

# MOLYKOTE® Specialty Lubricants for the oil & gas industry

*Smart Lubrication™* solutions to meet the needs of the upstream, midstream & downstream segments



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*If you are viewing a digital copy of this brochure, please note that all QR codes in this brochure contain clickable links for direct access to those additional resources.*

# Your partner for your toughest design & lubrication challenges

For more than 75 years – since 1948 – MOLYKOTE® has been a trusted partner, helping engineers and manufacturers meet some of the world’s toughest design and lubrication challenges. Now, with the addition of DuPont’s technologies and expertise, we are even better positioned to create solutions for emerging trends.

We continually invest in technology and product innovation to support customers’ changing needs. Working side by side with our customers, MOLYKOTE® is forging the future of specialty lubrication with:

- A broad range of trusted, technology-driven specialty lubricant chemistries
- Application expertise and technical support from internationally recognized lubrication experts
- Lubrication solutions across six product families to enable long-term solutions across a wide variety of applications
- Innovative combination of tribology and material science for wet and dry lubrication





# Providing solutions to the oil & gas industry

MOLYKOTE® offers a wide range of products divided into six product categories: greases, pastes, oils, compounds, dispersions and anti-friction coatings. Within these categories, complementary specialties beyond lubricants also are included – products such as wax-based coatings for temporary corrosion protection, as well as cleaners. This broad product offering helps to streamline your purchasing process. Turn the page for an overview of how these six categories of products can help solve a variety of challenges across the oil and gas industry.



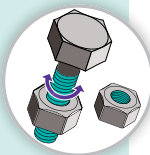
# Solutions for your oil & gas challenges

COMMON MOLYKOTE® PRODUCT SOLUTIONS\*

Solid to semisolid materials consisting of a lubricating fluid, thickening agent and additives. Used on rolling element bearings and other moving parts.



Greaselike materials containing a very high percentage of solid lubricants. Used for assembly and lubrication of highly loaded, slow-moving parts or threaded fasteners.



Learn more:



These lubricating fluids are fortified with carefully selected additives to provide optimum performance and service life while maximizing protection of the equipment and machinery they are designed to lubricate.



## MOLYKOTE® GREASES

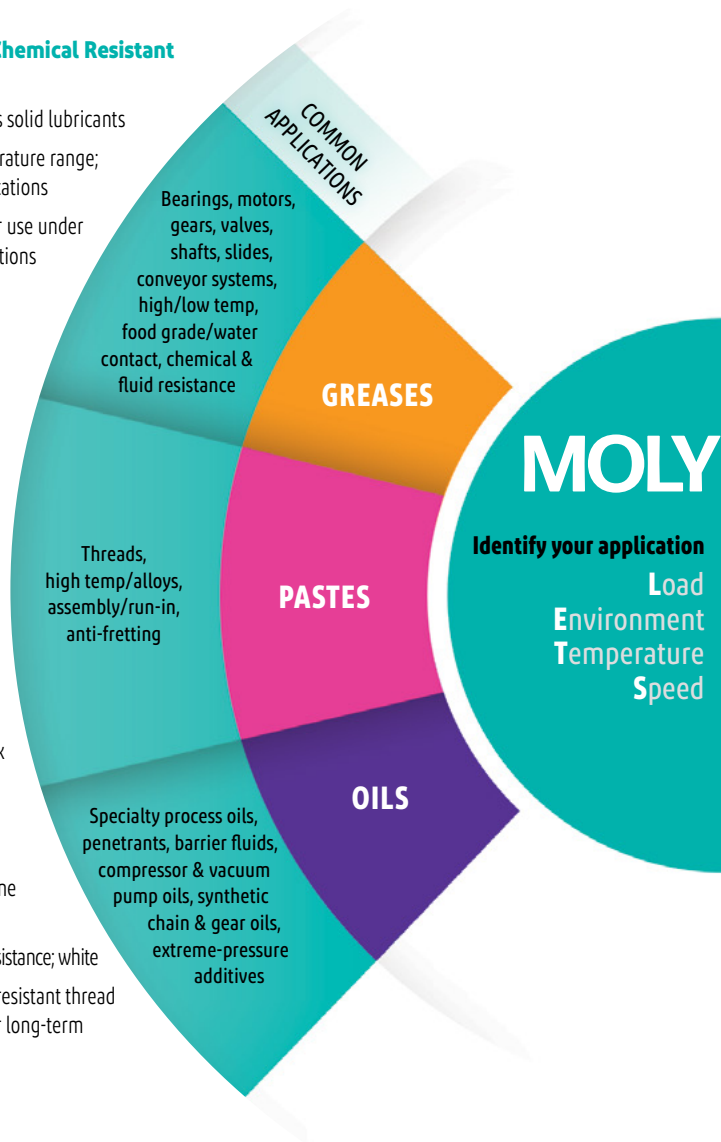
- BR-2 Plus High Performance Grease:** For general applications; contains solid lubricants, such as MoS<sub>2</sub>
- HP-870 Grease & HP-300 Grease:** Chemical-resistant; extraordinary performance under extreme conditions
- Longterm 2 Plus Extreme Pressure Bearing Grease:** Prevents fretting corrosion, groove formation (false brinelling), moisture ingress
- G-4700 Extreme Pressure Synthetic Grease:** For general applications with moderate loads & high speeds; long-lasting; contains MoS<sub>2</sub> & other solid lubricants; black
- 3451 Chemical Resistant Bearing Grease & 3452 Chemical Resistant Valve Lubricant:** Chemical-resistant greases
- 1122 Chain and Open Gear Grease:** Synthetic; contains solid lubricants
- BG-20 Synthetic Bearing Grease:** Wide service-temperature range; suitable for high speeds & high-temperature/high-load applications
- 33 Medium Extreme Low Temperature Grease:** For use under a wide range of temperature conditions; for light-load applications at low to high speeds

