

Original instruction manual for KWB Sun Alloy lifting components G12

General information

Components and chains mentioned in this instruction manual are designed for the assembly of KWB Sun Alloy G12 chain slings. By accepting the instruction manual and respective national standards, these chain slings can be used for lifting purposes and transportation of loads. These products meet the requirements of the EU Machinery Directive 2006/42/EC and may only be used when taking into consideration the declaration of incorporation and after reading and understanding the operating manual. It is updated continuously and is only valid in its latest version, which can be downloaded using the following link www.kwb-hebetchnik.com.

Intended use

Intended application: Accessories and chains for assembling of chain slings, lifting and transport of loads. Detailed information for intended use is provided in tables for each component on the following pages.

The load weight: Chains have to be aligned in load direction and free of twists and edge loading (for reduction factors see table: **reduction factors**) master links, master link assemblies and hooks or other accessories shall also be aligned in load direction.

Application temperature: -40 °C to 200 °C – at different temperatures see: **application limits**.




Shocks: Loading must be free of shocks and impacts, in the event of inevitable shock loading refer to **application limits**.

User: Only by trained personnel.

Application limits

Under certain circumstances KWB Sun Alloy lifting chains and accessories G12 may be used under specific limitations – see table **reduction factors** on the following page. The maximum permissible load capacity of the chain sling results from multiplying the maximum load capacity of the component with all corresponding reduction factors in this table.

KWB Sun Alloy chains and accessories are not designed to lift or operate with or around food, cosmetics, pharmaceuticals or chemicals as well as under heavily corrosive influences (e.g. acids, chemicals, sewage, ...) They should not be exposed to acids and chemicals or their vapor. KWB Sun Alloy chains and accessories must not be used for transportation of people or used in explosion-protected areas, neither should they be used to lift liquid metals.

Reduction factors			
Thermal load	-40 °C to 200 °C	Above 200	
Load factor	1	Not permissible	
Shocks/Impacts	Slight shocks Arise from e.g. acceleration when lifting or lowering	Medium shocks Arise from e.g. the lifting chain shifting after fixation around the shape of a load	Strong shocks Arise wehn e.g. the load falls into an unloaded lifting chain
Reduction factor	1	0,7	Not permissible
Edge load	R = larger than 2x chain Ø 	R = larger than chain Ø 	R = chain Ø or smaller 
Reduction factor	1	0,7	0,5

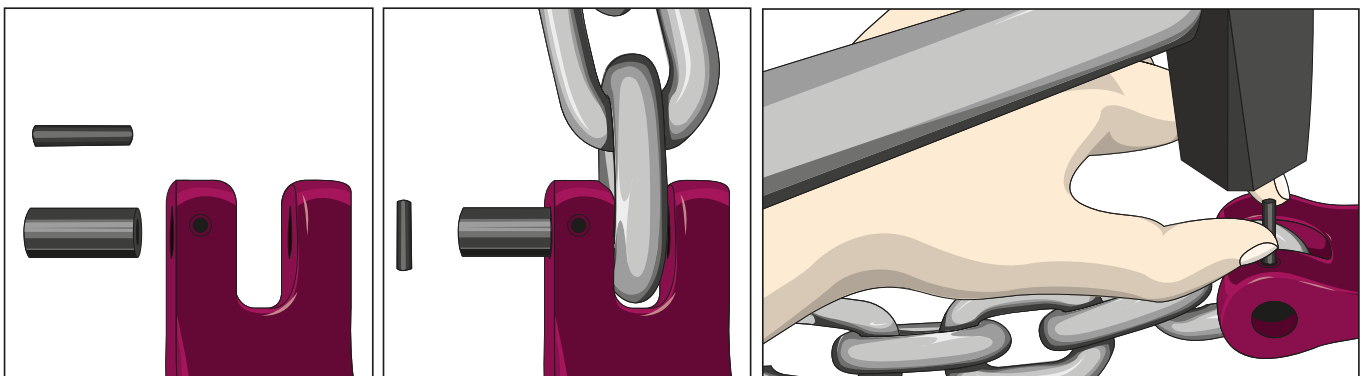
This instruction manual assumes that the lifting chains are being used in low-risk situations. High-risk conditions are classified as offshore-operations, lifting of people or potentially dangerous loads such as liquid metals or nuclear materials. In such cases, the permissibility and the degree of risks should be clarified with KWB.

