# Greases and Oil Compounds (For North and South America)

Shin-Etsu Silicone

# Contents



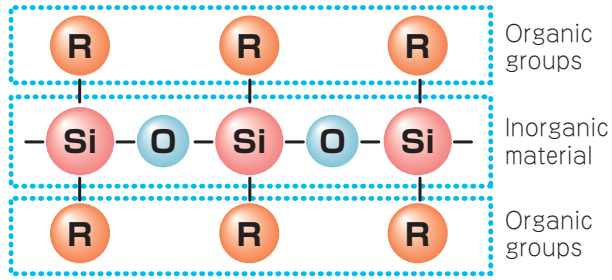
# Facts about Silicone

## 【Chemical properties of silicones】

The main chain of a silicone is made up of inorganic siloxane linkages (Si-O-Si), to which are attached side chains which contain organic groups. Silicones are a sort of hybrid polymer with both inorganic and organic components.

### ■Features attributable to siloxane linkages

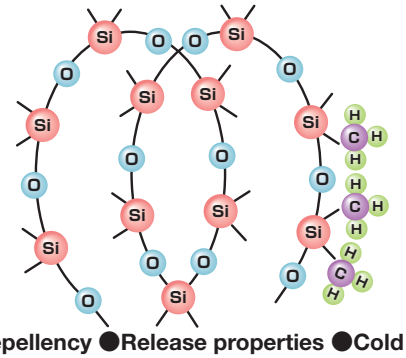
Silicones have a “backbone” of siloxane linkages, with attached side chains which contain organic groups.




●Heat resistance ●Weatherability
●Chemical stability ●Dielectric properties

### ■Features attributable to molecular structure

The molecules of dimethyl silicone exhibit a twisted, helical structure.



●Water repellency ●Release properties ●Cold resistance
●Low temperature-dependence

●Compared to organic polymers, which have a carbon skeleton (C-C bond energy: 85 kcal/mol), silicones have superior heat resistance and weatherability (UV light, ozone resistance). This is due to the greater stability of siloxane bonds, which have a bond energy of 106 kcal/mol.

● Siloxane bonds have a bond length of 1.64 Å and bond angle of 134°. Compared to carbon bonds (bond distance: 1.54 Å, bond angle: 110°), they have a long bond distance and high bond angle, and a low rotational energy barrier. As a result, siloxane bonds move more freely and intermolecular forces are weak. These characteristics manifest themselves in the features of silicone materials, which include softness, gas permeability, cold resistance, and little change in viscosity due to temperature changes.

● The backbone of dimethyl silicone exhibits a helical structure.
Hydrophobic methyl groups cover almost the entire surface of the silicone polymer molecules, and surface energy is low. This gives rise to unique properties including water repellency and easy release.

● Moreover, silicones are low-polarity polymers, so they exhibit minimal moisture absorption.

# Silicone Greases & Oil Compounds

Silicone greases are products which consist of a base oil of silicone fluid compounded with thickening agents (such as metallic soaps) and other additives. They can be used in a wide range of temperatures and are used primarily on moving parts to provide lubrication and adhesion.

Silicone oil compounds are products which consist of a base oil of silicone fluid compounded with fillers such as silica powder or metallic oxides. The intended application will dictate the type of filler used.
They can be used in a wide range of temperatures and are used primarily on non-moving parts for thermal conduction, electrical insulation and sealing.

## Features of Silicone Greases & Oil Compounds

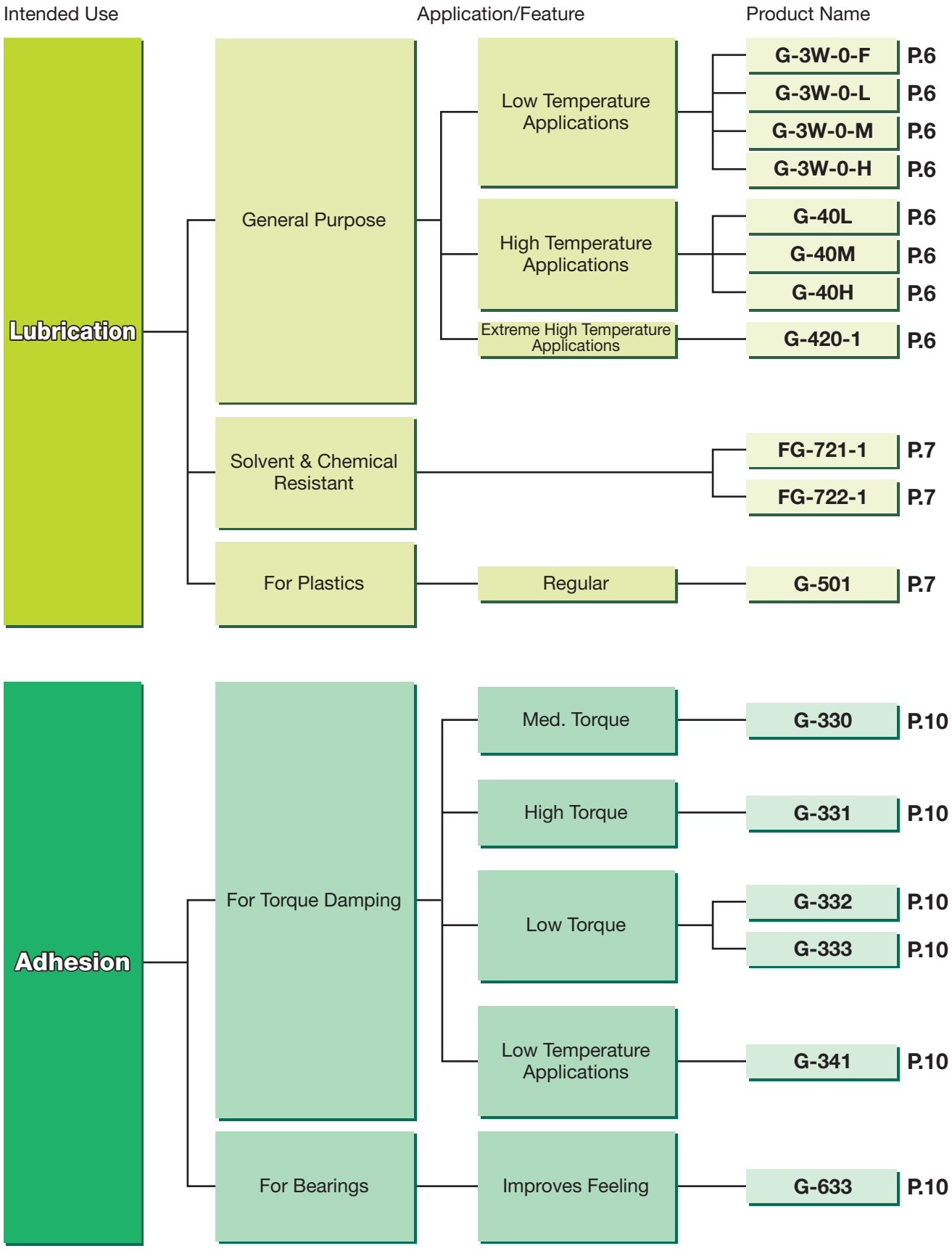
Because they use silicone fluid as the base oil, Shin-Etsu silicone greases and oil compounds offer the following advantages.

1. Outstanding heat and cold resistance, so they perform well in extreme conditions and will continue to do so over prolonged use.
2. Electrically insulating, so they can be used with confidence.
3. Outstanding moisture resistance and water repellency.
4. Non-corrosive.
5. Effective in small amounts.

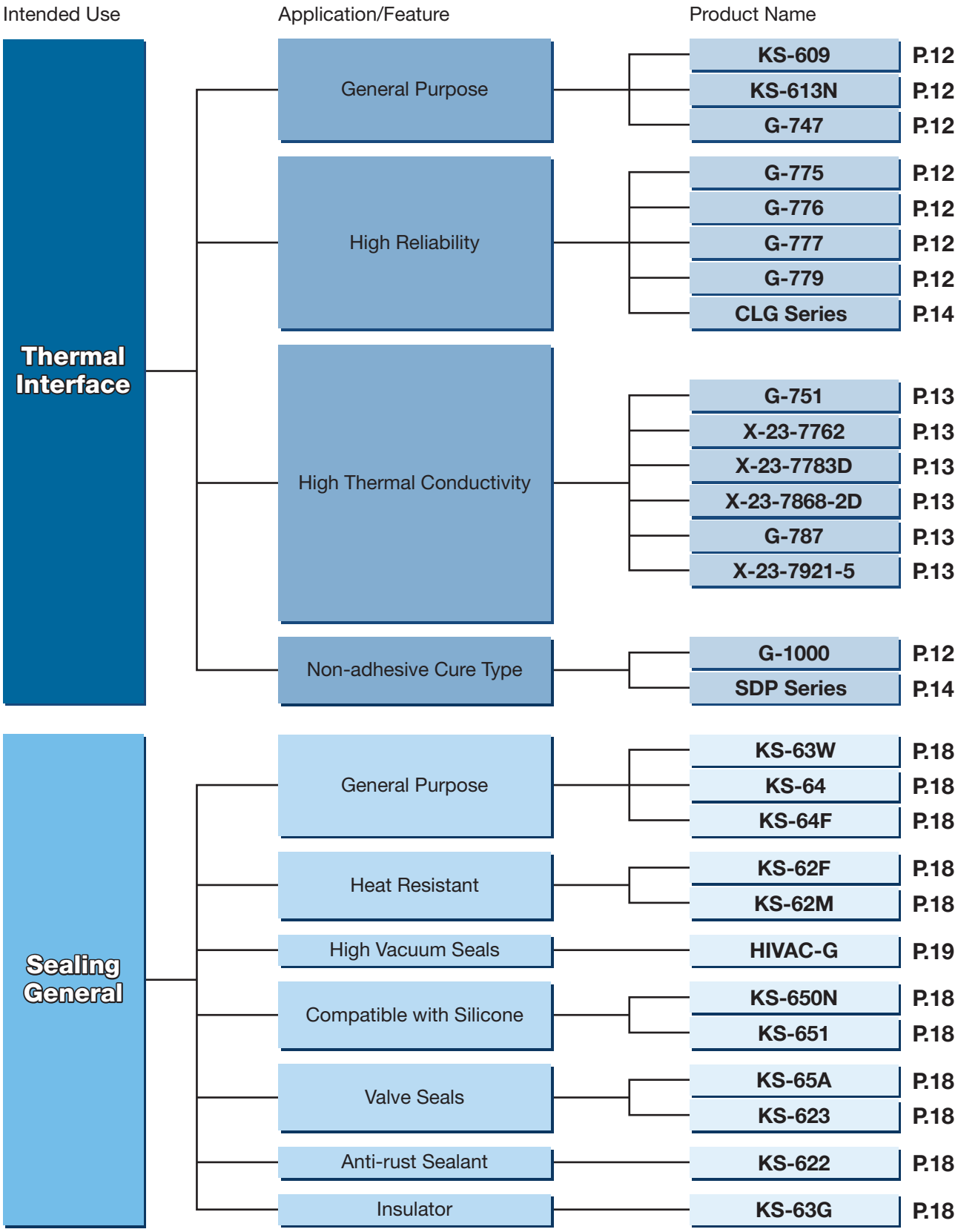
Heat resistance comparison (Left: mineral oil Right: silicone fluid)

※Before using any of these products, be sure to test beforehand to determine the product's suitability to the intended application.

