaning of the machine that the temperature sensors of the fire-warning and fire-fighting systems do not come into contact with hot cleaning agents as this might activate the fire-fighting system.

1.5.2.13 After cleaning, remove all covers and tapes applied for the purpose.

1.5.2.14 After cleaning, examine all fuel, lubricant, and hydraulic fluid lines for leaks, loose connections, chafe marks and damage. Any defects found must be rectified without delay.

1.5.2.15 Always tighten any screwed connections that have been loosened during maintenance and repair.

1.5.2.16 Any safety devices removed for set-up, maintenance or repair purposes must be refitted and checked immediately upon completion of the maintenance and repair work.

1.5.2.17 Ensure that all consumables and replaced parts are disposed of safely and with minimum environmental impact.

1.6 Warning of special dangers

1.6.1 Electric Energy

1.6.1.1 Use only original fuses with the specified current rating. Switch off the machine/plant immediately if trouble occurs in the electrical system.

1.6.1.2 When working with the machine/plant, maintain a safe distance from overhead electric lines. If work is to be carried out close to overhead lines, the working equipment must be kept well away from them. Caution, danger! Check out the prescribed safety distances.

1.6.1.3 If your machine comes into contact with a live wire

- do not leave the machine
- drive the machine out of the hazard zone
- warn others against approaching and touching the machine
- have the live wire de-energized
- do not leave the machine until the damaged line has been safely de-energized.

1.6.1.4 Work on the electrical system or equipment may only be carried out by a skilled electrician himself or by specially instructed personnel under the control and supervision of such electrician and in accordance with the applicable electrical engineering rules.

1.6.1.5 If provided for in the regulations, the power supply to parts of machines and plants, on which inspection, maintenance and repair work is to be carried out must be cut off.
Before starting any work, check the de-energized parts for the presence of power and ground or short-circuit them in addition to insulting adjacent live parts and elements.

1.6.1.6 The electrical equipment of machines/plants is to be inspected and checked at regular intervals. Defects such as loose connections or scorched cables must be rectified immediately.

1.6.1.7 Necessary work on live parts and elements must be carried out only in the presence of a second person who can cut off the power supply in case of danger by actuating the emergence shut-off or main power switch. Secure the working area with a red-and-white safety chain and a warning sign. Use insulted tools only.

1.6.1.8 Before starting work on high-voltage assemblies and after cutting out the power supply, the feeder cable must be grounded and components such as capacitors short-circuited with a grounding rod.

