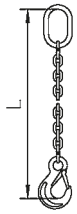
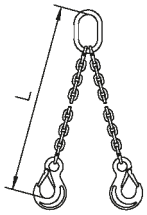
KWB
Safety in action

Original operating manual for KWB Super Alloy (G80) chain slings

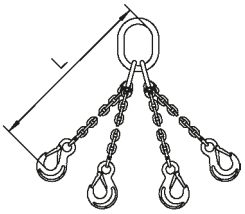
Standard chain sling types:



I-leg chain sling

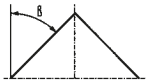
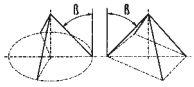


II-leg chain sling



IV-leg chain sling

Working load limit for Super Alloy G80 standard sling chains:

Maximum working load limit for sling chains						
Chain Ø	Single Leg	Double Legs		3-4-Legs		Endless sling chains
						
		0°<ß_<45°	45°<ß_<60°	0°<ß_<45°	45°<ß_<60°	
mm	kg	kg	kg	kg	kg	kg
6	1,120	1,600	1,120	2,360	1,700	1,800
7	1,500	2,120	1,500	3,150	2,240	2,500
8	2,000	2,800	2,000	4,250	3,000	3,150
10	3,150	4,250	3,150	6,700	4,750	5,000
13	5,300	7,500	5,300	11,200	8,000	8,500
16	8,000	11,200	8,000	17,000	11,800	12,500
18	10,000	14,000	10,000	21,200	15,000	16,000
20	12,500	17,000	12,500	26,500	19,000	20,000
22	15,000	21,200	15,000	31,500	22,400	23,600
26	21,200	30,000	21,200	45,000	31,500	33,500
32	31,500	45,000	31,500	67,000	47,500	50,000

If the chains are used in more demanding conditions (e.g. high temperature, asymmetric load distribution edge loads, impacts) the maximum load capacities in the table must be reduced. Please use the load factors below and refer to the specification in the user information.

General description

KWB standard chain slings are composed of KWB lifting chains, connecting links and other KWB accessories.
They are designed for the attachment between a load and a crane hook in order to transport and lift the load.
The working load limit, the angle of inclination for multi-leg chain slings, the number of chain legs and the nominal diameter of the chain, are given on the identification tag of the chain sling.
KWB standard chain slings are not designed to be used with food, cosmetics or pharmaceutical products, and must not be subjected to severe corrosive influences (e.g. acids, chemical substances, sewage, ...).
KWB standard chain slings are only to be used by competent personnel. If properly used, KWB chain slings have a long service life and offer a high degree of safety. Personal injury and material damage can only be prevented by proper use. It is therefore of vital importance that the operating manual has been read and understood before this product is put into service. However, this does not exclude a responsible and attentive use of the chain sling when lifting the load. The operating manual must always be available to the user until the chain slings are discarded. It is updated continuously and is only valid in its latest version, which can be downloaded from the following link www.kwb-ketten.at.

Conditions of use

Use purposes: slinging, lifting and transporting loads.
Working load limit: the working load limit of a chain

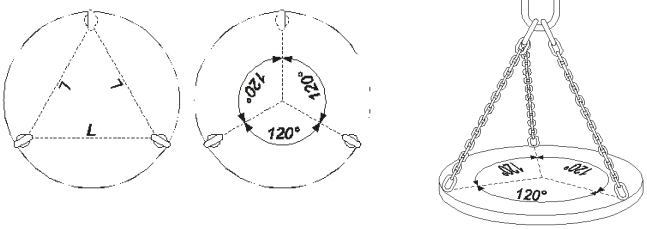
sling depends on the chain dimension (d), number of chain legs, angle of inclination (β) and the type of the sling – see table with working load limit values. The working load limit is given by the marking on the identification tag. The given working load limit is only valid for applications according to regulations.

Admissible operating temperature: -40 °C to 200 °C.

Angle of inclination: the angle of inclination is the angle defined by the chain leg and the imaginary vertical line. When using multi-leg chain slings, the angles of inclination must be in the range 0-45° or 45-60° and must not differ more than 15° from each other. Avoid angles of inclination of less than 15°.
The weight of the load to be lifted must be equally shared among all chain legs. This is the case when chain legs are symmetrical to each other.

