The Engineering Society For Advancing Mobility Land Sea Air and Space®
INTERNATIONAL
400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE MATERIAL SPECIFICATION

SAE AMS 3265

Issued MAR 1996

Submitted for recognition as an American National Standard

SEALING COMPOUND, POLYSULFIDE (T) RUBBER
Nonchromated, Corrosion Inhibiting
for Intermittent Use to 340 °C (171 °F)

1. SCOPE:

1.1 Form

This specification covers a polysulfide (T) rubber sealing compound with nonchromated corrosion inhibitors supplied as a two-component system which cures at room temperature.

1.2 Application:

The compound has been used typically for faying surface sealing and for wet-installation of fasteners in aircraft structural joints, but usage is not limited to such applications. This compound is also suitable for fillet sealing and overcoating fasteners in nonfuel areas. The sealing compounds are usable from -67 to 248 °F (-55 to 120 °C).

1.3 Classification:

The sealing compound covered by this specification are classified by method of application and application time as follows:

Class A - Suitable brush application, available with the following application times:

A-1/2
A-2
A-4

1.3 (Continued)

Class B - Suitable for application by extrusion gun, spatula, brush or roller, available with the following application times:

B-1/4
B-1/2
B-1
B-2
B-4
B-12

Class C - Suitable for application by extrusion gun, spatula, brush or roller. Used for fay surface sealing only. Available with the following application times:

C-2
C-6
C-12
C-20
C-40
C-48
C-128

1.4 Safety - Hazardous Materials:

While the materials, methods, applications, and processes described or referenced in this specification may involve the use of hazardous materials, this specification does not address the hazards which may be involved in such use. It is the sole responsibility of the user to ensure familiarity with the safe and proper use of any hazardous materials and to take necessary precautionary measures to ensure the health and safety of all personnel involved.

2. APPLICABLE DOCUMENTS:

The following publications form a part of this specification to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order.

2.1 SAE Publications:

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

AMS 2471 Anodic Treatment of Aluminum Alloys, Sulfuric Acid Process, Undyed Coating
AMS 2629 Jet Reference Fluid
AMS 2825 Material Safety Data Sheets
AMS 3020 Oil, Reference, for "L" Stock Rubber Testing
AMS 3021 Fluid, Reference, for Testing Diester (Polyol) Resistant Material
AMS 3819 Cloths, Cleaning for Aircraft Primary and Secondary Structural Surfaces

2.1 (Continued)

AMS 4037 Aluminum Alloy Sheet and Plate, 4.4Cu - 1.5Mg - 0.60Mn (2024; T3 Flat Sheet, T-351 Plate), Solution Heat Treated
AMS 4045 Aluminum Alloy Sheet and Plate, 5.6Zn - 2.5Mg - 1.6Cu - 0.23Cr (7075; -T6 Sheet, T-6), Solution and Precipitation Heat Treated
AMS 4049 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
AMS 4901 Titanium, Sheet, Strip and Plate, Annealed, 70,000 psi (485 MPa) Yield Strength
AMS 4911 Titanium Alloy, Sheet, Strip and Plate, 6A1, 4V Annealed
MAM 4911 Titanium Alloy, Sheet, Strip and Plate, 6A1, 4V Annealed
AMS 5516 Steel Sheet, Strip, and Plate, Corrosion Resistant, 18Cr - 9.0Ni, Solution Heat Treated

2.2 ASTM Publications:

Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

ASTM B 117	Salt Spray (Fog) Testing
ASTM D 412	Rubber Properties Vulcanized Rubber and Thermoplastic Rubber and Thermoplastic Elastomers in Tension
ASTM D 792	Specific Gravity (Relative Density) and Density of Plastics by Displacement
ASTM D 2240	Rubber Property - Durometer Hardness

2.3 U.S. Government Publications:

Available from DODSSP, Subscription Services Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

TT-N-97	Naphtha, Aromatic
CCC-C-419	Cloth, Duck, Cotton, Unbleached, Plied Yarns, Army and Numbered
PPP-B-636	Box, Shipping, Fiberboard
PPP-C-96	Can, Metal, 28 Gage and Lighter
PPP-P-704	Pail, Metal (Shipping, Steel, 1 Through 12 Gallons)
PPP-D-729	Drums, Shipping and Storage, Steel, 55 Gallon (208 Liters)
QQ-A-250	Aluminum and Aluminum Alloy Plate and Sheet
FED-STD-141	Paint, Varnish, Lacquer and Related Materials, Inspection, Sampling and Testing
FED-STD-601	Rubber Sampling and Testing
MIL-S-5002	Surface Treatments and Inorganic Coatings for Metal Surfaces of Weapons Systems
MIL-S-7839	Screw Structural, Aircraft
MIL-C-5541	Chemical Conversion Coatings on Aluminum Alloys
MIL-A-9962	Abrasive Mats, Non-woven, Non-metallic
MIL-P-23377	Primer Coating, Epoxy Polyamide, Chemical and Solvent Resistant
MIL-C-27725	Coating, Corrosion Preventive, for Aircraft Integral Fuel Tanks

2.3 (Continued)

MIL-C-38334	Corrosion Removing Compound, Prepaint, for Aircraft Aluminum Surfaces
MIL-S-38714	Sealant Cartridge for Two-Component Materials
MIL-L-81352	Lacquer, Acrylic (For Naval Weapons Systems)
MIL-C-81706	Chemical Conversion Materials for Coating Aluminum and Aluminum Alloys
MIL-S-83430	Sealing Compound Integral Fuel Tank and Fuel Cell Cavities, Intermittent Use to 360 °F (182 °C)
MIL-T-9046	Titanium and Titanium Alloy, Sheet, Strip and Plate
MIL-C-83286	Coating, Urethane, Aliphatic Isocyanate, for Aerospace Applications
MIL-STD-2073-1	DOD Materiel, Procedures for Development and Application of Packaging Requirements
MS24694	Screw, Machine, Flat Countersunk Head, 100 Deg, Cross Recessed, URIC- 3A and UNF-3A

2.4 AIA Publications:

Available from National Standards Association, Inc., 1321 14th Street NW, Washington, DC 20005.

NAS 679	Nut, Self Locking, Hexagon Head, Titanium, .190 to .500

3. TECHNICAL REQUIREMENTS

3.1 Materials:

The basic ingredient shall be polysulfide type synthetic rubber with additive(s) for corrosion inhibition. The sealing compound shall cure by the addition of a curing agent to the base compound, and shall not depend on solvent evaporation for curing. The material shall contain no lead or chromium compounds. The curing agent shall possess sufficient color contrast to the base compound to permit easy identification of an unmixed or incompletely mixed sealing compound. Neither the base compound nor the cured sealant shall be red or pink in color. The base compound and the curing agent shall be of uniform blend and shall be free of skins, lumps, and gelled or coarse particles.

3.2 Properties:

The sealing compound, when mixed in accordance with the manufacturer's instructions and cured as specified in 4.5.2.9, shall conform to the following requirements, determined in accordance with specified test methods in Table 1.

TABLE 1 - Properties

Paragraph	Property	Requirement	Test Method
3.2.1	Specific Gravity of Base Compound, max	1.65	ASTM D 792, Method A-1
3.2.2	Nonvolatile Content, min		4.5.3
	Class A	84%	
	Class B	92%	
	Class C	88%	
3.2.3	Viscosity of Base Compound		4.5.4
	Class A	100 to 600 poises (10 to 60 Pa·S)	
	Class B	9000 to 18000 poises (900 to 1600 Pa·S)	
	Class C	1500 to 4000 poises (150 to 400 Pa·S)	
3.2.4	Hardness, min Durometer "A" Instantaneous	40	ASTM D 2240
3.2.5	Viscosity of Accelerator	700 to 1600 poises (70 to 160 Pa·S)	4.5.5
3.2.6	Flow (Class B only)	0.1 to 0.75 inch (2.5 to 19.1 mm)	4.5.6
3.2.7	Application Time, min		4.5.7
3.2.7.1	Class A - From the beginning of mixing, the viscosity shall not exceed 2500 poises (250 Pa·S)		
	A-1/2	1/2 hour	
	A-2	2 hours	
	A-4	4 hours	

TABLE 1 - (Continued)

Paragraph	Property	Requirement	Test Method
3.2.7.2	Class B - From the beginning of mixing, not less than 15 grams per minute shall be extruded		
	B-1/4	1/4 hour	
	B-1/2	1/2 hour	
	B-1	1 hour	
	B-12	12 hours	
	B-2	2 hours	
3.2.7.3	Class C - From the beginning of mixing, not less than 30 grams per minute shall be extruded		
	C-2	2 hours	
	C-8	8 hours	
	C-12	12 hours	
	C-48	48 hours	
	C-96	96 hours	
3.2.8	Assembly Time, min (Class C only)		4.5.8
	Class C-2	2 hours	
	Class C-8	24 hours	
	Class C-12	48 hours	
	Class C-48	168 hours	
	Class C-96	336 hours	
3.2.9	Tack Free Time (measured from the beginning of mixing), max	See Table 2	4.5.9
3.2.10	Standard Cure Time, max (30 Shore A, min)	See Table 2	4.5.10
3.2.11	Peel Adhesion, min (All Classes)	20 pounds force/inch (3502 N/m) 100% cohesive failure	4.5.11
3.2.12	Tensile Strength/Elongation (Class B and C), min Standard Cure	200 psi (1.4 MPa) 200%	4.5.12
	12 Days at 140 °F (60 °C) In AMS 2629, Type I	200 psi (1.0 MPa) 200%	

TABLE 1 - (Continued)