# Greases Selection Guide



# Oil Compound Selection Guide



# Properties of Grease Products

Silicone greases are made using a silicone fluid as the base oil. This is compounded with other materials such as thickeners, oiliness improvers and antioxidants. Compared to common mineral oil greases, silicone greases have greater thermo-oxidative stability and moisture resistance, and have a wider range of use temperatures. Silicone greases are also chemically inert, and so are compatible with almost all types of equipment.

## Low-temperature Lubrication Applications

### G-3W-0-F G-3W-0-L G-3W-0-M G-3W-0-H

The greases in the G-3W-0 series were specially designed to provide excellent lubrication at low temperatures. There are four grades of consistency : F, L, M and H.

#### Typical properties

| Parameter | | | | G-3W-0-F | G-3W-0-L | G-3W-0-M | G-3W-0-H |
|---|---|---|---|---|---|---|---|
| Appearance | | | | Grayish white paste | Grayish white grease | | |
| Specific gravity | | 25°C | | 0.99 | 0.99 | 1.00 | 0.99 |
| JIS K2220 Test method | Consistency | 25°C/worked | | 340 – 400 | 280 – 320 | 240 – 280 | 200 – 240 |
| | Drop point | | °C | — | 200+ | 200+ | 200+ |
| | Oil separation | 150°C×100h | % | — | 5.7 | 2.3 | 0.5 |
| | Oxidative stability | 150°C×50h*1 | kPa | — | 30 | 30 | 30 |
| | Moisture resistance | | % | — | 1 | 1 | 1 |
| | Worked stability | 100,000 strokes | | — | 400 (max.) | 400 (max.) | 400 (max.) |
| | Low-temperature torque (Starting/Running) | -60°C | mN m | — | 107/31 | 266/93 | 329/122 |
| MIL-L15719A | Low-temperature torque | -60°C 2,000 g-cm | | — | Less than 1 sec | 1 sec | 1 sec |
| BTB | Free acid or free alkali | | | Neutral | | | |
| Use temperature range | | | °C | −60 to +180 | | | |
| Volatile content | | 150°C×100h | % | — | 0.35 | 0.41 | 0.35 |
| Low-molecular-weight siloxane content | | $\Sigma D_3$-$D_{10}$ | ppm | ≦100 | | | |

*1 The oxidative stability test conditions prescribed in JIS K 2220 indicate 99°C×100 hours, but in this case measurement was done at 150°C×50 h. (Not specified values)
※G-3W-0 greases are suitable for speed factors (bearing bore in mm _ bearing shaft speed in rpm) up to 200,000.

## High-temperature Lubrication Applications


Bearing lubrication

### G-40L G-40M G-40H G-420-1

The greases in the G-40 series were specially designed to provide excellent lubrication at high temperatures, and are ideal for lubrication of sealed bearings.
There are three grades of consistency : L, M and H.
G-420-1 provides outstanding lubrication at very high temperatures.

#### Typical properties

| Parameter | | | | G-40L | G-40M | G-40H | G-420-1 *1 |
|---|---|---|---|---|---|---|---|
| Appearance | | | | Beige grease | | Brown grease | White grease |
| Specific gravity | | 25°C | | 1.06 | 1.05 | 1.06 | 1.10 |
| JIS K2220 Test method | Consistency | 25°C/worked | | 280 – 320 | 240 – 280 | 200 – 240 | 268 |
| | Drop point | | °C | 200+ | 200+ | 200+ | 250+ |
| | Oil separation | 150°C×100h | % | 8.9 | 5.9 | 3.0 | 5.9 *2 |
| | Oxidative stability | 150°C×50h*3 | kPa | 10 | 10 | 10 | — |
| | Moisture resistance | | % | 1 | 1 | 1 | <1 |
| | Worked stability | 100,000 strokes | | 400 (max.) | 360 (max.) | 320 (max.) | 267 |
| | Low-temperature torque (Starting/Running) | -20°C | mN m | 66/29 | 83/46 | 117/57 | 210/65 |
| MIL-L15719A | Low-temperature torque | -20°C 2,000 g-cm | | Less than 5 sec. | Less than 5 sec. | Less than 5 sec. | — |
| BTB | Free acid or free alkali | | | Neutral | | | — |
| Use temperature range | | | °C | −30 to +200 | | | −30 to +250 |
| Volatile content | | 150°C×100h | % | 0.4 | 0.3 | 0.3 | 0.15 *2 |
| Low-molecular-weight siloxane content | | $\Sigma D_3$-$D_{10}$ | ppm | ≦100 | | | ≦100 *4 |

*1 For information on safety, see page 22 (Safety & hygiene). (Not specified values)
*2 200°C×24h
*3 The oxidative stability test conditions prescribed in JIS K 2220 indicate 99°C×100 h, but in this case measurement was done at 150°C×50 h.
*4 $\Sigma D_4$-$D_{10}$
※G-40 greases are suitable for speed factors (bearing bore in mm _ bearing shaft speed in rpm) up to 200,000.

# For Lubrication of Plastics

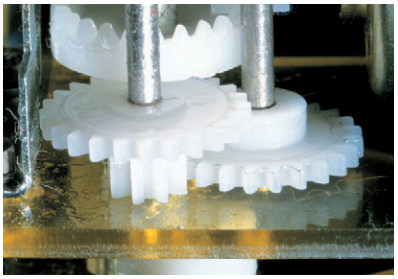
## G-501

G-501 is compounded with a special silicone fluid as the base oil. This grease is ideal for blower bearings and plastic parts, where it provides both lubrication and noise reducing properties.
With its special formula, G-501 is much less likely to cause stress cracking of polycarbonate (PC), polyacetal (POM), ABS and other plastics.
It is also an excellent lubricant for steel/steel contacts.

### Typical properties

| Parameter | | | | G-501 |
|---|---|---|---|---|
| Appearance | | | | White to pale yellow grease |
| Specific gravity | | 25°C | | 0.92 |
| JIS K2220 Test method | Consistency | 25°C/worked | | 306 |
| | Oil separation | 150°C×24h | % | 2.5 |
| | Low-temperature torque (Starting/Running) | -50°C | mN m | 211／103 |
| Use temperature range | | | °C | –50 to +150 |
| Volatile content | | 150°C×24h | % | 0.1 |
| Low-molecular-weight siloxane content | | $\Sigma D_3$-$D_{10}$ | ppm | ≦100 |

(Not specified values)



Lubrication of plastic gears

# Solvent Resistant Greases

## Fluorosilicone greases

## FG-721-1 FG-722-1

The greases in the FG-72 series feature a fluorosilicone fluid as the base oil, compounded with fluoropolymer powder. These hybrid greases exhibit certain properties of both silicones and fluorine compounds, and offer outstanding heat resistance, solvent resistance and chemical resistance.
These greases provide excellent lubrication even in high speed, high load conditions.

### Typical properties

| Parameter | | | | FG-721-1 *2 | FG-722-1 *2 |
|---|---|---|---|---|---|
| Appearance | | | | White grease | |
| Specific gravity | | 25°C | | 1.50 | 1.50 |
| JIS K2220 Test method | Consistency | 25°C/worked | | 296 | 270 |
| | Drop point | | °C | 259 | ＞260 |
| | Oil separation | 200°C×24h | % | 3.4 | 0.6 |
| | Oxidative stability | 150°C×50h*2 | kPa | 10 | 0 |
| | Low-temperature torque (Starting/Running) | -30°C | mN m | 250/77 | 1,800/710 |
| | Copper strip corrosion | Room temp.×24h | | Pass | |
| Use temperature range | | | °C | –30 to +200 | |
| Volatile content | | 200°C×24h | % | 1.4 | 0.9 |
| Low-molecular-weight siloxane content | | $\Sigma D_4$-$D_{10}$ | ppm | ≦100 | |

(Not specified values)

*1 For information on safety, see page 22 (Safety & hygiene).
*2 The oxidative stability test conditions prescribed in JIS K 2220 indicate 99°C×100 h, but in this case measurement was done at 150°C×50 h.

# Reference Data

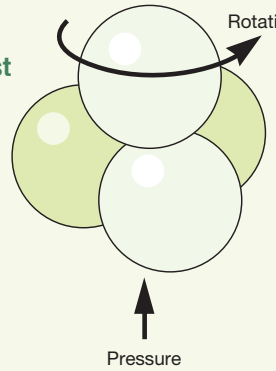
## Boundary lubrication properties

### ●Properties of extreme-pressure greases

| | 4-ball weld load (kgf) |
|---|---|
| G-3W-0-M | 102 |
| G-40M | 126 |
| G-501 | 158 |
| FG-721 | 348 |
| Mineral oil type | 183 |

kgf values: 1500 rpm/1 min.