1.6.4 Noise < 70 dB(A)

1.6.4.1 During operation, all sound baffles must be closed.

1.6.4.2 Always wear the prescribed ear protectors.

1.6.5 Oil, grease and other chemical substances

1.6.5.1 When handling oil, grease and other chemical substances, ob-serve the product-related safety regulations.

1.6.5.2 Be careful when handling hot consumables (risk of burning or scalding).

1.7 Transport; recommissioning

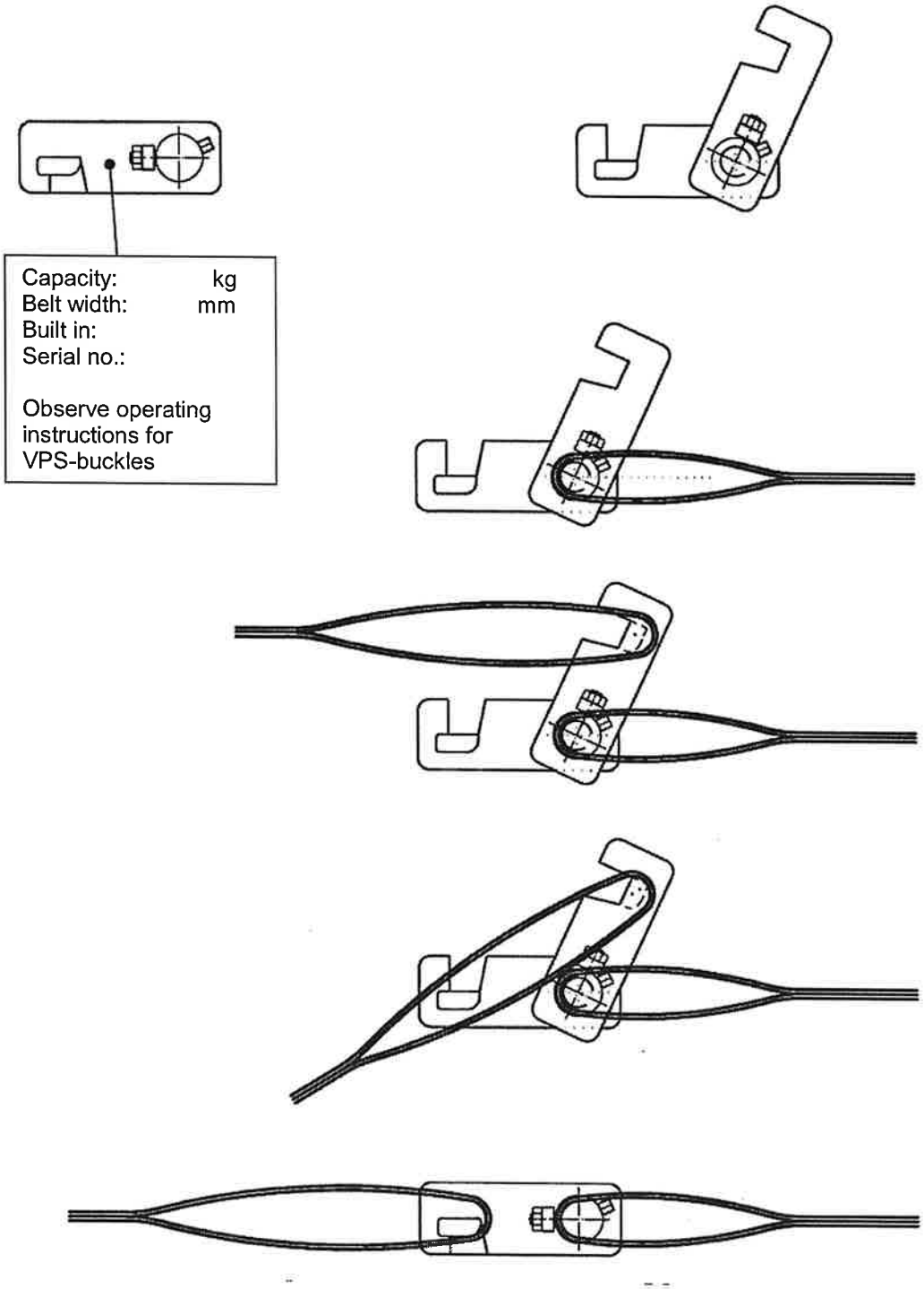
1.7.3 Use only appropriate means of transport and lifting gear of adequate capacity.

1.7.4 The recommissioning procedure must be strictly in accordance with the operating instructions.

Operation manual buckle

Note capacity and belt width! VPS buckles and connecting buckles Operation manual of load turning device ROTOMAX® has to be taken into consideration!