## MOLYKOTE® PASTES

- P-1042 Adhesive Grease Paste:** For sliding surfaces exposed to high-pressure loadings; fortified with solid lubricants; excellent water-washout resistance & corrosion protection; light-colored
- P-40 (S) Paste:** For assembly & continuous lubrication jobs, particularly those exposed to corrosive environments (e.g., splash water, humidity)
- G-Rapid Plus Paste:** For assembly & running-in of metallic components (e.g., press-fits); particularly low friction coefficient; black
- G-N Plus Paste:** Protects against fretting corrosion & stick-slip for continuous lubrication of metallic components; black
- 1000 Paste:** Thread paste for use in high-temperature & corrosive environments; black
- P-74 Assembly Paste:** For a wide variety of threaded connections, sliding contact bearings, linear sliding guides, spline shafts, flanges, seals; metal-free
- P-3300 Paste:** Hazard-free thread paste with good corrosion resistance; white
- P-3700 Anti-Seize Paste:** Ultrapure, high-temperature-resistant thread paste for gas & steam turbines; no Cr(VI) formation, even after long-term high-temperature exposure on chromium-containing steel

## MOLYKOTE® OILS

- L-1510 Process Gas Oil:** ISO 100; synthetic; intended for use in compressors or vacuum pumps handling corrosive gas (e.g., hydrogen chloride, methyl chloride)
- L-1605FM Synthetic Barrier Fluid:** ISO 5; PAO-based; contains no additives; H1-certified through NSF for incidental food contact
- L-1210 Synthetic Compressor and Vacuum Pump Oil:** ISO 100; PAO-based; contains an additive package that inhibits rust, oxidation, corrosion
- L-0268 Process Gas Oil:** ISO 68; mineral-oil-based; contains a corrosion inhibitor additive; not for oxygen-rich environments
- L-1568 Process Gas Oil:** ISO 68; synthetic; intended for use in compressors or vacuum pumps handling corrosive gas
- L-1668FM Synthetic Blend Vacuum Pump Oil:** ISO 68; mineral oil/PAO blend; contains an additive package that inhibits rust, oxidation, corrosion; H1-certified through NSF for incidental food contact



## MOLYKOTE® COMPOUNDS

**111 Compound:** Valve lubricant & sealant; O-ring lubrication; carries specific specifications/approvals

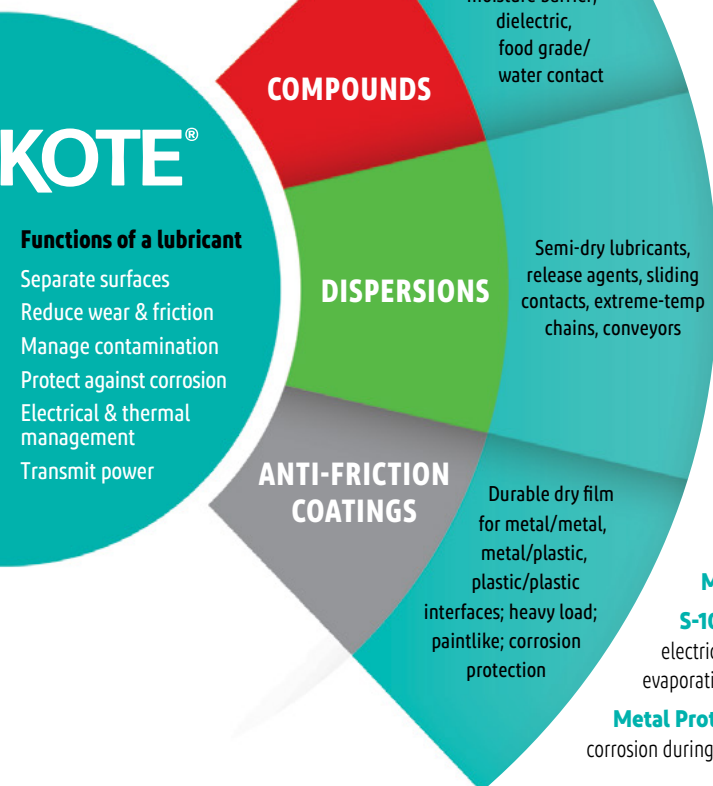
**High Vacuum Grease:** For seals & chemical-processing equipment (valves); stiff; nonmelting; water-resistant; silicone-based

**3099 HVIC Compound:** Greaselike; offers a protective coating to electrical insulators; provides a high level of flashover resistance under high-voltage stress conditions

**4 Compound:** For seals & chemical-processing equipment; semi-flowable; excellent dielectric strength & electrical insulating properties



Greaselike materials composed of silicone fluids and silica fillers. Used for their sealing, dielectric, nonmetal-to-metal lubricating properties.



## MOLYKOTE® DISPERSIONS

**M-55 Plus Dispersion:** Solid lubricants in mineral oil; used as additive for mineral oils to increase lubrication performance (e.g., load-carrying capacity); black

**Metalform Wax Solution:** For forming operations at metals to extend tool life; transparent

**Metal Cleaner Spray:** Solvent to clean & degrease parts, including brakes, clutches, engine components, electrical contacts, various other metal parts & surfaces

**L-0500 Protective Zinc Coating Spray:** For protection of blank metal surfaces & drilling & welding points; for repair of damaged galvanic surfaces; corrosion-protective primer for all types of paints

**MKL-N Dispersion:** Grease with solid lubricants dispersed in solvent to lubricate chains & provide corrosion protection

**Multigloss Dispersion:** Rust remover; simplifies dismantling

**S-1002 Electrical Contact Cleaner Spray:** For reducing electrical resistance of electrical & electronic equipment; fast-evaporating; no residue

**Metal Protector Plus:** Wax solution to protect metal parts against corrosion during storage or transport



Finely divided solid lubricants suspended in lubricating fluid; preferred when it is necessary to apply lubricants in liquid form.

