

Klüberpaste HS 91-21

High-temperature and high-purity screw paste



Your benefits at a glance

- Efficient assembly of screws of varying dimensions and materials due to constant preload forces
- Screws easy to undo even when subject to high temperatures for a long time
- High degree of purity for minimum impact on screws as paste is virtually free of chlorine, fluorine and sulphur

Your requirements - our solution

Klüberpaste HS 91-21 is black and easy to spread. It contains an innovative combination of solid lubricants to facilitate screw assembly.

The product's high degree of purity regarding sulphur, chlorine, fluorine and heavy metals prevents reactions with metal surfaces. The paste enables excellent separation of materials with a tendency to fretting such as V2A, V4A and high-temperature steel.

We developed Klüberpaste HS 91-21 especially for applications in oil refineries. It can withstand a wide temperature range.

Application

For all screws in pipes, measurement and control equipment, valves and fittings, tanks and containers, heat exchangers, etc.

Klüberpaste HS 91-21 has proven particularly useful during oil refinery inspections.

The paste is characterised by very good friction coefficients, e.g. on stainless steel (A2-70). It is ideal for use on screws that are subject to high temperatures, for example in heat exchangers.

High-temperature screw test acc. to VW-TL 52112

- Nut DIN 934 M10
- Bolt DIN 933 M10x35
- Material: 1.4828

The breakaway torque after 100 h of exposure at 750 °C was very low.

Klüberpaste HS 91-21 can also be successfully used in other industrial applications that are subject to extreme temperatures, e.g. in the steel industry.

Application notes

Prior to applying Klüberpaste HS 91-21, surfaces should be cleaned and degreased carefully. Remove any oil residues or rust. The paste can then be applied as a thin film covering the whole surface by means of brush, leather cloth or plastic sponge.

Klüberpaste HS 91-21 is easy to spread to facilitate full surface wetting while preventing overlubrication.

Klüberpaste HS 91-21 containers should be kept closed at all times to protect the product from contamination. If you have any further questions, please do not hesitate to contact our application engineers.

The friction values indicated on page 2 in the Section Product Data were determined with two different materials. Other materials/surfaces have to be checked accordingly.

Material safety data sheets

Material safety data sheets can be requested via our website www.klueber.com. You may also obtain them through your contact person at Klüber Lubrication.

Pack sizes	Klüberpaste HS 91-21
Tube 60 g	+
Can 750 g	+

Klüberpaste HS 91-21

High-temperature and high-purity screw paste

Product data	Klüberpaste HS 91-21
Article number	005132
Lower service temperature	-40 °C / -40 °F
Upper service temperature	1400 °C / 2552 °F
Colour space	black
Texture	homogeneous
Texture	pasty
Sulfur, chlorine, fluoride content	<= 200 ppm
Content of metals and metal alloys (except Ca, Mg, Zr)	<= 500 ppm
Unworked penetration, DIN ISO 2137, 25°C, lower limit	280 x 0.1 mm
Unworked penetration, DIN ISO 2137, 25°C, upper limit	310 x 0.1 mm
Four-ball tester, welding load, DIN 51350 pt. 04	>= 4 000 N
Screw test, DIN 933 M10x35, DIN 934 M10, 100 h, 750 °C, breakaway torque	approx. 67 Nm
Friction coefficient screw test, measured with hexagon bolts M10x30-8.8, DIN EN ISO 4017, tightening speed n = 5 rpm, number of screws = 20, nut M10-8, plain and degreased, face material 42CrMo4 with roughness Ra 1.6, tightening torque MA = 50 Nm, averaged bearing surface friction coefficient (initial tightening)	0.11
Friction coefficient screw test, measured with hexagon bolts M10x30-8.8, DIN EN ISO 4017, tightening speed n = 5 rpm, number of screws = 20, nut M10-8, plain and degreased, face material 42CrMo4 with roughness Ra 1.6, tightening torque MA = 50 Nm, standard deviation (S) of averaged bearing surface friction coefficient (initial tightening)	0.007
Friction coefficients screw test, screw M 10x30-8.8, DIN EN ISO 4017, black and nut M 10-8, DIN EN ISO 4032, polished, averaged thread friction coefficient (first-time tightening)	0.1
Friction coefficient screw test, Measured with hexagon bolts M10x30-8.8, DIN EN ISO 4017, tightening speed n = 5 rpm, number of screws = 20, nut M10-8, plain and degreased, face material 42CrMo4 with roughness Ra 1.6, tightening torque MA = 50 Nm, standard deviation (S) of averaged thread friction coefficient (initial tightening)	0.009
Friction values screw test, screw M10x55-A2-70 Plain, DIN EN ISO 4017, M 10-A2-70, DIN EN ISO 4032 plain, washer plain acc. DIN EN ISO 16047 point. 7.2.3.HL, averaged friction coefficient of the head (first tighten)	0,10 µ / (0,02)
Friction values screw test, screws M10x55-8.8 plain and degreased DIN EN ISO 4017, M10-10, DIN EN ISO 4032 blank and degreased, washer plain and degreased acc. to DIN EN ISO 16047 section 7.2.3. HL, averaged thread-friction value (first-time tightening) / (standard deviation (S))	0,12 µ / (0,00)
Friction values screw test, screws M10x55-8.8 plain and degreased DIN EN ISO 4017, M10-10, DIN EN ISO 4032 blank and degreased, washer plain and degreased acc. to DIN EN ISO 16047 section 7.2.3. HL, averaged head friction value (first-time tightening) / (standard deviation (S))	0,10 µ / (0,01)
Friction coefficients screw test, screw M10x55-A2-70 plain and degreased, DIN EN ISO 4017, M10-A2-70, DIN EN ISO 4032 plain and degreased, washer plain and degreased acc. DIN EN ISO 16047 chapter 7.2.3. HL, averaged thread friction coefficient (initial tightening) / (standard deviation (S))	0,15 µ / (0,02)
Friction coefficient screw test, measured with hexagon bolts M10x50-A2-70, DIN EN ISO 4017, tightening speed n = 5 rpm, number of screws = 20, material of the nut A2, face material 42CrMo4 with roughness Ra 1.6, tightening torque MA = 40 Nm, averaged bearing surface friction coefficient (initial tightening)	0.1