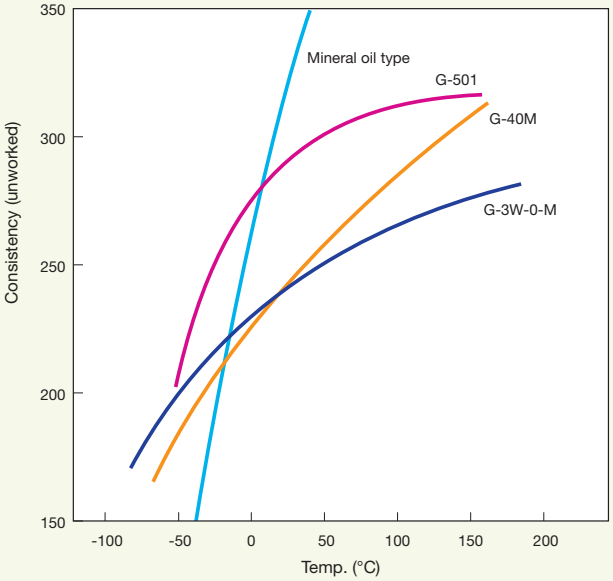
### ●4-ball test



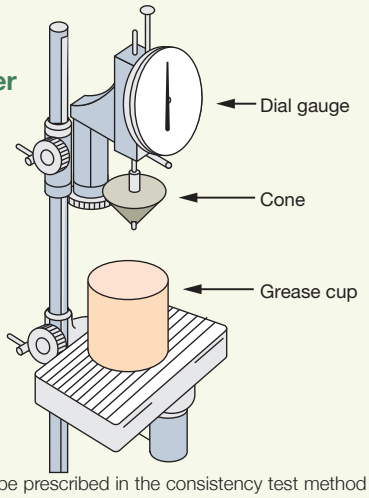

Test conditions
Speed: 1500 rpm
Time: 1 min
Temp.: room temperature
Test balls: 1/2 inch DIA
Steel ball bearings

## Consistency

### ●Effect of change in temperature on consistency




### ●Consistency tester

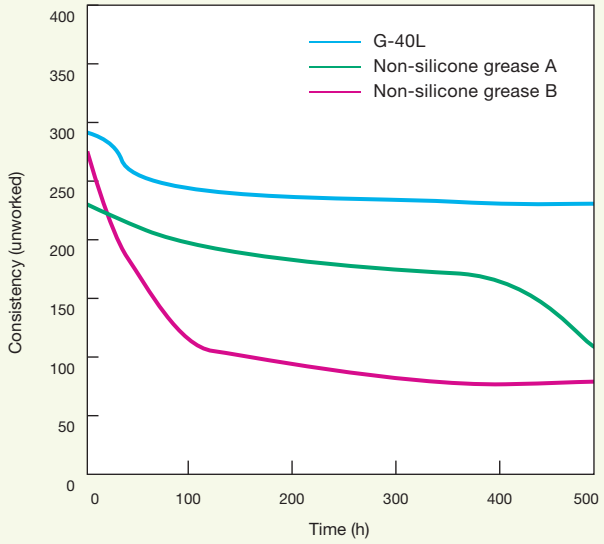



**∗Consistency test**

A consistency tester of the type prescribed in the consistency test method in JIS K 2220 (grease) was used. For the test, a sample is put into the prescribed grease cup and the surface is leveled, then the sample is kept at 250.5 °C. The cone is then lowered and allowed to press vertically into the grease for 5 seconds. The penetration depth is measured to a precision of 0.1 mm, and this value is multiplied by 10 to get the consistency of the sample. Worked consistency is the consistency measured after the grease has been worked for 60 strokes over 1 minute using a mechanical grease worker of the prescribed type.

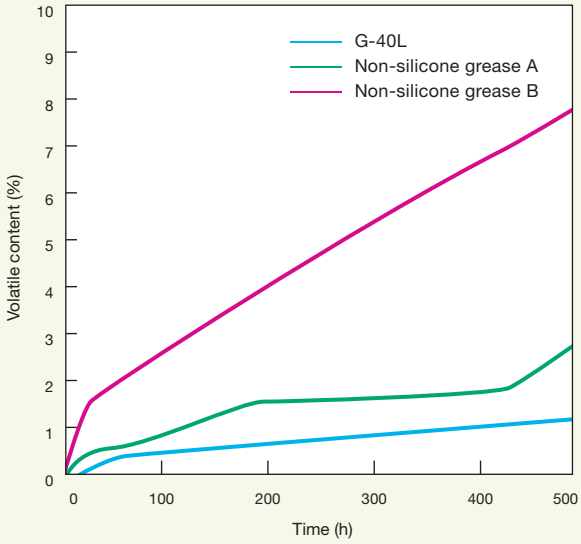
## Reliability comparison: Silicone grease vs. Non-silicone grease

### ●Consistency




Test conditions: 150°C × 500 h

### ●Volatile content

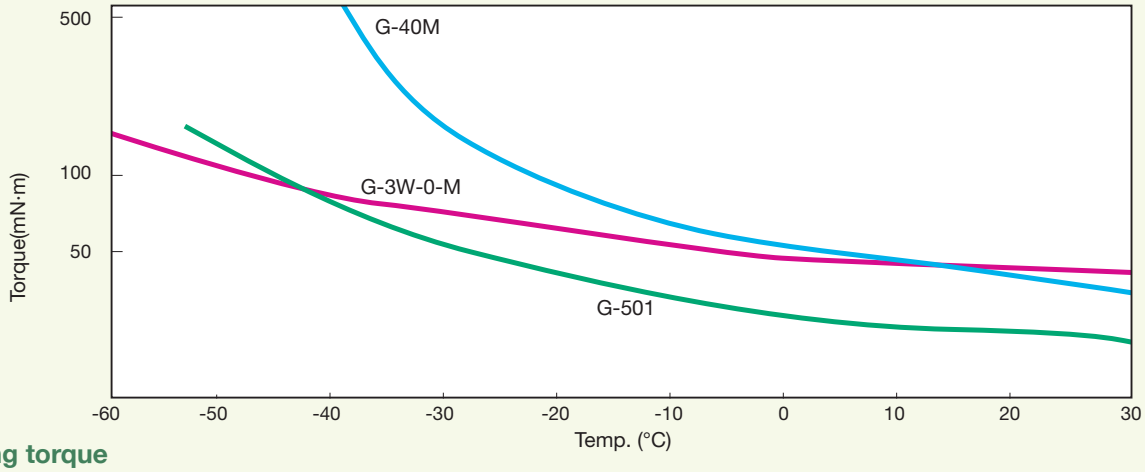



Test conditions: 150°C × 500 h

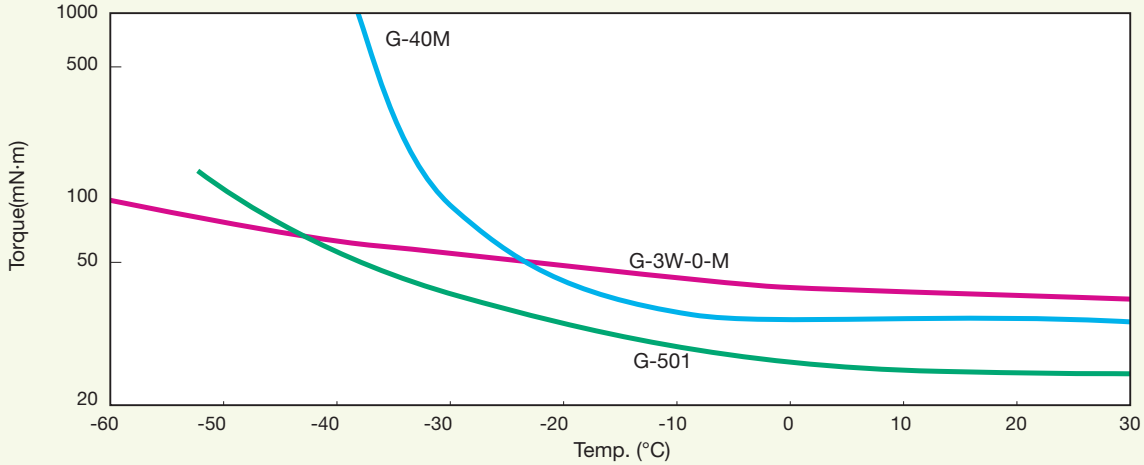
## Torque (sliding resistance)

Measured in accordance with JIS K 2220. 6204 bearings, 1 rpm.
Grease is kept at a prescribed temperature for two hours, then starting torque is measured. Rotation is continued, and the torque value after 10 minutes is taken to be the running torque.

### ●Starting torque




### ●Running torque



# Tacky Greases (Torque, Damper Applications)

## ■G-330 G-331 G-332 G-333
## ■G-341
## ■G-633

The products in the G-330 series and G-341 are highly tacky greases that exhibit little change in torque values due to changing temperatures.
These greases can be applied to sliding and rotating parts in a variety of equipment, where their high tackiness provides a superior damping effect.
G-330 has medium shear resistance (torque), while G-331 has high shear resistance. G-332 and G-333 are low-torque greases.
G-341 is specially formulated to ensure stable physical properties at low temperatures.
G-633 was developed as a bearing grease for variable resistors, and can also be used as a damping grease.
Note that G-633 is made using non-silicone base oils, and so the use temperature range will not be as wide as those of the other products.

### ■ Typical properties

| Parameter | | | | G-330 | G-331 | G-332 | G-333 |
|---|---|---|---|---|---|---|---|
| Appearance | | | | White grease | | Blue grease | White grease |
| Specific gravity | | 25°C | | 1.15 | 1.15 | 1.12 | 1.11 |
| JIS K2220 Test method | Consistency | 25°C/unworked | | 285 | 305 | 307 | 304 |
| | Oil separation | 105°C×24h | % | 0.01 | 0.01 | 0.12 | 0.38 |
| Torque | After 50 turns | | N·m×10$^{-4}$* | 23 | 34 | 9 | 7 |
| Use temperature range | | | °C | −30 to +150 | | | |
| Volatile content | | 105°C×24h | % | 0.05 | 0.05 | 0.06 | 0.06 |
| Low-molecular-weight siloxane content | | ΣD$_3$-D$_{10}$ | ppm | ≦100 | | | |

※Torque meter: Torque Tester MDT2-AMP made by Shinmei Electric.
The sample is applied evenly to the shaft (4 mm DIA_8 mm) and in the bearing clearance (35 μm). The shaft is then turned 50 times (1 turn=360°) by hand at a rate of 1 turn per second. After 50 turns, the sample is loaded into the torque meter and the torque value is measured after rotation at 10 rpm for 1 minute. This value is taken as the test value.

(Not specified values)

### ■ Typical properties

| Parameter | | | | G-341 |
|---|---|---|---|---|
| Appearance | | | | Paleyellow grease |
| Specific gravity | | 25°C | | 1.02 |
| JIS K2220 Test method | Consistency | 25°C/unworked | | 182 |
| | Oil separation | 105°C×24h | % | 0.06 |
| Torque | After 50 turns | | N·m×10$^{-4}$* | 9 |
| Use temperature range | | | °C | −40 to +100 |
| Volatile content | | 105°C×24h | % | 0.08 |
| Low-molecular-weight siloxane content | | ΣD$_3$-D$_{10}$ | ppm | ≦100 |

※Torque meter: Torque Tester MDT2-AMP made by Shinmei Electric.
The sample is applied evenly to the shaft (4 mm DIA_8 mm) and in the bearing clearance (35 μm). The shaft is then turned 50 times (1 turn=360°) by hand at a rate of 1 turn per second. After 50 turns, the sample is loaded into the torque meter and the torque value is measured after rotation at 10 rpm for 1 minute. This value is taken as the test value.