## MOLYKOTE® ANTI-FRICTION COATINGS (AFCs)

**D-321 R Anti-Friction Coating:** Air-cure dry-film lubricant suitable for high loads & maintenance applications; also available as spray

**D-7409 Anti-Friction Coating:** Heat-cure dry-film lubricant with excellent wear resistance at high pressures; provides chemical resistance

**D-6600 Anti-Friction Coating:** Heat-cure dry-film lubricant with excellent lubrication properties, especially for low & medium surface pressures

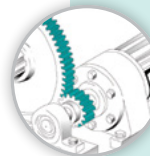
**D-708 Anti-Friction Coating:** Heat-cure dry-film coating; provides corrosion protection; nice black finish

**3400A Anti-Friction Coating LF:** Heat-cure dry-film lubricant with good heat resistance & corrosion protection

**D-3484 Anti-Friction Coating:** Fast-heat-cure dry-film lubricant with excellent lubrication properties at high loads

**3402-C LF Anti-Friction Coating:** Air-cure dry-film lubricant with good corrosion protection

**106 Anti-Friction Coating:** Heat-cure dry-film lubricant with excellent lubrication properties at high loads



“Lubricating paints”; when applied, these materials cure to form dry, solid lubricant coatings that are bonded to the surface.

Learn more:



\*For these applications, the products listed are the most commonly used in this subset of the complete MOLYKOTE® product line.





## MOLYKOTE® Specialty Lubricants

# Discover *Smart Lubrication*™ for the oil & gas industry

MOLYKOTE® offers more than 550 solutions that provide increased uptime and reliability for our global customers across a variety of industries.

Customers benefit from our extensive local inventories and rely on our network of technical service engineers to help them prevent or solve virtually any energy or lubrication problem in a timely manner. MOLYKOTE® has established a protocol of “LETS” – load, environment, temperature and speed – which helps us rapidly assess our customers’ needs and provide the right solution.

Our comprehensive specialty lubricant offering and our drive to develop innovative products provide you with the best solutions for your needs. As a result, increased uptime of your equipment is guaranteed, overall maintenance costs are reduced, equipment life is extended, and reliability is improved.

In addition to superior technical properties that help keep equipment running (e.g., resistance against chemicals, water, extreme temperatures, or oxygen- or hydrogen-rich environments), MOLYKOTE® also offers several material packages to simplify and shorten application and maintenance processes.

Packaging options include, among others, drums for automated dispensing systems, cartridges for grease guns, cans equipped with brushes for precise lubrication of small areas, and aerosols to quickly lubricate large surface areas. Lubricants available as cans with brushes or as aerosols are noted in the “Product selection guide for typical oil & gas machine elements” table on pages 10 to 15 of this brochure.

New eco-friendly pastes, such as MOLYKOTE® P-1042 Adhesive Grease Paste and MOLYKOTE® P-3300 Paste, will help meet future regulations aimed at avoiding contamination of the environment – including seawater.

Visit **molykote.com** to learn more about our extensive product and service offerings – or scan the QR code at right to be taken directly to our oil & gas lubricants web page.



# Applications of MOLYKOTE® Lubricants in the oil & gas industry

Whether the application is in the upstream, midstream or downstream segment, MOLYKOTE® Specialty Lubricants are used successfully across the entire oil and gas industry. Some common applications are highlighted on pages 7 to 9.

## Valves

Valves exist in all three segments, but different valves require different lubricants, depending on the type of service. In upstream and midstream segments, resistance against H<sub>2</sub>S might be critical. Downstream in the petrochemical industry, further resistance against additional harsh chemicals is needed to enable smooth, long-lasting operation.

### CASE STUDY: Valve stem lubrication in dusty environments





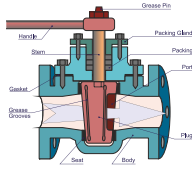



#### *Featured product: MOLYKOTE® D-321 R Anti-Friction Coating*

Selecting the right lubricant also involves considering the specific environmental conditions of the region where your valve operates. For instance, in areas like the Middle East – which is among the main oil and gas producers globally – it is common to encounter hot, humid or dusty environments. Foreign particles, such as sand, can be trapped by wet lubricants (e.g., greases), resulting in an abrasive mixture that causes major wear issues.

Such issues can be observed on various valve stems without housing in dusty environments. Technical experts from MOLYKOTE® identified **MOLYKOTE® D-321 R Anti-Friction Coating** as an alternative solution to a wet lubricant. This AFC also is available as an aerosol and can be applied on clean metal surfaces without the need for any additional equipment. It dries under ambient temperatures, and it provides long-lasting lubrication once fully cured. One key advantage of this dry lubricant is that it does not attract dust as a grease or a paste would. As a result, stem wear issues are eliminated, leading to much longer operational times.

*In addition to stems, other valve components also require specialty lubricants to enable long-lasting performance under various conditions. See the table on page 8 (“Suggested MOLYKOTE® solutions for valves”) for more details on MOLYKOTE® Specialty Lubricants that enable smooth operation and increase performance of valves.*