Handling errors

KWB Sun Alloy G12 chains and accessories must not be used when there are different conditions as described in **intended use** or **application limits** e.g. no cross-wise or bend loading. The master link of the chain sling must be suitable for the size of crane hook in use. No additional heat treatment, welding or drilling is allowed.

Assembly instructions

The assembly may only be executed by a qualified person. KWB Sun Alloy components in G12 are being attached to the chain by clevis connection – see figure. KWB Sun Alloy G12 components are designed to be assembled with original accessories – bolts and safety pins provided by KWB only. The corresponding chain dimension is to be found in the tables of each component on the following pages. They shall not be used to repair or connect KWB Super Alloy (grade 8) nor KWB Star Alloy (grade 10) chain slings. The lifting device which is used together with the components or chain has to be in conformity with the provisions of the Directive 2006/42/EC. Only non-damaged parts must be assembled. Defective components or chains must not be assembled and used components or chains have to be inspected before the assembly process as described below under the section **Maintenance, inspections and repairs**.



Protective measures to be taken into consideration by the user

Gloves should be worn during fastening as well as during lifting.

When using the lifting chains in situations of implementation-related limitations, the reduction factors concerning load capacity must be taken into account so that sufficient safety is ensured.

Residual risks

Overloading caused by non-observance of the maximum load capacity or disregarding the reduced load capacity due to temperature influence, asymmetry, edge or impact loading can also lead to the failure of the lifting chain and accessories as well as using the wrong spare parts, wrong assembly, usage under chemicals, cosmetics, pharmaceuticals or exceeding the angle of inclination, strong vibrations/oscillations caused by overloading or the use of untested and/or twisted or knotted chains. This can lead to the failure of the lifting chain or components that further leads to the falling of the load and consequently injuring of personnel present in the danger zone of the hoisting device.

Accident/Breakdown Procedure

The lifting chains need to be taken out of operation immediately in the event of an accident or unforeseen incident – e.g. accidents, overheating, overloading, collisions, acid and chemical influences. In doing so, it must be ensured that through the removal of the lifting chain the load and personnel are not harmed in the process, e.g. because the load was set down in an unstable position which could lead to toppling over. If deemed necessary, an additional chain can be mounted before the damaged one is removed – the chain should then be given to a qualified person for evaluation.

Maintenance, Inspections and Repairs

Maintenance: Lifting chains and accessories should also be cleaned, dried and safeguarded against corrosion, e.g. slightly oiled.

Inspection: Evaluation of the lifting chain should take place after it has been cleaned – it must be free from oil, dirt and rust. Painting is only admissible as far as an evaluation of the chain sling's condition is possible. Methods of cleaning that cause embrittlement of the material (pickling), overheating (burning), abrasion of material (sand blasting) are not permitted; cracks or other defects should not be hidden.

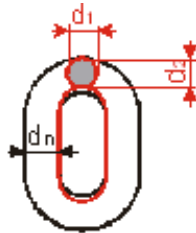
The chain should be checked to make sure it is in good condition before each and every use by the operator. Trained personnel should carry out periodic inspections based on the national legal requirements; if not otherwise specified a minimum of a twelve months period must be applied. This time frame should be shortened for lifting chains in frequent use at maximum load capacity or under implementation-related limitations, in the case of increased wear or corrosion. A load test should be carried out every two years with 2 times the 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 entire chain sling must be checked across its full length.