(Not specified values)

### ■ Typical properties

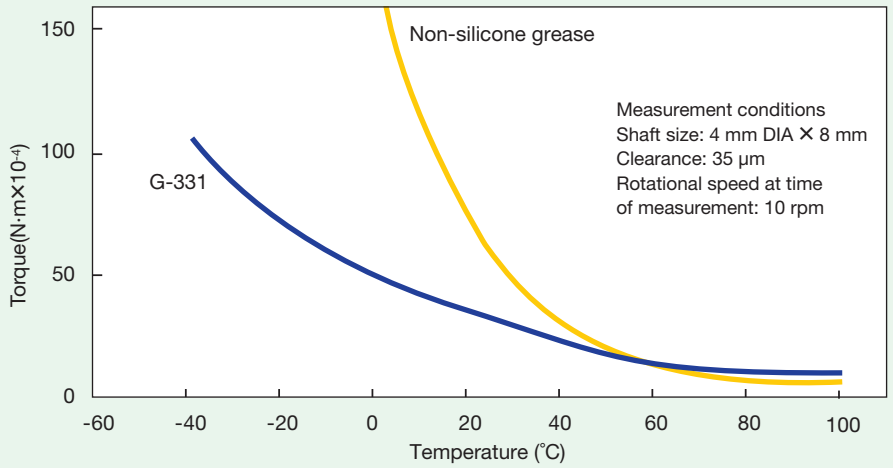
| Parameter | | | | G-633 |
|---|---|---|---|---|
| Appearance | | | | Pale yellow to creamy white translucent grease |
| Specific gravity | | 25°C | | 0.87 |
| JIS K2220 Test method | Consistency | 25°C/unworked | | 235 |
| | Oil separation | 105°C×24h | % | 0.04 |
| Torque | After 50 turns | | N·m×10$^{-4}$* | 64 |
| Use temperature range | | | °C | 0 to +80 |
| Volatile content | | 105°C×24h | % | 0.07 |
| Low-molecular-weight siloxane content | | ΣD$_3$-D$_{10}$ | ppm | ≦100 |

※Torque meter: Torque Tester MDT2-AMP made by Shinmei Electric.
The sample is applied evenly to the shaft (4 mm DIA_8 mm) and in the bearing clearance (35 μm). The shaft is then turned 50 times (1 turn=360°) by hand at a rate of 1 turn per second. After 50 turns, the sample is loaded into the torque meter and the torque value is measured after rotation at 10 rpm for 1 minute. This value is taken as the test value.

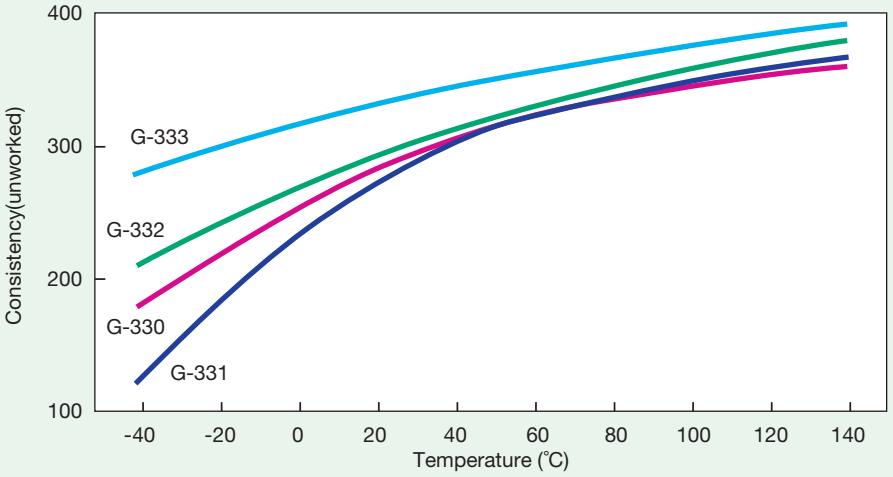
(Not specified values)

# Reference Data

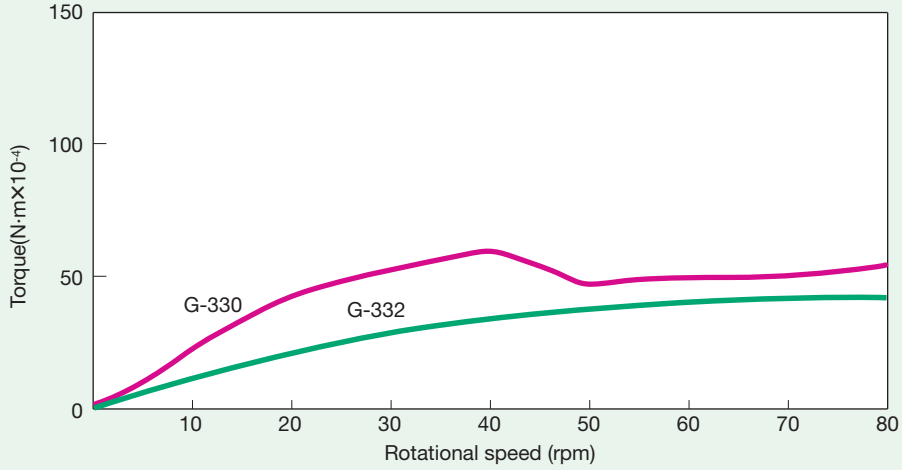
## Temperature vs. Torque




## Temperature vs. Consistency




## Rotational speed vs. Torque



# Properties of Silicone Oil Compounds

A silicone oil compound features a base oil of silicone fluid, compounded with silica or metal powders. Silicone oil compounds have superior electrical properties and water repellency and are exceptionally stable against heat and oxidation across a wide temperature range. These products are thus used extensively as a dielectric material, as a thermal interface material, for sealing, and to improve water repellency.

## Thermal Interface Compounds (General Purpose)

### KS-609 KS-613N G-747

All three feature silicone fluid as the base oil, plus thermally conductive fillers. These oil compounds offer excellent thermal conductivity and electrical properties.
They are ideal for use as a thermal interface and insulator for semiconductor elements (transistors, thermistors) and various types of heatsinks.
KS-609 is a general purpose product, KS-613N has enhanced heat resistance for potting of thermistors, and G-747 can be used as a thermal interface material for resin-encapsulated power transistors.

#### Typical properties

| Parameter | | | KS-609 | KS-613N | G-747 |
|---|---|---|---|---|---|
| Appearance | | | White grease | | |
| Specific gravity | 25°C | | 2.50 | 2.41 | 2.65 |
| Viscosity | 25°C | Pa·s | 70 | 80 | 50 |
| Consistency*2 | 25°C/worked | | 328 | 326 | 328 |
| Oil separation*2 | 200°C×24h | % | 0.3 | N/A | 0.01 *1 |
| Thermal conductivity | | W/m·K | 0.73 | 0.86 | 0.90 |
| Volume resistivity | | TΩ·m | 2.3 | 0.05 | 2.5 |
| Dielectric breakdown strength | 0.25mm | kV | 3.5 | 5.4 | 3.7 |
| Use temperature range | | °C | –55 to +200 | –50 to +250 | –50 to +150 |
| Volatile content | 200°C×24h | % | 0.3 | 0.19 | 0.06 *1 |
| Low-molecular-weight siloxane content | $\Sigma D_3$-$D_{10}$ | ppm | ≦100 | | |

*1 Measured at 120°C×24 h. *2 Tested in accordance with JIS K 2220.

(Not specified values)

## Thermal Interface Compounds (High Reliability)

### G-775 G-776 G-777 G-779 G-1000

All three feature a base oil of silicone fluid, compounded with thermally conductive fillers. These oil compounds offer excellent thermal conductivity and electrical properties.
Compared to general purpose products, these oil compounds offer better resistance against pump-out, creep and oil separation, meaning they can be used in spots where long-lasting reliability is required.
G-775 is high viscosity and offers the ultimate in creep resistance.
G-776 has been diluted with an isoparaffin solvent, to achieve properties which are normally at odds, namely low viscosity (ease of use) and low oil bleed.
G-777 is an all-purpose product that offers a balance of good working properties, heat resistance, thermal conductivity, and resistance against pump-out.
The all-purpose G-779 has all the reliability of G-777, and works great in low BLT applications.
The curable grease G-1000 has the low contact thermal resistance of a grease, and resists pump-out like a sheet.

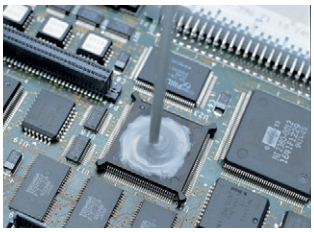
#### Typical properties

| Parameter | | | G-775 | G-776 | G-777 | G-779 | G-1000 |
|---|---|---|---|---|---|---|---|
| Appearance | | | White grease | | | | |
| Specific gravity | 25°C | | 3.4 | 2.9 | 3.2 | 3.2 | 3.04 |
| Viscosity | 25°C | Pa·s | 500 | 60 | 140 | 160 | 80 |
| Consistency*2 | 25°C/unworked | | 250 | 354 | 190 | 190 | — |
| Hardness after cured | Asker C | | — | — | — | — | 40 |
| Thermal conductivity | | W/m·K | 3.6 | 1.3 *1 | 3.3 | 3.0 | 2.4 |
| Dielectric breakdown strength | 0.25mm | kV | 2.5 | 2.9 | 3.2 | 3.2 | 3.6 |
| Use temperature range | | °C | –40 to +150 | –40 to +200 | –40 to +200 | –40～+200 | –40～+180 |
| Volatile content | 150°C×24h | % | 0.26 | 3.10 | 0.1 | 0.18 | 0.58 |
| Low-molecular-weight siloxane content | $\Sigma D_3$-$D_{10}$ | ppm | ≦300 | ≦100 | | | ≦100 |

*1 Value after evaporation of solvent. *2 Tested in accordance with JIS K 2220.

(Not specified values)

# Thermal Interface Compounds (High Thermal Conductivity)


Thermal interface for CPUs

## ■G-751 X-23-7921-5

These oil compounds have excellent thermal conductivity. All feature a base oil of silicone fluid compounded with high thermal conductivity fillers.
In G-751 and X-23-7921-5 the emphasis is on thermal conductivity, and their dielectric strength is lower than that of other silicone products. Thus, G-751 and X-23-7921-5 are not recommended for applications that require a material with insulating properties.
G-751 and X-23-7921-5 are used as thermal interface materials and ideal for CPUs and MPUs.

