All About Solid Film Lubricants

1. What are solid film lubricants (SFLs)?
They are thin films of resin that bind lubricating powders such as MoS_2 (molybdenum disulfide), graphite, or PTFE to a surface.

2. How do they work?
They prevent surface-to-surface contact, reducing friction and wear between mating surfaces. Each lubricant powder has different properties. MoS_2 provides higher load carrying and corrosion protection than graphite, while graphite provides higher temperature stability and better electrical conductivity. PTFE provides the highest level of corrosion protection, release, and functionality for lighter load applications.

3. How do solid film lubricants produce low friction?
They have exceptional low resistance to shear and slip easily… like a deck of new cards.

4. Are these films thick?
No. Most are applied to a dry film thickness of 0.0002 to 0.0005 inches.

5. How are solid film lubricants applied?
They are sprayed, dipped, dip/spun, tumble sprayed, or brushed onto a properly pretreated surface. Some require thermal curing and others are ready to use after air drying.

6. Where are SFLs applied?
If only one surface of mating surfaces is to be coated, it is generally best to coat the surface with the greatest area. Camshafts, bearings, guns, weapons, pistons, valves, connectors, fasteners, and slides are examples. Typical situations where solid film lubricants should be used include:

- On heavily loaded equipment susceptible to galling and seizing…particularly aluminum and titanium.
- On inaccessible or concealed components where maintenance of conventional "wet" lubes are not practical or possible.
- On equipment that may not be compatible with fuel, solvents, grease, or oils.
- In place of liquid lubricants that can migrate and contaminate adjacent parts.
- Where dust or other airborne debris may impair machine operation.
- Where operating temperatures exceed the range of fluid lubricants.
- Where fretting corrosion occurs (solid film lubricants can often delay the onset of corrosion beyond the expected life of the part).

7. What are the frictional properties of SFLs?

- As load increases, the coefficient of friction (μ) decreases (to a point), to as low as 0.02 under extreme loads on hard surfaces.
- The kinetic (or dynamic) coefficient of friction is slightly lower than the static coefficient.
- The coefficient of friction is affected by the hardness of the surface to which the lubricant is applied, decreasing for hard surfaces and increasing for soft ones.
- The coefficient of friction is lower for rotating motion than for oscillating motion.
- The purpose of the film is to prevent surface-to-surface contact. The rule is: For the lowest friction and longest wear, use the hardest metals consistent with good design.
- If it is necessary to choose between applying the lubricant to either surface in a hard/soft bearing system, the lubricant should be applied to the softer material.
- The coefficient of friction of a solid film lubricant is independent of temperature within the coating's recommended range.
- The coefficient of friction of crystalline lubricants, like MoS_2, WS_2, and graphite, will always decrease during burnishing.
- In general, coating both surfaces will provide greater service life but may reduce load-carrying capacity due to plastic deformation of the thicker dry film thickness layer.

8. Why you should choose Everlube® Products.

- Our courteous Customer Service Department will help make your ordering experience fast, efficient, and effective.
- Our Technical Service personnel average 35+ years of coating experience to assist with any questions or offer coating recommendations for your specific needs.
- Each of our solid film lubricants is subjected to careful quality testing during every manufacturing step to ensure you receive the highest quality product, along with any requested certifications or test reports. Everlube® Products continues to meet the latest ISO and AS9100 certifications.
- As EPA and other regulatory restrictions tighten, Everlube® Products continues to develop new and improved solid film lubricants to meet VOC restrictions, as well as REACH and RoHS compliance.
- Our guaranteed shelf life for solid film lubricants is one year from the date of shipment when stored in a factory sealed container below 100˚F. This ensures you have the maximum use time.
- Our substantial product line offers a wide selection of solid film lubricants, many of which that are qualified to Military, OEM, and standard industrial specifications.

