

Product Information

High Performance Lubricants

DOW CORNING

MOLYKOTE® 1000 Solid lubricant paste

Solid lubricant paste for bolted metal joints; contains no lead or nickel

FEATURES

- Can be used over a wide range of temperature (-30°C/-22°F to +650°C/1202°F)
- High load-carrying capacity
- Enables non-destructive dismantling, even after long use at high temperatures
- Coefficient of friction unchanged in the area of oiled bolts, even after several bolt re-tightening and loosening processes
- Good corrosion protection

COMPOSITION

- Solid lubricants
- Mineral oil
- Thickener
- Powdered metal

APPLICATIONS

- Suitable for bolted joints that are subjected to high temperatures up to 650°C (1202°F) and to corrosive effects, and which, after assembling and the initial operation, have to be re-tightened or disconnected. In order to ensure constant pre-stressing forces, uniform and steady coefficients of friction of the lubricant are necessary.
- Used successfully for cylinder head bolts, nozzle head screws of plastic injection molding machines, bolted joints in the chemical industry, and also for the tension rings of centrifuges.

TYPICAL PROPERTIES

Specification writers: These values are not intended for use in preparing specifications. Please contact your local Dow Corning sales representative prior to writing specifications on this product.

Standard*	Test	Unit	Result
	Color		Brown
	Penetration, density		
ISO 2137	Unworked penetration	mm/10	280-310
ISO 2811	Density at 20°C (68°F)	g/ml	1.26
	Temperature		
	Service temperature ¹	°C	-18 to 1093
		°F	-20 to 2000
	Load-carrying capacity, wear protection, service life		
	Four-ball tester		
DIN 51 350 pt.4	Weld load	N	4800
DIN 51 350 pt.5	Wear scar under 400N load	mm	0.08
	Almen-Wieland machine		
	OK load	N	20000
	Frictional force	N	2600
	Coefficient of friction		
	Screw test - μ thread ²		0.13
	Screw test - μ head		0.08
	Initial break-away torque ³	Nm	135
DIN 51 802	SKF-Emcor method		1

1. Temperature resistance of solid lubricants.

2. Coefficient of friction in bolted connection, M12, 8.8, on blackened surface.

3. M 12, with starting torque $M_a = 62\text{Nm}$ and heat treatment at 540°C (1004°F), 21h, bolt material: no. 1.7709.

* ISO: International Standardisation Organisation.

DIN: Deutsche Industrie Norm.

HOW TO USE

How to apply

If possible, clean the thread and the bolt with a wire brush. Spread an adequate amount of the paste on the thread, right up to its root in order to obtain a good seal. In order not to alter the properties, the paste must not be mixed with grease or oils.

To enable this product to be applied more quickly and cleanly to larger areas, it is advisable to use the spray can.

HANDLING PRECAUTIONS

Product safety information required for safe use is not included. Before handling, read product and safety data sheets and container labels for safe use, physical and health hazard information. The material safety data sheet is available on the Dow Corning website at www.dowcorning.com. You can also obtain a copy from your local Dow Corning sales representative or Distributor or by calling your local Dow Corning Global Connection.

USABLE LIFE AND STORAGE

When stored at or below 20°C (68°F) in the original unopened containers, this product has a usable life of 60 months from the date of production.

PACKAGING

This product is available in different standard container sizes. Detailed container size information should be obtained from your nearest Dow Corning sales office or Dow Corning distributor.

LIMITATIONS

This product is neither tested nor represented as suitable for medical or pharmaceutical uses.

HEALTH AND ENVIRONMENTAL INFORMATION

To support Customers in their product safety needs, Dow Corning has an extensive Product Stewardship organization and a team of Product

Safety and Regulatory Compliance (PS&RC) specialists available in each area.

For further information, please see our website, www.dowcorning.com or consult your local Dow Corning representative.

LIMITED WARRANTY INFORMATION - PLEASE READ CAREFULLY

The information contained herein is offered in good faith and is believed to be accurate. However, because conditions and methods of use of our products are beyond our control, this information should not be used in substitution for customer's tests to ensure that Dow Corning's products are safe, effective, and fully satisfactory for the intended end use. Suggestions of use shall not be taken as inducements to infringe any patent.

Dow Corning's sole warranty is that the product will meet the Dow Corning sales specifications in effect at the time of shipment.

Your exclusive remedy for breach of such warranty is limited to refund of purchase price or replacement of any product shown to be other than as warranted.

DOW CORNING SPECIFICALLY DISCLAIMS ANY OTHER EXPRESS OR IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE OR MERCHANTABILITY.

DOW CORNING DISCLAIMS LIABILITY FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES.