### ■ Typical properties

| Parameter | | | G-751 | X-23-7921-5 |
|---|---|---|---|---|
| Appearance | | | Gray grease | |
| Specific gravity | 25°C | | 2.51 | 2.6 |
| Viscosity | 25°C | Pa·s | 420 | 363 |
| Oil separation* | 150°C×24h | % | 0.01 | – |
| Thermal conductivity | | W/m·K | 4.5 | 6.0 |
| Volume resistivity | | TΩ·m | 0.008 | – |
| Dielectric breakdown strength | 0.25mm | kV | Below measurable limit | |
| Use temperature range | | °C | –50 to +120 | |
| Volatile content | 150°C×24h | % | 0.10 | 0.44 |
| Low-molecular-weight siloxane content | $\Sigma D_3$-$D_{10}$ | ppm | ≦100 | |

* Tested in accordance with JIS K 2220.

(Not specified values)

# Thermal Interface (High Thermal Conductivity, Solvent Diluted Types)

## ■X-23-7762 X-23-7783D X-23-7868-2D G-787

These oil compounds have excellent thermal conductivity. All feature a base oil of silicone fluid compounded with high thermal conductivity fillers.
They are compounded with around 2-3% isoparaffin based solvent so they not only have high thermal conductivity, but are also easier to work with. These products are ideal as a thermal interface for CPUs and MPUs.
X-23-7783D is essentially X-23-7762 compounded with a fine filler to give it a lower thermal resistance.
X-23-7868-2D has a lower viscosity than X-23-7783D, making it easier to work with and giving it an even higher thermal conductivity.
G-787 has thermal conductivity exceeding 3.0W/m · K, achieving excellent workability, heat resistance and insulation.

### ■ Typical properties

| Parameter | | | X-23-7762 | X-23-7783D | X-23-7868-2D | G-787 |
|---|---|---|---|---|---|---|
| Appearance | | | Gray grease | | | White grease |
| Specific gravity | 25°C | | 2.55 | 2.55 | 2.5 | 3.48 |
| Viscosity | 25°C | Pa·s | 180 | 200 | 100 | 70 |
| Thermal conductivity | | W/m·K | 4.0(6.0*) | 3.5(5.5*) | 3.6(6.2*) | 3.3(4.0*) |
| Dielectric breakdown strength | 0.25mm | kV | Below measurable limit | | | 2.4 |
| Use temperature range | | °C | –50 to +120 | | | –40~+200 |
| Volatile content | 150°C×24h | % | 2.58 | 2.43 | 2.70 | 0.93 |
| Low-molecular-weight siloxane content | $\Sigma D_3$-$D_{10}$ | ppm | ≦100 | | | |

* Value after evaporation of solvent.

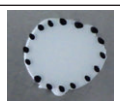
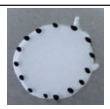
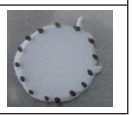
(Not specified values)

# TIM* Materials with Improved Resistance against Pump-out CLG Series

*TIM=Thermal Interface Material

## CLG-1500 CLG-2500 CLG-3500 CLG-4500

1 Part ready to use
No need to cure
Resists against pump-out
Owing to grease consistency, it is applicable on various surface shapes.
Wide range of thermal conductivity

| Test condition \ Product name | CLG-1500 | CLG-2500 | CLG-3500 | CLG-4500 |
|---|---|---|---|---|
| Initial |  |  |  |  |
| 1,000 cycles later |  |  |  |  |

[Test method]
1 A sample is sandwiched between a microscope slide (glass) and an aluminum plate, which are separated by a 2.0mm spacer.
2 This test piece is stood vertically, and a heat cycle test is conducted (cycling between -40°C × 30 min and +125°C × 30 min).

### Typical properties

| Parameter | | CLG-1500 | CLG-2500 | CLG-3500 | CLG-4500 |
|---|---|---|---|---|---|
| Appearance | | White | | | |
| Specific gravity at 25°C | | 2.6 | 2.9 | 3.1 | 3.2 |
| Viscosity at 25°C | Pa·s | 500 | 500 | 250 | 550 |
| Thermal conductivity | W/m·K | 1.5 | 2.9 | 3.5 | 4.8 |
| Dielectric breakdown strength | kV/mm | 9.6 | 6.2 | 8.9 | 4.7 |
| Operation temperature range | °C | –40 to +180 | | | |
| LMW siloxane content $\Sigma D_3$-$D_{10}$ | ppm | ≦300 | | | |

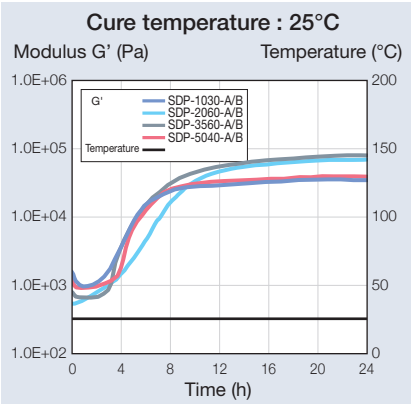
(Not specified values)

# Non-adhesive Curing TIM* Materials SDP Series

*TIM=Thermal Interface Material

## SDP-1030-A/B SDP-2060-A/B SDP-3560-A/B SDP-5040-A/B SDP-6560-A/B

Thermal interface materials that cure at room temperature when the two components are mixed.
When applied, the materials have a grease-like consistency and get into the nooks and crannies of the substrate surface, which translates to lower contact thermal resistance.
The materials have low hardness after curing, which means less stress on components.
The materials can be reworked because they do not adhere to substrates.
Owing to the addition reaction, curing time is shortened by heating.




### Typical properties

| Parameter | | SDP-1030-A/B | SDP-2060-A/B | SDP-3560-A/B | SDP-5040-A/B | SDP-6560-A/B |
|---|---|---|---|---|---|---|
| Appearance | | A:White B:Light blue | A:White B:Light blue | A:White B:Light blue | A:Grayish white B:Pink | A:Grayish white B:Pink |
| Specific gravity at 25°C | | A/B:2.45 | A/B:2.87 | A:3.11 B:3.12 | A:3.25 B:3.26 | A/B:3.20 |
| Mix ratio | | 100:100 | | | | |
| Viscosity after mixing at 25°C | Pa·s | 74 | 81 | 104 | 169 | 284 |
| Pot life at 23°C | min | 240 | | | | |
| Standard curing conditions | | 25°C×24h | | | | |
| Hardness after curing | Shore OO | 32 | 57 | 60 | 42 | 61 |
| Thermal conductivity | W/m·K | 1.1 | 2.3 | 3.7 | 5.1 | 6.5 |
| Dielectric break down strength | kV/mm | 19 | 18 | 15 | 21 | 20 |
| Operation temperature range | °C | –40 to +180 | | | | |
| LMW siloxane content $\Sigma D_3$-$D_{10}$ | ppm | ≦300 | | | | |

(Not specified values)

# Heat Resistance: Evaluation & Measurement Methods

## ●Thermal conductivity

●At a given temperature, thermal conductivity is a value intrinsic to a particular substance. According to Fourier's Law, in a steady state, the proportionality constant is the thermal conductivity.

Thermal conductivity $\lambda$

$$Q = \lambda \frac{(T_1 - T_2)\,A}{L} \Rightarrow \lambda = \frac{Q}{A} \times \frac{L}{(T_1 - T_2)}$$

From this we get

Q: heat flow rate A: cross-sectional surface area L: Heat transfer distance
$T_1$: temperature at high side $T_2$: temperature at low side

## ●Thermal resistance

●Thermal resistance is the sum of contact resistance plus the resistance as heat flows (Q) from $T_1$ to $T_2$.

Thermal resistance R

$$R_0 = \frac{T_1 - T_2}{Q} = \frac{L}{\lambda A} \Rightarrow R = R_0 + R_S$$

In reality

$R_0$: Intrinsic thermal resistance of substance $R_S$: Thermal contact resistance

## ●Thermal conductivity measurement method(hot disk)

Two "pouches" were prepared by wrapping grease samples in kitchen wrap. A sensor was sandwiched between the pouches as shown in Figure 1, and a constant current was applied to the sensor so as to generate a specific amount of heat. Thermal conductivity was calculated from the rise in temperature of the sensor.
The sensor is constructed with a double spiral of nickel metal, and can detect temperature changes as the change in electrical resistance of the sensor. Figure 2 shows the signals obtained from the sensor when the constant current is applied.
If we take the graph showing temperature rise (Fig. 2) and scale the X-axis (function of time and thermal diffusivity ($\alpha$) of the sample) to D($\tau$), we get the graph in Figure 3.
From Equation (1), we know that the slope of this straight line is inversely proportional to the thermal conductivity ($\lambda$) of the sample. The temperature rise ($\Delta$Tave) of the sensor may be theoretically expressed by the following equation.

$$\Delta T_{ave}(\tau) = \frac{Po}{\pi^{\frac{3}{2}} r \lambda} \cdot D(\tau) \cdots (1)$$

Po : Total power (W) applied to the sensor
r : Radius (m) of sensor
$\lambda$ : Thermal conductivity (W/m_K) of sample
$\tau$ : Dimensionless parameter, defined by $\sqrt{\alpha \cdot t / r^2}$
$\alpha$ : Thermal diffusivity ($m^2/s$) of sample
t : Test time (sec)
D($\tau$) : Dimensionless function of

Fig. 1: Setup of samples

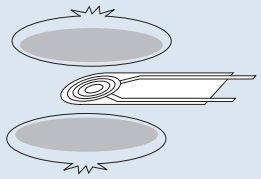


Fig. 2: Applied current and change in sensor signal over time

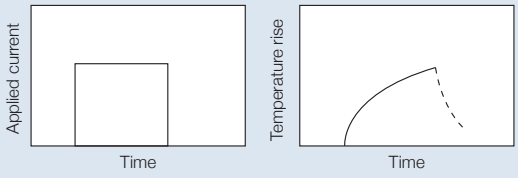
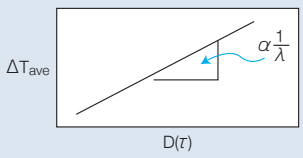



Fig. 3: Temperature rise curve vs. D($\tau$)

