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Processing and handling notes of Keratherm® thermal grease (KP 12, KP 97, KP 98, KP 99) in different packagings

Keratherm® thermal compounds are silicone or mineral oil based compounds, highly filled with ceramic particles and optimized for customers' application. These products have a high thermal conductivity in the case of a low viscosity. Optimal adapting on component surfaces and compensation of smaller unevennesses are guaranteed.

Physiological notes:

Thermal greases of Kerafol® comply with valid RoHS and REACH compliance requirements.
Oils included in the thermal greases are physiologically safe.
No exposure of air is expected when using a thermal grease.
Contact to eyes and skin should be prevented by appropriate protective measures.
Using skin protection salves or other appropriate measures is recommended.
Please have a look at the references in the safety data sheets of each thermal grease.

Surface quality in application:

The component surface need to be dry and free of contaminations like oil, grease, dust, paint layers and solvent contaminations. Condensing humidity (e.g. by temperature variations) must be avoided. Depending on the condition of the component, a mechanical or chemical cleaning of the surface is eventually necessary. Please be attentive using porous heat sink or casing parts because cappilar ascension in the porous surfaces may occur due to already explained migration abilities of the compounds.

Pretreatment:

Thermal greases of Kerafol® have a low viscosity and include fillers which are proned to separate to a certain level depending on storage temperature. Therefore a careful mixing process before processing is required. No binding specifications for mixing speed are present. 200-300 rpm can be used as a guidline. The mixing process have to be done smoothly to avoid air incorporation. Otherwise an evacuation process (100 mbar, ca. 5 minutes) is necessary.
Please note: Thermal greases filled in syringes and cartouches cannot be remixed.

Application:

The thickness of the thermal grease should be measured that the thermal grease fills the hollow space between the two components but not increase the distance. The most frequently error is to use too much thermal grease. The most common layout is a dot and/or a rhomb application. Therefore the viscosity and the ability of the thermal grease to level out under pressure are decisive.
The **dot application** was choosen for low viscosity greases, realizing thin layers (10 – 20 µm) and covering big areas.
The **rhomb application** was used for middle to high viscosity greases and realizing higher layer thicknesses (25 – 50 µm).
Thermal greases are of limited suitability for **screen printing** and therefore for very high layer thicknesses. In general laboratory tests need to be done to find the right layout and application.
The application of a dot and a rhomb structure with thermal grease can be done by half automated dispensing units. At high piece numbers dispensing was done on components of loaded circuit boards or on single components. After application thermal greases do not need an additional thermal treatment. Moreover fixed components should not stored over a long time line to minimize contamination or damage of the component surface and consequently a change in material performance. Applying the dispensed components to the chassis or the heat sink need to receive attention, due to the used contact pressure a levelling of the gap width take place, which have to be compensated by screws combined with springs or self-regulating clamps.
Thermal grease is not recommendable for applications with higher gap width (> 30 µm).

Processing temperature:

Keratherm® - products must be processed at temperature range from +18°C and +35°C at a relative humidity of 30 – 70%. At different temperature or humidity changes of the applying behaviour of the compounds may occur.

Storage suitability:

At least 12 month in the original packaging under frost free standard conditions: [RT // + 5°C – + 35 °C/ rel. humidity 30 – 70%]. Direct sun exposure or storage near radiators must absolutely be avoided. Opened packagings must be stored cool and protected and should be used as soon as possible.

The thermal grease KP12 show a migration of the fillers due to their low viscosity. After remixing, see pretreatment, (possible for Hobbock and small cans) the thermal grease is useable again. The KP12 can also be homogenized again by "rolling up" the mass using a roll mill (in the case of the usage of cartridges), which means that the material can be reused. An exemplary concept can be found under the following link: http://gmbh.zoz.de/?page_id=248

Table 1: storage suitability of diffrent bunches

bunch	room temperature + 5 °C bis + 35 °C rel.humidity 30 – 70% **rolled**		room temperature + 5 °C bis + 35 °C rel.humidity 30 – 70% **stationary**		max. usage for opened bunches	
Hobbock	n.a.		12 month		3 month	
can 0,5 l and 1,0 l	n.a.		12 month		3 month	
Thermal grease	KP12	KP97 KP98 KP99	KP12	KP97 KP98 KP99	KP12	KP97 KP98 KP99
1K-cartouche*	1 month; (3 month)**°	6 month; (12 month)**	1 month; (3 month)**	3 month; (12 month)**	1 month	3 month
tube	n.a.	n.a.	1 month; (3 month)**	3 month; (12 month)**		
syringe 1 – 10 ml	n.a.	n.a.	1 month; (3 month)**	3 month; (12 month)**	1 month	3 month

*1K-cartouche = Semco-one coponent cartouches to 30 cc, 75 cc, 180 cc, 360 cc, 600 cc and Euro-cartouches to 310 ml (without integrated mixer)
**() = storage temperature +8 °C bis +12 °C ; If the cold chain is interrupted for a maximum of 2 weeks (e.g. due to transport), the minimum shelf life of the KP97, KP98 and KP99 is at least 6 months

Transport conditions:

Clean, free of dust and moisture at min. – 40 °C to max. + 50 °C; Make sure there is no condensation on the material before processing!

General information:

Thermal greases may have a pump out effect, due to temperature variations of the components in operation mode a migration of the oil in the thermal grease can occur. Therefore the thermal grease is not edaphic and the properties in application may change (decreasing of thermal conductivity over time, etc.). If thermal greases show a separation they have to be remixed before usage.