Paragraph	Property	Requirement	Test Method
3.2.12	(Continued)		
	12 days at 140 °F (60 °C) in AMS 2629 Type I, plus 24 hours at 120 °F (49 °C) plus standard heat cycle as in 4.5.1.3		
	Standard Heat Cycle as in 4.5.1.3	200 psi (1.0 MPa) 100%	
	72 Hours in AMS 3021 at Room Temperature	200 psi (1.4 MPa) 200%	
	72 Hours in AMS 3020 at Room Temperature	200 psi (1.4 MPa) 200%	
3.2.13	Shear Strength (Class C), min	150 psi (1034 kPa) 100% cohesive failure	4.5.13
3.2.14	Low-Temperature Flexibility	No visual evidence of cracking, checking, or loss of adhesion	4.5.14
3.2.15	Long Term Storage		4.5.15
3.2.15.1	Application Time	Same as 3.2.7	
3.2.15.2	Tack Free Time	Same as 3.2.9	
3.2.15.3	Cure Time	Same as 3.2.10	
3.2.16	Repairability	10 pounds force/inch (1751 N/m) 100 % cohesive failure	4.5.16
3.2.17	Paintability	No separation from sealant	4.5.17
3.2.18	Shaving and Sanding	No rolling or tearing of the sealant smooth finish	4.5.18

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TABLE 1 - (Continued)

3.2.19	Corrosion Test		4.5.19
	Cyclic Loading and Exposure	No visible evidence of corrosion	
	Galvanic Cell	No visible evidence of corrosion	
	Aluminum/Titanium Couple	No visible evidence of corrosion	
	Aluminum-Cadmium Plated Steel Couple	No visible evidence of corrosion	
	Aluminum/Epoxy Graphite (AS4/3501-6) Composite Couple		
3.2.20	Weight Loss Flexibility and Swell		4.5.20
3.2.20.1	Weight loss, max	10%	
3.2.20.2	Flexibility	No cracking or checking	
3.2.20.3	Swell	5 to 15%	
3.2.21	Thermal Rupture, max	0.15 inch (3.8 mm) No blistering or sponging	4.5.21
3.2.22	Air Content, max (Class B only)	4%	4.5.22

TABLE 2 - Application, Tack-Free, and Standard Cure Time

Class	Application Time Hours, Min.	Tack-Free Time Hours, Max.	Cure Time Hours, Max.
A-1/2	1/2	10	30
A-2	2	24	72
A-4	4	48	90
B-1/4	1/4	6	16
B-1/2	1/2	10	30
B-1	1	12	36
B-2	2	24	48
B-12	12	120	240
C-2	2	24	72
C-8	8	96	168
C-12	12	N/A	336
C-48	48	N/A	8 weeks
C-96	96	N/A	16 weeks

3.3 Quality:

The sealing compound, as received by purchaser, shall be uniform in quality and condition, as free from foreign materials as commercially practical and free from imperfections detrimental to the usage of the compound. There shall be no separation of ingredients that cannot be readily dispersed.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection:

The manufacturer of the product shall supply all samples for vendor's tests and shall be responsible for performing all required tests. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the product conforms to the requirements of this specification.

4.2 Classification of Tests:

4.2.1 Acceptance Tests: Tests for the following requirements are acceptance tests and shall be performed on each batch.

Hardness
Nonvolatile content
Viscosity of the base compound (not possible with sectional-type containers) (3.2.3) (4.2.1.1)
Viscosity of the curing agent (not possible with sectional-type containers) (3.2.5) (4.2.1.1)
Flow
Application time (3.2.7)
Assembly time (C-4 only)

4.2.1 (continued)

Tack-free time (3.2.9)
Standard curing rate (3.2.10)
Peel strength two aluminum panels coated with material conforming to MIL-C-27725 aged in AMS 2629 jet reference fluid (JRF) for seven days at 140 °F (60 °C) (3.2.11)
Shear strength (C-2 only)
Corrosion test-Galvanic cell test only

4.2.1.1 Testing viscosity of base compound or curing agent need not be performed on compound packaged in sectionalized containers of small size containers of less than 8 ounces (235 mL).

4.2.1.2 Acceptance test requirements can be satisfied by use of the National Aerospace Defense Contractors Accreditation Program (NADCAP) or by performing the tests required by 4.2.1. If the NADCAP system is used, the sealant manufacturer must be NADCAP accredited and product surveillance in accordance with NADCAP procedures must be carried out on each batch of material. All tests specified in 4.2.1 must be performed by the manufacturer.

4.2.2 Qualification Tests: Tests for all technical requirements are qualification tests and shall be performed prior to or on the initial shipment of sealing compound to a purchaser, when a change in ingredients and/or processing requires reapproval as in 4.4.2, and when purchaser deems confirmatory testing to be required.

4.2.2.1 The first compound that a manufacturer must qualify is Class B-2. That compound shall meet all applicable requirements of this specification. Once qualification for Class B-2 is obtained, other classes may be qualified. The formulation for the other classes and application times shall be the same as that for the Class B-2, except for minor variations necessary for viscosity and application life. It will not always be necessary for the qualifying agency to conduct all tests on the other classes. In general, the acceptance tests will be sufficient, although additional tests can be required. The manufacturer shall show proof that all requirements are met prior to requesting qualification approval for any class. This includes assurance that the compound will cure at standard conditions. After the compound has been accepted for qualification, approval will be granted and the compound will be identified by reference to the manufacturer's code or formula number.

4.2.2.2 For direct U.S. Military procurement, substantiating test data and, when requested, preproduction test material shall be submitted to the cognizant agency as directed by the procuring activity, contracting officer, or request for procurement.

4.3 Sampling and Testing:

Shall be as follows:

4.3.1 For Acceptance Tests: Sufficient sealing compound shall be taken at random from each batch to perform all the required tests. A batch shall be the quantity of material run through a mill or mixer at one time. The number of determinations for each required test shall be as specified in the applicable test procedure or, if not specified herein, not less than three, except that multiple testing is not required for viscosity, application time, flow, tack-free time and hardness.

4.3.1.1 Compound for testing shall be mixed, as much as possible, in the same containers in which the sealing compounds were procured.

4.3.1.2 If the compound is being procured in plastic injection kits, such as those conforming to MIL-S-38714, all tests shall be conducted on compound that has been packaged and mixed in the initial sample injection kits except for viscosity of base compound and viscosity of the curing agent. During filling of the initial sample injection kits, base compound and curing agent shall be placed in 1-quart (1 L) cans for the viscosity tests. If more than one size of injection kits are to be packaged from a particular batch, it is necessary to test compound from only one size kit.

4.3.1.3 If the compound is being procured in cans, pails, or drums, the batch shall be tested on the compound placed in 1-quart (1 L) cans.

4.3.1.4 If the compound is being procured in both type containers, the quality conformance tests shall be conducted on the compound packaged in plastic injection kits (See 4.3.1.2).

4.3.1.5 A statistical sampling plan, acceptable to purchaser, may be used in lieu of sampling as in 4.3.1.

4.3.1.6 For U.S. Government Procurement: Each batch shall be subjected to both initial and final acceptance testing. Sufficient compound for initial acceptance testing shall be packaged in the same type containers that are being procured. Initial acceptance tests are those listed in 4.2.1. After successful completion of the initial quality conformance tests, the batch shall be released for final packaging. During packaging, tests kits shall be picked at random to perform the following final acceptance tests:

Application time (3.2.7)
Tack-free time (3.2.9)
Standard cure time (3.2.10)
Air content (3.2.22)

4.3.1.6.1 If the batch is being packaged in different type and/or different size containers, the final acceptance tests shall be conducted on each type and/or each size containers. If the compound is being procured under different purchase orders, but the purchase orders call for the same type and size containers, it is only necessary to conduct the final acceptance tests once.

4.3.2 For Qualification Tests: Samples shall consist of one 5-gallon (19 L) pail of base compound with one 1 gallon (4 L) pail of curing compound, two 1-quart (1 L) kits of sealing compound, and two pints (1/2 L) of adhesion promoter. Samples shall be identified as follows and forwarded to the activity responsible for qualification testing as designated in letter of authorization from that activity (See 8.2).

SEALING COMPOUND, INTEGRAL FUEL TANK AND FUEL CELL CAVITIES, LOW DENSITY (1.35 sp gram max), INTERMITTENT USE TO 360 °F (182 °C)
AMS 3265 CLASS
MANUFACTURER'S IDENTIFICATION
NAME OF MANUFACTURER
LOT NUMBER
DATE OF MANUFACTURE
SUBMITTED BY (NAME) (DATE) FOR QUALIFICATION TESTS IN ACCORDANCE WITH AMS 3265 CLASS UNDER AUTHORIZATION (REFERENCE AUTHORIZING LETTER)

4.3.3 Shelf Life Surveillance and Updating:

4.3.3.1 Sampling: The minimum number of samples to be tested during shelf life surveillance and updating are as follows in Table 3.

TABLE 3 - Samples

Items in Stock	Samples to be Tested
Up to 100	3
100 to 500	5
Over 500	7

4.3.3.2 Testing: The following inspections shall be conducted for shelf life surveillance and updating.

Condition of container
Application time
Tack-free time
Standard cure time
Viscosity of base compound (not possible with sectional-type containers)
Viscosity of curing agent (not possible with sectional-type containers)
Peel Strength; two aluminum panels, sulfuric acid anodized per AMS 2471, coated with MIL-C-27725 corrosion-preventive coating, and aged in AMS 2629, Type I, for seven days at 140 °F (60 °C)

4.3.3.2.1 If the tests are being performed at the end of the stated shelf life to update the shelf life of the sealing compound, and all tests are passed, the shelf life will be extended an additional three months. Up to three updatings will be allowed.

4.4 Approval:

4.4.1 Except as specified in 4.4.1.1 sealing compound shall be approved by purchaser before sealing compound for production use is supplied, unless such approval be waived by purchaser. Results of tests on production sealing compound shall be essentially equivalent to those on the approved (qualified) sample.