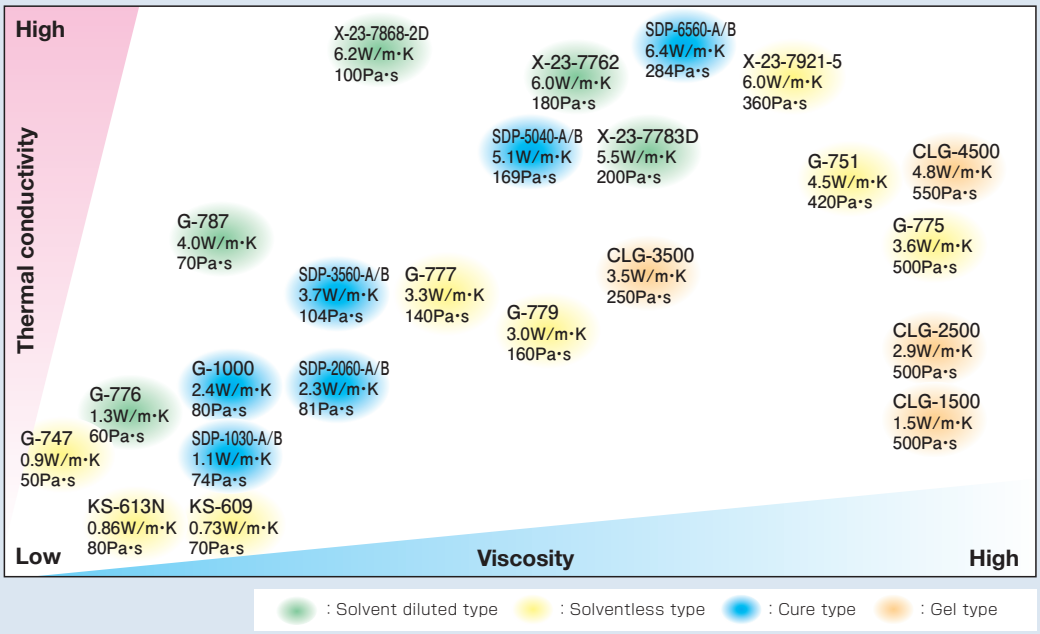



## ●Method used to measure thermal resistance (laser flash)

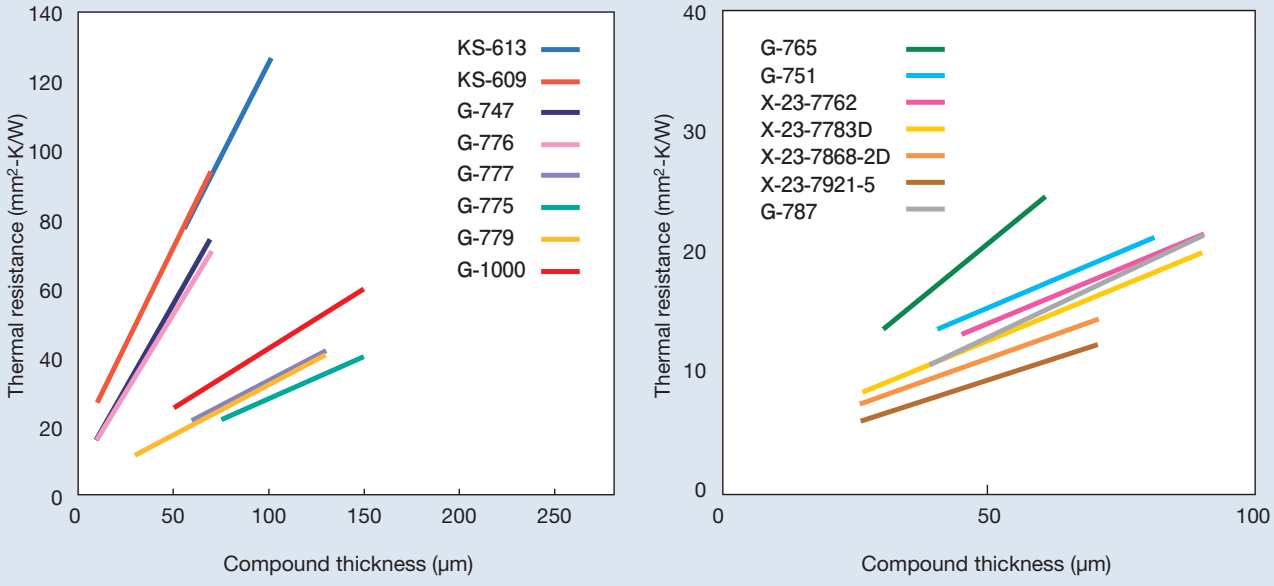
Thermal resistance was measured by the laser flash method, which is one method used to measure thermal constants. In this method, one face of a sample is irradiated with a pulse laser to heat it. The temperature rise at the opposite face is measured using an infrared sensor, which does not touch the sample.

# Reference Data

## Correlation between thermal conductivity and viscosity



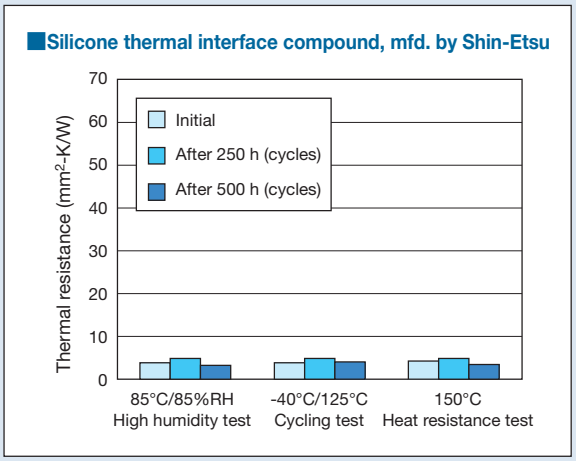

## Correlation between thermal resistance and thickness of oil compound



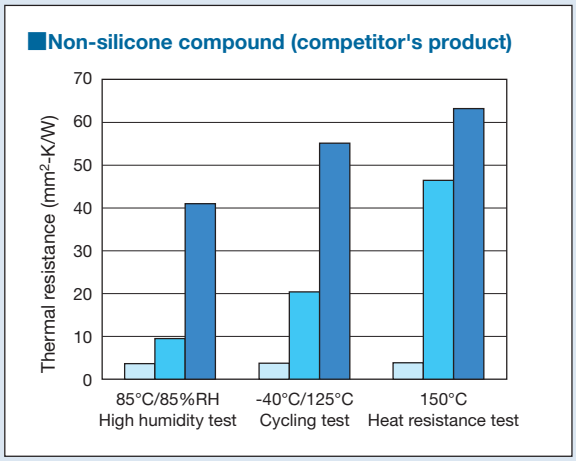
# Reliability

## ●Reliability comparison: Silicone compound vs. Non-silicone compound

■Silicone thermal interface compound, mfd. by Shin-Etsu




■Non-silicone compound (competitor's product)

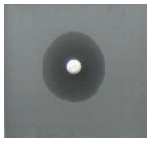



## ●Creep resistance of G-775

| | Silicone compound from a competitor | G-775 |
|---|---|---|
| After 100 cycles |  |  |
| After 500 cycles |  |  |

[Test method]
1 A 0.1cc sample is sandwiched between a microscope slide (glass) and an aluminum plate, which are separated by a 0.3mm spacer.
2 This test piece is stood vertically, and a heat cycle test is conducted (cycling between -40°C and +125°C).

## ●Resistance to oil-bleed of G-776

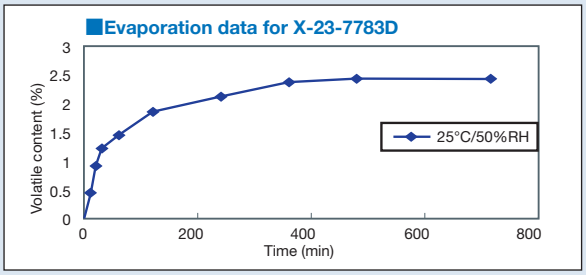
| Conditions | 23°C×64h | | 125°C×64h | |
|---|---|---|---|---|
| Sample | Conventional product | G-776 | Conventional product | G-776 |
| Photo |  |  |  |  |
| Bleed distance mm | 10.0 | 1.5 | 20.6 | 1.6 |

[Test method]
1 A 0.1 g sample is placed on a piece of frosted glass.
2 The oil bleed distance (radius of circle) is measured and oil separation is evaluated.
3 Bleed is measured after keeping samples at 23°C and 125°C.

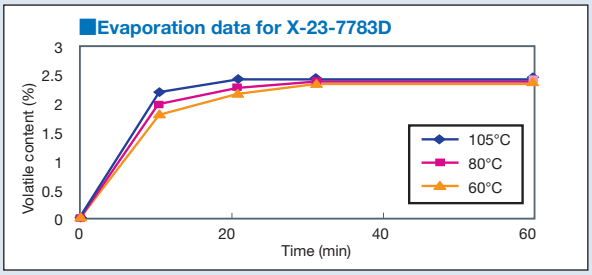
# Solvent evaporation time

## ●Solvent evaporation conditions (guide)

■Evaporation data for X-23-7783D




■Evaporation data for X-23-7783D




※Solvent diluted products: G-776, X-23-7762, X-23-7783D, X-23-7868-2D, G-787

[Test method]
· Using a metal screen, X-23-7783D was applied (application size: 25 mm long × 25 mm wide _ 120 μm thick) to aluminum plates.
· The samples were kept at various temperatures, and the change in weight was measured.

# For Dielectric & Sealing Applications (General Purpose)

## ■KS-62F KS-62M KS-63W KS-64F KS-64

These oil compounds have superior electrical properties and water repellency, and are chemically inert. They are ideal for use as insulating and sealing materials for electric and electronic equipment.
KS-63W, KS-64 and KS-64F are general purpose products, while KS-62F and KS-62M are heat resistant products.