## Suggested MOLYKOTE® solutions for valves

| Valve components                |   |   |   |   |   |   |
|---------------------------------|---|---|---|---|---|---|
|                                 | Seat rings  | O-rings   | Plugs   | Stems   | Actuators   | Fasteners   |
| <b>Targeted application</b>     | <ul style="list-style-type: none"> <li>Seat ring of ball valves (highlighted in black)</li> </ul>  | <ul style="list-style-type: none"> <li>Elastomer O-rings used in all types of valves</li> </ul>    | <ul style="list-style-type: none"> <li>Plug of plug valves</li> </ul>    | <ul style="list-style-type: none"> <li>Stems of ball, gate &amp; choke valves</li> </ul>    | <ul style="list-style-type: none"> <li>Gearbox</li> </ul>  | <ul style="list-style-type: none"> <li>Fasteners in all valves</li> </ul>    |
| <b>Function of lubricant</b>    | Reduce friction & wear to improve sealing performance   | Assembly aid to reduce risk for micro-cracks & improve sealing performance  | Reduce friction & wear to enable smooth operation   | Reduce friction & wear to enable smooth operation   | Reduce friction & wear to increase lifetime of gears  | Provide proper tightening torque to ensure sealing performance; anti-seize performance to enable smooth maintenance   |
| <b>Recommended lubricant(s)</b> | <ul style="list-style-type: none"> <li>MOLYKOTE® D-321 R Anti-Friction Coating</li> </ul>   | <p><b>Standard:</b></p> <ul style="list-style-type: none"> <li>MOLYKOTE® 111 Compound</li> <li>MOLYKOTE® 55 O-Ring Grease</li> </ul> <p><b>Harsh chemical environment:</b></p> <ul style="list-style-type: none"> <li>MOLYKOTE® 3452 Chemical Resistant Valve Lubricant</li> </ul> <p><b>Temperatures above 150°C &amp; FFKM seal:</b></p> <ul style="list-style-type: none"> <li>MOLYKOTE® G-5008 Dielectric Grease</li> </ul> | <p><b>Standard:</b></p> <ul style="list-style-type: none"> <li>MOLYKOTE® 111 Compound</li> </ul> <p><b>Harsh chemical environment:</b></p> <ul style="list-style-type: none"> <li>MOLYKOTE® 3452 Chemical Resistant Valve Lubricant</li> <li>MOLYKOTE® 3400A Anti-Friction Coating LF</li> <li>MOLYKOTE® 106 Anti-Friction Coating</li> </ul> | <p><b>Housed stem – standard:</b></p> <ul style="list-style-type: none"> <li>MOLYKOTE® G-Rapid Plus Paste</li> </ul> <p><b>Housed stem – harsh chemical environment:</b></p> <ul style="list-style-type: none"> <li>MOLYKOTE® 6169 Grease</li> </ul> <p><b>Stem without housing in dusty environment:</b></p> <ul style="list-style-type: none"> <li>MOLYKOTE® D-321 R Anti-Friction Coating</li> </ul> | <ul style="list-style-type: none"> <li>MOLYKOTE® Longterm 2 Plus Extreme Pressure Bearing Grease</li> </ul>                                   | <p><b>Standard:</b></p> <ul style="list-style-type: none"> <li>MOLYKOTE® 1000 Paste</li> </ul> <p><b>Sustainable solution:</b></p> <ul style="list-style-type: none"> <li>MOLYKOTE® P-3300 Paste</li> </ul> |

## Flanges & downhole equipment

Flanges and downhole equipment represent another field of applications within the oil and gas industry that require specialty lubricants to provide long-lasting performance.

### CASE STUDY: Protecting threaded connections & simplifying maintenance in flanges & downhole equipment



#### Featured products: MOLYKOTE® 1000 Paste & MOLYKOTE® P-37 Paste

Oil and gas pipeline segments typically are held together via **flanges** with nuts and bolts. Nuts and bolts require lubrication to provide proper tightening and release torque. **MOLYKOTE® 1000 Paste** is well-known and specified across the industry as a go-to solution. Furthermore, customers around the globe benefit from the extra corrosion protection and anti-seize features that MOLYKOTE® 1000 Paste provides. This enables excellent sealing of flanges over time and facilitates ease of maintenance (e.g., retightening caused by bolt extension due to pipe flushing or full replacement of pipe segments due to leakage). K-factors and more information about our full line of pastes can be found in our comprehensive MOLYKOTE® Pastes brochure by scanning the QR code at right.



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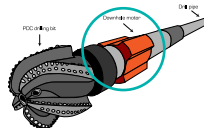




**Downhole equipment** is exposed to aggressive environments – including high concentrations of H<sub>2</sub>S or CO<sub>2</sub> – often in combination with high temperatures. Typically, these tools have threaded connections to attach them to wires and pipes, or the tool itself is built out of modules with multiple threaded connections. Easy exchange of components, whether for maintenance or for replacement of tools, requires proper lubrication of the thread.

**MOLYKOTE® P-37 Paste** is well-known for this job and has been adopted broadly across the industry. This paste provides proper tightening torque, thus ensuring excellent sealing. In addition, proper release torque – even after long-term exposure to high temperatures – results in simple, fast exchange of components. Furthermore, high-purity-grade pastes prevent metal failures of costly downhole equipment.

Several other flange components and downhole equipment components also require long-lasting lubrication. See the table below (“Suggested MOLYKOTE® solutions for flanges & downhole equipment”) for more details.