Product data	Klüberpaste HS 91-21
Friction coefficient screw test, measured with hexagon bolts M10x50-A2-70, DIN EN ISO 4017, tightening speed $n = 5$ rpm, number of screws = 20, material of the nut A2, face material 42CrMo4 with roughness Ra 1.6, tightening torque MA = 40 Nm, standard deviation (S) of averaged bearing surface friction coefficient (initial tightening)	0.007
Friction coefficient screw test, measured with hexagon bolts M10x50-A2-70, DIN EN ISO 4017, tightening speed $n = 5$ rpm, number of screws = 20, material of the nut A2, face material 42CrMo4 with roughness Ra 1.6, tightening torque MA = 40 Nm, averaged thread friction coefficient (initial tightening)	0.13
Friction coefficient screw test, measured with hexagon bolts M10x50-A2-70, DIN EN ISO 4017, tightening speed $n = 5$ rpm, number of screws = 20, material of the nut A2, face material 42CrMo4 with roughness Ra 1.6, tightening torque MA = 40 Nm, standard deviation (S) of averaged thread friction coefficient (initial tightening)	0.017
Minimum shelf life from the date of manufacture - in a dry, frost-free place and in the unopened original container, approx.	24 months



Klüberpaste HS 91-21

High-temperature and high-purity screw paste

Klüber Lubrication – your global specialist

Innovative tribological solutions are our passion. Through personal contact and consultation, we help our customers to be successful worldwide, in all industries and markets. With our ambitious technical concepts and experienced, competent staff we have been fulfilling increasingly demanding requirements by manufacturing efficient high-performance lubricants for more than 80 years.

**Klüber Lubrication München SE & Co. KG /
Geisenhausenerstraße 7 / 81379 München / Germany /
phone +49 89 7876-0 / fax +49 89 7876-333.**

The data in this document is based on our general experience and knowledge at the time of publication and is intended to give information of possible applications to a reader with technical experience. It constitutes neither an assurance of product properties nor does it release the user from the obligation of performing preliminary field tests with the product selected for a specific application. All data are guide values which depend on the lubricant's composition, the intended use and the application method. The technical values of lubricants change depending on the mechanical, dynamical, chemical and thermal loads, time and pressure. These changes may affect the function of a component. We recommend contacting us to discuss your specific application. If possible we will be pleased to provide a sample for testing on request. Klüber products are continually improved. Therefore, Klüber Lubrication reserves the right to change all the technical data in this document at any time without notice.

Publisher and Copyright: Klüber Lubrication München SE & Co. KG. Reprints, total or in part, are permitted only prior consultation with Klüber Lubrication München SE & Co. KG and if source is indicated and voucher copy is forwarded.