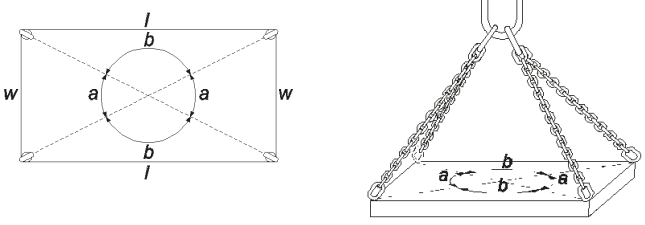
With a three-leg chain sling, it is assumed that the lower attachment points are at the same distance to each other, that means that the chain legs form an equilateral triangle and, viewed in plan, are at 120° to each other – see figures.

With a four-leg chain sling, the lower attachment points make the corners of a rectangle or a square and the angles, viewed in plan, are by pairs the same – see figures.



The load can still be considered symmetrical when the following conditions are met:

- The weight of the load is less than 80 % of the marked working load limit on the identification tag
- The angles of inclination of all chain legs are not less than 15°
- The angles of inclination of all chain legs are the same or differ a maximum of 15° from each other
- In the case of 3- and 4-leg chain slings, the angles, viewed in plan, differ a maximum of 15° from each other



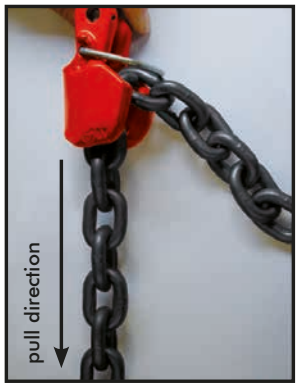
Shortening of the chain: the available chain shorteners (type P, PK, VKL) can be used to vary the length of the chain. Chain shorteners are also used in order to modify the angle of inclination and to compensate asymmetries in the distribution of the lifting points to a large extent, so that the load can be lifted horizontally and the weight of the load is equally shared among all chain legs. In this process, the desired length between the lifting point and the shortening hook is set up and the nearest chain link is hooked into the slot of the hook. After this process, a readjustment of the chain may be required. Please, take following figures also into account.

incorrect!

correct!

Incorrect suspended chain

Correct suspended chain



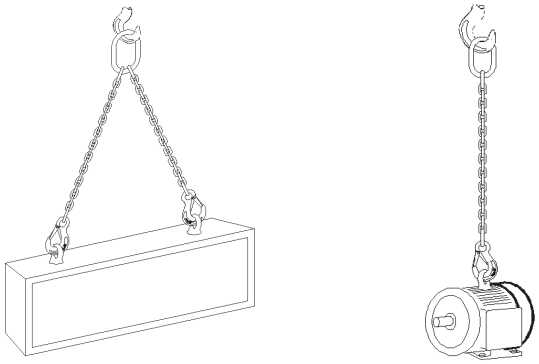
Impacts: the load must be applied without any impact or shock loading.

Load: chain legs must be twist-free and straightly aligned (not knotted), or redirected free of bending influences (edges). Master links and hooks, as well as other accessories like linking elements attached to the load or the crane hook, must be free to move and be aligned in the direction of the load.

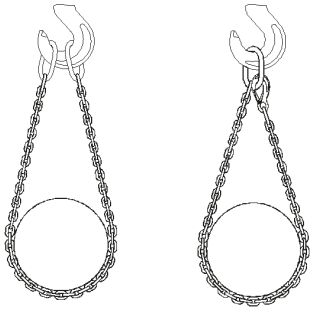
Types of chain slings: chain slings may be attached to the load in several ways:

Straight leg: in this case lower fittings are connected directly to the load by means of lifting points (eyes or hooks). The selection of the hooks and lifting points must be such that the load is carried in the seat of the hook and tip loading of the hook is avoided. The safety catch or safety latch must be closed.

In the case of multi-leg chain slings, hook tips must point outwards unless the hooks are specifically designed to be used otherwise (e.g. BH/S Sheet Metal Plate Hook – from Star Alloy program). The orientation of the hook tips can be changed by rotating the master link – the bottom side to the top.

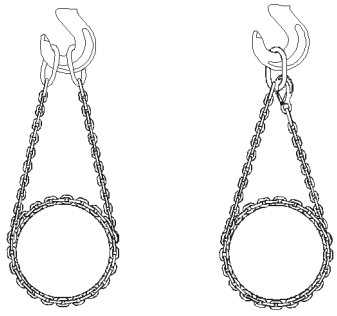


Basket hitch: the chain sling is passed through or under the load. In this case, the lower fittings are connected directly to the master link or to the hook of the crane or hoist. Generally this method requires two sling chains and must not be used for lifting loose bundles since some parts of the load could fall when decelerating in the direction of the lifting process. 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 centre of gravity of the load, so that it cannot swing.