## Suggested MOLYKOTE® solutions for flanges & downhole equipment

|                                 | Flange components   |  | Downhole equipment components  |  |  |
|---------------------------------|---|--|--|--|--|
|                                 | Seals   | Threaded connections   | Bearings   | Seals  | Threaded connections   |
| <b>Targeted application</b>     | <ul style="list-style-type: none"> <li>• Metal seal/gasket</li> <li>• Elastomer seal</li> </ul>   | <ul style="list-style-type: none"> <li>• Threads of standard flanges</li> <li>• Threads of over-the-pipe connections</li> <li>• Threads of subsea clamp connectors</li> </ul>                              | <ul style="list-style-type: none"> <li>• Bearings in drilling bits</li> </ul>  <ul style="list-style-type: none"> <li>• Thrust bearings in mud motors/electric submersible pump</li> </ul>                      | <ul style="list-style-type: none"> <li>• Elastomer seals in drilling bits</li> <li>• Elastomer seals in packers</li> <li>• Elastomer seals in logging &amp; sidewall coring tools</li> </ul>   | <ul style="list-style-type: none"> <li>• Threads of tools/pipes</li> </ul>    |
| <b>Function of lubricant</b>    | <p><b>All seals:</b> Simplify assembly</p> <p><b>Metal seal:</b> Enable reuse of metal seal ring</p> <p><b>Elastomer seal:</b> Reduce risk for cracks; improve sealing performance</p>  | <p>Provide proper tightening torque to ensure sealing performance; anti-seize performance to enable smooth maintenance</p>   | <p>Reduce friction &amp; wear to increase bearing lifetime; reduce relubrication intervals</p>   | <p>Simplify assembly; reduce risk for crack formation; improve sealing performance</p>   | <p><b>Pastes:</b> Provide proper tightening torque; anti-seize performance to enable smooth maintenance</p> <p><b>Anti-friction coatings:</b> Same as pastes, plus multiple tightenings without relubrication</p>  |
| <b>Recommended lubricant(s)</b> | <p><b>Metal seal:</b></p> <ul style="list-style-type: none"> <li>• MOLYKOTE® D-321 R Anti-Friction Coating</li> <li>• MOLYKOTE® 3402-C LF Anti-Friction Coating</li> <li>• MOLYKOTE® P-3700 Anti-Seize Paste</li> <li>• MOLYKOTE® P-1042 Adhesive Grease Paste</li> </ul> <p><b>Elastomer seal – standard:</b></p> <ul style="list-style-type: none"> <li>• MOLYKOTE® 111 Compound</li> <li>• MOLYKOTE® 55 O-Ring Grease</li> </ul> <p><b>Elastomer seal – harsh chemical environment:</b></p> <ul style="list-style-type: none"> <li>• MOLYKOTE® 3452 Chemical Resistant Valve Lubricant</li> <li>• MOLYKOTE® 6169 Grease</li> </ul> | <p><b>Threads in normal environment:</b></p> <ul style="list-style-type: none"> <li>• MOLYKOTE® G-Rapid Plus Paste</li> </ul> <p><b>Subsea threads – clamp connectors:</b></p> <ul style="list-style-type: none"> <li>• MOLYKOTE® 3400A Anti-Friction Coating LF</li> <li>• MOLYKOTE® P-40 (S) Paste</li> </ul> <p><b>Threads in refineries:</b></p> <p>MOLYKOTE® 1000 Paste</p> | <p><b>Bearings in drilling bits:</b></p> <ul style="list-style-type: none"> <li>• MOLYKOTE® 165 LT Gearwheel Grease</li> <li>• MOLYKOTE® X Grease Paste</li> </ul> <p><b>Thrust bearings in mud motors/electric submersible pump:</b></p> <ul style="list-style-type: none"> <li>• MOLYKOTE® D-7409 Anti-Friction Coating</li> <li>• MOLYKOTE® D-6818 Anti-Friction Coating</li> </ul> | <p><b>All seals:</b></p> <ul style="list-style-type: none"> <li>• MOLYKOTE® 111 Compound</li> <li>• MOLYKOTE® 55 O-Ring Grease</li> </ul>  | <p><b>Pastes:</b></p> <ul style="list-style-type: none"> <li>• MOLYKOTE® P-37 Paste</li> <li>• MOLYKOTE® P-74 Assembly Paste</li> </ul> <p><b>Anti-friction coatings:</b></p> <ul style="list-style-type: none"> <li>• MOLYKOTE® 3400A Anti-Friction Coating LF</li> <li>• MOLYKOTE® D-6600 Anti-Friction Coating</li> </ul> |

# Product selection guide for typical oil & gas machine elements

The previously discussed applications cover only a fraction of what MOLYKOTE® offers for the oil and gas industry. This table spanning pages 10 to 15 represents a selection guide for lubricating other typical machine elements used in the industry. To identify the best solutions for your specific application needs, we invite you to connect with our experts around the globe via [www.dupont.com/molykotecontact](http://www.dupont.com/molykotecontact) or by scanning the QR code at right.



Contact us

| Machine element                | Specific condition(s)                            | Recommended MOLYKOTE® Specialty Lubricant(s)   |
|--------------------------------|--|--|
| <b>Chains</b>                  |  |  |
|                                | High speeds; good water-washout resistance       | MKL-N Dispersion <sup>1</sup> , 1122 Chain and Open Gear Grease <sup>1</sup>                               |
|                                | Dusty environments; low speeds                   | D-321 R Anti-Friction Coating <sup>1</sup>   |
|                                | High speeds; high temperatures (>175°C)          | CO-220 Oil Multi-Purpose Chain Oil, L-1428 High Temperature Chain Oil                                      |
|                                | Extreme loads (additive for oils)                | M-30 Dispersion  |
|                                | Low temperatures (<-40°C)                        | L-1468 FM Synthetic Freezer Chain Oil  |
|                                | High stress; high temperatures (250°C)           | S-1503 High Temperature/Low Friction Chain Oil   |
| <b>Couplings</b>               |  |  |
|                                | Standard   | BR-2 Plus High Performance Grease, G-4700 Extreme Pressure Synthetic Grease                                |
|                                | Extreme pressure; good water-washout resistance  | Longterm 2 Plus Extreme Pressure Bearing Grease, P-1042 Adhesive Grease Paste <sup>2</sup>                 |
|                                | Low temperature (<-30°C)                         | G-4700 Extreme Pressure Synthetic Grease   |
| <b>Gears</b>                   |  |  |
| <b>Running-in</b>              |  |  |
|                                | Running-in lubricant                             | G-N Plus Paste, G-Rapid Plus Paste <sup>1</sup>  |
| <b>Operation</b>               |  |  |
| <i>Open gears</i>              | Standard   | 1122 Chain and Open Gear Grease <sup>1</sup> , 165 LT Gearwheel Grease, G-67 Extreme Pressure Grease       |
|                                | Corrosion resistance                             | 1122 Chain and Open Gear Grease <sup>1</sup> , Longterm 00 Semi-Fluid Gearbox Grease                       |
|                                | High loads (>3000 N weld load)                   | Longterm 00 Semi-Fluid Gearbox Grease, 165 LT Gearwheel Grease, G-67 Extreme Pressure Grease               |
| <i>Closed gears</i>            | Oil bath or drip lubrication                     | L-21XX Synthetic Gear Oil  |
|                                | Tackiness required                               | Longterm 00 Semi-Fluid Gearbox Grease  |
|                                | Dry lubricant with fretting corrosion protection | D-321 R Anti-Friction Coating <sup>1</sup> , D-7409 Anti-Friction Coating                                  |
|                                | Shock or vibration exposure                      | 165 LT Gearwheel Grease, G-4700 Extreme Pressure Synthetic Grease  |
|                                | Oil lubrication for helical, spur, bevel gears   | L-1115 Synthetic Gear Oil, L-1122 Synthetic Gear Oil, L-2122 Synthetic Gear Oil                            |
|                                | Oil lubrication of hypoid gears                  | L-1122 Synthetic Gear Oil, L-2122 Synthetic Gear Oil, L-1132 Synthetic Gear Oil, L-2132 Synthetic Gear Oil |
|                                | Oil lubrication of worm gears                    | L-1146 Synthetic Gear Oil  |
| <b>Additive to gearbox oil</b> |  |  |
|                                | Extreme loads; noise reduction                   | M-55 Plus Dispersion   |

<sup>1</sup>Also available as spray. | <sup>2</sup>Also available as can equipped with brush.