VPS-buckles



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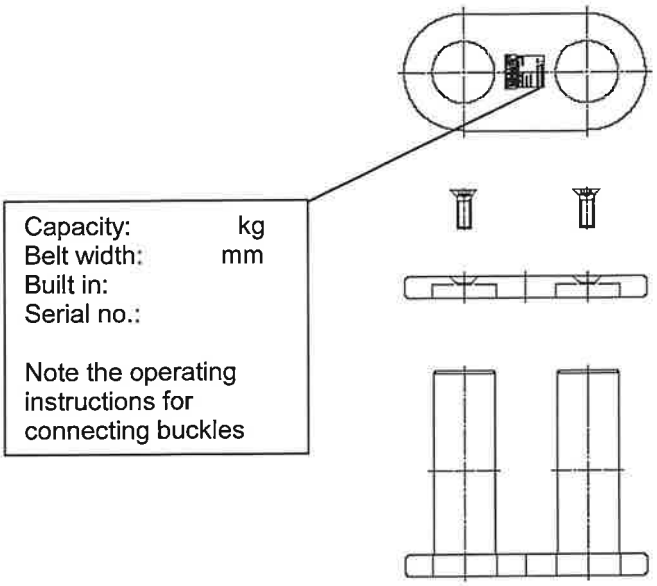
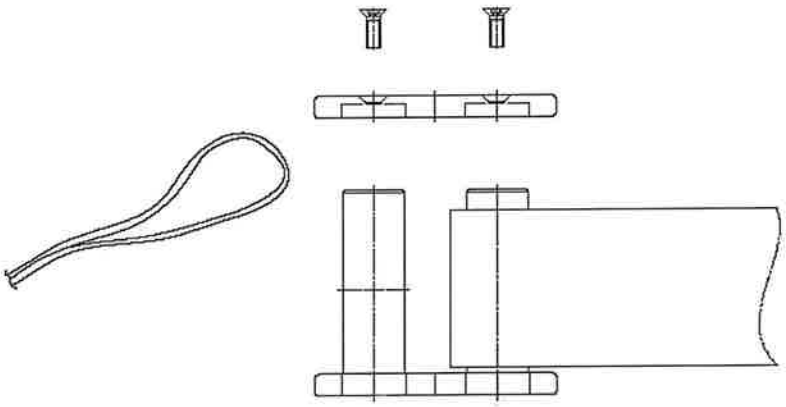
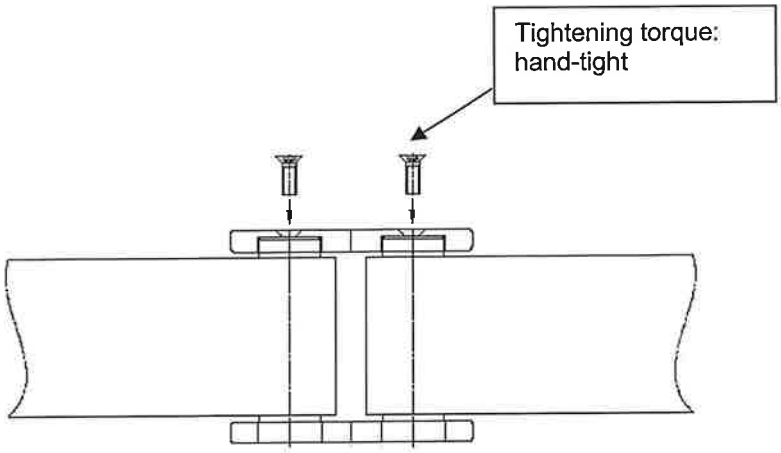
Connecting buckles



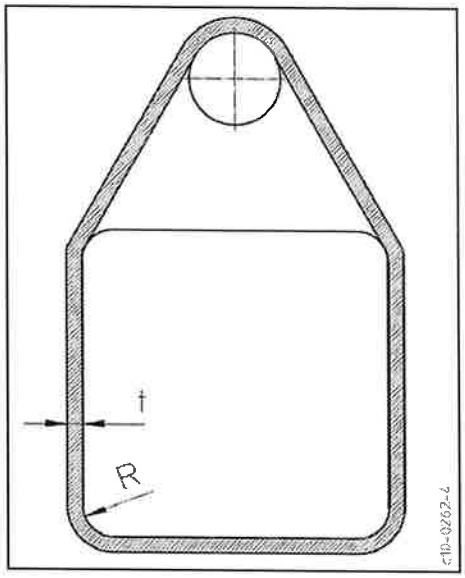




Minimum radius R on all edges for the use of belts

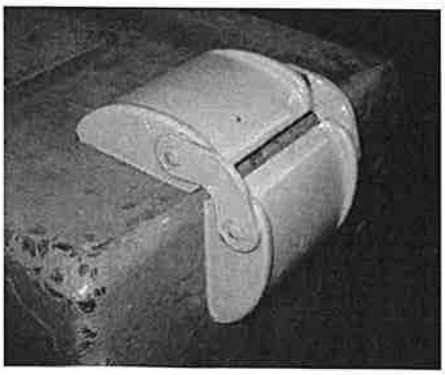
Condition: R ≥ t

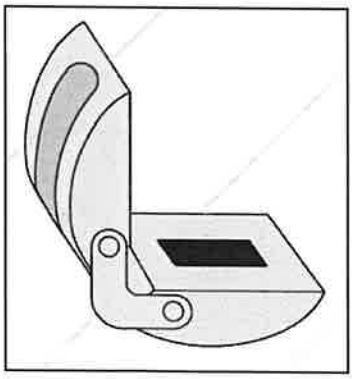
R = minimum radius on the parts to be turned
t = belt thickness