Basket hitch

Wrap and basket hitch: this method is designed to provide extra security of loose bundles and means taking an extra loop of chain completely around the load.
Pay special attention to the determination of the working load limit when using a basket hitch or a wrap and basket hitch. For example, the working load limit of a single-leg chain sling continues to be valid if, after the chain has been passed under or through the load, the hook is attached into the master link. Conversely, the working load limit of a single-leg chain sling with a master link as lower fitting will be calculated as the working load limit of a two-leg chain sling if, after the chain has been passed through or under the load, the master link is attached into the crane hook (see figures).



Wrap and basket hitch

Restrictions of use

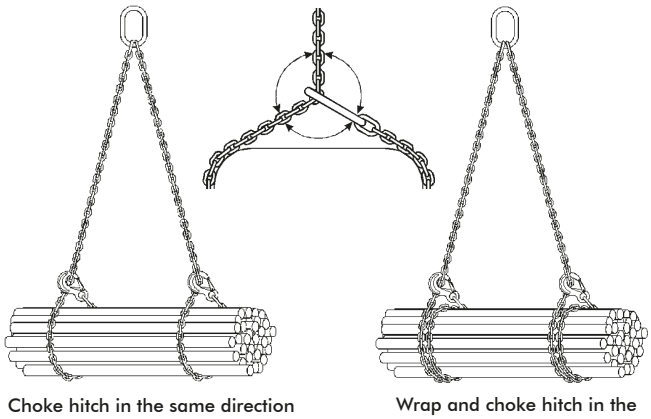
Special chain sling types: there are some types of chain slings that are very common but when used, a reduction of the working load limit must be applied.

Choke hitch: in this case chain sling legs are passed through or under the load and the lower fitting (.e.g. a hook or a master link) is hooked back directly 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 bind the load together. If a choke hitch is used, it must be possible to adjust the angle of inclination without the use of force, and the working load limit (WLL) of the chain sling shall be no more than 80 % of the working load limit marked on the identification tag (see table above).

Wrap and choke hitch: this method is designed to provide extra security of loose bundles and involves taking an extra loop of chain completely around the load (see figure). If a wrap and choke hitch is used, the working load limit (WLL) of the chain sling must not be more than 80 % of the working load limit on the identification tag (see table above).
If two or more chain legs are used in a choke hitch or in a wrap and choke hitch, attention must be paid to following criteria:

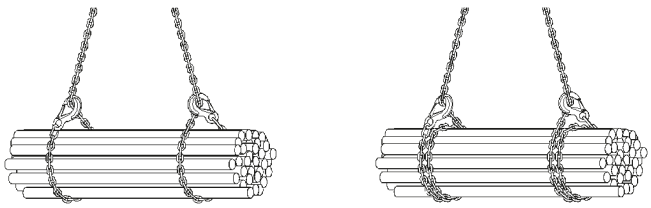
- If it is important to avoid imparting a torque to the load, a choke hitch in the same direction is to be used (see figure)
- If it is important to avoid the load rolling when first lifted, a reverse choke hitch is to be used (see figure)

If more than two chain legs are used in a choke hitch or in a wrap and choke hitch, the weight of the load will not be equally shared among all chain legs.



Choke hitch in the same direction

Wrap and choke hitch in the same direction



Reverse choke hitch

Reverse wrap and choke hitch direction

Temperature: chain slings can also be used with temperatures above normal values by taking into consideration the reduction factors. When used with high temperatures, the working load limit must be reduced. The table below describes the allowed operating temperatures with their corresponding reduction factors. Safe working load values with high temperatures are calculated by multiplying the working load limit defined on the identification tag with the reduction factor defined in the table. In practice, it is difficult to estimate which temperature the chain sling could support. Choose, therefore, the highest one.
The reduction of the working load limit with high temperatures must be taken into consideration until the chain and other components reach room temperature again.
Chain slings must not be used with temperature ranges other than the ones mentioned below. If the chain sling is accidentally used with higher temperatures than the ones allowed, it has to be discarded.