## Product selection guide for typical oil & gas machine elements *(continued)*

| Machine element                          | Specific condition(s)                         | Recommended MOLYKOTE® Specialty Lubricant(s)  |
|--|---|---|
| <b>Plain bearings, bushings, sleeves</b> |   |   |
| <b>Running-in</b>                        |   |   |
|  | Black running-in lubricant                    | G-N Plus Paste, G-Rapid Plus Paste <sup>1</sup>   |
|  | White running-in lubricant                    | D Paste <sup>1</sup>  |
|  | Dusty environments                            | D-321 R Anti-Friction Coating <sup>1</sup>  |
| <b>Operation</b>                         |   |   |
|  | Standard                                      | BR-2 Plus High Performance Grease, Longterm 2 Plus Extreme Pressure Bearing Grease, G-4700 Extreme Pressure Synthetic Grease  |
|  | High loads (>3000 N weld load)                | BR-2 Plus High Performance Grease, 3451 Chemical Resistant Bearing Grease, HP-870 Grease, G-4700 Extreme Pressure Synthetic Grease  |
|  | High speeds (>250,000 Dn)                     | BG-20 Synthetic Bearing Grease, BG-555 Low Noise Grease, BR-2 Plus High Performance Grease, HP-870 Grease   |
|  | Chemical & solvent resistance                 | 3451 Chemical Resistant Bearing Grease, 3452 Chemical Resistant Valve Grease, HP-300 Grease, HP-870 Grease  |
|  | Vacuum environments                           | HP-300 Grease, High Vacuum Grease, D-321 R Anti-Friction Coating <sup>1</sup> , D-7409 Anti-Friction Coating  |
|  | Dusty environments                            | D-321 R Anti-Friction Coating, D-7409 Anti-Friction Coating <sup>1</sup>  |
|  | Oil-resistant dry lubrication                 | D-7409 Anti-Friction Coating  |
| <b>Rolling element bearings</b>          |   |   |
|  | Standard                                      | BR-2 Plus High Performance Grease, Longterm 2 Plus Extreme Pressure Bearing Grease  |
|  | High loads (>3000 N weld load)                | BR-2 Plus High Performance Grease, HP-870 Grease, G-4700 Extreme Pressure Synthetic Grease  |
|  | High temperatures (>150°C)                    | BG-20 Synthetic Bearing Grease, G-4700 Extreme Pressure Synthetic Grease, 44 Medium High Temperature Grease, 41 Extreme High Temperature Grease, 3451 Chemical Resistant Bearing Grease, HP-300 Grease, HP-870 Grease |
|  | High speeds (>250,000 Dn)                     | BG-20 Synthetic Bearing Grease, BG-555 Low Noise Grease, HP-870 Grease  |
|  | Good water-washout resistance                 | Longterm 2 Plus Extreme Pressure Bearing Grease, G-0102 Bearing Grease, G-4500 FMS Multi-Purpose Synthetic Grease, G-1502 FM Synthetic Bearing & Gear Grease  |
|  | Chemical & solvent resistance                 | 3451 Chemical Resistant Bearing Grease, HP-870 Grease, HP-300 Grease  |
|  | Very low speeds; water washout resistance     | 1122 Chain and Open Gear Grease <sup>1</sup> , P-1042 Adhesive Grease Paste <sup>2</sup> , P-40 (S) Paste, X Grease Paste, 165 LT Gearwheel Grease  |
| <b>Seals, O-rings, packers</b>           |   |   |
|  | Standard                                      | 111 Compound, 55 O-Ring Grease  |
|  | Extreme low temperatures (<-40°C)             | 55 O-Ring Grease, HP-300 Grease, G-5008 Dielectric Grease   |
|  | Extreme high temperatures (>250°C)            | HP-300 Grease, HP-870 Grease, G-5008 Dielectric Grease  |
|  | Chemical & solvent resistance                 | 3452 Chemical Resistant Valve Lubricant, 6169 Grease, HP-870 Grease, HP-300 Grease  |
|  | Double tandem mechanical seal (barrier fluid) | L-1605FM Synthetic Barrier Fluid  |

<sup>1</sup>Also available as spray. | <sup>2</sup>Also available as can equipped with brush.



