9A

SOLID FILM LUBRICANT: HEAT CURE

SERIES E750

QUALIFIED TO SAE AS5272 Type II
(FORMERLY MIL-L- 46010D Type II)

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DESCRIPTION

Sandstrom 9A dry film lubricant is a paint-like coating containing molybdenum disulfide and corrosion inhibiting pigments. This heat curing material prevents corrosion, galling, seizing and fretting. It is a low-friction coating which exhibits long wear life when operated at -320°F to +500°F under loads exceeding 100,000 psi. Sandstrom 9A should be applied where maximum wear life and corrosion protection from a dry film lubricant are required.

Sandstrom 9A may be applied by brush, dip or spray method to a wide variety of surfaces. After it is heat cured, 9A is virtually unaffected by atmospheric and fretting corrosion, solvents, acids, oils or degreasers and is not re-softened at elevated temperatures.

Basic Product Guidance:

- Use LC-300 or #099 on metals that may be adversely affected by a 1 hour @ 400°F bake cycle.
- Use 9A on metals not affected by higher bake temperatures.
- Use #099 to meet low VOC requirements.

Please consult Sandstrom Technical Rep during product selection process for best results.

OUTSTANDING FEATURES/BENEFITS

- Excellent Corrosion Protection
- Chemical Resistance
- Long Wear Life
- **9A CONTAINS NO GRAPHITE**

NOTICE

Before using this product, read all warnings, limitations and safety information printed on the product label, Safety Data Sheet (MSDS), and Technical Data Sheet. The properties listed on this sheet are not intended for use as a specification. Please contact our Technical Service Team.

Refer to our website for answers to common questions:
https://www.sandstromproducts.com/resources/FAQs/

TYPICAL USES

Sandstrom 9A is an excellent solution to the problem of lubricating parts:

- That will be operated in corrosive atmospheres.
- That may be stored for long periods.
- That are seldom lubricated once they leave the factory and permanent lubrication is desired.
- Where operating pressures exceed the load-bearing capacities of ordinary oils and greases.
- Where "clean operation" is desired (does not collect dirt and debris like grease and oils).
- Where a protective coating and sacrificial break-in lubricant is needed.
- Where fretting and galling is a problem (e.g., splines, universal joints, keyed bearings).
- Where easy release is desired (e.g., fasteners, PVC molds).
- Where parts may be subjected to frequent disassembly.

LIMITATIONS

Do not use 9A where there is potential for contact with food.

COMPOSITION AND PHYSICAL PROPERTIES

Net Weight per gallon ^ *ASTM D1475*	9.5 lbs. ± 0.2 lbs.	**Vehicle**	Epoxy-Phenolic
Weight Solids ^	40% minimum	**Lubricating Pigment**	Molybdenum Disulfide
VOC – water	5.5578 lbs./gallon (Theoretical)	**Color**	Flat Dark Gray
Odor	Strong Solvent	**Coverage Rate ***	660 sq. ft./gal @ 0.5 mil DFT
Viscosity ^ *ASTM D4212*	40-46 seconds, #1 EZ Zahn cup @ 77°F	**Recommended Coats**	1
Shelf Life	12 months from date of manufacture	**Dry Film Thickness**	0.5 mil
Storage Conditions	≤ 100°F		
Flash Point	23° ± 2°F Setaflash		

* Actual figures do not include spray loss. Also allow for surface irregularities and porosity, as well as material loss when mixing.
^ Property tested with each production batch.

PERFORMANCE AND FUNCTIONAL PROPERTIES

Coefficient of Friction	0.0236 Per ASTM D2625B Calculations	**Aluminum Corrosion Resistance Per ASTM D2649**	PASS
Corrosion Protection:		**Operating Temperature Range**	-320°F to +500°F
ASTM B117: Steel MIL-DTL-16232 Type M Class 3 ^	> 1500 hours * (at 0.5 mil)	**Resistivity**	1.4 x 10^6 Ohms CM
Fluid Resistance: *SAE AS5272 Table 3 Fluids*		**Thermal Stability** *ASTM D2511*	Pass
ASTM D2510 C	Pass	**Vacuum Outgassing**	None @ 10^{-6} Torr.
Load Carry Capacity ^ *ASTM D2625B*	2250 lbf	**Wear Life ^** *ASTM D2625A*	496 minutes average

* Tests halted before failure.
^ Property tested with each production batch.

GENERAL
Sandstrom 9A is a paint-like material consisting of lubricative pigments dispersed in a thermosetting resin system thinned with appropriate solvents. For maximum service, the APPLICATION INSTRUCTIONS MUST BE FOLLOWED CLOSELY.

FILM THICKNESS & ENGINEERING TOLERANCE
As supplied, Sandstrom 9A will yield a film thickness of about 0.0005 inches per dip coat. Usually engineering tolerances will permit necessary minimum film buildup of 0.0002 to 0.0003 inches without interference. If excess buildup does occur and a force fit is necessary, burnishing lightly will assist in mating the parts. The remaining excess will be worn away in the first few cycles of operation. Whenever possible, the proper tolerances should be designed into the part.

Whenever possible, treat both contact surfaces (i.e., the shaft and the bearing).