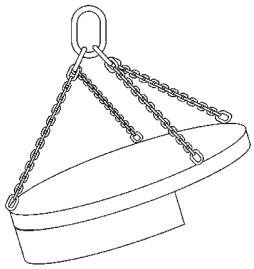
Impact loading: when loads are accelerated or decelerated suddenly, high dynamic forces occur which increase the stresses on the chain. Such situations, which must be avoided, arise from snatch or impact loading. Impact loading is categorized in 3 types. The table below describes the three types of impact loading with their corresponding reduction factors. Safe working load values when impact loading or the equivalent occurs are calculated by multiplying the working load limit on the identification tag with the reduction factor defined in the table.

Vibrations: KWB chain slings and accessories are rated for 20.000 load cycles. At high dynamic forces there may nevertheless be a risk of damage to the chain and accessories. According to the Berufsgenossenschaft Metall Nord Süd, this risk may be prevented if the stress at load capacity is reduced by using a chain of a larger nominal dimension.

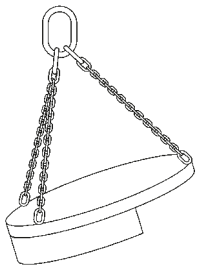
Symmetrical loading: if the chain sling legs are not symmetrically disposed and do not have the same angles to the vertical – as described under angle of inclination and conditions of use – the load must be considered asymmetrical and the weight will not be equally shared among all chain legs. The determination of the working load limit and lifting procedure in this case is to be assessed by a competent person. Following criteria are applied:

If there is a lack of symmetry within the chain legs and unequal angles to the vertical, the two effects could combine or negate each other. In the case of two-, three- and four- leg chain slings, if the legs have different angles to the vertical, the greatest tension will be in the leg with the smallest angle to the vertical (see figure). The working load limit on the identification tag must be accordingly reduced by the WLL of one or more chain legs so that no chain leg is overloaded. In the extreme case, the leg which is vertically disposed will carry the entire load. Angles of inclination of less than 15° must be avoided, since this constitutes a bigger risk factor to the stability of the load. Chain legs could be overloaded if the load swings.
In the case of doubt, it should be assumed that only one chain leg is carrying the load. In such a case, the working load limit of the chain sling must be reduced accordingly. Alternatively, the chain sling can be rated at half of the marked WLL.

Example of asymmetry:

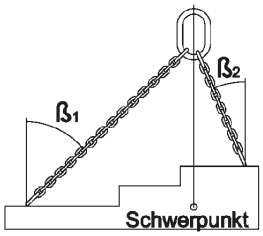


All the load is carried by one chain leg



All the load is carried by two chain legs

The greatest tension will be in the leg with the smallest angle to the vertical (ß2).



Edge load: packing may be required when 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 due to high contact pressure. Edge protectors, such as wooden blocks, may be used to prevent such damage. For correct and incorrect use, see following figures:

When lifting with chains directly on lugs, it is recommended that a lug diameter of at least 3 x the pitch of the chain (inside length of the chain link) is used. If a lug diameter of less than stipulated above is used, the WLL needs to be reduced by 50 %.

If chains are in contact with the edges without edge protectors, the working load limits of the chains must be reduced. The criteria for correct edge protection and for the extent of the reduction when incorrect or missing edge protection occurs, depends on the radius of the edge. It does not matter whether the edges of the load or the edges of the edge protectors are concerned, this is applied in both cases. The table below describes certain criteria with their corresponding reduction factors. Safe working load values are calculated by multiplying the working load limit on the identification tag with the corresponding reduction factor.

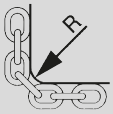
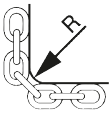
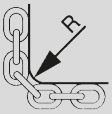
size and same grade at the same time. If this is not the case, the working load limit of the chain sling of the smaller nominal size must be used.

Type of chain sling	Number of chain legs in use	Factor to be applied to the marked WLL
2-leg chain sling	1	1/2
3- and 4-leg chain sling	2	2/3
3- and 4-leg chain sling	1	1/3
2 x 1-leg chain sling	2	1.4
2 x 2-leg chain sling	3 or 4	1.5

Extremely dangerous conditions: all instructions given in this operating manual assume the absence of extremely dangerous conditions. Such extremely dangerous conditions include offshore activities, lifting of people and potentially dangerous loads, such as liquid metals or nuclear material. In these cases, the admissibility and extent of the risks are to be assessed by KWB.

Reduction factors

Safe working load values are calculated by multiplying the working load limit on the identification tag with ALL corresponding reduction factors defined in the table.