Elimination criteria:

If one or more of following criteria applies, chain slings and accessories have to be discarded immediately:

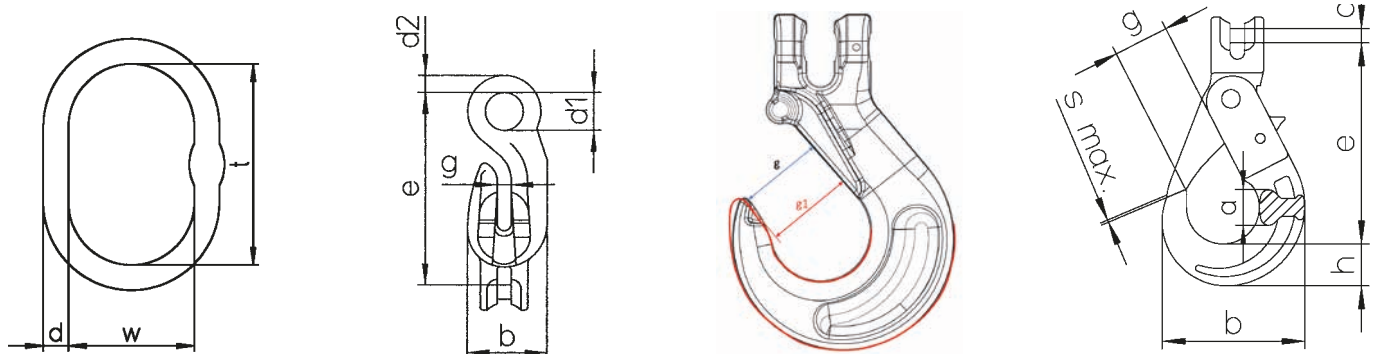
- Damaged or broken parts
- Missing or illegible marking on the component
- Deformation on the chain or accessories
- Elongation of the chain: The chain has to be discarded if $t > 1,05 t_n$
- Wear is determined as the mean value of two measurements of diameter d_1 and d_2 carried out at a right angle (see picture below). The chain has to be discarded if:

$$d_m = \frac{d_1 + d_2}{2} \leq 0,9 d_n$$



- Cuts, notches, grooves, surface cracks, excessive corrosion, discoloration due to heat, signs of subsequent welding, bent or twisted links or other flaws
- Cracks: chains with cross-cracks that are visible to the naked eye have to be discarded
- Missing or non-functional safety device (safety catches if fitted) as well as signs of widening or twisting of hooks, e.g. noticeable enlargement of the opening or other forms of deviation. The enlargement of the opening must not exceed 10 % of the nominal value
- If safe use or functionality of component is in doubt

Type	Measure	Max. allowed deviation
Chain	d	-10 %
	t	+5 %
Links	d	-10 %
	t	+10 %
HKS/SUN, HKS/SUN VK/SUN	e	+5 %
	h, d2	-10 %
	g1, g	+10 %
Clevis pins	d	-10 %
HKS/SUN	Tip opening (S)	2 x s max.d



Repair:

Subsequent repairs should only be carried out by qualified personnel with the necessary know-how and experience. Small cuts, notches and grooves can be eliminated (e.g. on large hooks or lifting chains) by carefully grinding or filing. The newly repaired part should blend seamlessly into the adjoining material without there being a noticeable difference in the cross-section. Through eliminating the damage, the material thickness must not have been decreased by more than 10 % – after the repairs, the component or chain should not fit into any of the “discard” categories.

Storage

KWB Sun Alloy G12 lifting components should be stored in a clean and dry condition and protected from corrosion, e.g. slightly lubricated.

Special information for each component

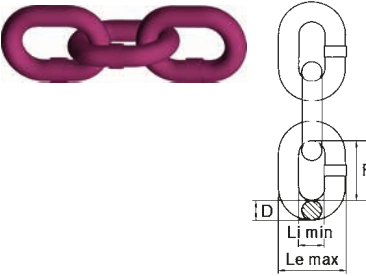
Lifting chain Sun Alloy G12

Intended use: Mounting of chain strands in sling chains. Lifting or transport of loads.

