



AEROSPACE STANDARD	AS81550™	REV. B
	Issued 2004-06 Revised 2021-03	
	Superseding AS81550A	
(R) Insulating Compound, Electrical, Embedding, Reversion Resistant Silicone		
FSC 5970		

RATIONALE

Five-Year Review. Restore several technical requirements removed between Revision A submission and publication.

1. SCOPE

This specification covers the requirements for two types of a two-part, transparent, reversion resistant flexible insulating compound, to provide resilient, environmental, and electrical insulation of components in systems in temperature range -85 to 392 °F (-65 to 200 °C). These insulating compounds are intended for embedding, potting or encapsulation of electrical and electronic components in systems where tear resistance is not critical, but their use is not limited to such applications. These transparent compounds allow visual circuit and part identification and facilitate part replacement and repairs. The insulating compound shall cure in sections of unlimited thickness, either exposed to air or completely sealed.

1.1 Classification

Insulating compounds covered by this specification shall be of the following types:

Type I - Room temperature curing.

Type II - Heat curing.

1.1.1 Type I compound is intended for general purpose potting and embedding of electronic equipment where it is not convenient to heat the equipment. Type I material has low dielectric losses that do not change appreciably over a temperature range of -67 to 310 °F (-55 to 154 °C). It is intended for use where protection from thermal cycling, mechanical shock, vibration, and moisture is required.

1.1.2 Type II compound is intended for general purpose potting and embedding of electronic equipment and shall have the same electrical properties as Type I when cured. Type II is used when the electronic parts can be heated and provides faster processing during the embedding procedure.

1.2 Safety – Hazardous Materials

Shall be in accordance with AS5502 (1.1).

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2. APPLICABLE DOCUMENTS

Shall be in accordance with AS5502 (2).

2.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

AMS4049	Aluminum Alloy, Sheet and Plate, Alclad, 5.6Zn - 2.5Mg - 1.6Cu - 0.23Cr (Alclad 7075; -T6 Sheet - T651 Plate) Solution and Precipitation Heat Treated
AS5127	Aerospace Standard Test Methods for Aerospace Sealants Methods for Preparing Aerospace Sealant Test Specimens
AS5127/1	Aerospace Standard Test Methods for Aerospace Sealants Two-Component Synthetic Rubber Compounds
AS5502	Standard Requirements for Aerospace Sealants and Adhesion Promoters

2.2 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

ASTM D149	Standard Test Method for Dielectric Breakdown Voltage and Dielectric Strength of Solid Electrical Insulating Materials at Commercial Power Frequencies
ASTM D150	Standard Test Methods for A-C Loss Characteristics and Permittivity (Dielectric Constant) of Solid Electrical Insulation
ASTM D257	Standard Test Methods for D-C Resistance or Conductance of Insulating Materials
ASTM D471	Standard Test Method for Rubber Property-Effect of Liquids
ASTM D635	Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position
ASTM D792	Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement
ASTM D2240	Standard Test Method for Rubber Property-Durometer Hardness

2.3 U.S Government Publications

Copies of these documents are available online at <https://quicksearch.dla.mil>.

A-A-59544	Cable and Wire, Electrical (Power, Fixed Installation)
MIL-STD-810	Environmental Engineering Considerations and Laboratory Tests

3. TECHNICAL REQUIREMENTS

3.1 First Article

A sample shall be subjected to first article inspection in accordance with 4.3 and when specified on Purchase Documents (see 8.6).

3.2 Material

The insulating compound shall be supplied as a two-component transparent, reversion resistant, flexible silicone rubber, consisting of the base compound and the curing agent. Components shall be of the highest quality and shall be homogeneous and free of pigments, and foreign matter. The material shall contain no solvents.

3.2.1 Primer

A primer specified by the manufacturer shall be used in all tests where required.

3.2.2 Sealer

A sealer is not required for performance of insulating compounds meeting requirements of this specification. However, if a sealer is recommended by the manufacturer to mitigate inhibition reactions with particular substrates, the sealer shall have equivalent electrical properties as the sealing compound.

3.2.3 Suitability

The insulating compound shall protect the electrical components of the equipment to which it is applied by sealing against such environmental conditions as moisture, dirt, fumes, fungus, or other deleterious substances.

3.2.4 Toxicological Formulations

Shall be in accordance with AS5502 (3.2).

3.3 Quality

Shall be in accordance with AS5502 (3.3).

3.4 Shelf Life

Shelf life shall be a minimum of 4 months from date of packaging. Date of Shipment may be used by a manufacturer to provide shelf life and/or warranty claims, however first article testing for Shelf Storage Life (3.5.22) must be performed on the maximum allowable packaged product life from last performed Quality Conformance Tests (4.4.2) performed by the manufacturer. No material testing for shelf life extension is permitted unless specifically identified by the manufacturer.