Temperature*	-40 °C to 200 °C	above 200 °C to 300 °C	above 300 °C to 400 °C
Reduction factor	1	0.9	0.75
Impact Load	**Slight impacts** created, for example, when accelerating during the lifting or lowering movement	**Medium impacts** created, for example, when the chain is loaded but it slips while adjusting to the shape of the load	**Strong impacts** created, for example, when the load falls onto an unloaded chain
Reduction factor	1	0.7	Impermissible
Edge load	R = larger than 2 x chain Ø 	R = larger than chain Ø 	R = chain Ø or smaller 
Reduction factor	1	0.7	0.5

*The use at temperatures below -40 °C and above 400 °C is forbidden!

Multi-chain legs with more legs than the ones in use: in practice, situations arise where not all individual chain legs of a chain sling can be used simultaneously or where several chain slings are to be used at the same time. The working load limit (WLL) on the identification tag is not valid in these cases. Allowable working load limits are given in the working load limit table according to the dimension of the chain and the number of chain legs in use. In the case of doubt or as an alternative, the working load limit given on the identification tag must be multiplied with the corresponding factor. Under no circumstances must a chain sling be loaded with a higher WLL than the one on the identification tag.
Individual chain legs that will not be used must be hooked back into the master link in order to prevent hazards caused by free swinging or accidental unhooking of the load. Before using several chain slings at the same time, make sure that the master links are free to move when attached to the crane hook and cannot unhook during the lifting process. Angles of inclination of more than 45° are not permitted. Only use chain slings of the same nominal

Reasonably foreseeable misuse

Condition on delivery: a modification of the original condition of the product is not permitted. It is especially important that no welding processes are carried out on KWB chain slings and that they are not exposed to temperature influences over the permitted temperature ranges (see temperature loading and restrictions of use).

The shape of the chain sling must be not modified – e.g. by bending, grinding, dividing parts, boring etc.

For safety reasons, it is not permitted to remove safety devices like triggers, safety pins, safety catches, safety bushes etc.

Surface coating procedures are only permitted if it is guaranteed that no reaction in or on the material of the chain sling will appear during or after the coating process. Hot dip galvanizing or electrogalvanizing are, therefore,

not permitted. Stripping and pickling are also dangerous processes and must not be carried out without the approval of the manufacturer.

Food, pharmaceutical products, cosmetics and chemical substances: KWB standard chain slings are not designed to be used with food, cosmetics or pharmaceutical products, and must not be subjected to severe corrosive influences (e.g. acids, sewage, ...). They must not be used in explosion-protected areas or exposed to the fumes released by acids or chemicals.

Other: chain legs must not be knotted or twisted.

Tip loading of the hooks is not allowed.

Replacement parts

Spare parts are only to be replaced by a qualified person. For the replacement process, use only the original spare parts provided by KWB. Only new bolts, pins and other safety parts are to be used.

Safety precautions to be taken by the user

Gloves must always be worn during the slinging and lifting process. When using chain slings under conditions with restrictions of use, working load limit values must be reduced by the above reduction factors in order to assure the required security level.

Residual risks

Residual risks occur mainly as a result of not paying attention to this operating manual or to other chain sling techniques. That is why, it is essential that the lifting process is evaluated and carried out only by qualified personnel.
Overloading because of exceeding the working load limit or not reducing the working load limit when influences under severe conditions such as temperature, asymmetry, edge load or impact occur, can also lead to failure on the chain sling. Other factors are the application of non-genuine spare parts, transgression of the permitted angle of inclination, strong vibrations with high load or the use of uninspected, knotted or twisted chains. In such cases, the load could fall causing injuries or fatalities among the workers who operate and work in the danger zone of the lifting equipment.
When using four-leg chain slings for lifting rigid loads, the largest mass portion will only be lifted by three or two of the chain legs; the remaining chain legs will serve only to stabilize the load. This is the case when the chain legs are not correctly shortened, they do not have the same length and/or the lifting points are not correctly disposed. This could also lead to the overloading or breaking of the chain sling. When the angle between the chain sling legs is increased, apart from the force acting in the chain leg, the clamping force acting on the load (horizontal component of force) will also increase. This could lead to damage or to the breaking of the load or lifting points. When the centre of gravity of the load acts on the lifting points, the load could become unstable and tilt. Tilting risk increases by using inclination angles of less than 15° or when the load swings.