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DOW CORNING CORPORATION

Material Safety Data Sheet

Page: 1 of 9

Version: 1.2

Revision Date: 2006/08/21

MOLYKOTE(R) 1000 PASTE

1. IDENTIFICATION OF THE SUBSTANCE AND OF THE COMPANY

Dow Corning Corporation
South Saginaw Road
Midland, Michigan 48686

24 Hour Emergency Telephone: (989) 496-5900

Customer Service: (989) 496-6000

Product Disposal Information: (989) 496-6315

CHEMTREC: (800) 424-9300

MSDS No.: 02467682

Revision Date: 2006/08/21

Generic Description: Inorganic and organic compounds in mineral oil

Physical Form: Paste

Color: Brown

Odor: Slight odor

NFPA Profile: Health 2 Flammability 1 Instability/Reactivity 0

Note: NFPA = National Fire Protection Association

2. HAZARDS IDENTIFICATION

POTENTIAL HEALTH EFFECTS

Acute Effects

- Eye: Direct contact may cause moderate irritation.
- Skin: May cause moderate irritation.
- Inhalation: Vapor may irritate nose and throat. Vapor overexposure may cause drowsiness.
- Oral: May cause vomiting. Aspiration of liquid while vomiting may injure lungs seriously.

Prolonged/Repeated Exposure Effects

- Skin: Repeated or prolonged contact may cause defatting and drying of skin which may result in skin irritation and dermatitis.
- Inhalation: Overexposure by inhalation may injure the following organ(s): Liver. Kidneys. Spleen.
- Oral: Repeated ingestion or swallowing large amounts may injure internally.

Signs and Symptoms of Overexposure

No known applicable information.

Medical Conditions Aggravated by Exposure

No known applicable information.

MOLYKOTE(R) 1000 PASTE

The above listed potential effects of overexposure are based on actual data, results of studies performed upon similar compositions, component data and/or expert review of the product. Please refer to Section 11 for the detailed toxicology information.

3. COMPOSITION/INFORMATION ON INGREDIENTS

<u>CAS Number</u>	<u>Wt %</u>	<u>Component Name</u>
64742-65-0	<=70.0	Solvent dewaxed heavy paraffinic petroleum distillate
64742-56-9	<=70.0	Paraffinic petroleum distillates
7789-75-5	15.0 - 40.0	Calcium fluoride
7440-50-8	7.0 - 13.0	Copper
17265-14-4	3.0 - 7.0	Disodium sebacate

The above components are hazardous as defined in 29 CFR 1910.1200.

4. FIRST AID MEASURES

Eye:	Immediately flush with water for 15 minutes. Get medical attention.
Skin:	Remove from skin and wash thoroughly with soap and water or waterless cleanser. Get medical attention if irritation or other ill effects develop or persist.
Inhalation:	Remove to fresh air. Get medical attention if ill effects persist.
Oral:	Get medical attention. Do not induce vomiting.
Notes to Physician:	Treat according to person's condition and specifics of exposure.

5. FIRE FIGHTING MEASURES

Flash Point:	
Autoignition Temperature:	Not determined.
Flammability Limits in Air:	Not determined.
Extinguishing Media:	On large fires use dry chemical, foam or water spray. On small fires use carbon dioxide (CO ₂), dry chemical or water spray. Water can be used to cool fire exposed containers.
Fire Fighting Measures:	Self-contained breathing apparatus and protective clothing should be worn in fighting large fires involving chemicals. Determine the need to evacuate or isolate the area according to your local emergency plan. Use water spray to keep fire exposed containers cool.

MOLYKOTE(R) 1000 PASTE

Unusual Fire Hazards: None.

6. ACCIDENTAL RELEASE MEASURES

Containment/Clean up: Observe all personal protection equipment recommendations described in Sections 5 and 8. Wipe up or scrape up and contain for salvage or disposal. Clean area as appropriate since spilled materials, even in small quantities, may present a slip hazard. Final cleaning may require use of steam, solvents or detergents. Dispose of saturated absorbant or cleaning materials appropriately, since spontaneous heating may occur. Local, state and federal laws and regulations may apply to releases and disposal of this material, as well as those materials and items employed in the cleanup of releases. You will need to determine which federal, state and local laws and regulations are applicable. Sections 13 and 15 of this MSDS provide information regarding certain federal and state requirements.

Note: See section 8 for Personal Protective Equipment for Spills. Call (989) 496-5900, if additional information is required.

7. HANDLING AND STORAGE

Use with adequate ventilation. Avoid eye contact. Avoid skin contact. Avoid breathing vapor, mist, dust, or fumes. Keep container closed. Do not take internally.

