

## Chain sling

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	<p><b>EC-Declaration of Conformity</b> In accordance with valid EU-Directive for Machinery 2006/42/EG appendix 2:1 A</p> <p>CERTEX Svenska AB declare under our sole responsibility that delivered CE-marked chain sling(s) is in conformity with the SS-EN 818-1, -2, -4 or -6 standard.</p> <p>If the customer makes any modifications of the products or if the customer adds any products/components which are incompatible CERTEX Svenska will not take any responsibility for the consequences regarding the safety of the products.</p>
	<p><b>According to Swedish standard SS-EN 818 Short link chain for lifting purposes - Safety</b> Part 1: General conditions of acceptance Part 2: Medium tolerance chain for chain slings – Grade 8 (Grade 10, 10+ and 12) Part 4: Chain slings – Grade 8 (Grade 10, 10+ and 12) Part 6: Chain slings – Specification for information for use and maintenance to be provided by the manufacturer</p>
<p>The work with lifting devices and equipment's must be planned, organized and executed in order to prevent hazardous situations.</p> <p>In accordance with national statutory regulations lifting devices and equipment's must only be used by someone well familiar with the work and having theoretical and practical knowledge of safe use.</p> <p>Before the equipment is used the instruction manual must be read. It contains important information about how the equipment will work in a safe and correct way. If the equipment is used in accordance with this instruction manual risks and damages can be avoided.</p> <p>Apart from the instruction manual we refer to existing national regulations on each workplace.</p>	

### Use in adverse environments

**Temperature effects on working load limit (WLL):** Account should be taken to the maximum temperature that can be reached by the chain sling in service. This is difficult in practice, but underestimation of the temperature should be avoided. The table below summarizes the necessary de-rated working load limit due to temperature.

Chain slings in grade 8, 10, 10+ and 12 will not be negatively affected by temperatures down to -29 °C which result in the fact that no reduction of the working load limit is needed. When chain slings are to be used in temperatures below -29 °C CERTEX should be consulted.

The use of a chain sling in grade 8, 10, 10+ and 12 within the permissible temperature ranges given in the table does not require any permanent reduction in working load limit. Working load limit is valid again when the chain sling is used in normal temperature. If the chain sling reach temperatures that highly exceed the maximal allowed according to the table, it should be discard or be returned to CERTEX for measure.

Grade	Allowed load expressed in % of working load limit (WLL)			
	temperature (t) °C			
	-29 – 200	201 – 300	301 – 380	381 – 400
8	100	90	75	75
10 & 12	100	Not allowed	Not allowed	Not allowed
10+	100	100	75	Not allowed

**Acidic conditions:** Chain slings in grade 8, 10, 10+ and 12 should not be used either immersed in acidic solutions or exposed to acid fumes.

Chain slings should, for the same reason, not be warm-galvanized or exposed to electrolytic finish without permission from CERTEX.

**Chemical effects:** CERTEX should be consulted in case the slings are to be exposed to chemicals combined with high temperature.

### Hazardous conditions

Particularly hazardous conditions including offshore activities, the lifting of a person and lifting of potentially dangerous loads such as molten metals, corrosive materials or fissile materials. In such cases the degree of hazard should be assessed by a competent person and the working load limit adjusted accordingly.

### Before first use

Before first use of the chain sling should be ensured that:

- the sling is precisely as ordered;
- the manufacturer's certificate is to hand;
- the identification and working load limit marking on the sling correspond to the information on the certificate;
- full details of the sling are recorded in a register of slings.

### Before each use

Before each use the chain sling should be inspected for obvious damage or deterioration. If faults are found during this inspection, the procedure given in "Inspection and maintenance" should be followed.

### Safe use

**Preparation:** Before starting the lift, it should be ensured that the load is free to move and is not bolted down or otherwise obstructed.

Packing may be required where a chain comes into contact with a load in order to protect either the chain or the load or both, since sharp corners of hard material may bend or damage the chain or, conversely, the chain may damage the load because of high contact pressure. Corner protection should be used to prevent such damage.

In order to prevent dangerous swaying of the load and to position it for loading, a tag line is recommended.

When loads are accelerated or decelerated suddenly, dynamic forces occur which increase the stresses in the chain. Such situations,

which should be avoided, arise from snatch or shock loading ex. from not taking up the slack chain before starting to lift, or because of the shock from falling load being stopped.

**Mass of the load:** It is essential that the mass of the load to be lifted is known.

**Method of connection:** A chain sling is usually attached to the load and the lifting machine by means of terminal fittings such as hooks and links. Chains should be without twists or knots.

The lifting point should be seated well down in a hook, never on the point or wedged in the opening. The hook should be free to incline in any direction so as to avoid bending. For the same reason, the master link should be free to incline in any direction on the hook to which it is fitted.

