



**MOLYKOTE**®

FROM DOW CORNING

## Anti-Friction Coatings Selection Guide



Smart Lubrication™ for Automotive Applications

## Molykote® Is Smart Lubrication™

With innovative thinking, unmatched expertise, global resources and local support, Dow Corning is helping the world's automotive industry solve or prevent lubrication problems with Molykote® brand lubricants. A complete line of Molykote products and services meets tough lubrication challenges and delivers trusted performance in a wide range of automotive applications. We have Smart Lubrication™ solutions for manufacturing and maintenance, component design and vehicle service. Our experts can help you find new ways to add value and reduce costs: **Start with Molykote Anti-Friction Coatings.**



*Cover: Various metal fasteners, gear couplings and underhood linkages are provided anti-seizing, lifetime lubrication with a wide choice of Molykote Anti-Friction Coatings.*

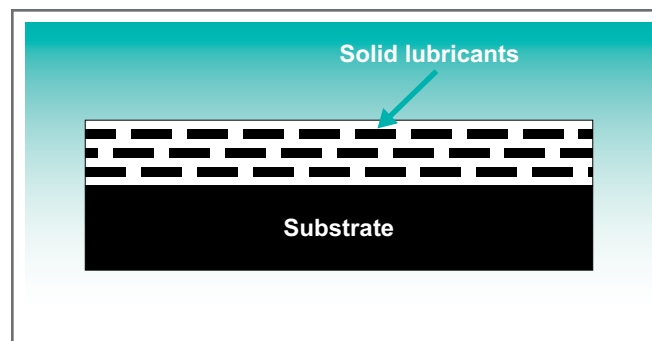
## Advantages of Anti-Friction Coatings

Molykote Anti-Friction Coatings are bonded, dry-film lubricants that provide superior lubrication in harsh operating conditions and environmental extremes. They are economical to apply, long lasting and valued in uses where other lubricants fail. Compared to typical lubricating pastes and greases, Molykote Anti-Friction Coatings have a number of advantages. They provide:

- Dry, clean lubrication unaffected by dust, dirt and moisture;
- Lifetime lubrication without aging, evaporation or oxidation;
- Rust prevention without surface treatments like galvanizing;
- Nonflammable, non-staining protection on metals and plastics;
- Controlled film thickness for exact load-bearing capabilities; and,
- Fully effective lubrication even after prolonged shutdown.

## How Anti-Friction Coatings Work

Molykote Anti-Friction Coatings have solid lubricant particles dispersed in carefully selected blends of resin and solvents. The volume concentration of lubricants and choice of raw materials are important for the lubricating and corrosion-protection properties. Once applied to a metal or plastic, these paint-like solutions bond to the coated surface and provide a slippery lubricating film that is dry and clean. The film covers all surface roughness and optimizes metal-to-metal, metal-to-plastic or plastic-to-plastic friction even under extreme loads and working conditions.



*Solid lubricants in a binder system adhere strongly to a substrate, forming a thin, slippery film of lubricating particles.*

*Selection Guide for Molykote Anti-Friction Coatings compares results achieved with different coating methods.*

## Selection of Anti-Friction Coatings

Molykote Anti-Friction Coatings typically contain MoS<sub>2</sub> (molybdenum disulfide), graphite or PTFE lubricating solids. Depending on your lubrication need, precise formulations can be engineered with these or other lubricating solids to provide customized options that meet your exact requirements.