4.4.1.1 For direct U.S. Military procurement and for procurement for use on U.S. Military contracts, the sealing compound shall be listed, or approved for listing, on the applicable U.S. Military qualified products list.

4.4.2 Manufacturer shall use ingredients, manufacturing procedures, processes, and methods of inspection on production sealing compound which are essentially the same as those used on the approved (qualified) sample. If necessary to make any change in ingredients, in type of equipment for processing, or in manufacturing procedures, manufacturer shall submit for reapproval a statement of the proposed changes in ingredients and/or processing and, when requested, sample sealing compound. Production sealing compound made by the revised procedure shall not be shipped prior to receipt of reapproval.

4.5 Test Methods:

Testing shall be as follows:

4.5.1 Standard Conditions:

4.5.1.1 Test Conditions: Standard laboratory conditions shall be 77 °F ± 2 (25 °C ± 1) and 50% ± 5 relative humidity. Except as otherwise specified herein, all test specimens shall be cured under these conditions.

4.5.1.2 Standard Tolerances: Unless otherwise specified herein, Table 4 shows standard tolerances applied throughout test methods.

TABLE 4 - Standard Tolerances

Measurement Units	Tolerance
Temperatures	±2 °F (±1 °C)
Days	±2 hours
Hours	±5 minutes
Minutes	±10 seconds
Inches (mm)	±0.010 inch (0.25 mm)

4.5.1.3 Standard Heat Cycle: Standard heat cycle shall consist of the cure cycle of 4.5.2.8 followed by 66 hours ±1 at 200 °F (93 °C), plus 20 hours ± 0.5 at 250 °F (121 °C).

4.5.2 Preparation of Test Specimens:

4.5.2.1 Aluminum Test Panels:

4.5.2.1.1 Chemical Conversion Coating Application:

4.5.2.1.1.1 Coating Preparation: A chemical conversion coating conforming to MIL-C-81706, Class 1A, Form II, Method C, shall be used. It shall be prepared according to manufacturer's instructions. The pH of the resulting solution shall be adjusted to 1.5 using nitric acid.

4.5.2.1.1.2 Panel Preparation: Clean, using a method which results in surfaces free of waterbreak. Rinse the cleaned panels in warm flowing tap water 60 to 100 °F (16 to 38 °C), and check for cleanliness by observing for a waterbreak free surface. If a waterbreak occurs on the panel surfaces, repeat the cleaning procedure until a waterbreak free surface is obtained. Immediately transfer the cleaned panels to a deoxidizing solution consisting of the following:

Butyl alcohol - 35% by weight
Distilled or deionized water - 22% by weight
Isopropyl alcohol - 25% by weight
Phosphoric acid (85% by weight) - 18% by weight)

4.5.2.1.1.3 MIL-C-38334 acid deoxidizer may also be used. Allow the panels to remain in the above solution for three to five minutes at room temperature. Rinse the panels thoroughly under flowing tap water.

4.5.2.1.1.4 Coating Application (Immersion): Transfer the deoxidized panels immediately to the MIL-C-81706 chemical conversion coating solution. Mix the conversion coating solution in either 18-8 stainless steel, polyethylene, or other compatible plastic containers. DO NOT MIX IN GLASS CONTAINERS. Immerse the panels in the solution at standard temperature for three to five minutes or until a light straw color develops. Color development time will vary with the aluminum alloy being conversion coated. After removal from the conversion coating solution, immediately rinse thoroughly in flowing distilled or deionized water. Arrange the panels in an upright position to permit them to drain dry. Apply the test materials to the conversion coated surfaces within 48 hours.

4.5.2.2 Preparation of Composite Panels:

4.5.2.2.1 Graphite Epoxy: AS4/3501-6 test panels shall be fabricated using eight plies of unidirectional tape laid (0, 45, 90, 135) symmetrical. Size of the test panels shall be 0.040 x 2.75 x 6 inches (1.02 x 69.8 x 152 mm). Cure as in 4.5.2.2.2.1.

4.5.2.2.2 Graphite Bismaleimide (BMI): IM7/5250-4 BMI test panels shall be fabricated using eight plies of unidirectional tape laid (+45°, 90°, -45°, 0°) symmetrical. Size of the test panels shall be 0.040 x 2.75 x 6 inches (1.02 x 69.8 x 1.52 mm). Cure as in 4.5.2.2.2.1.

4.5.2.2.2.1 Install peel ply to bag surface of laminate. Nylon peel ply is acceptable. Apply a vacuum of not less than 28 inches (711 mm) of mercury and 85 psi (587 kPa) pressure. Heat to 375 ± 10 °F (190 ± 5 °C) at a rate of 1 to 4 F (0.5 to 2 C) degrees per minute. From 320 °F (160 °C) to 375 °F (190 °C) heat at a rate of less than 1 F (0.5 C) degrees per minute. Keep free air temperature at or below 390 °F (199 °C). Hold laminate at 375 °F (190 °C) for 360 minutes ± 20. Cool laminate to 150 °F (65 °C) or below at an average rate less than or equal to 5 F (3 C) degrees per minute while maintaining a minimum of 25 psi (172 kPa) pressure. Remove peel ply.

4.5.2.3 Preparation of Sealing Compound:

4.5.2.3.1 Qualification Tests: The quantity of sealing compound required for the tests shall be machine mixed as thoroughly as practical exercising care to minimize air inclusion. Where applicable, the sealing compound, immediately after mixing, shall be placed in cartridges for extrusion from a pneumatic sealing gun. Sealing compound in sectional type containers are to be machine mixed.

4.5.2.3.2 Acceptance Tests: The quantity of sealing compound required for the test shall be hand mixed as thoroughly as possible according to manufacturer's instructions. MIL-S-38714 containers shall be used when applicable.

4.5.2.5 Quick Freezing: After machine mixing, load the material into cartridges, both ends of the cartridges shall be closed off after filling. The installed plunger constitutes a satisfactory plug at one end. Two cartridges shall be held at room temperature. One of these shall be used for testing application time and the other for tack free time, curing rate, and flow. The remaining cartridges shall be quick frozen immediately in a TT-N-97, Type I, Grade B aromatic naphtha or other suitable solvent, and dry ice bath at -90 °F (-68 °C) or lower for 30 minutes. The cartridge shall be placed in a plastic bag and immersed with its plugged nozzle end down and the upper end about 1 inch (25 mm)above the liquid level. For tests on tack free, curing rate, application time and flow the Class B-2, sealant shall be stored at or below -65 °F (-55 °C) for 16 hours to 48 hours. Thaw-out shall be accomplished by immersion of the 120 °F (49 °C) water bath for 18 minutes with the plugs installed and the upper end of the cartridge 1 inch (25 mm) above the liquid level. Time zero shall be considered as occurring at the end of the 18-minute period and the timed tests begun. For all other tests, the storage time of the frozen material shall not exceed 10 days at -40 °F (-40 °C). Thaw-out shall be accomplished as above except sealant may be thawed out at room temperature if desired.

4.5.2.6 Cleaning of Test Panels: All test panels shall be cleaned by scrubbing and rinsing using a suitable solvent and clean AMS 3819 Grade A cloths. The panels shall be wiped dry with clean AMS 3819 Grade A cloths. Titanium and AMS 5516 corrosion resistant steel panels shall be scrubbed with abrasive mats and a suitable solvent. After scrubbing, the panels shall be rinsed using a suitable solvent and clean AMS 3819 Grade A cloths and then wiped dry. The abrasive mats shall conform to MIL-A-9962, Type I, Class I, Grade A for the stainless steel and epoxy graphite and MIL-A-9962, Type III, Class 1, Grade A for the titanium.

4.5.2.6.1 When organic coating is specified for the test panels, the coating shall be fully cured as defined by the applicable coating specification before cleaning. The applied coatings shall be at least 14 days but not more than six months old when stored at ambient indoor temperatures.

4.5.2.7 Application of Adhesion Promoter: When specified, AMS 4901 titanium and AMS 5516 stainless steel panels shall be treated with AMS 3100 adhesion promoter. This shall be done immediately after the panel is abraded and cleaned, by wetting a clean AMS 3819 cloth with AMS 3100 adhesion promoter and wiping the surface. Allow adhesion promoter to air dry at least 30 minutes but no more than two hours before applying the sealant. If more than two hours has elapsed, reclean and reapply the adhesion promoter before applying the sealant.

4.5.2.8 Application of Sealing Compound: Unless otherwise specified herein, test panels shall be given an application for sealing compound to produce a coating having a total thickness of 1/8 inch ± 1/64 (3.2 mm ± 0.4) when cured. For Class A material, a time equal to the treated application life shall be used between applications to permit release of solvents.

4.5.2.9 Cure of Sealing Compound: For qualification testing the sealing compound shall be cured for 14 days at 77 °F (25 °C) and 50% ± 5 relative humidity. For acceptance tests, the sealing compound shall be given an accelerated cure for 48 hours at 77 °F (25 °C) and 50% ± 5 relative humidity plus 24 hours at 140 °F (60 °C). Tests on the cured sealing compound shall commence not more than two days after the completion of the specified cure.

4.5.3 Nonvolatile Content: Within five minutes after mixing or warming to application temperature, 11 to 12 grams of mixed sealing compound shall be transferred as rapidly as possible to a previously weighted (W_1) aluminum dish approximately 57 mm in diameter. The Class A and C sealant shall be poured into the dish. The Class B sealant shall be extruded from a plastic cartridge fitted with 0.125 inch (3.18 mm) orifice nozzle, filling the bottom of the dish to a uniform depth. The initial weight (W_2) shall be determined using an analytical balance accurate within ±1 mg. Immediately following weighing, the sample and dish shall be placed in a circulating air oven preheated to 158 °F (70 °C), and allowed to dwell for 72 hours ± 2. Following this, the sample and dish shall be removed from the oven and allow to cool in a desiccator to room temperature. Final weight (W_3) shall be determined on the same balance used for the initial weights. All weights shall be recorded to the nearest milligram.