## Product selection guide for typical oil & gas machine elements *(continued)*

| Machine element                    | Specific condition(s)                              | Recommended MOLYKOTE® Specialty Lubricant(s)   |
|------------------------------------|--|--|
| <b>Shaft &amp; hub connections</b> |  |  |
| <b>Running-in</b>                  |  |  |
|                                    | Extreme pressure                                   | G-N Plus Paste, G-Rapid Plus Paste <sup>1</sup>  |
|                                    | Dry lubricant                                      | D-321 R Anti-Friction Coating <sup>1</sup>   |
| <b>Operation</b>                   |  |  |
|                                    | Standard   | BR-2 Plus High Performance Grease  |
|                                    | Fretting corrosion protection                      | DX (S) Paste, P-40 (S) Paste, P-1042 Adhesive Grease Paste <sup>2</sup> , P-1500 (S) Paste   |
|                                    | Extreme pressure; good water-washout resistance    | Longterm 2 Plus Extreme Pressure Bearing Grease, P-1042 Adhesive Grease Paste <sup>2</sup>   |
| <b>Slides, guides, tracks</b>      |  |  |
| <b>Running-in</b>                  |  |  |
|                                    | Running-in lubricant                               | G-N Plus Paste, G-Rapid Plus Paste <sup>1</sup> , D-321 R Anti-Friction Coating  |
| <b>Operation</b>                   |  |  |
|                                    | Standard   | BR-2 Plus High Performance Grease, Longterm 2 Plus Extreme Pressure Bearing Grease, G-4500 FMS Multi-Purpose Synthetic Grease                                      |
|                                    | High loads (>3000 N weld load)                     | BR-2 Plus High Performance Grease, G-4700 Extreme Pressure Synthetic Grease, 3451 Chemical Resistant Bearing Grease, HP-870 Grease                                 |
|                                    | High temperatures (>150°C)                         | G-4700 Extreme Pressure Synthetic Grease, P-40 (S) Paste   |
|                                    | Low temperatures (≤-40°C)                          | 33 Light Extreme Low Temperature Grease, G-4501 FMS Multi-Purpose Synthetic Grease, EM-30L Grease  |
|                                    | Remove stick-slip                                  | BR-2 Plus High Performance Grease, G-N Metal Assembly Paste, DX (S) Paste, P-1042 Adhesive Grease Paste <sup>2</sup>   |
|                                    | Machine fluid resistance; water washout resistance | P-1042 Adhesive Grease Paste <sup>2</sup>  |
|                                    | Dusty environments                                 | D-321 R Anti-Friction Coating <sup>1</sup> , D-6600 Anti-Friction Coating, D-708 Anti-Friction Coating, D-3484 Anti-Friction Coating, D-7409 Anti-Friction Coating |
|                                    | Nonstaining  | Metalform Wax Solution   |

<sup>1</sup>Also available as spray. | <sup>2</sup>Also available as can equipped with brush.



## Product selection guide for typical oil & gas machine elements *(continued)*

| Machine element             | Specific condition(s)  | Recommended MOLYKOTE® Specialty Lubricant(s)   |
|-----------------------------|--|--|
| <b>Threaded connections</b> |  |  |
|                             | Standard to provide proper tightening & release torque   | 1000 Paste <sup>1,2</sup> , G-Rapid Plus Paste <sup>1</sup> , P-74 Assembly Paste <sup>2</sup> , P-40 (S) Paste  |
|                             | Ultrapure  | P-3700 Anti-Seize Paste, P-37 Paste <sup>2</sup>   |
|                             | High-temperature resistance without Cr(VI) formation   | P-3700 Anti-Seize Paste <sup>2</sup>   |
|                             | Flanges/pipe connections (consistent assembly torque)  | 1000 Paste <sup>1,2</sup> , P-3300 Paste   |
|                             | Subsea connector   | 3400A Anti-Friction Coating LF, P-40 (S) Paste   |
|                             | Metal-free paste   | P-74 Assembly Paste <sup>2</sup> , P-40 (S) Paste, G-Rapid Plus Paste <sup>1</sup> , P-1042 Adhesive Grease Paste <sup>2</sup> , P-37 Paste, P-3700 Anti-Seize Paste <sup>2</sup>                      |
|                             | Corrosion resistance   | 1000 Paste <sup>1,2</sup> , P-3300 Paste, Cu-7439 Plus Paste V1 <sup>1</sup> , HSC Paste <sup>1</sup> , P-74 Assembly Paste <sup>2</sup> , P-1042 Adhesive Grease Paste <sup>2</sup>                   |
|                             | White paste  | P-1042 Adhesive Grease Paste <sup>2</sup> , P-3300 Paste   |
|                             | Water resistance   | Cu-7439 Plus Paste V1 <sup>1</sup> , P-40 (S) Paste, P-1042 Adhesive Grease Paste <sup>2</sup> , P-1900 FM Anti-Seize Paste <sup>1</sup> , P-3300 Paste, 1000 Paste <sup>1</sup> , P-74 Assembly Paste |
|                             | Dusty environments   | D-321 R Anti-Friction Coating <sup>1</sup> , D-6600 Anti-Friction Coating, D-708 Anti-Friction Coating, 3400A Anti-Friction Coating LF, D-3484 Anti-Friction Coating                                   |
| <b>Disassembly aid</b>      |  |  |
|                             | Rust loosener  | Multigloss Dispersion  |
| <b>Compressors</b>          |  |  |
| <b>Bearing grease</b>       |  |  |
|                             | Standard   | BR-2 Plus High Performance Grease, Longterm 2 Plus Extreme Pressure Bearing Grease, G-4700 Extreme Pressure Synthetic Grease   |
|                             | High speeds  | BG-20 Synthetic Bearing Grease, BG-555 Low Noise Grease  |
|                             | Chemical & solvent resistance  | 3451 Chemical Resistant Bearing Grease, HP-870 Grease, HP-300 Grease   |
| <b>Oil lubrication</b>      |  |  |
|                             | PAO  | L-1232 Synthetic Compressor Oil, L-1246 Synthetic Compressor Oil, L-1268 Synthetic Compressor Oil, L-1210 Synthetic Compressor Oil   |
|                             | Chemical resistance; handling corrosive gases (e.g., hydrogen chloride, methyl chloride); not usable for air | L-0268 Process Gas Oil, L-1568 Process Gas Oil, L-1510 Process Gas Oil   |
|                             | Synthetic; high temperatures   | L-1510 Process Gas Oil   |
|                             | Reciprocating compressor   | L-4611 Synthetic Reciprocating Compressor Oil  |
|                             | Barrier fluid  | L-1605FM Synthetic Barrier Fluid   |

<sup>1</sup>Also available as spray. | <sup>2</sup>Also available as can equipped with brush.