Use reasonable care and store away from oxidizing materials.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION**Component Exposure Limits**

<u>CAS Number</u>	<u>Component Name</u>	<u>Exposure Limits</u>
64742-65-0	Solvent dewaxed heavy paraffinic petroleum distillate	Observe oil mist limits. OSHA PEL (final rule) and ACGIH TLV: TWA 5 mg/m ³ ; ACGIH STEL 10 mg/m ³ .
7789-75-5	Calcium fluoride	Observe fluoride limits. OSHA PEL and ACGIH TLV, as fluorine: TWA 2.5 mg/m ³ .
7440-50-8	Copper	OSHA PEL (final rule), as copper: fume - TWA 0.1 mg/m ³ , dusts and mists - TWA 1 mg/m ³ . ACGIH TLV, as copper: fume - TWA 0.2 mg/m ³ ; dusts and mists - TWA 1 mg/m ³ .

Engineering Controls

Local Ventilation: Recommended.
General Ventilation: Recommended.

MOLYKOTE(R) 1000 PASTE

Personal Protective Equipment for Routine Handling

Eyes:	Use proper protection - safety glasses as a minimum.
Skin:	Wash at mealtime and end of shift. Contaminated clothing and shoes should be removed as soon as practical and thoroughly cleaned before reuse. Chemical protective gloves are recommended.
Suitable Gloves:	Teflon(R). Silver Shield(R). Viton(R). 4H(R).
Inhalation:	Use respiratory protection unless adequate local exhaust ventilation is provided or exposure assessment demonstrates that exposures are within recommended exposure guidelines. IH personnel can assist in judging the adequacy of existing engineering controls.
Suitable Respirator:	General and local exhaust ventilation is recommended to maintain vapor exposures below recommended limits. Where concentrations are above recommended limits or are unknown, appropriate respiratory protection should be worn. Follow OSHA respirator regulations (29 CFR 1910.134) and use NIOSH/MSHA approved respirators.

Personal Protective Equipment for Spills

Eyes:	Use chemical worker's goggles.
Skin:	Wash at mealtime and end of shift. Contaminated clothing and shoes should be removed as soon as practical and thoroughly cleaned before reuse. Chemical protective gloves are recommended.
Inhalation/Suitable Respirator:	Respiratory protection recommended. Follow OSHA Respirator Regulations (29 CFR 1910.134) and use NIOSH/MHSA approved respirators. Protection provided by air purifying respirators against exposure to any hazardous chemical is limited. Use a positive pressure air supplied respirator if there is any potential for uncontrolled release, exposure levels are unknown, or any other circumstance where air purifying respirators may not provide adequate protection.
Precautionary Measures:	Avoid eye contact. Avoid skin contact. Avoid breathing vapor, mist, dust, or fumes. Keep container closed. Do not take internally. Use reasonable care.

Note: These precautions are for room temperature handling. Use at elevated temperature or aerosol/spray applications may require added precautions.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical Form:	Paste
Color:	Brown
Odor:	Slight odor
Specific Gravity @ 25°C:	1.26
Viscosity:	Not determined.
Freezing/Melting Point:	Not determined.
Boiling Point:	Not determined.

MOLYKOTE(R) 1000 PASTE

Vapor Pressure @ 25°C: Not determined.
Vapor Density: Not determined.
Solubility in Water: Not determined.
pH: Not determined.
Volatile Content: Not determined.
Flash Point:
Autoignition Temperature: Not determined.
Flammability Limits in Air: Not determined.

Note: The above information is not intended for use in preparing product specifications. Contact Dow Corning before writing specifications.

10. STABILITY AND REACTIVITY

Chemical Stability: Stable.

Hazardous Polymerization: Hazardous polymerization will not occur.

Conditions to Avoid: None.

Materials to Avoid: Oxidizing material can cause a reaction.

Hazardous Decomposition Products

Thermal breakdown of this product during fire or very high heat conditions may evolve the following decomposition products: Carbon oxides and traces of incompletely burned carbon compounds. Silicon dioxide. Nitrogen oxides. Fluorine compounds. Sulfur oxides. Metal oxides. Formaldehyde.

11. TOXICOLOGICAL INFORMATIONComponent Toxicology Information

Inhalation of fumes may result in metal fume fever, a flu-like illness with symptoms of metallic taste, fever and chills, aches, chest tightness, and cough.

Long term exposure to fluorides can cause fluorosis with bone changes, mottled teeth, weight loss and anemia.

Special Hazard Information on Components

No known applicable information.

12. ECOLOGICAL INFORMATIONEnvironmental Fate and Distribution

MOLYKOTE(R) 1000 PASTE

Complete information is not yet available.

Environmental Effects

Complete information is not yet available.