Percent nonvolatile content shall be determined from the average of three samples calculated using Equation 1.

$$\text{Percent nonvolatile} = \frac{(W_3 - W_1) \times 100}{W_2 - W_1} \quad \text{(Eq.1)}$$

4.5.4 Viscosity of Base Compound:

4.5.4.1 Shall be determined with the base compound placed in a quart (1 L) can. The can shall be filled with the base compound to within 1/2 inch (13 mm) of the top, covered, and stored at 77 °F (25 °C) for not less than eight hours. The base compound shall be thoroughly mixed by stirring slowly for not less than three minutes after which the can shall be closed and the base compound shall be allowed to stand for not less than one hour.

4.5.4.2 The Brookfield model RVF viscosimeter, or equivalent, shall be used. The readings obtained shall be converted to poises (Pa·S). For Class A material, the No. 6 spindle, at 10 rpm, shall be used for the test. For Class B materials, the No. 7 spindle, at 2 rpm, shall be used. For Class C material, the No. 6 spindle, at 2 rpm, shall be used. The highest reading shall be taken after the instrument has run in the base compound for not less than one minute.

4.5.5 Viscosity of the Curing Agent: The viscosity of the curing agent shall be determined in accordance with 4.5.4 except a No. 7 spindle at 10 rpm shall be used.

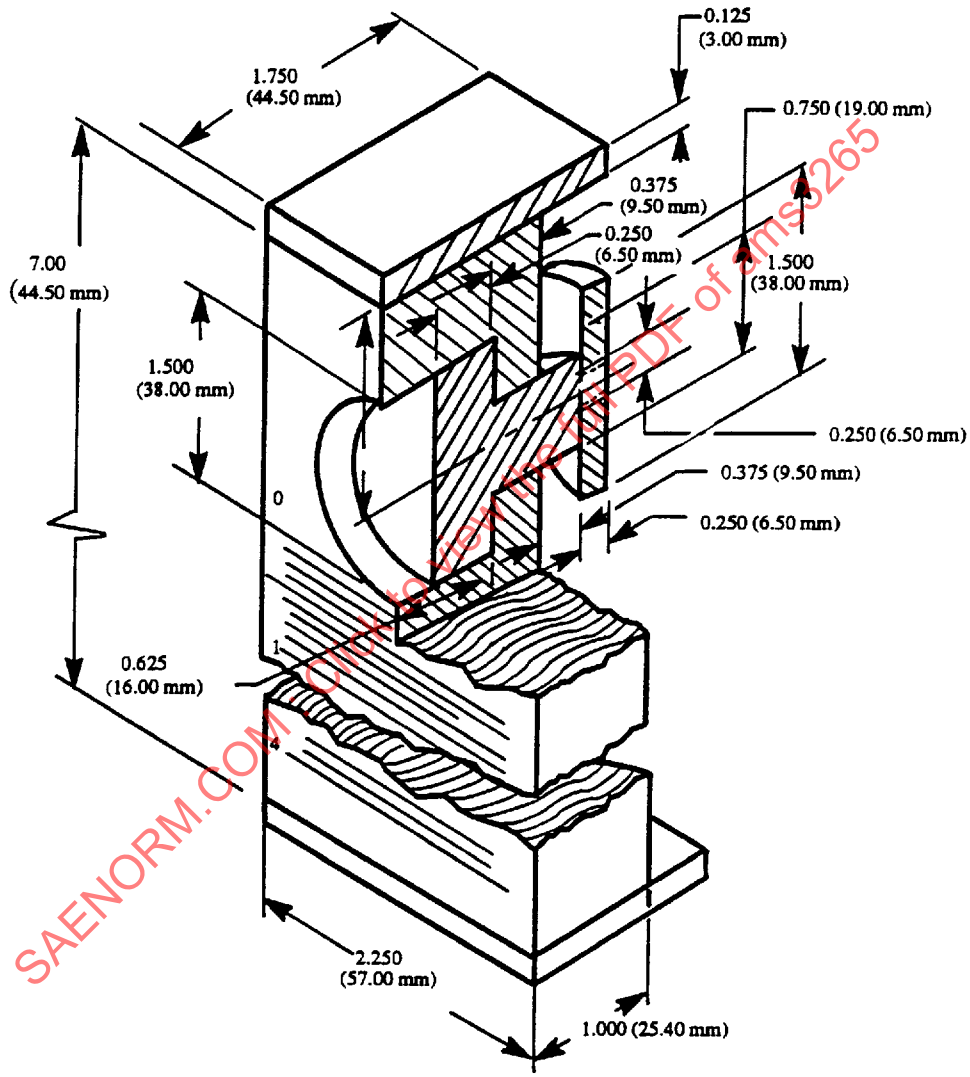
4.5.6 Flow/Class B Only: A standard sealant gun cartridge, fitted with a suitable nozzle, shall be filled with freshly mixed sealing compound. The gun and sealing compound shall be maintained at standard conditions throughout the test. The test shall be conducted with a flow test jig as show in Figure 1. Depth of the plunger tolerances is critical and shall be controlled within the tolerance during all tests. The flow jig shall be placed on a table with the front face upward and the plunger depressed to the limit of its travel. Within 15 minutes after the beginning of mixing, enough of the mixed sealing compound shall be extruded from the application gun to fill the recessed cavity of the jig and leveled off with the block. The test at this interval shall be considered the initial flow of the sealing compound. Within 10 seconds after the leveling operation, the jig shall be placed on its end and the plunger immediately advanced to the limit of its forward travel. The flow measurement shall be taken 30 minutes after the sealing compound has been applied to the test jig. The flow shall be measured from tangent to the lower edge of the plunger to the further point to which the flow has advanced. As the sealing compound progresses in its application time, the flow test shall be repeated at the time intervals specified below. All time intervals, other than for the initial test, shall be measured from the end of the mixing period (See Equation 2).

B – 2 = Initial, 50 minutes, 90 minutes (Eq.2)

4.5.7 Application Time:

4.5.7.1 Class A Material:

4.5.7.1.1 The base compound and curing agent shall be stabilized at standard conditions (See 4.5.1) for not less than eight hours before a sample of the base compound is mixed with the proper amount of curing agent sufficient to fill a standard 1/2 pint (1/3 L) can, 2 7/8 inches (73 mm) in diameter to 2 7/8 inches (73 mm) high to within 1/2 inch (13 mm) of the top. This can shall be tightly covered except when testing for viscosity.



MATERIAL: ALUMINUM ALLOY
DIMENSIONS IN INCHES (MILLIMETERS)
TOLERANCES:
DECIMALS ±0.016 INCH (± 0.41 MM).

(NOT TO SCALE)

FIGURE 1 - Flow Test Fixture

4.5.7.1.2 At the end of two hours for A-2 measured from the beginning of the mixing period, the sealing compound shall be tested for viscosity using a Brookfield Model RVF viscosimeter, or equivalent with No. 7 spindle at 10 rpm. One reading shall be taken after the instrument has run in the sealing compound for one minute.

4.5.7.2 Class B and C:

4.5.7.2.1 The base compound, curing agent, and application gun shall be stabilized at standard conditions (See 4.5.1) for not less than eight hours before not less than 250 grams of the base compound is mixed with the proper amount of curing agent.

4.5.7.2.2 The mixed sealing compound shall be used to fill a standard sealing gun cartridge, having a nozzle with an orifice of 0.125 inch ± 0.005 (3.19 mm ± 0.13). The gun and sealing compound shall be maintained at standard conditions throughout the test.

4.5.7.2.3 The gun shall be attached to a constant air supply of 90 psi ± 5 (620 kPa ± 34). From 2 to 3 inches (51 to 76 mm) of sealing compound shall be extruded initially to clear any entrapped air. At the end of two hours for B-2, and C-2, measured from the beginning of the mixing period, the sealing compound shall be extruded onto a previously weighted suitable receptacle for one minute and the weight of extruded sealing compound determined.

4.5.8 Assembly Time (Class C Only): Six test panels, 0.40 x 1.5 x 4 inches (10.1 x 38 x 102 mm), shall be prepared from AMS 4049 aluminum alloy. Drill two holes with a number 11 drill, 1.2 inches (30 mm) from one end with center 3/4 inch (19 mm) apart and 3/8 inch (9.5 mm) from each side. Deburr and clean with MIL-C-38736 solvent. Accurately determine the thickness of the panels around the holes. Apply approximately 0.015 inch (0.38 mm) of freshly mixed sealant to the drilled end of three specimens and allow to cure for 30 minutes. Place the other cleaned panels on those with sealant so that the holes line up and results in a one inch (25 mm) overlap. Sealant shall cover the entire one inch (25 mm) faying surface overlap area. Insert two (10-32) steel bolts that have been heat treated to at least 160 ksi (1103 MPa), into the holes and tighten (NAS 679-A3) nuts only until sealant starts to squeeze out. The thickness of the assembly shall be measured at this time and the thickness of the sealant shall be 0.010 to 0.015 inch (0.25 to 0.38 mm). Allow the specimens to be exposed to standard conditions for two hours. Tighten nuts to a torque value of 40 inch-pound (4.5 N·m). Measure the thickness of the assembly at the bolts with a micrometer and from this thickness subtract the thickness of the panels. Evaluate in accordance with 3.2.8. The sealant must squeeze out to a thickness of 0.005 inch (0.13 mm) or less at the bolts.