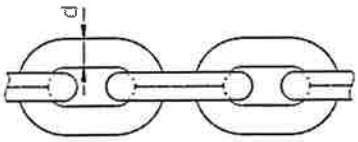
Width of PES belt [mm]	Layers	Spray coated [mm]	One-sided WAPU coating [mm]	max. belt thickness [mm]	Total thickness t [mm]
75	2-fold	2		7,6	**9,6**
100	2- fold	2		5,7	**7,7**
180	2- fold	2		5,6	**7,6**
180	4- fold	2		11,2	**13,2**
75	2- fold		7	7,6	**14,6**
100	2- fold		7	5,7	**12,7**
180	2- fold		7	5,6	**12,6**
180	4- fold		7	11,2	**18,2**

Alternative: Edge protectors

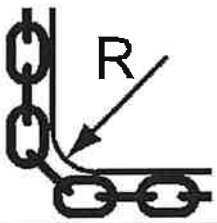
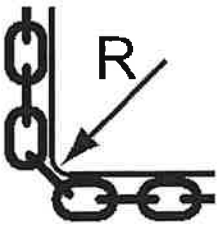
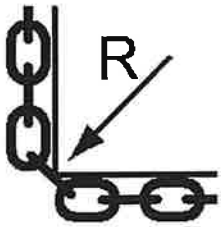




Minimum radius R on all edges for the use of chains



R = minimum radius on the parts to be turned

			
Edge load	R = bigger than 2x chain Ød	R = bigger than chain Ød	R = chain Ød or smaller
Load factor	1	0,7	0,5

Chain d	x	p	WLL 1strand [kg]	WLL 1strand [kg] with max. spread angle 30°
9,5	x	28,6	2500	2100
9	x	27	2500	2100
13	x	36	5300	4500
18	x	50	10000	8600
32	x	90	31500	27200
36	x	108	40000	34600

Example calculation for R5000/1.1 with chain 9,5x28,6, 4 strands

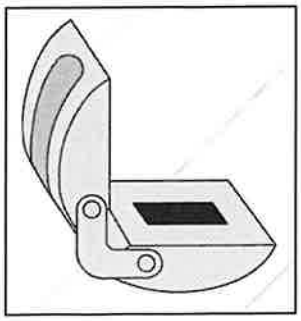
Number of strands	x	WLL at 30	x	Load factor	=	Total capacity
4	x	2100 kg	x	0,7	=	5880 kg

Condition:

Total capacity	>	Capacity of Rotomax
5880 kg	**>**	**5000 kg**

Thus applies: R = bigger than chain Ød

Alternative: Edge protectors

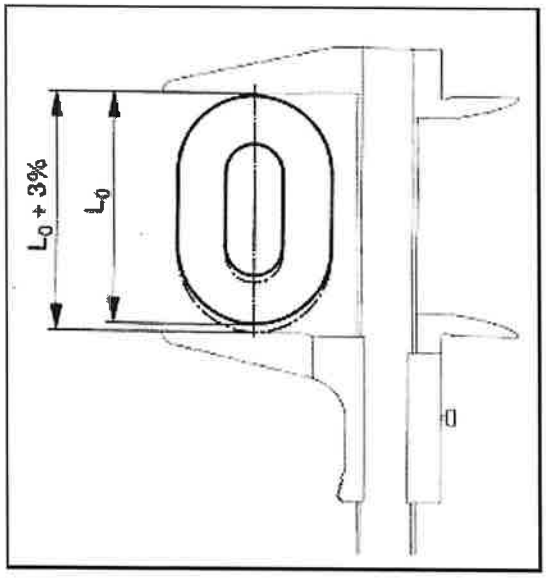


Discard criteria for chains

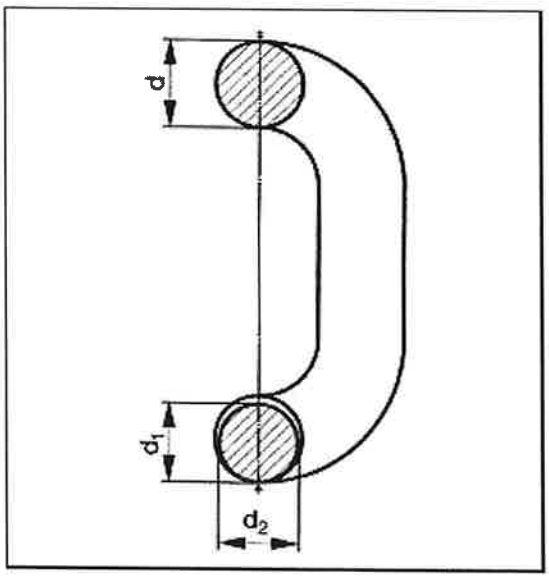
- Mechanical damage by crushing, indentation or cracks
- Deformation by bending, twisting or denting (Picture 1)
- Expansion by overload:
  If the complete chain or one single link is elongated by 5% or more (Pictures 2-4)
- Wear:
  Reduction of the material thickness at any point of the chain link by more than 10%.

Picture 1
Chain with deformed and carved chain link

Picture 2
Stiffened chain after overload



Picture 3
The chain is discarded when the outer length of one or more links are elongated by 3%. This corresponds to an elongation of the inner length of 5%.

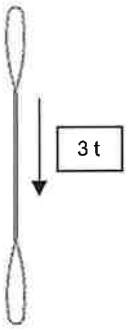
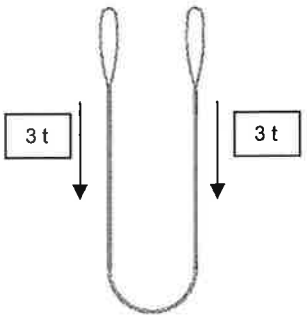
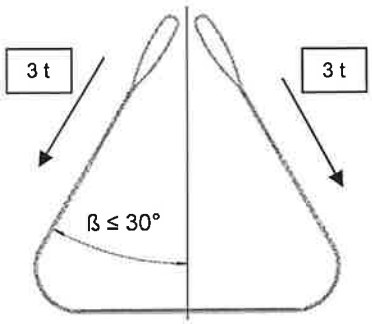


Picture 4
The chain is discarded when the average thickness dm of the material at one point oft he chain link has decreased by 10 % or more.

$$dm = \frac{d_1 + d_2}{2} > 0{,}9d$$

WLL (Working Load Limit) of divided belts

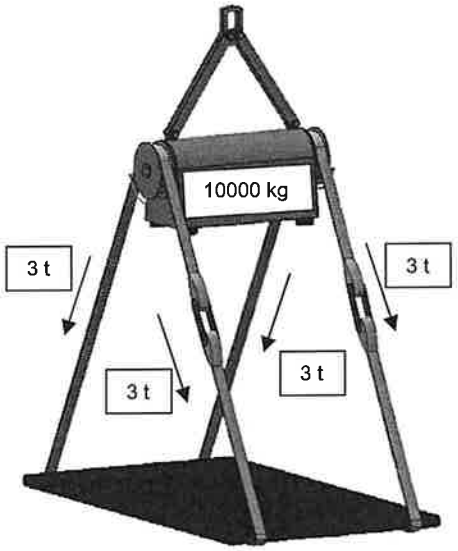
Example: R10000/2.0
ROTOMAX capacity: 10000 kg
Number of belts: 2 pieces
Maximum working angle: 30°
WLL: 3t