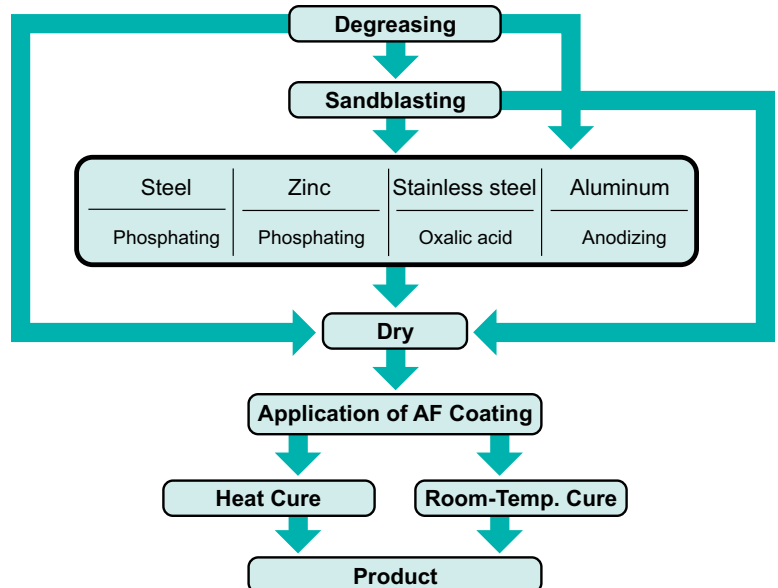
Product selection depends on service requirements, the desired coating method and specific advantages for different applications. From selecting the right formulation for your application needs to identifying the proper coating methods, you can rely on Molykote experts for help.

## The Coating Process

To ensure the effectiveness and full service life of Molykote Anti-Friction Coatings, a proper coating process must be followed. Surface pretreatment is important. Depending on the material, this involves degreasing, sandblasting, phosphating, anodizing, acid washing or other type of surface pretreatment.

Once the pretreated parts materials dry, various methods can be used to apply an anti-friction coating. Following application, the coating requires drying and curing to bind the lubricating solids to the parts. This can vary from as little as three minutes with air drying to as long as one hour with oven curing.

*Key steps for using anti-friction coatings include parts cleaning (pretreatment), drying, applying the coating and heat or room-temperature curing.*



## Selection Guide

Product <sup>1</sup>	106 Anti-Friction Coating	3400A Anti-Friction Coating Lead Free
<b>Solid Lubricant</b>	Molybdenum disulfide (MoS <sub>2</sub> ), Graphite	Molybdenum disulfide (MoS <sub>2</sub> )
<b>Color</b>	Gray	Gray
<b>Service Temperature, °C (°F)</b>	-70/+250 (-94/+482)	-200/+315 (-328/+599)
<b>Curing Temperature, °C (°F)</b>	150 (302)	200 (392)
<b>Cure Time, minutes</b>	60	30
<b>Spraying</b>	●	●
<b>Drum Spraying</b>	●	●
<b>Dipping</b>	●	●
<b>Dip-Spinning (Centrifuging)</b>	●	●
<b>Brushing</b>	●	●
<b>Printing</b>	●	●
	Low friction, good adhesion	Corrosion protection, chemical resistance, low friction
	Hinges, springs, slides	Hinges, springs, weapons, ammunition

<sup>1</sup>All products are Molykote® brand.