### Typical properties

| Parameter | | | KS-62F | KS-62M | KS-63W | KS-64F | KS-64 |
|---|---|---|---|---|---|---|---|
| Appearance | | | Off-white paste | White translucent grease | White grease | White paste | White grease |
| Specific gravity | | 25°C | 1.13 | 1.18 | 1.02 | 1.01 | 1.05 |
| JIS K2220 Test method | Consistency | 25°C/worked | — | 229 | 225 | 385 | 246 |
| | Oil separation | 200°C×24h % | — | 1.3 | 2.9 *1 | 18 *1 | 5.8 |
| Dielectric breakdown strength | | 0.1mm kV | 3.4 | 3.5 | 3.8 | 3.6 | 4.0 |
| Volume resistivity | | TΩ·m | 0.15 | 56 | 130 | 230 | 620 |
| Permittivity | | 60Hz | 2.96 | 2.88 | 2.84 | 2.80 | 2.80 |
| Dissipation factor | | 60Hz | $2.5\times10^{-4}$ | $3.2\times10^{-4}$ | $2.4\times10^{-4}$ | $1\times10^{-4}$ | $2.3\times10^{-4}$ |
| Thermal conductivity | | W/m·K | 0.17 | 0.20 | 0.19 | 0.17 | 0.19 |
| Use temperature range | | °C | –30 to +250 | | –50 to +200 | | |
| Volatile content | | 200°C×24h % | ≦1.0 | 0.3 | 0.1 *1 | 0.1 *1 | 0.1 |
| Low-molecular-weight siloxane content | | $\Sigma D_3$-$D_{10}$ ppm | ≦100 | | | | |

*1 Measured at 150 °C×24 h.

(Not specified values)

# For Dielectric & Sealing Applications (Special Purpose)

## ■KS-650N KS-651 KS-65A KS-623 KS-622 KS-63G

These oil compounds have superior electrical properties and water repellency, and are chemically inert. They are ideal for use as insulating and sealing materials for electric and electronic equipment.
KS-650N and KS-651 will not cause swelling of silicone rubber.
KS-65A and KS-623 are ideal for sealing valves, cocks and packing in common chemistry equipment.
KS-622 is specially formulated to prevent corrosion of copper, and is ideal for terminal protection for copper wiring.
KS-63G can be applied to insulators to help prevent flashover which can be caused by salt damage.

Protecting insulators from salt damage
(application example for KS-63G)

### Typical properties

| Parameter | | | KS-650N | KS-651 | KS-65A | KS-623 | KS-622 | KS-63G |
|---|---|---|---|---|---|---|---|---|
| Appearance | | | Creamy white translucent grease | Pale yellow to yellow grease | White grease | White grease | Creamy white grease | Green grease |
| Specific gravity | | 25°C | 0.98 | 1.02 | 1.04 | 1.03 | 1.03 | 1.06 |
| JIS K2220 Test method | Consistency | 25°C/worked | 263 | 258 | 221 | 211 | 268 | 209 |
| | Oil separation | % | 0.7(105°C×24h) | 2.0(150°C×24h) | 1.1(200°C×24h) | 1.9(200°C×24h) | 2.74(150°C×24h) | 0.8(150°C×24h) |
| Silicone rubber swelling (Weight change/volume change) | | 105°C×500h % | +0.5/+1.1 | +0.6/+1.3 | — | — | — | — |
| Dielectric breakdown strength | | 0.1mm kV | — | — | 3.7 | 1.5≦ | — | 11 *1 |
| Volume resistivity | | TΩ·m | 208 | 1.3 | 2,600 | 1≦ | — | 2,300 |
| Permittivity | | 60Hz | 2.48 | 2.6 | — | — | — | 2.82 |
| Dissipation factor | | 60Hz | $3.3\times10^{-4}$ | $4.7\times10^{-4}$ | — | — | — | — |
| Use temperature range | | °C | –10 to +100 | –50 to +170 | –50 to +200 | | –50 to +160 | –50 to +200 |
| Volatile content | | % | 0.5(105°C×24h) | 0.1(150°C×24h) | 0.1(200°C×24h) | 0.2(200°C×24h) | 0.44(150°C×24h) | 0.1(150°C×24h) |
| Low-molecular-weight siloxane content | | $\Sigma D_3$-$D_{10}$ ppm | ≦100 | | | | | |

※1: 0.25mm

(Not specified values)

# For Dielectric & Sealing Applications (High Vacuum Seals)

## HIVAC-G

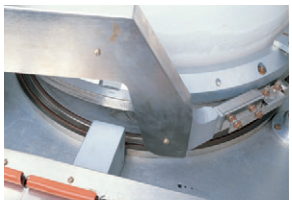
HIVAC-G features a base oil of specially refined silicone fluid, compounded with silica powder. This oil compound has excellent heat resistance, oxidative stability and chemical stability. Through an intensive refining process, volatile content has been reduced to very low levels, thereby making it possible to attain high vacuums of $10^{-6}$ Torr. HIVAC-G forms exceptionally tight seals on gaskets and sliding mechanisms, and is widely used as a sealing compound for high vacuum devices.

### Typical properties

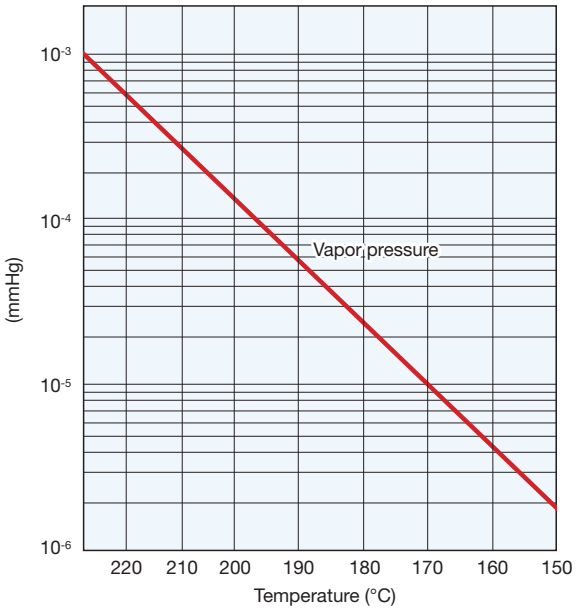
| Parameter | | | | HIVAC-G |
|---|---|---|---|---|
| Appearance | | | | White grease |
| Specific gravity | | 25°C | | 1.03 |
| JIS K2220 Test method | Consistency | 25°C/worked | | 209 |
| | Oil separation | 200°C×24h | % | 0.1 |
| | Copper strip corrosion | Room temp.×24h | | Pass |
| Dielectric breakdown strength | | 0.1mm | kV | 4 |
| Volume resistivity | | | T·m | 900 |
| Permittivity | | 60Hz | | 2.82 |
| Dissipation factor | | 60Hz | | $2.2\times10^{-4}$ |
| Use temperature range | | | °C | −50 to +200 |
| Volatile content | | 200°C×24h | % | 0.1 |
| Low-molecular-weight siloxane content | | $\Sigma D_3$-$D_{10}$ | ppm | ≦100 |

(Not specified values)

Sealing of high vacuum devices



### Vapor pressure curve of HIVAC-G



# Safety Data

## Toxicity test results for silicone greases & oil compounds

| Item / Product name | Skin irritation (human)*1 | LD50: Oral (rat) (unit: g/kg) |
|---|---|---|
| HIVAC-G | Negative | 5≦ |
| KS-64 | Negative | 5≦ |
| G-3W-0-M | Negative | 5≦ |
| G-40M | Negative | 5≦ |

*1 Tested by the Japanese Society for Cutaneous Health.

As the table at left shows, most silicone greases and oil compounds are highly safe. (See below for information on oral toxicity standards.) However, Shin-Etsu's special grades may differ in terms of safety, so please contact us for inquiries about products other than those shown at left.

### Oral toxicity standards

●Acute toxicity test

Generally, an animal subject is exposed to a large quantity of a substance to determine the lethal dose.
This is normally expressed as LD50 (Lethal Dose, 50%). See the table below for information on degrees of toxicity.

●Categories of strength of toxicity

| Degree of toxicity | LD50: Oral (rat) (unit: g/kg) |
|---|---|
| Extremely toxic | <0.001 |
| Strongly toxic | 0.001～0.05 |
| Moderately toxic | 0.05～0.5 |
| Mildly toxic | 0.5～5 |
| Minimally toxic | 5～15 |
| Nearly non-toxic | 15< |

Source: Hodge, H.G. and Sterner, J.H.
: American Industrial Hygiene Association Quarterly, 10:4, 93, 1943

# Reference Data

## Various silicone fluids and their swelling of synthetic rubbers

### ●Test of swelling tendencies of base oils on synthetic rubbers

(70°C, 120°C×240h)

| Rubber type | Test item | KS-64 (base oil) | | 650N (base oil) | | G-40 (base oil) | | G-3W-0 (base oil) | | FG-721-1 (base oil) | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 70°C | 120°C | 70°C | 120°C | 70°C | 120°C | 70°C | 120°C | 70°C | 120°C |
| IIR | Weight change (%) | −1.8 | −3.7 | −1.5 | −2.1 | −1.8 | −2.8 | −2.0 | −3.6 | −0.2 | −0.9 |
| | Volume change (%) | −3.1 | −6.3 | −2.4 | −3.5 | −3.0 | −4.9 | −3.3 | −6.2 | −0.4 | −1.6 |
| CR | Weight change (%) | −11.8 | −12.1 | −13.1 | −14.1 | −11.0 | −11.6 | −12.1 | −12.4 | −10.3 | −11.1 |
| | Volume change (%) | −18.5 | −19.7 | −20.1 | −22.1 | −17.4 | −18.9 | −19.0 | −1.4 | −16.1 | −18.1 |
| NR | Weight change (%) | −3.0 | −4.2 | −2.3 | −5.0 | −0.6 | −3.0 | −3.0 | −4.6 | −1.4 | −2.0 |
| | Volume change (%) | −5.1 | −9.4 | −3.5 | −9.4 | −1.4 | −7.3 | −5.1 | −10.1 | −2.2 | −5.3 |
| NBR | Weight change (%) | −5.4 | −9.6 | −6.3 | −10.8 | −6.1 | −10.0 | −5.8 | −9.8 | −4.9 | −8.6 |
| | Volume change (%) | −6.5 | −12.9 | −7.7 | −13.9 | −7.3 | −13.0 | −7.1 | −13.2 | −6.1 | −11.6 |
| EPDM | Weight change (%) | −17.6 | −17.9 | −14.7 | −15.8 | −17.7 | −17.9 | −18.1 | −18.4 | −11.3 | −14.3 |
| | Volume change (%) | −19.5 | −20.5 | −15.8 | −17.4 | −19.5 | −20.4 | −20.2 | −21.1 | −12.1 | −16.3 |
| Silicone | Weight change (%) | +32.0 | +31.2 | −0.2 | −0.4 | +7.2 | +7.7 | +33.2 | +33.4 | −0.6 | −1.5 |
| | Volume change (%) | +38.9 | +38.5 | +0.3 | +0.2 | +8.3 | +9.4 | +39.2 | +39.8 | −0.5 | −1.2 |

Note: The data in the table above are the values observed in severe tests in which strips of rubber were immersed in the base oils, and do not represent results obtained with greases. The table should be taken as a guide with respect to compatibility with the materials shown. The same tests conducted with the actual greases tend to yield absolute values which are lower.