## Product selection guide for typical oil & gas machine elements *(continued)*

| Machine element  | Specific condition(s)  | Recommended MOLYKOTE® Specialty Lubricant(s)  |
|--|--|---|
| <b>Vacuum pumps</b>  |  |   |
| <b>Bearing grease</b>  |  |   |
|  | See "Bearing grease" subsection of "Compressors" section of table (page 13)  | See "Bearing grease" subsection of "Compressors" section of table (page 13)   |
| <b>Oil lubrication</b>   |  |   |
|  | Mineral oil/PAO blend  | L-1668FM Synthetic Blend Vacuum Pump Oil  |
|  | PAO  | L-1210 Synthetic Compressor Oil   |
|  | Chemical resistance; handling corrosive gases (e.g., hydrogen chloride, methyl chloride); not usable for air                                 | L-0268 Process Gas Oil, L-1568 Process Gas Oil, L-1510 Process Gas Oil  |
| <b>Surface equipment (wire ropes, draw works, crown block, traveling block, top drive, iron roughneck, pipe-handling system)</b> |  |   |
| <b>Wire rope/wireline</b>  |  |   |
|  | Standard with corrosion protection   | Longterm 00 Semi-Fluid Gearbox Grease, BR-2 Plus High Performance Grease  |
|  | Alternative (no corrosion protection)  | 1122 Chain and Open Gear Grease <sup>1</sup>  |
| <b>Draw works</b>  |  |   |
|  | Bearing lubrication (good corrosion protection & water washout resistance)   | Multilub High Performance Grease  |
| <b>Crown &amp; traveling block</b>   |  |   |
|  | Block & tackle lubrication: set of pulleys/sheaves (high load-carrying capacity)   | G-4700 Extreme Pressure Synthetic Grease  |
|  | Sheave & roller bearing lubrication  | BR-2 Plus High Performance Grease, Longterm 2 Plus Extreme Pressure Bearing Grease                                      |
| <b>Top drive</b>   |  |   |
|  | Lubrication of rotating head, motor, dolly track, hook, traveling block (corrosion protection)   | 7514 Grease, Longterm 2 Plus Extreme Pressure Bearing Grease  |
| <b>Iron roughneck</b>  |  |   |
|  | All required lubrication points (typically central lubrication); manually before assembly of parts (e.g., spin & torque wrench, arm, column) | 7514 Grease, Longterm 2 Plus Extreme Pressure Bearing Grease  |
| <b>Pipe-handling system</b>  |  |   |
|  | Hinge (wet lubrication)  | P-74 Assembly Paste <sup>2</sup> , Longterm 2 Plus Extreme Pressure Bearing Grease                                      |
|  | Hinge (dry lubrication)  | 3400A Anti-Friction Coating LF, D-708 Anti-Friction Coating, 3402-C LF Anti-Friction Coating, 106 Anti-Friction Coating |
|  | Fastener   | 1000 Paste <sup>1,2</sup> , P-3300 Paste, G-Rapid Plus Paste <sup>1</sup>   |
|  | Actuator   | G-4500 FMS Multi-Purpose Synthetic Grease   |
|  | Bearing  | BR-2 Plus High Performance Grease   |
| <b>Subsea blowout preventer (BOP)</b>  |  |   |
|  | Packing to resist water & chemicals in hydraulic system  | 33 Medium Extreme Low Temperature Grease  |
|  | Lubrication of threaded connections  | 1000 Paste, P-3300 Paste, P-1042 Adhesive Grease Paste  |
|  | Lubrication of O-rings/seals   | 111 Compound, 55 O-Ring Grease  |

<sup>1</sup>Also available as spray. | <sup>2</sup>Also available as can equipped with brush.



## Product selection guide for typical oil & gas machine elements *(continued)*

| Machine element   | Specific condition(s)   | Recommended MOLYKOTE® Specialty Lubricant(s)   |
|---|---|--|
| <b>Electrical substation</b>  |   |  |
| <b>General</b>  |   |  |
|   | Insulation of gaskets & seals   | 3099 HVIC Compound, 111 Compound   |
|   | Switches  | Cu-7439 Plus Paste V1 <sup>1</sup> , 41 Extreme High Temperature Grease, 44 Medium High Temperature Grease, 33 Medium Extreme Low Temperature Grease, G-3451 Chemical Resistant Bearing Grease |
|   | Switch gears  | 111 Compound   |
|   | High-voltage electrical contacts                                      | HP-300 Grease, G-5008 Dielectric Grease  |
| <b>SF6 circuit breaker</b>  |   |  |
|   | Needle; other roller & sleeve bearings/ gaskets & seals               | 3451 Chemical Resistant Bearing Grease   |
|   | Trip latches  | G-N Metal Assembly Paste, 33 Medium Extreme Low Temperature Grease, 44 Medium High Temperature Grease  |
|   | Dry lubrication for sliding surfaces (latches, rollers, piston, etc.) | D-321 R Anti-Friction Coating  |
| <b>Mixed (rust loosener, cleaner, metal processing, corrosion protection, storage protection)</b> |   |  |
|   | Rust loosener   | Multigloss Dispersion, Supergloss Oil <sup>1</sup>   |
|   | Metal cleaner   | Metal Cleaner Spray, Foam Cleaner Spray  |
|   | Electrical contact cleaner  | S-1002 Electrical Contact Cleaner Spray  |
|   | Metal processing  | Metalform Wax Solution   |
|   | Corrosion protection  | L-0500 Protective Zinc Coating Spray, Supergloss Corrosion Protective Lubricant <sup>1</sup>   |
|   | Storage protection  | Metal Protector Plus   |

<sup>1</sup>Also available as spray. | <sup>2</sup>Also available as can equipped with brush.



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Since 1948, customers around the world have trusted the MOLYKOTE® brand for performance and expertise to help solve complex, technical design and lubrication challenges. Today, our greases, compounds, pastes, dispersions, oils and fluids, and anti-friction coatings support customers' innovation, performance and sustainability needs. To learn more about our extensive product and service offering, to utilize our interactive product selection tool, or to locate a distributor, visit **[molykote.com](https://molykote.com)**.



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