



# HI-T 650

**SOLID FILM LUBRICANT: AIR DRY OR HEAT CURE**  
**SERIES S765**  
**QUALIFIED TO SAE AS1701 CLASS V**  
**SOURCED UNDER PWA 550 REV. V**



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## DESCRIPTION

Sandstrom HI-T 650 Solid Film Lubricant is a thermoset coating containing molybdenum disulfide and corrosion-inhibiting pigments with a silicone vehicle. It is a specialized product designed to prevent galling and provide long wear life at high temperatures (500°F to 750°F) exceeding the operational ranges of Sandstrom 9A and 28A.

Higher pigment loading protects all metals from galling, fretting, and seizing. This solid film lubricant exhibits extremely low friction and anti-galling characteristics at loads in excess of 100,000 psi. It may be applied by spray or dip. Complete application instructions are on the reverse of this sheet.

Each batch is tested and conforms to the requirements of the latest revision of PWA 550.

## OUTSTANDING FEATURES/BENEFITS

- High Operating Temperature Performance
- May be air dried or heat cured for versatility in product use.

**SANDSTROM HI-T 650 CONTAINS NO LEAD OR GRAPHITE.**

## NOTICE

**Before using this product, read all warnings, limitations and safety information printed on the product label, Safety Data Sheet and Technical Data Sheet.**

## TYPICAL USES

Sandstrom HI-T 650 is an excellent solution to the problem of lubricating parts:

- Where high operational temperatures are incurred.
- That are seldom lubricated once they leave the factory.
- Where operating pressures exceed the load bearing capacities of ordinary oils and greases.
- Where "clean operation" is desired (HI-T 650 will not collect dirt and debris as do grease and oils).
- Where parts may be subjected to frequent disassembly.
- Where easy release is desired.
- Where a protective coating and sacrificial break-in lubricant are needed.
- Where fretting and galling is a problem (such as splines, universal joints, and keyed bearings).

## COMPOSITION AND PHYSICAL PROPERTIES

<b>Net Weight per gallon<sup>^</sup></b> <i>ASTM D1475</i>	8.20 - 9.20 lbs.	<b>Vehicle</b>	Modified Silicone
<b>Weight Solids<sup>^</sup></b> <i>ASTM D2369</i>	21.5 – 26.0%	<b>Lubricating Pigment</b>	Molybdenum Disulfide
<b>VOC</b>	6.76 lbs./gallon (816.6 g/L) (Theoretical)	<b>Color</b>	Flat Dark Gray
<b>Viscosity<sup>^</sup></b> <i>ASTM D4212</i>	33 - 38 sec, #1 EZ Zahn @ 77°F	<b>Thinner</b>	See THINNING
<b>Shelf Life</b>	1 year from date of shipment in unopened containers	<b>Drying Time</b>	See CURING
<b>Storage Conditions</b>	Below 100°F	<b>Coverage Rate *</b>	216 sq. ft./gal @ 0.5 mil
<b>Flash Point</b>	75°F ± 2°F Setaflash	<b>Dry Film Thickness</b> <i>ASTM D7091</i>	0.3 – 0.7 mils

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

## PERFORMANCE AND FUNCTIONAL PROPERTIES

<b>Corrosion Protection:</b>		<b>Operating Temperature Range</b>	Up to 750°F Intermittent to 1200°F
<i>ASTM B117: Steel</i> <i>MIL-DTL-16232 Type M Class 3</i>	Approx. 100 hrs. (at 0.5 mil)	<b>Thermal Stability</b> <i>ASTM D2511</i>	Will not chip, crack or peel at temps exceeding 1000°F
<b>Outgas Testing</b> <i>ASTM E 595</i> TML 0.05% CVCM 0.01% WVR 0.05%		<b>Wear Life</b> <i>ASTM D2625A</i>	200 - 250 Minutes
<b>Fluid Resistance:</b> <i>ASTM D2510 C</i>	<i>JP4 and Skydrol LD4 - Pass</i>	<b>Coefficient of Friction</b> <i>ASTM D2714</i>	0.098
<b>Load Carry Capacity</b> <i>ASTM D2625B</i>	3000 lbf.	<b>Coefficient of Friction</b> <i>ASTM D2625B</i>	0.0116 @ 765 lb. Direct Load

**IMPORTANT NOTICE TO BUYER / WARRANTY AND LIMITATIONS ON OUR LIABILITY**

We warrant our products to be free of manufacturing defects and that they meet our current published physical properties and specifications. All information and suggestions presented are rendered gratis and are accurate to the best of our knowledge. They are based on technical data we believe to be reliable and are intended for use by persons having skill and "know-how" at their own discretion and risk. Prior to use, customers are cautioned to determine the suitability of our products for any given application through their own testing. NO WARRANTY IS MADE, EXPRESS OR IMPLIED, REGARDING SUCH INFORMATION, THE DATA ON WHICH IT IS BASED OR THE RESULTS OBTAINED FROM ITS USE OR THAT OUR PRODUCT SHALL BE MERCHANTABLE OR FIT FOR ANY PARTICULAR PURPOSE. SUCH STATEMENTS ARE NOT INTENDED TO SUGGEST INFRINGEMENT OF ANY PATENT. Since conditions of use of our products are beyond our control, all suggestions and statements are made without guarantee, warranty or other responsibility, express or implied, on our part. We assume no responsibility for results obtained, or damages incurred, from their use beyond replacing material proved to be defective or refunding the purchase price of such material at our option. Acceptance of delivery of our product means you have accepted the terms of this warranty, whether or not purchase orders of other documents state terms that vary from this warning. No seller is authorized to make any representations or warranty or assume any other liability on our behalf with any sales of our products. SANDSTROM PRODUCTS COMPANY