COVERAGE
One gallon of this material will cover 660 sq. ft. with a dry film thickness of 0.0005 inches. Coverage depends upon methods of application and other variables such as overspray and type of surface to be coated. Above coverage rates are based on 100% efficiency.

SURFACE PREPARATION
THE FOLLOWING RECOMMENDATIONS ARE GIVEN TO PRODUCE OPTIMUM PROPERTIES FOR THIS COATING WHEN APPLIED OVER VARIOUS SUBSTRATES. ALTERNATIVE SURFACE PREPARATION MAY BE USED TO PRODUCE THE DESIRED END USE PROPERTIES. IT IS THE RESPONSIBILITY OF THE USER TO DETERMINE THE SUITABILITY FOR USE IN THEIR APPLICATION WHEN ANY ALTERNATIVE SURFACE PREPARATION IS USED. PLEASE CONTACT SANDSTROM PRODUCTS COMPANY FOR SUBSTITUTE SURFACE PREPARATIONS IF RECOMMENDED STEPS CANNOT BE FOLLOWED.

Application on steel. Pre-clean surface with aliphatic naphtha or any other EPA compliant cleaner that sufficiently cleans surface to pass ASTM F22. Abrasive blast surface with 180-220 grit aluminum oxide (25-50 RMS optimum). Phosphate IAW MIL-DTL-16232 (weight should be 11-22 g/m^2), type M, class 3 (optimal performance) or type Z, class 3.
Application on stainless steels. Pre-clean surface with aliphatic naphtha or any other EPA compliant cleaner that sufficiently cleans surface to pass ASTM F22. Abrasive blast surface with 180-220 grit aluminum oxide (25-50 RMS optimum). Passivate surface with ASTM A967, types nitric 1, nitric 2 or nitric 3, as applicable.
Application on aluminum and aluminum alloys. Pre-clean surface with aliphatic naphtha or any other EPA compliant cleaner that sufficiently cleans surface to pass ASTM F22. Sulfuric acid anodize IAW MIL-A-8625 and seal surface with hot deionized water (>180°F for 30 minutes).
Application on titanium and titanium alloys. Degrease surface to be coated with aliphatic naphtha or any other EPA compliant cleaner that sufficiently cleans surface to pass ASTM F22. Abrasive blast surface with 180-220 grit aluminum oxide (25-50 RMS optimum) and alkaline anodize.
Application on copper and copper alloys. Pre-clean surface with aliphatic naphtha or any other EPA compliant cleaner that sufficiently cleans surface to pass ASTM F22. Abrasive blast surface with 180-220 grit aluminum oxide (25-50 RMS optimum). Form a black oxide finish on surface (according to MIL-F-495).

MIXING
IMPORTANT! THIS LUBRICANT CONTAINS HEAVY PIGMENTS WHICH SETTLE RAPIDLY. THEREFORE, IT SHOULD BE MIXED THOROUGHLY BEFORE USE UNTIL HOMOGENEOUS, AND FREQUENTLY ENOUGH DURING APPLICATION TO ENSURE NO SETTLING OF PIGMENTS OCCUR.

THINNING
For brushing – Use as supplied.
For spraying * - Use 2 parts 9A to 1 part PM solvent (Sandstrom D106 Thinner).
For dipping * - Use slow-drying thinner mixture of PM and PMA, blended 1:1 (Sandstrom D122 Thinner), as to provide proper run-off characteristics. The suggested starting point is 4 parts 9A to 1 part thinner mixture.

* By volume.

APPLICATION
For Spec work, follow all instructions in the drawing.

Sandstrom 9A may be brushed, sprayed or dipped to the desired film thickness (usually 0.0003 to 0.0007 inches). Allow parts to flash off **at least** 30 minutes at 77°F ± 5°F and ≤ 70% relative humidity. Lower temperatures and/or higher humidity may require a longer dry time to prevent film defects.
It is important to keep container closed when not in use to keep loss of solvents at a minimum and avoid a change in volume solids.

BAKING
Bake for 60 minutes @ 400°F in a forced draft oven to yield optimum corrosion protection and wear life.

IMPORTANT! The hour begins when **the part** has reached 400°F, NOT when it is placed in the Class A oven. In cases of very thick metals, an extra hour may be required to bring the part up to the proper temperature. Thermocouples may be used to determine the true temperature of the metal. However, if the metallurgical properties are adversely affected by baking at this temperature (i.e., ALUMINUM, in some cases), we recommend use of Sandstrom LC-300, which cures for 1 hour at 300°F (149°C). Sandstrom #099 could also be used, as it cures in temperatures ranging from 300°F to 400°F.

IT IS IMPERATIVE TO USE A PROPERLY VENTED OVEN (DIRECT VENT TO THE OUTSIDE).

CLEANUP
Use the same solvents for cleaning tools as are recommended for thinning.

REMOVAL
In the event it is necessary to remove Sandstrom 9A, physical removal is best (such as grit blasting, sanding, or grinding).

DANGER! USE WITH ADEQUATE VENTILATION.

IMPORTANT! ***DO NOT TOUCH CLEAN SURFACE WITH FINGERS - OIL FROM THE HANDS WILL INTERFERE WITH PROPER COATING ADHESION.***

Strict compliance to the instructions given in Surface Preparation, Thinning, Application, and Baking is very essential for obtaining optimum results.