4.5.9 Tack-Free Time:

4.5.9.1 A 0.040 x 2 3/4 x 6 inch (1.02 x 69.8 x 152 mm) AMS 4049 aluminum alloy panel shall be cleaned in accordance with 4.5.2.4. Sealing compound, mixed and applied in accordance with 4.5.2.2 and 4.5.2.6 shall cover the cleaned panel surface to a depth of 1/8 inch ± 1/64 (3.2 mm ± 0.4). The panel shall be set aside to cure at standard conditions (See 4.5.2.9).

4.5.9.2 At the end of the tack-free time (See 3.2) two 1 x 7 inch (25 x 178 mm) pieces of polyethylene 0.005 inch ± 0.002 (0.10 mm ± 0.05) thick shall be applied to the sealing compound and held in place at a pressure of approximately 1/32 psi (215 Pa) for two minutes.

4.5.9.3 The strips shall then be slowly and evenly peeled back at right angles to the sealing compound surface. The polyethylene shall come away clean and free for sealing compound.

4.5.10 Standard Cure Time: The instantaneous hardness shall be determined in accordance with FED-STD-601, method 3021, after sealing compound is allowed to cure at standard conditions as specified in 4.5.1.1 for the time specified in 3.2.10. The reading shall be taken on a double back-to-back, 0.125 inch (3.18 mm) thick specimen.

4.5.11 Peel Strength:

4.5.11.1 The type and quantity of panels listed in Table 5 shall be used for evaluation of peel strength. All panels shall be 2.75 x 6 inches (69.8 x 152 mm). The thickness of the panels shall be as listed in Table 4. The panels shall be prepared in accordance with 4.5.2. When specified, AMS 3100 adhesion promoter shall be applied per 4.5.2.6. Sealing compound shall cover 5 inches (127 mm) of one side of the panel surface to a depth of 1/8 inch ± 1/64 (3.2 mm ± 0.4).

TABLE 5 - Peel Strength Panels

Quantity	Panel Material	Panel Dimensions
6	AMS 4049 aluminum alloy, chemical treated in accordance with 4.5.2.1	0.040 x 2.75 x 6.0 inch (1.02 x 69.8 x 152 mm)
6	AMS 4045 aluminum alloy, anodized in accordance with AMS 2471	0.040 x 2.75 x 6.0 inch (1.02 x 69.8 x 152 mm)
6	AMS 5516 stainless steel (Use AMS 3100 Adhesion Promoter)	0.025/0.040 x 2.75 x 6.0 inch (0.64/1.02 x 69.8 x 152 mm)
10	AMS 4901 titanium (Use AMS 3100 Adhesion Promoter)	0.025/0.040 x 2.75 x 6.0 inch (0.64/1.02 x 69.8 x 152 mm)
10	AMS 4045 aluminum alloy, anodized in accordance with AMS 2471, and coated with MIL-C-27725	0.040 x 2.75 x 6.0 inch (1.02 x 69.8 x 152 mm)
6	AMS 4045 aluminum alloy, anodized in accordance with AMS 2471, and coated with MIL-C-27725 (Use AMS 3100 Adhesion Promoter)	0.040 x 2.75 x 6.0 inch (1.02 x 69.8 x 152 mm)
2	AMS 4045 aluminum alloy, anodized in accordance with AMS 2471, coated with MIL-C-23377, and cured 7 days at standard conditions	0.040 x 2.75 x 6.0 inch (1.02 x 69.8 x 152 mm)

TABLE 5 - (Continued)

Quantity	Panel Material	Panel Dimensions
2	AMS 4045 aluminum alloy, anodized in accordance with AMS 2471, coated with MIL-P-23377, cured 2 hours at 200 °F (93 °C)	0.040 x 2.75 x 6.0 inch (1.02 x 69.8 x 152 mm)
2	AMS 4045 aluminum alloy, anodized in accordance with AMS 2471, primed with MIL-P-23377, and coated with MIL-C-83286 urethane topcoat	0.040 x 2.75 x 6.0 inch (1.02 x 69.8 x 152 mm)
2	AMS 4045 aluminum alloy, anodized in accordance with AMS 2471, coated with MIL-P-85582 waterbased primer (Use AMS 3100 adhesion promoter)	0.040 x 2.75 x 6.0 inch (1.02 x 69.8 x 152 mm)
6	Graphite Epoxy as in 4.5.2.2. Test both sides and tool side. Do not test both sides of the same panel	0.040 x 2.75 x 6.0 inch (1.02 x 69.8 x 152 mm)
6	Graphite Bismaleimide (BMI) as in 4.5.2.2.2. Test both sides and tool side. Do not test both sides of same panel.	0.040 x 2.75 x 6.0 inch (1.02 x 69.8 x 152 mm)

4.5.11.2 A 2 3/4 x 12 inch (69.8 x 305 mm) strip of CCC-C-419, Type III, cotton duck or a strip of wire screen (20 to 30 mesh aluminum or monel wire fabric) shall be impregnated with the sealing compound, so that approximately 5 inches (127 mm) at one end is completely covered on both sides.

4.5.11.3 The sealant coated end of the fabric shall be placed on the sealant coated panel, and smoothed down on the layer of sealing compound, taking care not to trap air beneath the fabric.

4.5.11.4 An additional coating of sealing compound shall be applied over the fabric approximately 1/32 inch (0.8 mm) thick.

4.5.11.5 The sealing compound shall be cured in accordance with 4.5.2.9. At the end of cure, two panels of each substrate listed in Table 4, except those coated with MIL-P-23377 primer, shall be subjected to immersion in JRF, AMS 2629 Type I at 140 °F (60 °C) for seven days.

4.5.11.5.1 In addition, two panels of each of the substrates marked with an asterisk (*) in Table 7 shall be subjected to each of the following test conditions:

70 days at 140 °F (60 °C) in AMS 2629, Type I, with fluid change every 14 days.

70 days at 140 °C (60 °C) in equal parts AMS 2629, Type I, and 3% by weight aqueous sodium chloride solution with fluid change every 14 days.

4.5.11.5.2 Four of the panels coated with MIL-P-23377 primer (two cured at standard conditions and two cured at 200 °F (93 °C)), two of the panels coated with MIL-C-83286 urethane topcoat, and two of the panels coated with MIL-P-85582 primer shall be subjected to seven days at 140 °F (60 °C) in 3% by weight aqueous sodium chloride solution.

4.5.11.6 After specified exposure, the panels shall be retained in the fluid for one day at standard conditions (4.5.1.1). Measure peel strength within five minutes after removal from the test fluid.

4.5.11.7 Two 1-inch (25-mm) wide strips shall be cut through the sealing compound and fabric to the metal and extended the full length of the fabric. The specimens shall be stripped back at an angle of 180 degrees to the metal panel in a suitable tensile testing machine having a jaw separation rate of 2 inches (51 mm) per minute. During the peel strength testing, three cuts shall be made through the sealing compound to the panel in an attempt to promote adhesive failure. The cuts shall be at approximately 1-inch (25-mm) intervals.

4.5.11.8 The results shall be the numerical average of the peak loads during cohesive failure. Failure of the sealant compound to the fabric shall not be included in the peel strength values.

4.5.11.9 Acceptance Tests: Prepare four AMS 4045 aluminum alloy panels measuring 0.040 x 2.75 x 6 inches (1.02 x 69.8 x 152 mm) sulfuric acid anodized in accordance with AMS 2471 and coated with MIL-C-27725.

4.5.12 Tensile Strength and Elongation: Mixed sealing compound shall be pressed between two polyethylene sheets 0.125 inch ± 0.015 (3.18 mm ± 0.38) thick to fabricate a cured sheet of sealing compound, removing the top sheet at the end of the tack-free time, and allowing the sealing compound to cure in accordance with 4.5.2.9. The cured sealant shall have a minimum hardness of 34 durometer "A" prior to testing. Twenty-four tensile specimens shall be cut from the sheet using die C, as specified in ASTM D 412. Three specimens shall be exposed to each of the following environmental conditions after standard cure as in 4.5.29:

Standard Cure as in 4.5.2.9
12 days at 140 °F (60 °C) + 60 hours at 160 °F (71 °C) + 6 hours at 180 °F (82 °C) all in AMS 2629 Type 1
Condition 2 + 24 hours at 120 °F (49 °C) + standard heat cycle as in 4.5.1.3
Standard heat cycle as in 4.5.1.3
72 hours in AMS 3021 at room temperature
72 hours in AMS 3020 at room temperature

Where fluid immersion is specified, the specimens shall be immersed in 400 mL of fluid. Specimens to be tested after the fluid immersion shall be cooled for 24 hours at 77 °F (25 °C) and tested within 5 minutes after removal from the fluid.

4.5.12 (Continued)

Specimens to be tested after oven aging shall be allowed to cool for 16 to 48 hours at standard conditions (4.5.1.1) before testing.

The tensile and elongation tests shall be conducted at standard conditions (4.5.1.1) and tested in accordance with ASTM D 412 at a jaw separation rate of 20 inches ± 1 (508 mm ± 25) per minute. Inspect to the requirements of 3.2.12 and 3.2.13.

4.5.13 Shear Strength (Class C Only): Six test panels, 0.040 x 1 x 3 inches (1.02 x 25 x 76 mm), shall be prepared from AMS 4049 aluminum alloy. Apply a coat of sealant 0.010 to 0.020 inch (0.025 to 0.51 mm) thick to one end of three panels covering approximately 1 inch (25 mm) on each panel. Overlap the sealant with another panel making a 1 square inch (6.45 cm^2) lap test specimen. Reduce the thickness of the sealant to 0.005 to 0.010 inch (0.13 to 0.25 mm). Cure the sealant in accordance with 4.5.2.9. Determine the shear strength by pulling in shear at a speed of 2 inches (51 mm) per minute.