How to act in case of accidents or damages

After an accident or when extraordinary events occur (e.g. overheating, overloading, collision, influence of acids or chemical substances etc.), take the chain sling out of service. In this process, pay attention when removing the chain sling so that the load is not damaged and the workers in the danger zone area are not injured (e.g. because the load becomes unstable when being set down and falls over). If necessary, before removing the chain sling, an additional chain can be attached. Afterwards, this chain must be removed and the chain sling must be inspected by a competent person.

Maintenance, Inspections and Repairs

When used, chain slings are subjected to conditions which influence their degree of safety. Therefore, it is necessary to maintain chain slings in a safe working condition by subjecting them to maintenance, inspection and repair processes.

Maintenance: KWB chain slings shall always be clean, dry and protected from corrosion, e.g. lightly oiled. Especially when using accessories with movable parts, bolts or bearings must be oiled in order to protect them from corrosion, wear or seizing.

Inspections: chain slings need to be in a clean condition when inspected – they must not contain oil, dirt or rust. Painting is only permissible if an evaluation of the chain sling condition is possible. When cleaning, do not subject chain slings to processes which cause material embrittlement (e.g. pickling), overheating (e.g. flame cleaning), material abrasion (e.g. sand blasting), etc. Surface cracks or other defects must not be covered. Adequate lighting has to be provided when inspecting. Chain slings shall be examined throughout its length. In the case of doubt, they must be sent to the manufacturer for further inspection.

Inspection before the first use: before the first use, following criteria must be applied:

- the delivered chain sling corresponds to the ordered chain sling
- test certificate, certificate of compliance and declaration of conformity are provided
- the information given by the marking and the working load limit coincide with the information given by the test certificate and the certificate of compliance
- when necessary, all the details about the chain sling must be saved in a file
- this operating manual has to always be available to the user and must be read and understood by the corresponding personnel

Inspection before each use: the safe working condition of the chain sling must be visually checked before each use. During the inspection, pay attention to visible signs of damage. In the case of doubt or when one or more withdrawal criteria are met (see below), the chain sling must be removed from service and inspected by a competent person.

Inspection after extraordinary events: extraordinary events – e.g. accidents, overheating, overloading, collision, influences of acids or chemical substances – affect the safe working condition of the chain sling. In these cases, the chain sling must immediately be taken out of service and inspected by a qualified person.

Inspection by a qualified person: an inspection according to national regulations must be carried out in regular intervals by a competent person. Except when otherwise specified, this inspection must be carried out at least once a year. However, this period must be shortened up in view of the conditions of use – e.g. because of frequent use with maximum load capacity or under conditions with restrictions of use, wear or corrosion. The inspection includes a visual and functional check. When the chain sling has been stored for a long period and the regular inspections has not been made, or it has been stored incorrectly (see below), an inspection must also be carried out before the first use.

Load test: it is recommended to subject chain slings to a load test at least every two years. The load test is followed by a visual and functional check. However, this period must be shortened up in view of the conditions of use – e.g. because of frequent use with maximum load capacity or under conditions with restrictions of use. The load test is carried out by subjecting the chain to 2 times the permitted working load limit. It can also be replaced by a crack detection test – e.g. by a magnetic crack test or a dye-penetration method. In this case, the chain sling must be checked throughout its length.

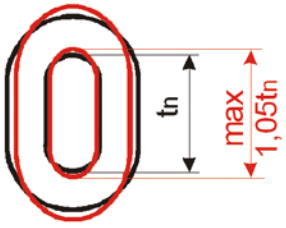
Withdrawal: the chain sling must be taken out of service if one or more of the following criteria are met:

- Broken parts
- Missing or illegible identification tag
- Unrecognizable identification marking of the parts
- Deformation of suspension parts, accessories or the chain itself

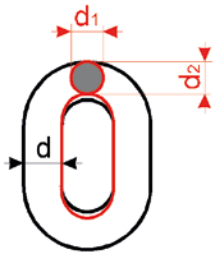
Elongation of the chain: when chain links are provided with different lengths, there is a lack of space between them, or there is an appreciable difference between the lengths of the chain legs in multi-leg chain slings, elongation of the chain could have occurred.
The chain must be discarded if the inside pitch of the link $t > 1{,}05\ t_n$, whereas tn is the nominal pitch from the chain link (see figure).