- Excellent
- Good
- Limited

7409 Anti-Friction Coating	D-708 AF Coating	7620 Anti-Friction Coating	321 Dry Film Lubricant	3402C Anti-Friction Coating	PA-744 AF Coating	D-10 Anti-Friction Coating	7400 Anti-Friction Coating	D-96 Anti-Friction Coating
Molybdenum disulfide (MoS <sub>2</sub> )	Polytetrafluoroethylene (PTFE)	Molybdenum disulfide (MoS <sub>2</sub> )	Molybdenum disulfide (MoS <sub>2</sub> ), Graphite	Molybdenum disulfide (MoS <sub>2</sub> )	Molybdenum disulfide (MoS <sub>2</sub> )	Graphite	Molybdenum disulfide (MoS <sub>2</sub> )	Polytetrafluoroethylene (PTFE)
Gray	Black	Gray	Gray	Gray	Gray	Black	Gray	Transparent
-70/+380 (-94/+716)	-180/+240 (-292/+464)	-70/+380 (-94/+716)	-180/+450 (-292/+464)	-200/+315 (-328/+599)	-75/+300 (-103/+572)	-70/+380 (-94/+716)	-70/+200 (-94/+392)	-40/+80 (-40/+176)
220 (428)	200 (392)	220 (428)	20 (68)	20 (68)	230 (446)	180 (356)	20 (68)	20 (68)
30	20	20	5	120	60	30	40	120
Coating Method								
●	●	●	●	●	●	●	●	●
●	●	●	●	●	●	●	●	●
●	●	●	●	●	●	●	●	●
●	●	●	●	●	●	●	●	●
●	●	●	●	●	●	●	●	●
●	●	●	●	●	●	●	●	●
Advantages								
Low friction, fuel and oil resistance, suitable for high-temperature use	Low friction	Low friction, fuel and oil resistance, suitable for high-temperature use	Air drying, fast curing, aerosol, low friction, suitable for high-temperature use	Corrosion protection, chemical resistance, low friction	Low friction, fuel and oil resistance, suitable for high-temperature use	Low friction, fuel and oil resistance, suitable for high-temperature use	Water base, air drying, low friction	Water base, air drying, low friction
Applications								
Pistons, hydraulic parts	Slides, nuts and bolts	Gaskets	Slides, gaskets, cold fogging	Nuts and bolts, weapons, ammunition, constricting components	Pistons, hydraulic parts	Pistons, hydraulic parts	Gears, shafts	Noise prevention for interior parts



*Various methods can be used to apply Molykote Anti-Friction Coatings to entire parts or localized areas. Hand spraying is shown.*

## Choice of Application Methods

Molykote Anti-Friction Coatings can be economically applied by hand or drum spraying, dipping, centrifuging (dip-spinning), brushing, roll coating and printing. The size, shape, weight and quantity of the parts being coated are factors in selecting a certain application method. Film-thickness and sliding-surface requirements are other factors.

Different application methods provide excellent, good or limited results, depending on the Molykote product, as shown in the Selection Guide. Each method has certain selection parameters, advantages and disadvantages, as shown in the Coating Methods Comparison Chart. Our application specialists can help you make the right choice.

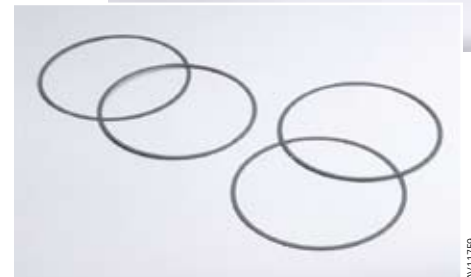
## Coating Methods Comparison Chart

*Coating Methods Comparison Chart overviews certain selection parameters, advantages and disadvantages.*

Method	Selection Parameters	Advantages	Disadvantages
Spraying	<ul style="list-style-type: none"> <li>• Speed</li> <li>• Quantity of material</li> <li>• Distance</li> <li>• Air pressure</li> <li>• Viscosity of coating</li> </ul>	<ul style="list-style-type: none"> <li>• Good appearance</li> <li>• Even film thickness</li> </ul>	<ul style="list-style-type: none"> <li>• Not so economical</li> <li>• Over-spray waste</li> <li>• Exhaust cabinet needed</li> </ul>
Dipping	<ul style="list-style-type: none"> <li>• Long, flat parts</li> <li>• Viscosity of coating</li> <li>• Withdrawal speed</li> </ul>	<ul style="list-style-type: none"> <li>• Good appearance</li> <li>• Even film thickness</li> </ul>	<ul style="list-style-type: none"> <li>• Batch economical</li> <li>• Stirring equipment</li> </ul>
Dip-Spinning (Centrifuging)	<ul style="list-style-type: none"> <li>• Form/quantity of parts</li> <li>• Rotational speed</li> <li>• Viscosity of coating</li> </ul>	<ul style="list-style-type: none"> <li>• Good for bulk volume</li> <li>• Economical</li> </ul>	<ul style="list-style-type: none"> <li>• Poor appearance</li> <li>• Two layers</li> <li>• Poor batch control</li> </ul>
Roll Coating	<ul style="list-style-type: none"> <li>• Long, flat parts</li> <li>• Viscosity of coating</li> <li>• Withdrawal speed</li> </ul>	<ul style="list-style-type: none"> <li>• Good appearance</li> <li>• Economical</li> <li>• Large surface areas</li> </ul>	<ul style="list-style-type: none"> <li>• Expensive equipment</li> <li>• Large space required</li> </ul>
Printing	<ul style="list-style-type: none"> <li>• Mesh size/film thickness</li> <li>• High-viscosity coating</li> <li>• Low-evaporation solvents</li> </ul>	<ul style="list-style-type: none"> <li>• Exact design coverage</li> <li>• Economical</li> </ul>	<ul style="list-style-type: none"> <li>• Special coatings</li> <li>• Viscosity, evaporation</li> </ul>