The chain may be passed under or through the load to form a choke hitch or basket hitch. Where it is necessary, due to the danger of the load tilting, to use more than one chain sling leg in a basket hitch, this should preferably be done in conjunction with a lifting beam.

When a chain sling is used in a choke hitch, the chain should be allowed to assume its natural angle and should not be hammered down

**Chain slings may be attached to the load in several ways:**

**Straight leg:** In this case lower terminals are connected directly to the attachment points. Selection of hooks and attachment points should be such that the load is carried in the seat of the hook and tip loading of the hook is avoided. In the case of multi-leg chain slings hook tips should point outwards unless the hooks are specifically designed to be used otherwise.

**Choke hitch:** In this case chain sling legs are passed through or under the load and the lower terminal back hooked or revved onto the chain. This method can, therefore, be used where no suitable attachment points are available and has the additional advantage that the chain sling legs tend to bind the load together.

Where choke hitch is employed the working load limit (WLL) of the chain sling should be no more than 80% of that marked.

**Basket hitch:** The chain sling is passed through or under the load, the lower terminals are connected directly to the master link or to the hook of the lifting machine. Generally, this method requires two or more chain sling legs and should not be used for lifting loads which are not held together. Where the load geometry permits, a single leg chain sling can be used provided that the chain sling passes through the load directly above the center of gravity of the load.

**Wrap and choke or wrap and basket hitch:** These methods are adaptations of choke hitch and basket hitch, designed to provide extra security of loose bundles and involve taking an extra loop of chain completely around the load.

If two or more chain sling legs are used in a choke hitch or a wrap and choke hitch care should be taken:

- a) if it is important to avoid imparting a torque to the load, to align the chokes; or
- b) if it is important to avoid the load rolling or moving laterally when first lifted, to ensure that at least one leg passes either side of the load.

Packing may be required where a chain comes into contact with a load in order to protect either the chain or the load or both, since sharp corners of hard material may bend or damage the chain links or, conversely, the chain may damage the load because of high contact pressure. Packing, such as wooden blocks, may be used to prevent such damage.

To prevent dangerous swaying of the load and to position it for loading, a tag line is recommended.

When loads are accelerated or decelerated suddenly, high dynamic forces occur which increase the stresses in the chain. Such situations, which should be avoided, arise from snatch or shock loading e.g. from not taking up the slack chain before starting to lift or by the impact of arresting falling loads.

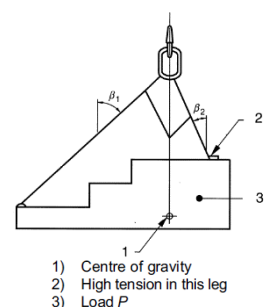
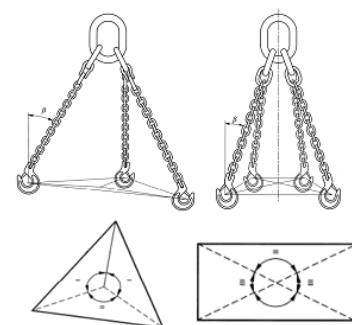
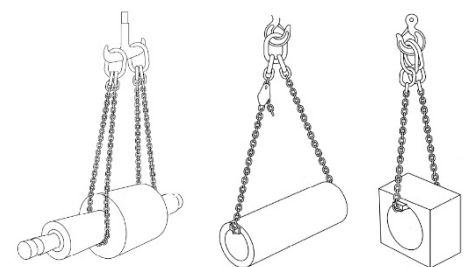
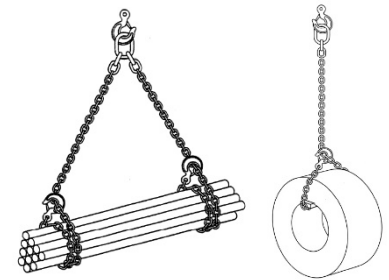
**Symmetry of loading:** Working load limits (WLL) for chains slings of different dimensions and configurations have been determined on the basis that the loading of the chain sling is symmetrical. This means that when the load is lifted the chain sling legs are symmetrically disposed in plan and subtend the same angles to the vertical. In the case of three leg chain slings, if the legs are not symmetrically disposed in plan the greatest tension will be in the leg where the sum of the plan angles to the adjacent legs are greatest. The same effect will occur in 4 leg chain slings except that the rigidity of the load should also be considered, with a rigid load the majority of the mass may be taken by only three or even two legs with the remaining leg or legs serving only to balance the load.

In the case of 2-, 3- and 4- leg chain slings, if the legs subtend different angles to the vertical the greatest tension will be in the leg with the smallest angle to the vertical. In the extreme case, if one leg is vertical, it will carry the entire load.

