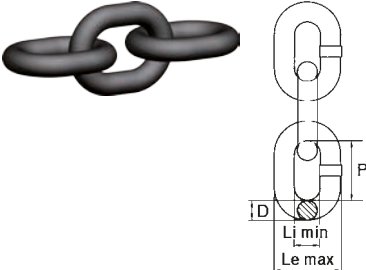


Original operating manual for lifting chain Super Alloy SA

Super Alloy Chain SA acc. EN 818-2 – Measurements, Load Values, Weights



| Chain | | Tolerance | Pitch | Tolerance | Li / min. | Le / max. | Weight | Working Load Limit | Breaking Load |
|-------|-------|-----------|-------|-----------|-----------|-----------|--------|--------------------|---------------|
| D | | | P | | | | | | |
| mm | inch | mm | mm | mm | mm | mm | kg/m | kg | kN |
| 6 | 1/4 | ±0.24 | 18 | ±0.5 | 7.80 | 22.20 | 0.80 | 1,120 | 45.20 |
| 7 | 9/32 | ±0.28 | 21 | ±0.6 | 9.10 | 25.90 | 1.10 | 1,500 | 61.60 |
| 8 | 5/16 | ±0.32 | 24 | ±0.7 | 10.40 | 29.60 | 1.40 | 2,000 | 80.40 |
| 10 | 3/8 | ±0.40 | 30 | ±0.9 | 13 | 37 | 2.20 | 3,150 | 126 |
| 13 | 1/2 | ±0.52 | 39 | ±1.2 | 16.90 | 48.10 | 3.80 | 5,300 | 212 |
| 16 | 5/8 | ±0.64 | 48 | ±1.4 | 20.80 | 59.20 | 5.70 | 8,000 | 322 |
| 18 | 11/16 | ±0.90 | 54 | ±1.6 | 23.40 | 66.60 | 7.30 | 10,000 | 407 |
| 20 | 3/4 | ±1.00 | 60 | ±1.8 | 26 | 74 | 9 | 12,500 | 503 |
| 22 | 7/8 | ±1.10 | 66 | ±2.0 | 28.60 | 81.40 | 10.90 | 15,000 | 608 |
| 26 | 1 | ±1.30 | 78 | ±2.3 | 33.80 | 96.20 | 15.20 | 21,200 | 849 |
| 32 | 1 1/4 | ±1.60 | 96 | ±2.9 | 41.60 | 118 | 23 | 31,500 | 1,290 |

Safety factor 4:1

Static test coefficient = 2.5; Safety factor = 4

These chains SA are designed for the assembly of chain slings and after reading the operating manual as well as the current national norms for lifting and transporting purposes. KWB Super Alloy lifting chains can be combined with suitable components (master links, master link assemblies, connecting links and hooks) to build lifting slings. This product meets the requirements of the EU Machinery Directive 2006/42/EC and is only to be used when taking into consideration the declaration of incorporation and after reading and understanding the operating manual. The operating manual must always be available to the user until the chains 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

Purpose of use: chain legs building, transport and lifting of loads

Load: in the longitudinal direction with a maximum working load limit (WLL) described in the table above, chain links must be freely aligned to the load direction.

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




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

Edge load: must be avoided. In the case of possible edge load, the load factors described in the table below must be taken into consideration.

- Lifting chains must only be used by competent personnel
- Lifting chains must be checked before each use for visible signs of damage

Restrictions of use

Under certain conditions, the use of chains is restricted (see table below). The table below describes certain loads with their corresponding reduction factors. Safe working load values are calculated by multiplying the working load limit attached on the identification tag with the reduction factor defined in the table. If more restrictions of use are applicable during a lifting process, all corresponding reduction factors must be taken into account.

| Reduction factors | | | |
|-------------------|--|---|---|
| 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!

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.

Reasonably foreseeable misuse

Lifting chains Super Alloy SA 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. They also must not be knotted, twisted or used under other circumstances as the one described above (Conditions of use and Restrictions of use). Do not apply any surface coating procedure with damaging effects on the materials (e.g. hot galvanizing or electrogalvanizing) and do not subject them to heat, welding or drilling processes.