## Application Engineering

Dow Corning offers more than just materials. Molykote application facilities, our Lubricants Expertise Centers, are an especially strong asset of our technology leadership. These dedicated laboratories are equipped with the most common application machines and staffed with coating experts. These centers can produce coated samples, optimizing the coating effectiveness from prototype to production, for the exact Smart Lubrication solutions you need. Our customer support and consulting services can also provide you with coating-line designs, process improvement ideas and coating-shop recommendations.



*Anti-friction coatings on pistons and piston rings can reduce noise and scuffing, while increasing combustion efficiency and fuel economy. Typical products include Molykote D-10, PA-744, 7409 and D-88 Anti-Friction Coatings, applied by spraying or printing.*

*A Molykote lubrication engineer checks curing of coated parts in Dow Corning's Anti-Friction Coating lab in Songjiang, China.*



## Wide Application Range

As fail-safe lubricants valued by the world's leading vehicle manufacturers, Molykote Anti-Friction Coatings are widely used in automotive applications to increase:

- **Driving comfort** by reducing noise and vibration;
- **Performance** by providing long-term lubrication;
- **Safety** by keeping inaccessible parts working; and
- **Reliability** by withstanding harsh operating conditions.

Molykote Anti-Friction Coatings are especially trusted for uses where maximum wear endurance is needed and where other types of lubricants cannot be applied. For adding lifetime lubrication to body and interior parts, cutting engine friction losses, or achieving as-designed performance from vehicle operating systems, Molykote expertise can meet your Smart Lubrication™ needs – exactly!



AV11697

*Molykote D-96, when used as a replacement for non-woven tape, eliminates squeaks and rattles in door trim assemblies.*



AV11842

*Molykote 7620, roll-coated on exhaust manifold gaskets, eliminates stick-slip between dissimilar metal parts and improves sealing properties.*



AV11698

*Lock-catching plates and locking levers are given long-term lubrication and corrosion protection by dip-spinning them in Molykote 3400A or D-708 Anti-Friction Coating.*

*Molykote 7409 Anti-Friction Coating provides clean, low-friction lubrication under high loads for seat belt and seat frame guide tracks.*



AV11699

*Molykote D-708 eliminates stick-slip and objectionable noise in interior components in which metal-to-plastic squeaks are a problem.*

*Long-term lubrication and corrosion protection can be applied to body components and bolts & nuts by dip-spinning them in Molykote 3400A or D-708.*



AV05908

## Global Lubricants Expertise

Dow Corning has Lubricants Expertise Centers, strategically located worldwide, to provide you with expert technical service and support. In addition to Molykote® Anti-Friction Coatings, our other Smart Lubrication™ solutions for automotive applications include multipurpose oils, synthetic and ultra-high-purity mineral oil fluids, specialty compounds, greases, pastes and more.

Molykote Smart Lubrication solutions are available through a distributor network of more than 3,000 channel partners worldwide. To learn more about our extensive product and service offering, please visit [www.molykote.com](http://www.molykote.com) or email [industrial@dowcorning.com](mailto:industrial@dowcorning.com).

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