Wear: wear by contact with other objects occurs normally on the outside surface of the chain links. This type of wear is easily determined and measured. The other type of wear appears between the chain links and is hidden. When inspected, the chain must be slack and chain links rotated in a way so that the cross section that must be measured (e.g. one of the inner contact surfaces of the link) is exposed. The mean diameter dm is permitted to be 90 % of the nominal size dn. dm is determined as the mean value of the diameters d_1 and d_2 measured at right angles on the corresponding cross section. The chain must be discarded if:

$$dm = \frac{d_1 + d_2}{2} < 0{,}9\ d_n$$



Elongation



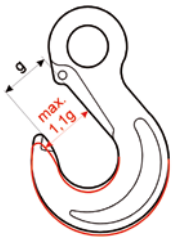
Wear

Maximal dimensional change permitted:

Designation	Dimensions	Max. Change Permitted
Chain	D	-10 %
	P	+5 %
Rings	d	-10 %
	t	+10 %
Hooks *)	e	+5 %
	h, d2	-10 %
	g, g1	+10 %
V, RSK	Both halves must be free to move	No change permitted
	e	+5 %
	c	-10 %
Connecting link VU	Bolts must be free to move	No change permitted
	e	+5 %
	d and M	-10 %
Clevis Bolts and Bolts for Connecting Links + Webbing Coupling Links	d	-10 %
HSB, HKSB, WSB	Tip opening	2 x s max.

*) HS, GH, P, HKS, PK, VHKS, VKL

- Cuts, nicks, gouges, cracks etc.: these faults, especially if they are transversely placed to the direction of the lift, can lead to broken parts
- Excessive corrosion, discoloration caused by heat, coating-burned off, signs of welding processes
- If the safety latch is missing or not working correctly, as well as signs of „opening out" of hooks. The enlargement of the hook opening must not exceed 10 % of the nominal size. A swing-out safety latch indicates the overloading of the hook



Repair: chain slings are only to be repaired by a qualified person. If any leg of a chain sling is required to be replaced then the whole chain within that leg must be replaced. Components that are cracked, visibly deformed or twisted, severely corroded, or have deposits which cannot be removed (e.g. welding spatter), deep cuts, nicks, gouges or cracks must be discarded and replaced. Components that were overheated must also be discarded and replaced. Missing safety devices like safety catches, triggers and safety pins, as well as damaged, broken or missing springs are to be replaced. When replacing, only use the original spare parts and accessories of the same nominal size and grade provided by KWB. When repairing KWB Super Alloy chain slings, KWB Star Alloy accessories can also be used. Only new bolts, pins and other safety devices are to be used during the repair or replacement process.
After inspection and possible repair of the chain sling, missing identification tags must be replaced by new ones as long as the working load limit can be clearly determined due to the marking of every individual part and the type of chain sling.

Welding processes must only be carried out by KWB.

Documentation: Inspections and repairs have to be documented on the file and must be retained during the entire service life of the chain sling. Records of inspections and repairs, as well as the test certificate or the manufacturer's certificate of compliance must always be available so that they can be shown upon request to the corresponding national authority.

Storage, transport

When not in use, chain slings should be kept on a properly designed rack. They must not be left lying on the ground where they may be damaged. If chain slings are to be left suspended from a crane hook in an unloaded condition, chain sling hooks must be attached into the master link or, if it is the case, the end links into the crane hook in order to reduce the risk of chain sling legs swinging freely or accidentally unhooking. If it is likely that chain slings will be out of use for some time, they shall be stored clean, dry and protected from corrosion, e.g. lightly oiled. When the chain sling has been stored for a long period and the regular inspections have not been made, or it has been stored incorrectly (see also inspections), an inspection must also be carried out before the first use.

Recommendations for the lifting process

Following recommendations are to help the user for the preparation and lifting process. However, they do not substitute the chain sling training course. References to this matter can also be found on the ISO 12480-1.

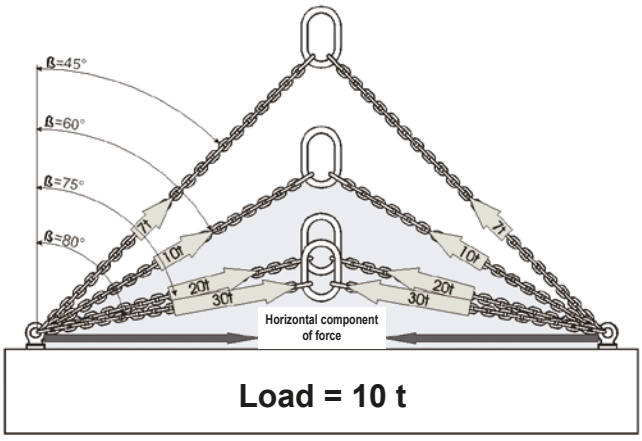
Before starting the lift, ensure that the load is free to move and is not bolted down or otherwise obstructed.