Load: In the longitudinal direction with a maximum working load limit (WLL) described in the table below, chain links have to be aligned freely in longitudinal direction, apply load without shocks.

Edge load: The loading must occur without any impact or shocks – for reduction factors see table **reduction factors** (page 2).

Chain Sun Alloy SUN – Measurements, Load Values, Weights



Chain		Pitch	Li/min.	Le/max.	Weight	Working Load limit	Breaking Load
D	P						
mm	inch	mm	mm	mm	kg/m	kg	kN
7	9/32	21	9.8	26.0	1.33	2,360	92.6
8	5/16	24	11.0	30.5	1.69	3,000	118
10	3/8	30	14.3	38.0	2.66	5,000	196
13	1/2	39	18.0	48.5	4.43	8,000	319
16	5/8	48	21.5	59.0	6.73	12,200	479

Clevis master sets GTKR/SUN and GTVK/SUN

Intended use: depending on the number of already assembled clevis coupling rings/shortening hooks, between 1 and 4 chain legs can be attached to the clevis master sets. The permitted number of chain legs and the selection of the right chain dimension are determined by the product code. The first figure before the hyphen indicates the allowed number of chain legs; the figure after the hyphen indicates the dimension of the chain. For example, GTKR/SUN 2-8 or GTVK/SUN 2-8 can be used as top master link for 2-leg chain slings with SUN Alloy 8 chain. GTKR/SUN or GTVK/SUN clevis master sets serve as an attachment of lifting chains to crane hooks. The biggest crane hook acc. to DIN15401 which a master link can be attached to is defined in the tables on the following pages.

Load: the loading must occur in a longitudinal direction. The inclination angle of the adjusted chain legs must not exceed 60 °C. Values for the working load limit, according to the inclination angle, are defined in the tables below. GTKR/SUN and GTVK/SUN clevis master sets must be free to be aligned according to the present forces.

Available spare parts – bolt with safety pin: KBG/SUN in respective dimensions.

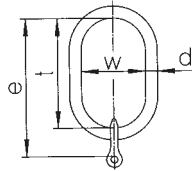
GTKR/SUN: GTKR/SUN 1 can be used as an end links as well.

GTVK/SUN: If needed, the chain sling's leg attached to the clevis shortening hook can be hooked back into the shortening hook's opening in order to reduce its length.

Hooks are not designed to form loops with the legs of the chain sling.

Chain legs must **not** be attached to the shortening hook of another chain leg. The loop created as a result of the shortened chain leg must not be used for lifting purposes.

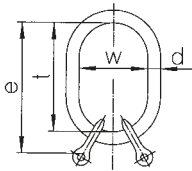
1 Special Clevis Sub-Assembly GTKR/SUN



For 1-leg slings.

Chain Ø		Code	Can be used to single hook acc. to DIN15401 no.	Dimensions				Weight	Working Load Limit	
mm	inch			d	t	w	e		kg	kg
7	9/32	GTKR/SUN 1-7		4	14	120	70	163	0.66	2,360
8	5/16	GTKR/SUN 1-8		5	17	140	80	183	0.89	3,000
10	3/8	GTKR/SUN 1-10		6	19	160	95	211	1.62	5,000
13	1/2	GTKR/SUN 1-13		10	27	190	110	254	3.47	8,000
16	5/8	GTKR/SUN 1-16		12	30	190	110	268	5.8	12,200

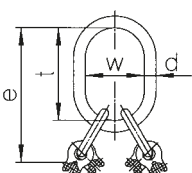
2 Special Clevis Sub-Assembly GTKR/SUN



For 2-leg slings.