## Compatibility with plastics

＋: No effect ±: Mild effects －: Significant effects

| Plastic name / Product name | ABS | POM | PBT | PVC | PS | PP | PC | HIPS | PMMA | AS | ASGF | Nylon 6 | Nylon 66 | Nory | Duranex |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| G-330 | ＋ | ＋ | ＋ | ＋ | ＋ | ＋ | ＋ | ＋ | | ＋ | ＋ | ＋ | ＋ | ＋ | ＋ |
| G-332 | ＋ | ＋ | ＋ | ＋ | ＋ | ＋ | ＋ | ＋ | | ＋ | ＋ | ＋ | ＋ | ＋ | ＋ |
| G-3W-0-M | ±to＋ | ＋ | ＋ | ＋ | | ＋ | | | | | | | | | ＋ |
| G-40M | ±to＋ | ＋ | ＋ | ＋ | ＋ | ＋ | ± | － | － | ＋ | ＋ | ＋ | ＋ | － | ＋ |
| G-501 | ＋ | ＋ | ＋ | ＋ | ＋ | ＋ | ＋ | ＋ | ＋ | ＋ | ＋ | ＋ | ＋ | ＋ | ＋ |
| KS-63W | ＋ | ＋ | ＋ | ＋ | ＋ | ＋ | ＋ | ＋ | ＋ | ＋ | ＋ | ＋ | ＋ | ＋ | ＋ |
| KS-64 | ＋ | ＋ | ＋ | ＋ | ＋ | ＋ | ＋ | ＋ | ＋ | ＋ | ＋ | ＋ | ＋ | ＋ | ＋ |
| KS-65A | ＋ | ＋ | ＋ | ＋ | ＋ | ＋ | ＋ | ＋ | ＋ | ＋ | ＋ | ＋ | ＋ | ＋ | ＋ |
| KS-62M | － | ＋ | ＋ | ＋ | ＋ | ＋ | ± | ± | － | ＋ | ＋ | ＋ | ＋ | － | ＋ |
| HIVAC-G | ＋ | ＋ | ＋ | ＋ | ＋ | ＋ | ＋ | ＋ | ＋ | ＋ | ＋ | ＋ | ＋ | ＋ | ＋ |
| KF-96H-200,000CS mm²/s | ＋ | ＋ | ＋ | ＋ | ＋ | ＋ | ＋ | ＋ | ＋ | ＋ | ＋ | ＋ | ＋ | ＋ | ＋ |

## ●Potential of silicone greases & oil compounds to cause stress cracking of plastics

When a stressed plastic is subjected to prolonged contact with certain chemicals, it may be more likely to crack at a much lower load than it would were it not in contact with the chemical. This phenomenon is commonly called stress cracking, and is characterized by glass-like cracking, usually with no whitening of the plastic.

Stress cracking of plastics can be a function of several factors which include stress, temperature, time and chemicals. Of these, exposure to chemicals is the most important factor. Silicone greases have also been known to cause stress cracking in plastics.

The particulars of the stress cracking will vary depending on the type of silicone grease and plastic involved. And even for molded pieces made using the same type of plastic, the effects of a grease may differ depending on the molding strain, orientation and other conditions.

Thus, before using a silicone grease where it will be in contact with a plastic, it is important to first determine how the grease will affect the plastic.

Shin-Etsu tests its products using the experimental method described below. The user should perform their own tests which simulate the conditions of actual use to make sure that the product will not cause problems when it is used.

**【Test method】**

1. A plastic test strip (140 mm long, 25 mm wide, 3 mm thick) is clamped in a jig set to a length of 130 mm.
2. Grease is applied evenly to the convex surface of the strip.
3. In this state, the strip is heated at 80°C for 16 hours.
4. After heating, the grease is wiped off and a visual inspection is made for cracking.
5. A visual check is done to look for cracking or surface deterioration.

The results are compared to those for a strip to which grease has not been applied.

# Packaging


Some of the available packaging options

# Precautions Related to Handling, Safety and Hygiene

## Handling & storage

1. Store in a cool and dark place. Avoid direct sun light.
2. After prolonged storage, oil may have separated, but it does not mean there is a problem with product. Stir the product well before using.
3. As a general rule it is best to completely use up the product once the container has been opened. If any remains, be sure to seal completely.
4. Before applying the product to the intended area, clean and dry the area thoroughly.
5. Do not mix these products with other oils or greases.

## Safety & hygiene

1. Wear gloves and other protective gear when using these products.
2. If product gets on the hands or other exposed skin, wipe off with a dry cloth and then wash thoroughly with soap and water. In case of eye contact, immediately flush eyes with plenty of running water, and consult a physician if necessary. Contact lens wearers must be careful to avoid contact between product and their contact lenses. If it comes into contact with the lens, the contact lens may become stuck to the eye.
3. Be sure there is adequate ventilation when handling these products at the time of heating in particular. Avoid handling in a poorly ventilated area causing inhalation of vapors.If you feel ill after breathing the vapors, move immediately to an area with fresh air.
4. Keep out of reach of children.
5. If product gets on the floor, it will become slippery. After wiping product up with a cloth, spread sand or other absorbent material, then wipe again to remove product completely.
6. Fluorosilicone greases (FG-72 series) are essentially harmless when used normally. However, if heated to temperatures above 150°C, trace amounts of toxic gas will be released. When using these products in high temperature conditions, be sure there is adequate ventilation.
7. Be sure to read the Safety Data Sheets (SDS) for these products before use. SDS are available from the Shin-Etsu Sales Department.

# Packaging List

| Type | Product name | Packaging |
|---|---|---|
| Greases | G-3W-0-F | 100g(tube) / 1kg(round can) / 18kg(pail) |
| | G-3W-0-L | 100g(tube) / 1kg(round can) / 18kg(pail) |
| | G-3W-0-M | 100g(tube) / 1kg(round can) / 18kg(pail) |
| | G-3W-0-H | 100g(tube) / 1kg(round can) / 18kg(pail) |
| | G-40L | 100g(tube) / 1kg(round can) / 20kg(pail) |
| | G-40M | 100g(tube) / 1kg(round can) / 20kg(pail) |
| | G-40H | 100g(tube) / 1kg(round can) / 20kg(pail) |
| | G-420-1 | 1kg(round can) / 20kg(pail) |
| | G-501 | 80g(tube) / 1kg(round can) / 16kg(pail) |
| | FG-721-1 | 100g(glass bottle) / 1kg(round can) / 20kg(pail) |
| | FG-722-1 | 100g(glass bottle) / 1kg(round can) / 20kg(pail) |
| | G-330 | 100g(glass bottle) / 1kg(round can) / 15kg(pail) |
| | G-331 | 100g(glass bottle) / 1kg(round can) / 20kg(pail) |
| | G-332 | 100g(glass bottle) / 1kg(round can) / 20kg(pail) |
| | G-333 | 1kg(round can) / 20kg(pail) |
| | G-341 | 100g(glass bottle) / 1kg(round can) / 18kg(pail) |
| | G-633 | 1kg(round can) / 18kg(pail) |
| Oil compound | KS-609 | 200g(tube) / 1kg(plastic container) / 20kg(pail) |
| | KS-613N | 1kg(round can) |
| | G-747 | 200g(tube) / 1kg(plastic container) / 20kg(pail) |
| | G-775 | 100g(plastic bottle) / 90g(syringe) / 1kg(cartridge) |
| | G-776 | 100g(plastic bottle) / 1kg(plastic container) |
| | G-777 | 200g(plastic bottle) / 90g(syringe) / 1kg(plastic container) |
| | G-779 | 1kg(plastic container) |
| | G-1000 | 200g(tube) / 900g(cartridge) |
| | G-751 | 100g(plastic bottle) / 150g(syringe) / 1kg(plastic container) |
| | X-23-7762 | 100g(plastic bottle) / 1kg(plastic container) |
| | X-23-7783D | 100g(plastic bottle) / 1kg(plastic container) |
| | X-23-7868-2D | 100g(plastic bottle) / 1kg(plastic container) |
| | G-787 | 1kg(plastic container) |
| | X-23-7921-5 | 60g(syringe) / 1kg(plastic container) |
| | KS-63W | 1kg(round can) / 20kg(pail) |
| | KS-64 | 100g(tube) / 1kg(round can) / 20kg(pail) |
| | KS-64F | 100g(tube) / 1kg(round can) / 20kg(pail) |
| | KS-62F | 1kg(round can) / 20kg(pail) |
| | KS-62M | 1kg(round can) / 20kg(pail) |
| | HIVAC-G | 100g(tube) / 50g(plastic bottle) / 1kg(round can) / 20kg(pail) |
| | KS-650N | 100g(tube) / 1kg(round can) / 16kg(pail) |
| | KS-651 | 100g(plastic bottle) / 1kg(round can) / 18kg(pail) |
| | KS-65A | 1kg(round can) / 20kg(pail) |
| | KS-623 | 1kg(round can) / 20kg(pail) |
| | KS-622 | 1kg(round can) / 15kg(pail) |
| | KS-63G | 1kg(round can) / 20kg(pail) |
| | CLG-1500 | 900g(cartridge) |
| | CLG-2500 | 900g(cartridge) |
| | CLG-3500 | 900g(cartridge) |
| | CLG-4500 | 900g(cartridge) |
| | SDP-1030-A/B | 50cc(double-barrel cartridge*) / 800g(cartridge) / 20kg(pail) |
| | SDP-2060-A/B | 50cc(double-barrel cartridge*) / 900g(cartridge) / 20kg(pail) |
| | SDP-3560-A/B | 50cc(double-barrel cartridge*) / 900g(cartridge) / 20kg(pail) |
| | SDP-5040-A/B | 50cc(double-barrel cartridge*) / 900g(cartridge) / 20kg(pail) |
| | SDP-6560-A/B | 50cc(double-barrel cartridge*) / 900g(cartridge) / 20kg(pail) |

* For sample only

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The Development and Manufacture of Shin-Etsu Silicones are based on the following registered international quality and environmental management standards.

| | | |
|---|---|---|
| **Gunma Complex** | ISO 9001 (JCQA-0004) | ISO 14001 (JCQA-E-0002) |
| **Naoetsu Plant** | ISO 9001 (JCQA-0018) | ISO 14001 (JCQA-E-0064) |
| **Takefu Plant** | ISO 9001 (JQA-0479) | ISO 14001 (JQA-EM0298) |

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