4.5.14 Low-Temperature Flexibility:

4.5.14.1 Four AMS 4049 aluminum alloy test panels, 0.040 x 2.75 x 6 inches (1.02 x 69.8 x 152 mm), shall be prepared. A coating of the sealing compound 0.10 x 1.5 x 4 inches (2.5 x 38 x 102 mm) shall be applied to the center of each of the four panels. Care shall be taken to maintain an accurate sample thickness of 0.1 inch (2.5 mm). At the end of a standard cure, as in 4.5.2.8, the specimens shall be immersed in 900 mL of AMS 2629, Type I for 120 hours ± 4 at 140 °F (60 °C) followed by 60 hours ± 4 at 160 °F (70 °C) and 6 hours ± 1 at 180 °F (80 °C). At the completion of the fluid exposure, the specimens shall be removed from the fluid and given a standard heat cycle as in 4.5.1.2. All four panels shall then be immediately placed in a low-temperature flexibility fixture (See Figure 2) consisting of a clamp support that will grip both sides of both 6 inch (152 mm) edges of the panel for 3 inches (76 mm) from one end without touching the sealant. The fixture shall be capable of flexing the panel through a 30 degree arc, 15 degrees each side of the center, at a constant speed of one cycle per five seconds. The temperature shall be reduced to -65 °F (-54 °C), stabilized at this temperature for at least two hours, and the panels flexed through 130 consecutive cycles

4.5.15 Long-Term Storage: Three original unopened 1-pint (1/2 L) kits of sealing compounds (12 fluid ounces (355 mL) of base compound in each kit and the appropriate amount of curing compound) shall be stored at 77 °F (25 °C) for nine months. At the end of the storage period the compound shall be tested in accordance with 4.5.6, 4.5.7, 4.5.9, and 4.5.10.

4.5.16 Repairability:

4.5.16.1 Prepare sufficient number of AMS 4045 aluminum alloy panels measuring 0.040 x 2.75 x 6 inches (1.02 x 69.8 x 152 mm) so that there are two panels for each Class B-2 sealing compound already qualified to this specification, plus two panels for the material being qualified and two panels for material qualified to AMS 3276. Sulfuric acid anodize in accordance with AMS 2471 and overcoat with MIL-C-27725.

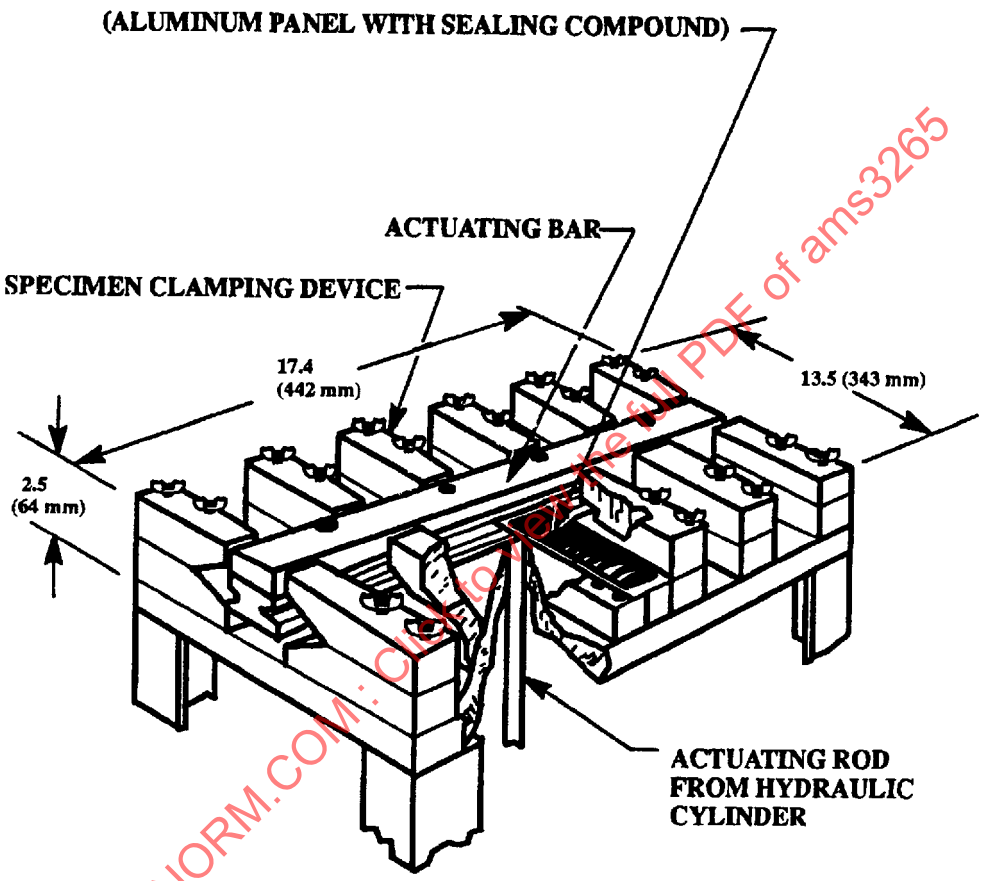
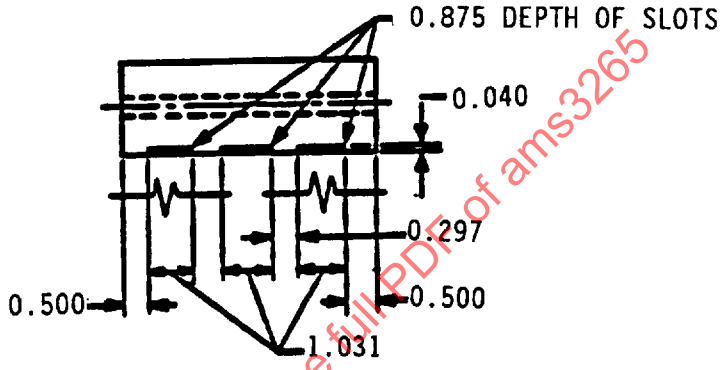


FIGURE 2 - Low Temperature Flexibility Apparatus

Inches	Millimeters
0.040	1.02
0.297	7.54
0.313	7.95
0.500	12.70
0.625	15.88
0.875	22.22
1	25
1.031	26.19
1.062	26.94
2	51
2.062	52.37
2.3759	60.32
2.625	66.68
4.500	114.30
5	127
6	152
6.125	155.58
9.250	234.95



VIEW SHOWING SLOTS FOR PANELS

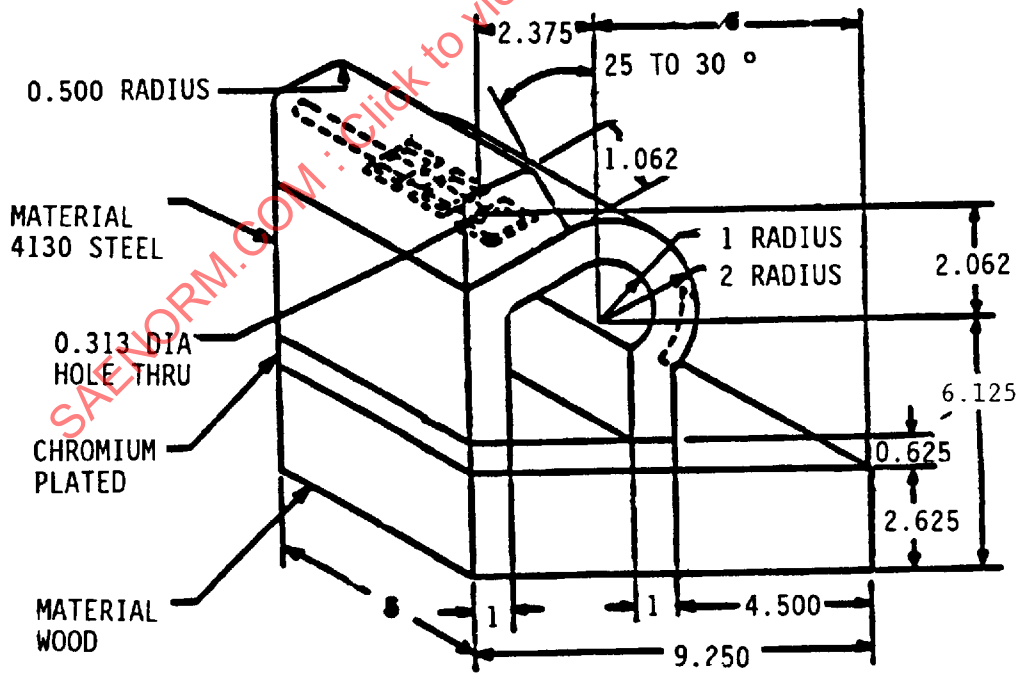


FIGURE 3 - Contour Block

4.5.16.2 Overcoat one side of the panels with 1/8 inch ± 1/64 (3.2 mm ± 0.4) of sealing compound so that two panels are coated with each Class B-2 sealing compound previously qualified to this specification, two panels are coated with AMS 3276 polysulfide sealing compound and two panels are coated with the sealing compound being qualified. After a standard cure per 4.5.2.9, expose one panel of each sealing compound to AMS 2629 JRF Type I for three days at 140 °F (60 °C), followed by three days air drying at 120 °F (49 °C), then seven days air aging at 250 °F (121 °C).

4.5.16.3 Clean all panels in accordance with 4.5.2.5 and apply a thickness of 0.125 inch (3.18 mm) of newly mixed sealing compound over the existing compound. A peel strength panel shall be prepared in accordance with 4.5.15. After a standard cure as in 4.5.2.8, the specimens shall be tested as specified in 4.5.15.