Chain Ø		Code	Can be used to single hook acc. to DIN15401 no.	Dimensions				Weight	Working Load Limit β		
mm	inch			d	t	w	e		up to 45°	45°-60°	
				mm				kg	kg	kg	
7	9/32	GTKR/SUN 2-7		6	19	160	95	203	1.65	3,350	2,360
8	5/16	GTKR/SUN 2-8		6	19	160	95	203	1.65	4,250	3,000
10	3/8	GTKR/SUN 2-10		10	23	170	105	221	2.56	7,100	5,000
13	1/2	GTKR/SUN 2-13		10	30	190	110	257	4.84	11,200	8,000
16	5/8	GTKR/SUN 2-16		12	38	275	150	353	10.32	17,000	12,200

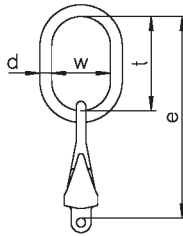
4 Special Clevis Sub-Assembly GTKR/SUN



For 3 and 4-leg slings.

Chain Ø		Code	Can be used to single hook acc. to DIN15401 no.	Dimensions				Weight	Working Load Limit β		
mm	inch			d	t	w	e		up to 45°	45°-60°	
				mm				kg	kg	kg	
7	9/32	GTKR/SUN 4-7		10	27	190	110	287	4.25	5,000	3,550
8	5/16	GTKR/SUN 4-8		10	27	190	110	287	4.25	6,300	4,500
10	3/8	GTKR/SUN 4-10		12	30	190	110	326	7.34	10,600	7,500
13	1/2	GTKR/SUN 4-13		12	38	275	150	479	14.4	17,000	11,800
16	5/8	GTKR/SUN 4-16		12	38	275	150	503	19.48	25,600	18,300

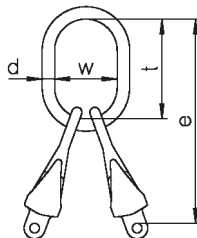
1 Special Clevis Sub-Assembly GTVK/SUN



For 1-leg slings with shortening element.

Chain Ø		Code	Can be used to single hook acc. to DIN15401 no.	Dimensions				Weight	Working Load Limit	
mm	inch			d	t	w	e		kg	kg
7	9/32	GTVK/SUN 1-7	4	14	120	70	244	1.21	2,360	
8	5/16	GTVK/SUN 1-8	5	17	140	80	264	1.44	3,000	
10	3/8	GTVK/SUN 1-10	6	19	160	95	318	2.72	5,000	
13	1/2	GTVK/SUN 1-13	10	27	190	110	391	5.83	8,000	
16	5/8	GTVK/SUN 1-16	12	30	190	110	423	9.5	12,200	

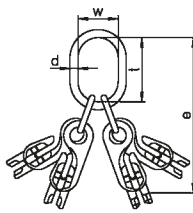
2 Special Clevis Sub-Assembly GTVK/SUN



For 2-leg slings with shortening element.

Chain Ø		Code	Can be used to single hook acc. to DIN15401 no.	Dimensions				Weight	Working Load Limit B	
mm	inch			d	t	w	e		kg	up to 45°
7	9/32	GTVK/SUN 2-7	6	19	160	95	284	2.75	3,350	2,360
8	5/16	GTVK/SUN 2-8	6	19	160	95	284	2.75	4,250	3,000
10	3/8	GTVK/SUN 2-10	10	23	170	105	328	4.76	7,100	5,000
13	1/2	GTVK/SUN 2-13	10	30	190	110	391	9.56	11,200	8,000
16	5/8	GTVK/SUN 2-16	12	38	275	150	508	18.66	17,000	12,200

4 Special Clevis Sub-Assembly GTVK/SUN



For 3 and 4-leg slings with shortening element.

Chain Ø		Code	Can be used to single hook acc. to DIN15401 no.	Dimensions				Weight	Working Load Limit B	
mm	inch			d	t	w	e		kg	up to 45°
7	9/32	GTVK/SUN 4-7	10	27	190	110	368	6.45	5,000	3,550
8	5/16	GTVK/SUN 4-8	10	27	190	110	368	6.45	6,300	4,500
10	3/8	GTVK/SUN 4-10	12	30	190	110	433	11.7	10,600	7,500
13	1/2	GTVK/SUN 4-13	12	38	275	150	616	23.84	17,000	11,800
16	5/8	GTVK/SUN 4-16	12	38	275	150	658	36.16	25,600	18,300

Clevis sling hook HKS/SUN Clevis safety hook HKSB/SUN

Intended use: HKSB/SUN clevis sling hooks serve as end hooks or suspension hooks for the attachment of the chain to the load or other load handling attachment in a quick and easy way. Moreover, they can also be attached to the chain leg when building loops.