**GENERAL**

For maximum service, the APPLICATION INSTRUCTIONS MUST BE FOLLOWED CLOSELY.

**FILM THICKNESS & ENGINEERING TOLERANCE**

As supplied, Sandstrom HI-T 650 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.

**COVERAGE**

One gallon of this material will cover 216 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**

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 surfaces to pass ASTM F22. Abrasive Blast the surfaces with 180-220 grit aluminum oxide (25-50 RMS optimum). Phosphate IAW MIL-DTL-16232 (weight should be 11-22 g/m<sup>2</sup>), 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 surfaces to pass ASTM F22. Abrasive Blast the surfaces with 120 grit aluminum oxide. Passivate the surfaces 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 surfaces 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 surfaces to pass ASTM F22. Abrasive Blast the 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 surfaces to pass ASTM F22. Abrasive Blast the surfaces with 180-220 grit aluminum oxide (25-50 RMS optimum). Form a black oxide finish on the surfaces.

**IMPORTANT! DO NOT TOUCH CLEAN SURFACE WITH FINGERS - OIL FROM THE HANDS WILL INTERFERE WITH PROPER COATING ADHESION.** Whenever possible, treat both contact surfaces (i.e., the shaft and the bearing).

**STIRRING**

IMPORTANT! THIS LUBRICANT CONTAINS HEAVY PIGMENTS WHICH SETTLE RAPIDLY. THEREFORE, IT SHOULD BE STIRRED THOROUGHLY BEFORE USE AND CONTINUOUSLY DURING APPLICATION.

**THINNING**

**For spraying** - Use Toluene as necessary to obtain the desired viscosity.

**For dipping** - Use Xylene in such proportions as to provide proper runoff characteristics.

**APPLICATION**

Sandstrom HI-T 650 should be sprayed, dipped or brushed to the desired film thickness (usually 0.0003-0.0007 inches). If the coating is to be heat cured, allow the surface to dry **at least 30** minutes before baking.

**CURING**

HI-T 650 features curing versatility to meet your production-line requirements. This material may be either air dried or baked.

Air drying HI-T 650 for 72 hours at 77°F ± 5°F and ≤ 70% relative humidity will produce the MINIMUM cure necessary for use. Complete curing beyond this point can be achieved during use at the functional temperatures for which this material was designed (500°F – 750°F). If a preoperational cure is needed, baking is recommended.

Baking 1 hour at 480°F produces MAXIMUM cure. However, several combinations of time and temperature can be used depending on the desired degree of cure. Baking for 1/2 hour at 250°F will produce a minimum cure equivalent to 3 - 5 days at room temperature. Baking at higher temperatures and/or longer times will increase chemical resistance, film hardness, and wear life. Call Sandstrom Technical Service for more information on how best to cure this coating to meet your specific needs.

**CLEANUP**

For cleaning tools, use the same solvents recommended for thinning.

**REMOVAL**

To remove applied product, immerse the coated part in MEK.

**WARNINGS:** Constant stirring is imperative for best results.

**DANGER! USE WITH ADEQUATE VENTILATION.**

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

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We warrant our products to be free of manufacturing defects and that they meet our current published physical properties and specifications. All information and suggestions presented are rendered gratis and are accurate to the best of our knowledge. They are based on technical data we believe to be reliable and are intended for use by persons having skill and "know-how" at their own discretion and risk. Prior to use, customers are cautioned to determine the suitability of our products for any given application through their own testing. NO WARRANTY IS MADE, EXPRESS OR IMPLIED, REGARDING SUCH INFORMATION, THE DATA ON WHICH IT IS BASED OR THE RESULTS OBTAINED FROM ITS USE OR THAT OUR PRODUCT SHALL BE MERCHANTABILITY OR FIT FOR ANY PARTICULAR PURPOSE. SUCH STATEMENTS ARE NOT INTENDED TO SUGGEST INFRINGEMENT OF ANY PATENT. Since conditions of use of our products are beyond our control, all suggestions and statements are made without guarantee, warranty or other responsibility, express or implied, on our part. We assume no responsibility for results obtained, or damages incurred, from their use beyond replacing material proved to be defective or refunding the purchase price of such material at our option. Acceptance of delivery of our product means you have accepted the terms of this warranty, whether or not purchase orders of other documents state terms that vary from this warning. No seller is authorized to make any representations or warranty or assume any other liability on our behalf with any sales of our products. SANDSTROM PRODUCTS COMPANY