If there is both a lack of symmetry in plan and unequal angles to the vertical the two effects will combine and may either be cumulative or tend to negate each other. The loading can be assumed to be symmetric if all of the following conditions are satisfied and the load is less than 80% of marked WLL:

- a) chain sling leg angles to the vertical are all not less than 15°; and
- b) chain sling leg angles to the vertical are all within 15° to each other; and
- c) in the case of three- and four-leg chain slings, the plan angles are within 15° of each other.

If all of the above parameters are not satisfied then the loading should be considered as asymmetric and the



lift referred to a competent person to establish the safe rating for the chain sling. Alternatively, in the case of asymmetric loading, the chain sling should be rated at half the marked WLL.



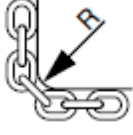
If the load tends to tilt, it should be lowered, and the attachments changed. This can be accomplished by re-positioning the attachment points or by using compatible shortening devices in one or more of the legs. Such shortening devices should be used in accordance with CERTEX's instructions.

**Safety of lift:** Hands and other parts of the body should be kept away from the chain to prevent injury as the slack is taken up. When ready to lift, the slack should be taken up until the chain is taut. The load should be raised slightly, and a check made that it is secure and assumes the position intended. Lifting personnel must be aware of the risks for swinging and tilting loads. This is especially important with basket or other loose hitches where friction retains the load.

**Multi-legs chain slings with less than the full number of legs in use:** As a general principle, chain slings should be used only for the purpose for which they have been designed. In practice, however, occasions may arise when a lift needs to be made using a smaller number of legs than the number of legs in the chain sling. In such cases the WLL should be reduced from that marked on the chain sling by applying the relevant factor given in table below.

Legs that are not in use should be hooked back to reduce the risk of such legs swinging freely or snagging when the load is moved.

**Reduction factor of WLL**

	R = larger than 2 x chain $\varnothing$	R = larger than chain $\varnothing$	R = chain $\varnothing$ or smaller
Edge load			
	1 x WLL	0,7 x WLL	0,5 x WLL

**Working load limit (WLL)**

Taking into consideration the recommendations and the cumulative effects of de-rating, the method of slinging should be decided and a suitable chain sling or selected so that the mass to be lifted does not exceed the WLL.

**Landing the load:** The landing site should be prepared. It should be ensured that the ground or floor is of adequate strength to take the load taking account of any voids, ducts, pipes etc. which may be damaged or collapse. It should also be ensured that there is adequate access to the site and that it is clear of any unnecessary obstacles and people. It is preferable to use timber bearers or similar material to avoid trapping the sling or to protect the floor or load or to ensure the stability of the load when landed.

The load should be landed carefully ensuring that hands and feet are kept clear. Care should be taken to avoid trapping the chain sling beneath the load as this may damage it. Before allowing the rope to become slack, the load should be checked to ensure that it is properly supported and stable. This is especially important when several loose objects are in basket hitch and choke hitch.

When the load is safely landed the chain sling should be carefully removed to avoid damage or snagging or cause the load to topple over. The load should not be rolled off the sling as this may damage the sling.

**Storage of chain slings:** When not in use chain slings should normally be kept on a properly designed rack. They should not be left lying on the ground where they may be damaged.

If the chain slings are to be left suspended from a crane hook, the sling hooks should be engaged in an upper link to reduce the risk of sling legs swinging freely or snagging.

If it is likely that chain slings will be out of use for some time they should be cleaned, dried and protected from corrosion, e.g. lightly oiled.

## Gravity

It is assumed that the attachment point of the hook is directly above the center of gravity of the load.

The position of the center of gravity of the load in relation to all attachment points for the chain sling should be established. To lift the load without rotation or overturning following conditions should be met:

- For single-leg and single endless slings the attachment point should be vertically above the center of gravity.
- For 2-leg slings the attachment points should either side of and above the center of gravity.
- For 3- and 4-leg slings the attachment points distributed in plan around the center of gravity. It is preferable that the distribution should be equal and that the attachment points are above the center of gravity.

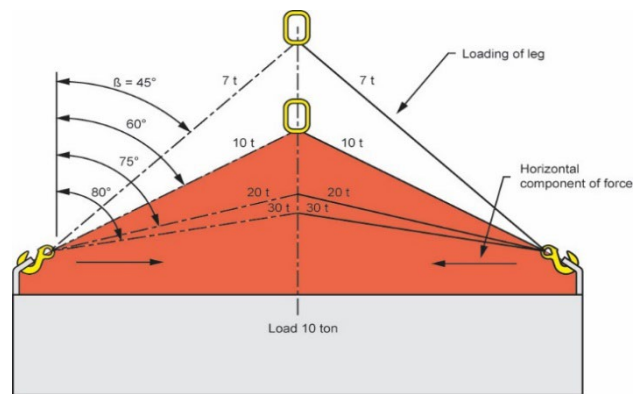
When using 2-, 3- and 4-leg slings the attachment points and sling configuration should be selected to achieve angle between the sling's legs and the vertical within the range marked on the sling. Preferably all angle to the vertical angle (angle  $\beta$ ) should be equal. Angles to the vertical of less than  $15^\circ$  should be avoided if possible as they present a significantly greater risk of load imbalance.