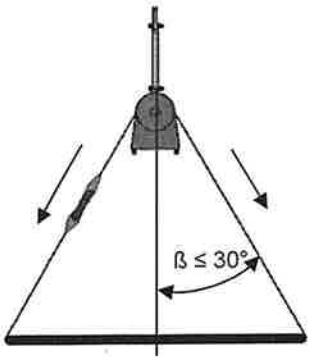
		
WLL 3 t	WLL 6 t	WLL 5,1 t (6 t x cos 30°)

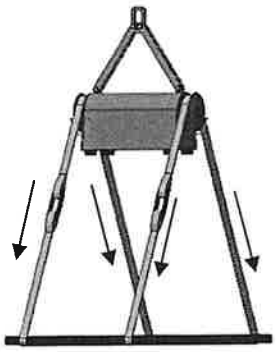
2 belts x WLL > ROTOMAX capacity
2 x 5,1 t > 10 t
10,2 t > 10 t

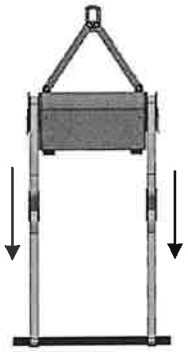
or:
4 x 3 t = 12 t
Working angle 30° → 12 t x cos 30° = 10,2 t
10,2 t > 10 t (ROTOMAX capacity)

Result: Capacity of the buckles: WLL 3 t



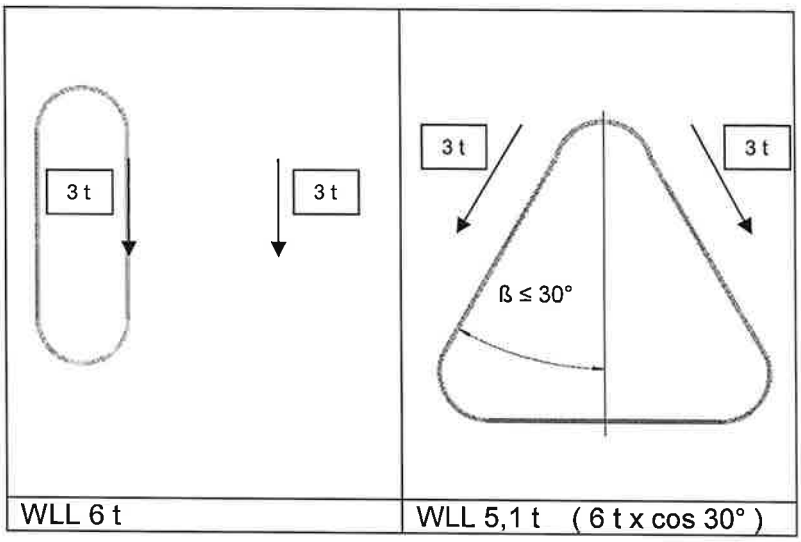






WLL (Working Load Limit) of endless belts

Example: R10000/2.0
ROTOMAX capacity: 10000 kg
Number of belts: 2 pieces
Maximum working angle: 30°
WLL: 6t



WLL 6 t	WLL 5,1 t (6 t x cos 30°)

2 belts x WLL > ROTOMAX capacity
2 x 5,1 t > 10 t
10,2 t > 10 t
or:
4 x 3 t = 12 t
Working angle 30° → 12 t x cos 30° = 10,2 t
10,2 t > 10 t (ROTOMAX capacity)

Maintenance instructions for load turning devices

Maintenance and inspection shall only be carried out by experienced specialist companies or by experts, in accordance with BGR 500-2.8, 3.15.1; 3.15.2; 3.15.3. In case of doubt, please contact your supplier.

Only use original spare parts, otherwise safety will be jeopardised. Spare parts are available from your supplier.

1. General

It is obligatory to observe these maintenance instructions and to conduct periodical inspections as prescribed in order to ensure proper functioning of load turning devices (LTD),.
Failing this, safety will jeopardised and claims will not be accepted.

For maintenance and inspection works please observe BGR500-2.8 'Load handling equipment used with hoists'.

Inspections of load turning devices are to be conducted by an expert as it they become necessary, however, at least once a year.