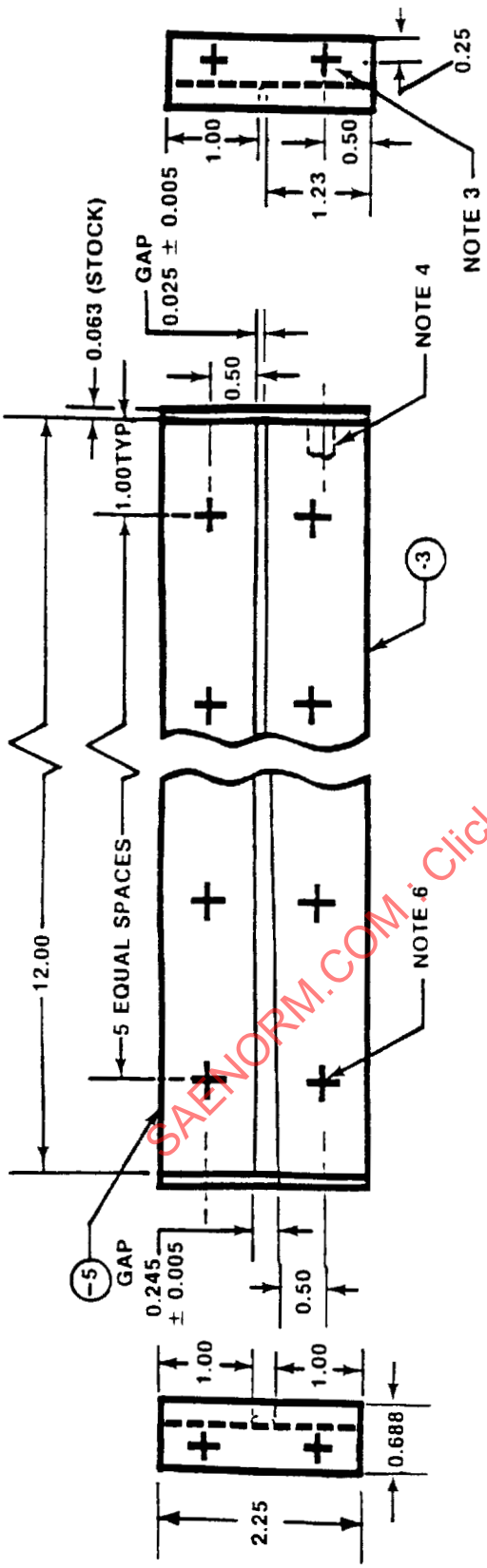
4.5.17 Paintability: Two 0.040 x 2.75 x 6 inches (1.01 x 70 x 152 mm) aluminum alloy AMS 4045 panels shall be sulfuric acid anodized in accordance with AMS 2471 and coated with MIL-C-27725. A thin layer of sealant, approximately 0.031 inch (0.79 mm) thick, shall be applied to one surface and allowed to cure at standard conditions. After curing, the sealant coated surface of one panel shall be painted with MIL-P-23377 primer and MIL-L-81352 acrylic coating. The sealant coated surface of the other panel shall be coated with MIL-P-23377 primer and MIL-C-83286 polyurethane coating. When the coatings are thoroughly cured they shall be tested for adhesion using a wet tape adhesion test in accordance with FED-STD-141, Method 6301.2. Soak the panels in distilled water for 24 hours. Inspect visually for separation of paint.

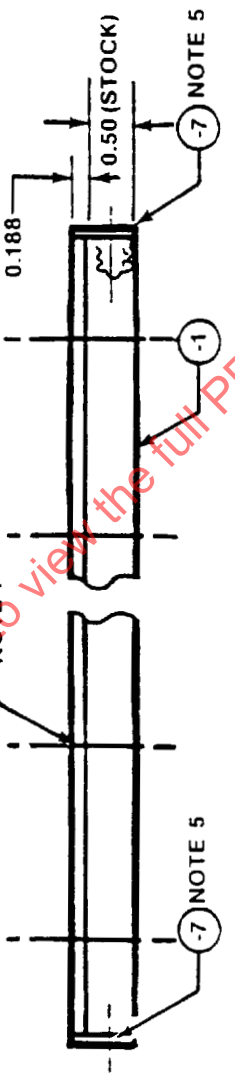
4.5.18 Shaving and Sanding (Class B Only): The groove and screw heads of a thermal expansion block (Figure 4), coated with MIL-P-23377, shall be filled with sealant allowing a small excess for shaving and sanding. After being given a standard cure, the excess compound shall be shaved off with a sharp razor blade and the surface sanded with 400 grit abrasive paper on a sanding block. Accomplishment of shaving and sanding shall be considered satisfactory if a smooth finish is obtained and unsatisfactory if the material rolls or tears while being worked. Inspect visually for evidence of rolling or tearing of sealant surface.

4.5.19 Corrosion:

4.5.19.1 Cyclic Loading and Exposure Test: Corrosion testing shall consist of stressed aluminum assemblies and mixed metal panels undergoing exposure to a corrosive environment.

4.5.19.1.1 Preparation of Test Assembly: Sufficient AMS 4045 aluminum alloy panels, chemically treated with MIL-C-81706, Class 1A, to produce coatings conforming to MIL-C-5541, shall be prepared to produce aluminum assemblies in accordance with Figure 5. All surface treatment shall be in accordance with MIL-S-5002, all sealants shall be mixed in accordance with manufacturer's instructions. Two assemblies shall be used for the corrosion test. Each corrosion assembly shall be prepared in accordance with Table 6. The prepared assemblies shall be exposed as specified in 4.5.19.1.6 and 4.5.19.1.7 and evaluated in accordance with 4.5.19.1.8.





INCHES	MILLIMETERS
0.005	0.13
0.01	0.25
0.02	0.51
0.03	0.76
0.63	1.60
0.188	4.78
0.245	6.22
0.25	6.4
0.261	6.63
0.50	12.7
0.688	17.48
1.00	25.4
1.23	31.2
2.25	57.2
12	305

NOTES:
1. Material: Aluminum alloy, 2024 per QQ-A-250/4, temper T81
2. Tolerances on dimensions: 0.XX — ±0.03, 0.XXX — 0.010.
3. 0.261 diameter hole two places in each —7.
4. Drill and tap for 1/4-inch bolt, typical two places each end of —1.
5. Attach —7 to —1 with 1/4 inch bolts, four places.
6. Install NAS1154-10 screw and MS21042L4 nut, 12 places.
7. Install screws 0.005 to 0.020 below surfaces of —3 and —5.
8. Dimensions are in inches (millimeters).

FIGURE 4 - Thermal Expansion Block

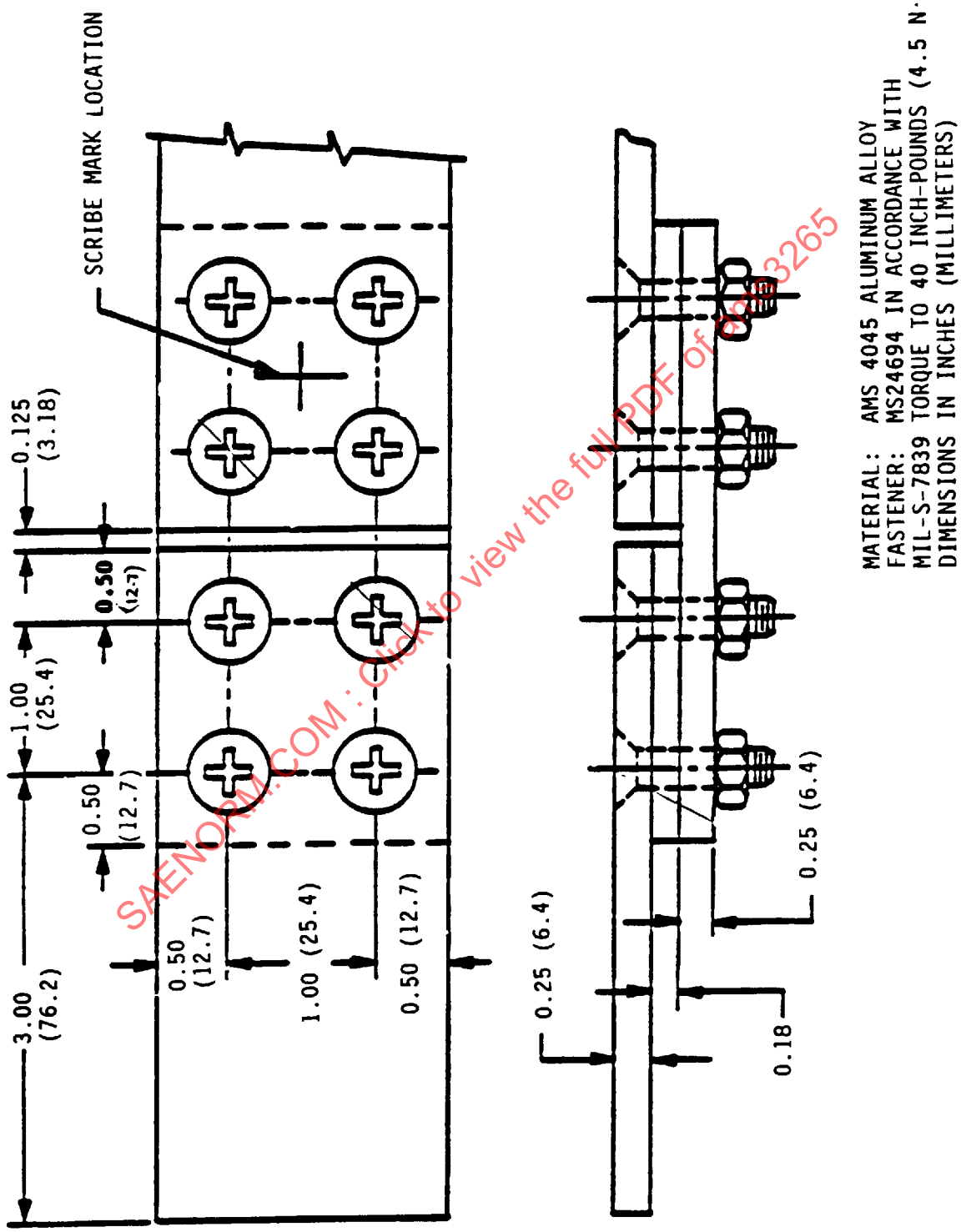


FIGURE 5 - Assembly Configuration for Cycle and Exposure

TABLE 6 - Preparation Sequence of Corrosion Test Assemblies

Sequence Step	Assembly Preparation
	Two assemblies shall be prepared as follows:
1	Approximately 5 mils (0.13 mm) Class C sealing compound shall be applied to one side of each panel by spatula. After one to two hours the coated sides of the panels shall be mated.
2	Threaded fasteners conforming to MIL-S-7839 shall be dipped into Class A compound, then inserted into the freshly matted panels and torqued to 40 inch pounds (4.6 N·m).
3	Class B compound shall be applied by gun to the butt joint. Using a spatula, cover over and around the fastener head, backs (nuts) and all edges.
4	Brush Class A compound over the entire assembly to a thickness of 5 to 7 mils (0.13 to 0.18 mm)
5	Cure the assembly in accordance with 4.5.2.9.
6	After curing, scribe one half of the front side of each assembly as shown in Figure 4.