It is essential that the mass of the load to be lifted is known. If the mass is not marked, the information is to be obtained from the consignment notes, manuals, plans etc. If such information is not available, the mass will be assessed by calculation.

The position of the centre of gravity of the load will be established according to the lifting points of the chain sling so that the load can be lifted without it tilting or toppling:

- For single-leg chain slings and endless chain slings, the attachment point must be vertically above the centre of gravity
- For two-leg chain slings, the attachment points must be on both sides of and above the centre of gravity
- For three and four leg chain slings, the attachment points shall be distributed in plan around the centre of gravity (see angle of inclination and conditions of use)

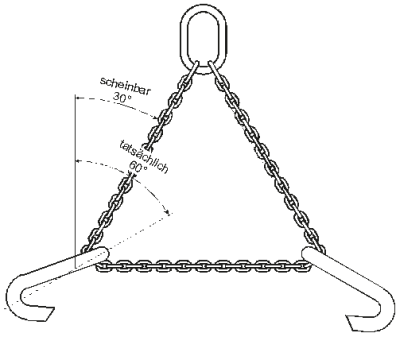
All multi-leg chain slings exert a tensioning force, horizontal component of force (see figure), which increases as the angle β between the chain sling legs is increased. Care has always to be taken to ensure that the load to be moved is able to resist the horizontal component of force without being damaged. The gray area of the figure below shows an angle of inclination of more than 60°, these angles of inclination must never be used. Where hooks or other chain sling components are threaded on a loop of chain, e.g. drum chain slings, the horizontal component of force is much greater and consequently the angle of such legs must not exceed 30° (see figure).



The type of chain sling and the number of chain legs must therefore be determined in accordance to this information.

Possible restrictions of use (e.g. temperature influences, asymmetry etc.) must be established and taken into consideration when determining the working load limit.

The hook to which the chain sling will be attached must be directly above the centre of gravity. Afterwards, the hook is attached to the load by means of the chain sling and, if needed, the lengths of the chain legs in multi-leg chain slings are shortened by means of chain shorteners in a way so that all chain legs can be taken up at the same time when lifting the load. The angle of inclination must not exceed the permitted range.



To avoid that the load swings and to hold it in the desired position when landing it, it is recommended to use a stay rope.

Hands and other parts of the body should be kept away to prevent injury as the slack chain is taken up. The load should be raised slightly to ensure that it is secure and assumes the desired position. This is especially important when using a basket hitch or other hitches where friction retains the load. In cases where the load begins to tilt, set down the load and use a different type of hitch – e.g. by relocating the lifting points or using shortening elements (grab hooks, clevis shortening hooks or clevis connectors).

The site where the load must be landed should be prepared. It should be ensured that the ground or floor supports the sufficient strength to take the weight, taking into account any voids or pipes which may be damaged. It must also be ensured that there is plenty of access to the site and that it is clear of people. It may be necessary to provide lumber or similar material to ensure the stability of the load when landed or to protect the floor or load.

The load should be set down carefully. Care should be taken to avoid clamping the chain sling under the load since this may damage it. Before the chain becomes slack, the load should be checked to ensure that it is correctly supported and stable. This is especially important when several loose objects are in basket hitch and choke hitch. When the load is landed, the chain sling should be removed by hand. The chain sling should not be removed with the lifting machine since it may snag and the load could topple over. The load should not be rolled off the chain sling since the chain sling may be damaged.

KWB
Safety in action

Declaration of conformity

In accordance with the requirements established in Annex II, part A, of the EU Machinery Directive 2006/42/EC and in the Machinery Safety Regulations (MSV) 2010 for components in lifting accessories:

The person authorised to compile the technical documentation in accordance with Annex VII part A:
DI Bernhard Oswald; Mariazeller Straße 143;
A-8605 Kapfenberg

This is to inform you that the product mentioned in this original operating manual complies with all the essential requirements of the EU Machinery Directive 2006/42/EC. This declaration has no legal effect if any changes to the product are introduced without KWB's approval.

Following Norms are applied and fulfilled: EN 818 Part 4 modified.

This product must not be put into service until this operating manual has been read and understood.

Klagenfurt, 2011-01-24

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