All multi-leg slings exert a horizontal component of force (see figure) which increases as the angle between the sling legs is increased. If the chain is pulled through an eye, hook or other type of attachment tool, ex. chain sling for barrel the horizontal component of force are a lot higher.

The result of this is that the vertical angle for the legs in this case should not exceed  $60^\circ$ . Care should always be taken to ensure that the load to be moved is able to resist the horizontal component of force, without being damaged.

### How the load in a part of the sling changes according to the vertical angle for a 10-ton load.

The red area indicates angles greater than  $60^\circ$  for which slings are not intended to be used.



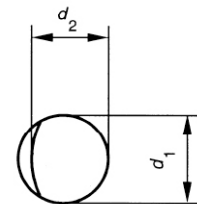
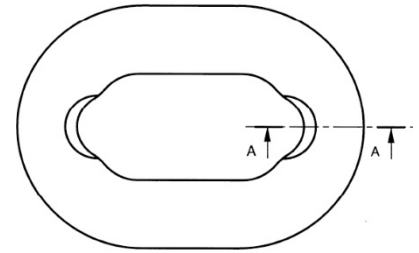
## Inspection and maintenance

**Examination:** During service, chain sling is subjected to conditions that affect their safety. It is necessary, therefore, to ensure, as far as is reasonably practicable, that the sling is safe for continued use.

If the tag or label identifying the chain sling and its working load limit becomes detached and the necessary information is not marked on the master link, or by some other means, the chain sling should be withdrawn from service.

The sling should be withdrawn from service and referred to a competent person for thorough examination if any of the following is observed before each use:

- Illegible sling markings i.e. sling identification and/or working load limit.
- Upper or lower terminal fitting has deformed.
- The chain has been overloaded. If the chain slings have extended, if free rotation between the links are missing or if there is a noticeable difference in length between legs in a multi-leg sling, the reason can be that the chain has been overloaded.
- Wear by contact with other objects usually occurs on the outside of the straight portions of the links where it is easily seen and measured. Wear between adjoining links is hidden. The chain should be slack and adjoining links rotated to expose the inner end of each link. Inter-link wear (in the bearing points) is tolerated until the mean value of two measured values 90° against each other has been reduced to 90% of the nominal diameter.
- Cuts, nicks, gouges, cracks, excessive corrosion, heat discoloration, bent or distorted links or any other defects.
- Signs of "opening out" of hooks, i.e. any noticeable increase in the throat openings or any other form of distortion in the lower terminal. The increase in throat opening should not exceed 10 % of the nominal value or be such as to allow the safety latch, if fitted, to become disengaged.



A-A

**Inspection:** A thorough examination should be carried out of a competent person at intervals not exceeding twelve months. This interval should be less were deemed necessary in the light of service conditions. Records of such examinations should be maintained.

Chains slings should be thoroughly cleaned to be free from oil, dirt and rust prior to examination. Any cleaning method which does not damage the parent metal is acceptable. Methods to avoid are those using acids, overheating, removal of metal or movement of metal which may cover cracks or surface defects.

Adequate lighting should be provided, and the chain sling should be examined throughout its length to detect any evidence of wear, distortion or external damage.

**Repair:** Any replacement component or part of the chain sling should be in accordance with the appropriate European Standard for that component or part.

With Grade 8, 10 and 12 chain slings, if any chain link within the leg of a chain sling is required to be replaced then the whole of the chain within that leg should be renewed.

The repair of chain in a welded chain slings should only be carried out by CERTEX using a resistance butt or flash butt welding process.

Components that are cracked, visibly distorted or twisted, severely corroded or have deposits which cannot be removed should be discarded and replaced.

Minor damage such as nicks and gouges may be removed by careful grinding or filing. The surface should blend smoothly into the adjacent material without abrupt change of section. The complete removal of the damage should not reduce the thickness of the section at that point to less than the manufacturer's specified minimum dimensions or by more than 10 % of nominal thickness of the section.

In the case of chain slings on which repair work has involved welding, each repaired chain sling should be proof-tested following heat treatment using a force equivalent to twice the working load limit and thoroughly examined before it is returned to use. However, where repair is carried out by inserting a mechanically assembled component, proof-testing is not required providing that the component has already been tested by CERTEX in accordance with the relevant European standard.

## End of use/Disposal



Chain sling shall always be sorted/scrapped as general steel scrap.

CERTEX will assist you with the disposal, if required.