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For more information on our products and our facilities, please call us or visit our website.
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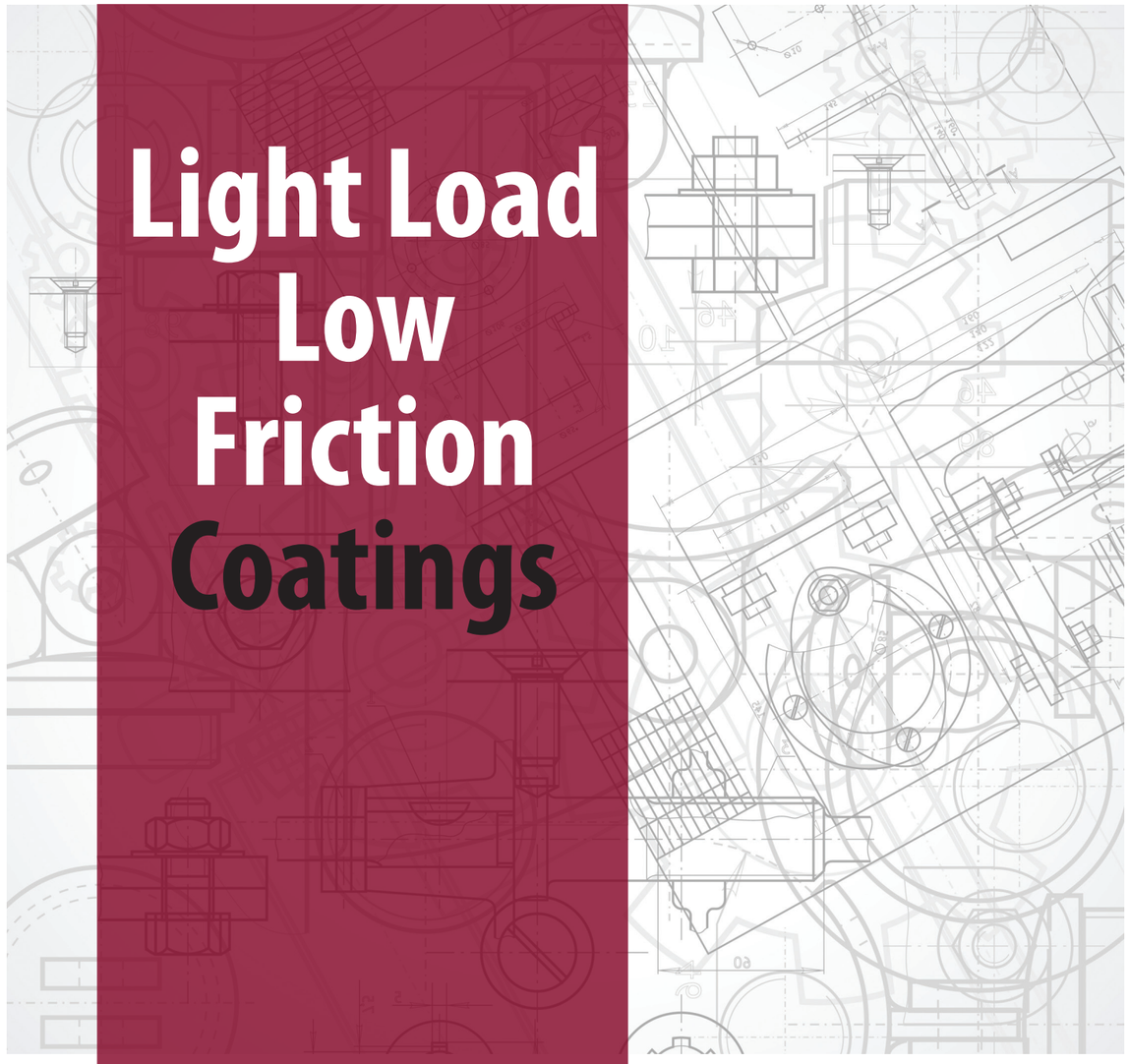
Light Load Low Friction Coatings



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PTFE and Specialty Solvent-Borne Coatings