Prior to start any works and before opening the cover of the load turning device, disconnect the mains plug and secure it against unauthorised use.

If any defects are discovered, operation shall be stopped immediately and the supplier notified as appropriate. In case of modification works, opening of gears or repair works carried out without prior approval of the supplier, any claims under warranty shall be invalidated.

Check all parts for smooth running, proper functioning and safety. Any parts showing excessive wear must be replaced.

All repairs others than those of minor nature shall be carried out by the manufacturer.

Suspensions, load-bearing components, turning devices and fastenings shall only be repaired by the manufacturer.

Maintenance work is subject to BGR 500-2.8, 3.14.
Load turning devices and fastenings shall only be repaired by the manufacturer.

When carrying out maintenance work, check proper functioning of suspensions and bearings as well as fixation of all screws. In addition, most important weld seams and accessories, in particular suspension eyelets and drive wheels are to be examined for deformation, wear, cracks and notches.
Chain wheels must be replaced if wear exceeds 10%.

Careful handling will increase service life and safety!

2. Maintenance

All roller bearings are permanently greased. Normally, there will be no need for re-lubrication.

In order to ensure smooth running of the driving wheels, the guide of the width adjustment device should periodically be cleaned and lubricated.

If available, lubricate the gear rim/gearing with a customary lubricant spray.

If available, lubricate the ball bearing slewing rim. Refer to the enclosed maintenance instructions.

Lubricating intervals of toothing of pinions and gear rim/ball bearing slewing rim are specific to operating conditions. In general, lubricate every 50 operating hours. Reduce lubrication intervals in an extremely dusty and dirty environment.
The grease point on the ball bearing slewing rim is situated on the steel plate casing of the drive unit at mid-level of the belt running wheel.

Make sure that drive wheels are clean and free from grease or oil (danger of slipping).

Gears are permanently greased.

If a drive is defective or damaged, the complete unit must be replaced.

Take care to thoroughly install and secure the new component, and make sure that all appropriate safety measures are taken (including means of preventing unintended loosening of nuts and screws). Observe torque values for screws and bolts.

3. Readjustment of the brake

Please see the enclosed instructions

4. Electrics

4.1. Replacing and checking fuses (load turning devices type R and RV)

In the event of an electric failure, firstly check the supply voltage (3p + PE) and then the fuses of the load turning device.

The main electrical circuit is protected by a fuse or an overload switch.

A contactor box for control is installed on or in the load turning device.
The mains and control fuses are installed in the box.

Disconnect the load turning device from the mains (pull out the mains plug) and secure it against unauthorised use.

Open the lid of the contactor box.

Remove fuses one after the other and check them with a continuity tester. Replace defective fuses by fuses of the same rating, if necessary.

To reassemble, proceed in the vice versa.

Activate the overload switch.

4.2. Checking other components

Check control panel, control line, feed line and plug-in connection. Check protective arrangements, screws and bolts, pull relief etc..

Defective or damaged components must be replaced.

Bolt tightening torques

Tightening torques for **hotdip galvanized** high tensile screws and high tensile disc with **hotdip galvanized** high tensile nut, lubricated with MoS_2, **with the nut tightened: DIN EN 14399-4.**

Thread	Quality: 10.9	
M12	100 Nm	10 kpm
M16	250 Nm	25 kpm
M20	450 Nm	45 kpm
M24	800 Nm	80 kpm
M27	1250 Nm	125 kpm
M30	1650 Nm	165 kpm
M36	2800 Nm	280 kpm

Preload forces and tightening torques for torque tensioning procedures for fittings,
Thread 8.8

Thread	Regular preload force F_V	Tightening torque procedure Tightening torque M_A required to obtain the regular preload force Fv Thread 8.8
M12	40 kN	90 Nm
M16	75 kN	220 Nm
M20	115 kN	420 Nm
M24	150 kN	650 Nm
M27	200 kN	1000 Nm
M30	250 kN	1300 Nm
M36	400 kN	2400 Nm

Important!! Bolts used as through bolts with square tubes must be tightened by MA/3 and have to be secured with a locking nut. Square tubes shall not be deform due to the preload force Fv.