Fate and Effects in Waste Water Treatment Plants

Complete information is not yet available.

Ecotoxicity Classification Criteria

Hazard Parameters (LC50 or EC50)	High	Medium	Low
Acute Aquatic Toxicity (mg/L)	<=1	>1 and <=100	>100
Acute Terrestrial Toxicity	<=100	>100 and <= 2000	>2000

This table is adapted from "Environmental Toxicology and Risk Assessment", ASTM STP 1179, p.34, 1993.

This table can be used to classify the ecotoxicity of this product when ecotoxicity data is listed above. Please read the other information presented in the section concerning the overall ecological safety of this material.

13. DISPOSAL CONSIDERATIONS**RCRA Hazard Class (40 CFR 261)**

When a decision is made to discard this material, as received, is it classified as a hazardous waste? No

State or local laws may impose additional regulatory requirements regarding disposal. Call (989) 496-6315, if additional information is required.

14. TRANSPORT INFORMATION**DOT Road Shipment Information (49 CFR 172.101)**

Not subject to DOT.

Ocean Shipment (IMDG)

Not subject to IMDG code.

Air Shipment (IATA)

Not subject to IATA regulations.

Call Dow Corning Transportation, (989) 496-8577, if additional information is required.

15. REGULATORY INFORMATION

Contents of this MSDS comply with the OSHA Hazard Communication Standard 29 CFR 1910.1200.

MOLYKOTE(R) 1000 PASTE

TSCA Status: All chemical substances in this material are included on or exempted from listing on the TSCA Inventory of Chemical Substances.

EPA SARA Title III Chemical Listings**Section 302 Extremely Hazardous Substances (40 CFR 355):**

None.

Section 304 CERCLA Hazardous Substances (40 CFR 302):

<u>CAS Number</u>	<u>Wt %</u>	<u>Component Name</u>
7440-50-8	8.0	Copper
7440-66-6	4.0	Zinc

Section 311/312 Hazard Class (40 CFR 370):

Acute: Yes
Chronic: Yes
Fire: No
Pressure: No
Reactive: No

Section 313 Toxic Chemicals (40 CFR 372):

<u>CAS Number</u>	<u>Wt %</u>	<u>Component Name</u>
7440-50-8	8.0	Copper

Note: Chemicals are listed under the 313 Toxic Chemicals section only if they meet or exceed a reporting threshold.

Supplemental State Compliance Information**California**

Warning: This product contains the following chemical(s) listed by the State of California under the Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65) as being known to cause cancer, birth defects or other reproductive harm.

None known.

Massachusetts

<u>CAS Number</u>	<u>Wt %</u>	<u>Component Name</u>
64742-56-9	<=70.0	Paraffinic petroleum distillates

MOLYKOTE(R) 1000 PASTE

7782-42-5	10.0 - 30.0	Graphite
7440-50-8	7.0 - 13.0	Copper
7440-66-6	3.0 - 7.0	Zinc
7631-86-9	1.0 - 5.0	Silica, amorphous

New Jersey

<u>CAS Number</u>	<u>Wt %</u>	<u>Component Name</u>
64742-65-0	<=70.0	Solvent dewaxed heavy paraffinic petroleum distillate
64742-56-9	<=70.0	Paraffinic petroleum distillates
7789-75-5	15.0 - 40.0	Calcium fluoride
7782-42-5	10.0 - 30.0	Graphite
7440-50-8	7.0 - 13.0	Copper
9003-29-6	5.0 - 10.0	Polybutene
7440-66-6	3.0 - 7.0	Zinc
7631-86-9	1.0 - 5.0	Silica, amorphous

Pennsylvania

<u>CAS Number</u>	<u>Wt %</u>	<u>Component Name</u>
64742-65-0	<=70.0	Solvent dewaxed heavy paraffinic petroleum distillate
64742-56-9	<=70.0	Paraffinic petroleum distillates
7789-75-5	15.0 - 40.0	Calcium fluoride
7782-42-5	10.0 - 30.0	Graphite
7440-50-8	7.0 - 13.0	Copper
9003-29-6	5.0 - 10.0	Polybutene
7440-66-6	3.0 - 7.0	Zinc

MOLYKOTE(R) 1000 PASTE

17265-14-4 3.0 - 7.0 Disodium sebacate

7631-86-9 1.0 - 5.0 Silica, amorphous

16. OTHER INFORMATION

Prepared by: Dow Corning Corporation

These data are offered in good faith as typical values and not as product specifications. No warranty, either expressed or implied, is hereby made. The recommended industrial hygiene and safe handling procedures are believed to be generally applicable. However, each user should review these recommendations in the specific context of the intended use and determine whether they are appropriate.

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