Load: the loading must occur in a longitudinal direction only and in the center of the radius of the hook with a maximum working load limit described in the tables below. The hook must be aligned in the direction of the load.

Available spare parts – bolt with safety pin: KBG/SUN in respective dimensions.

HKS/SUN: After the hook has been attached to the chain or the load, the safety catch must be able to close. The safety catch avoids accidental unhooking of the hook and must therefore be provided.

Available spare parts HKS/SUN – safety latch: FG/SUN in respective dimensions.

HKSB/SUN: The safety catch can be closed by hand, but the hook also closes automatically when loaded and will be locked by means of a trigger located on the back of the hook. Due to this system, HKSB/SUN clevis safety hooks with a closed safety catch are also securely hooked even when unloaded. The trigger must be pulled in order to open the hook.

Available spare parts HKSB/SUN – trigger set: HBG/SUN in respective dimensions.

Clevis Sling Hook with Forged Safety Latch HKS/SUN											
Chain		Code	Dimensions						Weight	Working Load Limit	
e	h		a	b	d	g1					
mm	inch		mm						kg	kg	
7	9/32	HKS/SUN 7	93	27	21	89	9,5	26	0.63	2,360	
8	5/16	HKS/SUN 8	92	27	21	89	11	26	0.63	3,000	
10	3/8	HKS/SUN 10	108	33	25	110	14	31	1.18	5,000	
13	1/2	HKS/SUN 13	130	41	34	132	17,5	38	2.35	8,000	
16	5/8	HKS/SUN 16	158	49	37	160	21	45	3.82	12,200	

Clevis Self Locking Hook HKSB/SUN											
Chain		Code	Dimensions							Weight	Working Load Limit
e	h		a	b	d	g	s max.				
mm	inch		mm							kg	kg
7	9/32	HKSB/SUN 7	125	26	21	92	9,5	32	1	0.93	2,360
8	5/16	HKSB/SUN 8	124	26	21	92	11	32	1	0.93	3,000
10	3/8	HKSB/SUN 10	143	31	26	115	14	45	1	1.60	5,000
13	1/2	HKSB/SUN 13	183	42	35	145	17,5	54	2	3.50	8,000
16	5/8	HKSB/SUN 16	218	51	41	169	21	60	2	6.50	12,200

The declaration of incorporation is valid for the products: Chain Sun Alloy, GTKR/SUN, GTVK/SUN, HKS/SUN, HKSB/SUN.

Declaration of incorporation

In accordance with the requirements established in Annex II, part B, of the EU Machinery Directive 2006/42/EC for components in lifting accessories:

This is to inform you that the product mentioned in this original operating manual is designed to be incorporated in lifting accessories complying with all essential requirements of the EU Machinery Directive 2006/42/EC. This product must not be put into service until the final lifting accessory into which it is to be incorporated has been declared in conformity with the provisions of the Directive 2006/42/EC. Moreover, it is a precondition that this operating manual has been read and understood. This declaration has no legal effect if any changes to the product are introduced without KWB's approval.

Following essential safety and health requirements of Annex I of the Directive are applied and fulfilled:

1.1.3, 1.3.4, 1.5.4, 4.1.2.3, 4.1.2.5, 4.3, 4.4.1.

Additionally, we declare that the relevant technical documentation is compiled in accordance with part B of Annex VII and will be transmitted electronically due to a well-founded request by the national competent authority.

The person authorised to compile the technical documentation:
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Klagenfurt, 31th of may 2016

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