Product Name	Binder Type	Lubricating Solids	Cure Time and Temperature[1]	Continuous Operating Temperature Range	Weight per Gallon[2]	VOC Content (Grams per Liter)	Coverage[3] (Sq. Ft./gallon)	Method of Application[4]	Coefficient of Friction[5]	Corrosion Resistance[6]	Performance[7]		Application/Markets[8]
											Endurance	Load Carrying	
Everlube® 723	Polyamide-imide	PTFE Blend	1 hr @ 425˚F	-100°F to 500°F	9.0 ± 0.5	720	879	S	0.02 to 0.06	VG	VG	Up to 25,000 psi	Eliminates squeaks, A, E, GI
Everlube® 725	Polyamide-imide	PTFE/MoS_2	1 hr @ 425˚F	-100°F to 500°F	9.2 ± 0.5	705	850	S	0.03 to 0.06	G	E	Up to 25,000 psi	A, GI, M, S
Everlube® 726	Polyamide-imide	PTFE	1 hr @ 425˚F	-100°F to 500°F	9.3 ± 0.5	732	962	S	0.03 to 0.06	G	E	Up to 20,000 psi	A, E, F, S
Everlube® 727	Polyamide-imide	PTFE	1 hr @ 425˚F	-100°F to 500°F	9.1 ± 0.5	732	873	S	0.03 to 0.06	G	VG	Up to 20,000 psi	A, GI, S
Everlube® 728	Phenolic/Epoxy	PTFE	1 hr @ 375˚F	-100°F to 400°F	8.3 ± 0.5	630	785	S, DS, D, B	0.03 to 0.06	VG	G	Up to 25,000 psi	A, GI, H, M
Everlube® 6102G	Phenolic	PTFE/MoS_2	1 hr @ 300˚F	-100˚F to 300˚F	8.3 ± 0.5	680	604	S, DS, D, B	0.06 to 0.08	VG	G	Up to 40,000 psi	A, F, GI, M
Everlube® 6107	Phenolic	PTFE	1 hr @ 300˚F	-100˚F to 300˚F	7.8 ± 0.5	672	526	S, DS, D, B	NA	VG	NA	NA	GI, H, M, S,
Everlube® 6108	Phenolic	PTFE	1 hr @ 300˚F	-100˚F to 300˚F	8.3 ± 0.5	689	577	S, DS, D, B	0.05 to 0.08	E	G	Up to 25,000 psi	A, F, GI, M
Everlube® 6109	Epoxy	PTFE	1 hr @ 325˚F	-100˚F to 350˚F	8.2 ± 0.5	625	818	S	0.06 to 0.08	G	G	Up to 25,000 psi	A, GI, M
Everlube® 6110	Epoxy	PTFE	1 hr @ 375˚F	-100˚F to 400˚F	8.6 ± 0.5	685	642	S	0.06 to 0.08	E	F	Up to 25,000 psi	A, AS, F, GI, S
Everlube® 6111	Epoxy	PTFE/MoS_2	1 hr @ 375˚-400˚F	-100˚F to 400˚F	9.1 ± 0.5	685	744	S	0.04 to 0.06	VG	G	Up to 40,000 psi	A, F, GI
Everlube® 6115	Epoxy	PTFE Blend	1 hr @ 375˚-400˚F	-100˚F to 400˚F	9.1 ± 0.5	685	770	S	0.02 to 0.06	VG	G	Up to 20,000 psi	A, F, GI
Everlube® 6116	Phenolic	MoS_2/PTF Blend	1 hr @ 300˚F	-100˚F to 300˚F	8.5 ± 0.5	650	720	S, DS, D, B	0.02 to 0.06	G	G	Up to 30,000 psi	Eliminates squeaks, A, F, GI
Everlube® 6150	Phenolic	NA	1 hr @ 300˚-375˚F	-100˚F to 325˚F	7.7 ± 0.5	707	507	S, DS, D, B	NA	G	NA	NA	AS, GI
Everlube® 6151	Epoxy	NA	1 hr @ 325˚F	-300°F to 350°F	8.4 ± 0.5	695	735	S	NA	G	NA	NA	A, GI, H
Everlube® 6155	Phenolic/Epoxy	NA	1 hr @ 375˚F	-300˚F to 400˚F	8.2 ± 0.5	625	712	S	NA	VG	NA	NA	Magnets, A, AS, EC, GI
Everlube® R-75	Polyamide-imide	PTFE	1 hr @ 400˚-450˚F	-100˚F to 500˚F	9.0 ± 0.5	650	1085	S	0.02 to 0.06	G	E	Up to 25,000 psi	NSF-61, E, M, S
Everslik® 1201	Epoxy	NA	1 hr @ 375˚-400˚F	-100˚F to 400˚F	8.4 ± 0.5	580	1090	S, D	NA	E	NA	NA	A, AS, P, S
Everslik® 1221	Phenolic	NA	1 hr @ 300˚F	-100°F to 300°F	8.0 ± 0.5	670	642	S, DS, D, B	NA	VG	NA	NA	Magnets, A, AS, E, GI
Everslik® 1222	Epoxy	NA	1 hr @ 300˚F	-100°F to 300°F	8.4 ± 0.5	587	1078	S	NA	VG	NA	NA	A, E, GI, H
Kal-Gard® 2240	Phenolic	NA	1 hr @ 375˚F	-100˚F to 375˚F	7.6 ± 0.5	708	401	S, DS, D, B	NA	VG	NA	NA	AS, GI, S
Kal-Gard® 2240C	Phenolic	NA	1 hr @ 375˚F	-100˚F to 350˚F	8.1 ± 0.5	575	898	S, DS, D, B	NA	VG	NA	NA	AS, GI, S
Kal-Gard® 2245	Phenolic	PTFE	1 hr @ 375˚F	-100˚F to 375˚F	8.2 ± 0.5	630	696	S, DS, D, B	0.04 to 0.08	VG	F	Up to 15,000 psi	AS, GI, S
Kal-Gard® Headerkote	Silicone	NA	30-60 min. @ 475˚F	-100°F to 1200°F	8.3 ± 0.5	570	1026	S	NA	F	NA	NA	High Temp, A, GI, H

[1] Cure times are at part metal temperature.
[2] Weights are listed in pounds and are based on Concentrate product.
[3] Theoretical coverage based on 100% transfer efficiency at 0.0005 inches (12.7 microns) dry film thickness.
[4] S=Spray, DS=Dip/Spin, D=Dip, B=Brush.
[5] Dynamic coefficient of friction as determined by ASTM D2714 (without oil).
[6] E= Greater than 800 hours, VG= 400 to 800 hours, G=100 to 400 hours, F= 24 to 100 hours, NR= Not Recommended.
[7] E=Excellent, VG=Very Good, G=Good, F=Fair, NR=Not Recommneded, NA=Not Applicable. Based on average cycles per ASTM D-2714, 150# load, no oil.
[8] A=Automotive, AS=Aerospace, E=Elastomer, EC=Electronics, F=Fasteners, GI=General Industry, H=Hardware, M=Medical, P=Petrochemical, S=Semiconductor

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