Assembly instructions

The assembly of KWB lifting chains may only be executed by a qualified person. KWB Super Alloy lifting chains SA can be combined by means of connecting links or clevis connectors with other chain sling components to build chain slings. When assembling, use only genuine KWB Super Alloy (G8) components with the same nominal size – accessories described in the classification table in the catalog or operating manual. ATTENTION! Since these chains correspond to grade 8, the WLL and the marking of the lifting assembly on the identification tag must be adjusted according grade 8 when used with G10 KWB Star Alloy chains and components. A grade 8 identification tag is to be used. When repairing Star Alloy (G10) chain slings, Super Alloy (G8) lifting chains SA can also be used as long as a misinterpretation by the user is excluded – e.g. by means of a unified coloration and correct identification. It is vital to pay attention to the right working load limit marking of the whole system (WLL on identification tag). The weakest part will determine the working load limit. Only non-damaged parts must be assembled. Defective chains must not be assembled and used chains must be inspected before the assembly process as described below under the section "Maintenance, Inspections and Repairs".

Safety precautions to be taken by the user

Gloves must be worn during the whole 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.

How to act in case of accidents or damages

After deformation of the chains because of overloading or other extraordinary events, take the chains out of service for inspection or repair by a qualified person.

Residual risks

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 lead to failure on the chain sling. Other factors are unsatisfactory adjustment, the usage of not genuine spare parts, 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.

Maintenance, Inspections and Repairs

Maintenance: Lifting chains Super Alloy SA shall be cleaned regularly, dried when exposed to wet atmospheres and protected from corrosion, e.g. lightly oiled.

Inspections: Lifting chains Super Alloy SA need to be inspected in a clean condition – they must not contain oil, dirt or rust. Painting is only permissible if an evaluation of the chain condition is possible. When cleaning, do not subject lifting chains 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. Lifting chains must be checked before each use for visible signs of damage. Once a year an inspection must be carried out by a competent person. However, this period must be shortened 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. It is recommended to subject the chain sling every two years to a crack test. There are different ways of crack testing: subjecting the chain to a load test with 2 times the working load limit, followed by a visual inspection, a magnetic crack test or a dye-penetration method.

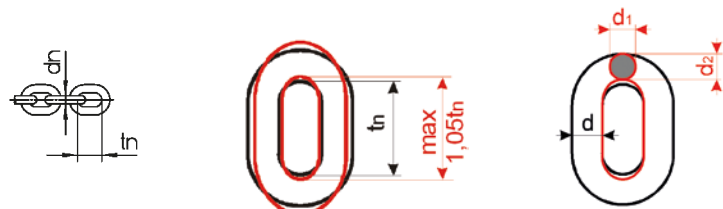
Withdrawal:

- Broken parts, deformation, notches, cracks of all types, excessive corrosion
- Signs of heat (e.g. discoloration or coating-burn off)
- In the case of doubts about the safety and correct functioning of the SA Super Alloy chains
- Unrecognizable identification marking
- Wear: the mean diameter d_m is permitted to be 90 % of the nominal size d_n . d_m 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

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

- Elongation of the chain. The chain must be discarded if the inside pitch of the link $t > 1,05 t_n$, whereas t_n is the nominal pitch from the chain link (see picture)

| Measure | Max. permitted change |
|---------|-----------------------|
| d_n | -10 % |
| t_n | +5 % |



Repair: These lifting chains are only to be repaired by a qualified person.

Welding, heat treatments, as well as the straightening of bent chain links are not permitted. Inspections and repairs have to be documented and the corresponding reports have to be retained during the service life of the chains.

Storage

KWB Super Alloy lifting chains SA shall be stored cleaned, dried, protected from corrosion, e.g. lightly oiled, and on racks in hanging conditions. While stored, they must not be exposed to corrosive, mechanical or thermal influences.

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:
DI Bernhard Oswald; Mariazeller Straße 143; A-8605 Kapfenberg

Klagenfurt, 2013-10-01

KWB Ketten Austria GmbH
Stefan Duller

KWB Ketten Austria GmbH
A-9020 Klagenfurt, Schleppe-Platz 8
Phone: +43 (0) 463 / 48 80-355
Fax: +43 (0) 463 / 48 80-350
kwb@kwb-ketten.at, www.kwb-ketten.at

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