3.5 Properties

The base compound and curing agent, when mixed in accordance with manufacturer's instructions and cured as in 4.5.4, shall conform to all requirements shown in Table 1, determined in accordance with specified test methods.

Table 1 - Properties

Paragraph	Property	Requirement	Test Procedures (Paragraph)
3.5.1	Color, mixed	Shall be transparent and shall range from colorless to light straw	
3.5.2	Viscosity of Base Compound, max	70 poises	AS5127/1 (5.3) Use No. 2 spindle @ 4 rpm
3.5.3	Specific Gravity (average), max	1.01 to 1.08	ASTM D792, Method A AS81550 (4.8.1)
3.5.4	Application Time, min After 5 minutes of mixing the viscosity shall not exceed 750 poise (75 Pa•S), Type I Type II	2 hours 5 hours	AS5127/1 (5.6.1) Use No. 5 spindle @ 4 rpm
3.5.5	Standard Cure Hardness, min Type I Type II	20 Durometer A 40 Durometer A	ASTM D2240 AS81550 (4.6.2)
3.5.6	Flammability	Shall not burn more than 1 inch and shall extinguish within 20 seconds after removal of flame	ASTM D635 AS81550 (4.6.6)
3.5.7	Heat Resistance	No cracking, softening, blistering, flowing, distorting, or charring	AS81550 (4.6.8)
	Change in Hardness, max Change in Weight, max Change in Volume, max	10 points, Durometer A 3% 5%	ASTM D2240 ASTM D471 ASTM D471
3.5.8	Fungus Resistance	Shall not support the growth of fungus	MIL-STD-810, Method 508 AS81550 (4.6.7)
3.5.9	Peel Strength, min Standard Cure (Control) Heat Aged at 392 °F (200 °C) for 72 hours	2 lbf/in (350 N/m) 2 lbf/in (350 N/m)	AS5127/1 (8.1) AS81550 (4.6.9)
3.5.10	Repairability, min Standard Cure (Control) Heat Aged at 392 °F (200 °C) for 72 hours	2 lbf/in (350 N/m) width 2 lbf/in (350 N/m) width	AS81550 (4.6.9.2)
3.5.11	Thick Section Cure, min Both top and bottom of specimen Type I Type II	20 Durometer A 40 Durometer A	ASTM D2240 AS81550 (4.6.13)
3.5.12	Reversion Resistance, max Oven air aging at 392°F (200°C)	- 5 points, Durometer A	ASTM D2240 AS81550 (4.6.13)
3.5.13	Dielectric Strength, min	450 volts/mil	ASTM D149 AS81550 (4.6.3)
3.5.14	Volume Resistivity, min $\frac{1}{\Omega \cdot \text{cm}}$		ASTM D257

Paragraph	Property	Requirement	Test Procedures (Paragraph)
	At Standard Conditions	1×10^{13} ohm-cm	AS81550 (4.6.4)
	At 392 °F (200 °C)	1×10^{12} ohm-cm	
3.5.15	Dielectric Constant, max		AS81550 (4.6.5)
	1 KHz	3.5	
	1 MHz	3.8	
	10 MHz	5.0	
3.5.16	Dissipation Factor, max		AS81550 (4.6.5)
	1 KHz	0.005	
	1 MHz	0.003	
	10 MHz	0.005	
3.5.17	Thermal Shock	Shall not rupture	AS81550 (4.6.14)
	10 cycles from 310 °F (154 °C) to -67 °F (-55 °C)		
3.5.18	Water Absorption, max		AS81550 (4.6.11)
	72 hour immersion at 140 °F (60 °C)		
	Change in Hardness, max	±10 points, Durometer A	ASTM D2240
	Change in Weight, max	2%	ASTM D471
	Change in Volume, max	3%	ASTM D471
3.5.19	Shrinkage, max		AS81550 (4.6.10)
3.5.19.1	Standard Cure		
	Type I	2%	
	Type II	4%	
3.5.19.2	7 days at 392 °F (200 °C)		
	Type I	4%	
	Type II	7%	
3.5.20	Corrosion	No visual evidence of corrosion on the metal surface	AS81550 (4.6.12)
3.5.21	Hydrolytic Stability, min		ASTM D2240
	Type I	20 Durometer A	AS81550 (4.6.15)
	Type II	40 Durometer A	
3.5.22	Shelf Storage Life		AS81550 (4.6.16)
	Viscosity of Base Compound, max	15% increase from original	AS5127/1 (5.3)
	Hardness, max	±5 points from original, Durometer A	Use No. 2 spindle @ 4 rpm ASTM D2240

1/ Median values shall be recorded.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

Shall be in accordance with AS5502 (4.1).