4.5.19.1.2 Mixed Couple: All sealant types shall be subjected to mixed couple corrosion testing. Two test panels of each type assembled, as indicated in Table 7, cleaned in accordance with 4.5.25, and configured as shown in Figure 6, shall be used for each sealant.

TABLE 7 - Mixed Couple Assemblies

Assembly	Metal B (Figure 6)	Metal A (Figure 6)
1	Aluminum[1]	Titanium[2]
2	Aluminum[1]	Aluminum[3]
3	Aluminum[1]	Epoxy/Graphite[4]

[1] AMS 4045 treated with MIL-C-81706, Class 1A, materials
[2] MIL-T-9046, Type III, Composite C (6 A1 - 4V)
[3] AMS 4049
[4] AS4/3501-6 in accordance with 4.5.2.2

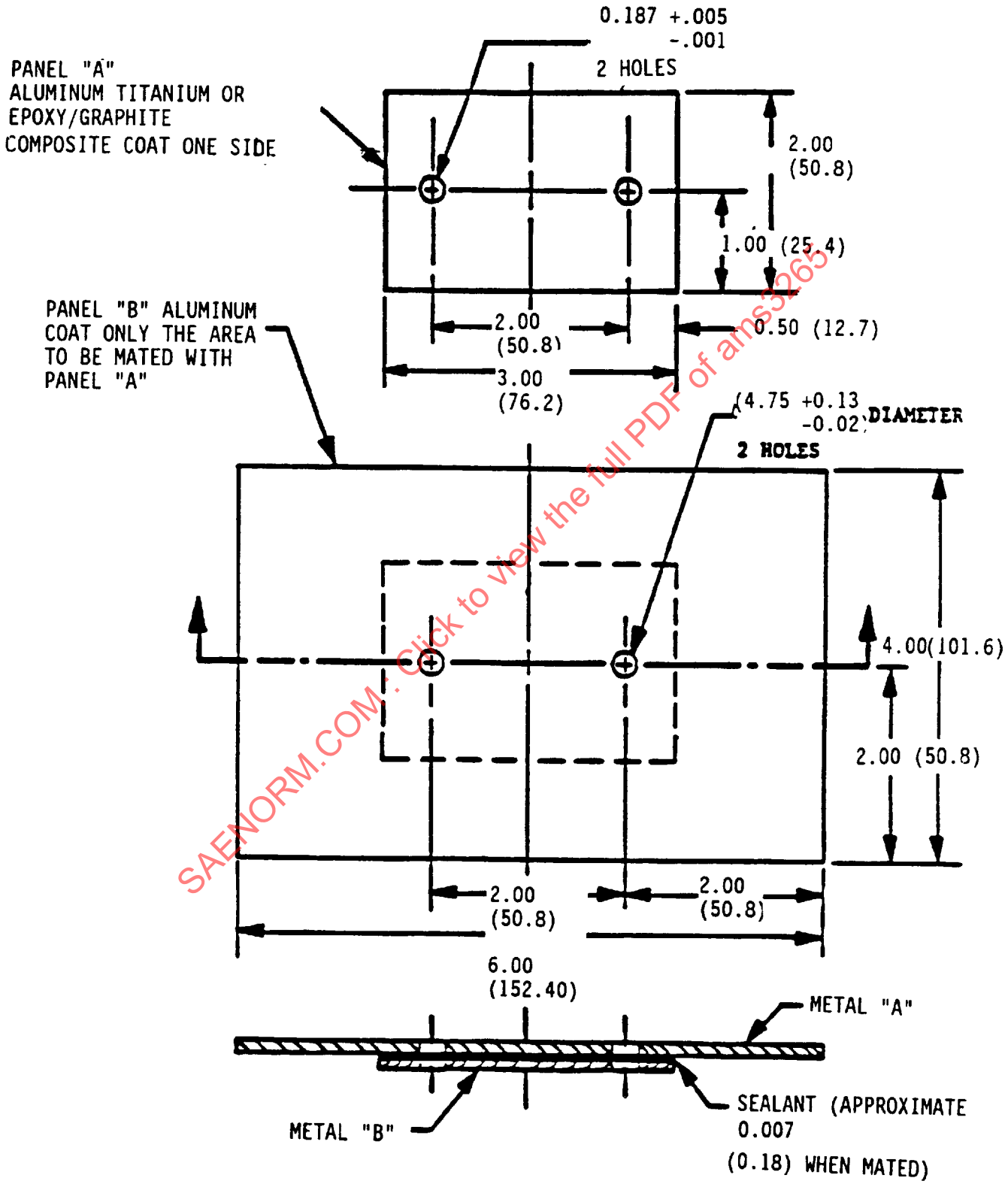


FIGURE 6 - Mixed Couple Assembly

4.5.19.1.3 Assembly Preparation: Five to 7 mils (0.13 to 0.18 mm) of sealant shall be applied to one side of each metal (See Figure 6). The coated portions shall be mated using inert nonmetal fasteners (e.g. nylon) tightened to produce a total sealant thickness of approximately 7 mils (0.18 mm). Excess sealant shall be carefully removed from the panel surface. Class C sealant shall not be mated until one to two hours after panels are coated.

4.5.19.1.4 Exposure: Mixed couple assemblies shall be exposed as specified in 4.5.19.1.7 and evaluated as in 4.5.19.1.8.

4 5.19.1.5 Stress Cycling, Exposure, and Evaluation of Assemblies:

4.5.19.1.6 Cyclic Loading: Assemblies prepared in 4.5.19.1.1 shall be installed vertically in the jaws of a machine capable of cycling between 0 and 5000 pounds force (22,241 N) for 250 cycles with a loading rate of 10 inches (254 mm) per minute. The assembly shall be subjected to 250 cycles at -65 °F (-54 °C) after a thirty-minute soak time at -65 °F (-54 °C) under no load.

4.5.19.1.7 Exposure: The prestressed or mixed couple assembly shall be exposed for four weeks in a salt spray cabinet meeting the requirements of ASTM B 117, Appendix 1. The test shall be conducted under the following conditions:

Salt solution: 5% by weight sodium chloride
Cabinet temperature: 95 °F (35 °C)
Saturator Tower Temperature: 115 °F (46 °C)
Cycle: Continuous spray; for one hour in every six hours, four times daily, at a flow rate of 1 mL/minute/cubic foot (0.03 m^3) of box.

4.5.19.1.7.1 The collected solution in the cabinet shall be tested weekly and shall conform to the following conditions:

1 to 2 ml/hour collection rate
pH: 2.5 to 3.2
Specific gravity: 1.02 to 1.04

4.5.19.1.8 Evaluation: When removed from the exposure cabinet, each assembly shall be disassembled. After the sealant has been carefully stripped from all surfaces, the assembly shall be evaluated for corrosion with respect to sealant function. Countersinks as well as adjacent areas, and faying surfaces shall be examined at 30X magnification. All surfaces shall be visually examined for evidence of corrosion.

4.5.19.2 Galvanic Cell Crevice Corrosion Test: Prepare sealant/panel assemblies in accordance with Table 8 and as follows. Solvent clean 2.75 x 6 inch (69.8 x 152 mm) aluminum panels per 4.5.2.5. Apply six strips of sealant 0.50 x 2.75 x 0.020 inch (12.7 x 69.8 x 0.51 mm) leaving 0.50 inch (12.7 mm) gaps between each strip and cure per standard conditions (4.5.2.8). Apply the second cleaned panel of the same size over the first and join on the end with the same sealant used to prepare the strips. Use electrical wire to connect both panels together to create a complete circuit to initiate the drive for corrosion. Half-immerse the panel-couple into a 3% saline solution for the specified test period in accordance with 3.2. Periodically add back distilled water to maintain a constant level. At the end of the test period, disassemble the panel-couples and examine visually for evidence of corrosion.

TABLE 8 - Galvanic Cell/Crevice Corrosion Test Assemblies

Assembly	Metal	Metal
1	AMS 4045 Aluminum	AMS 4911 or MAM 4911 titanium
2	AMS 4045 Aluminum	AMS 2400 cadmium plated low alloy steel
3	AMS 4045 Aluminum	Epoxy/graphite composite (See 4.5.2.2)

4.5.20 Weight Loss, Flexibility, and Swell:

4.5.21.1 Four, 0.125 x 1 x 5 inch (3.18 x 25 x 127 mm), specimens shall be cut from a sheet of the sealing compound that has been cured in accordance with 4.5.2.8.

4.5.21.2 Specimens shall be weighed in air (W_1) and in water (W_2) and then dried. The specimens shall be immersed in 900 mL of AMS 2629, Type 1, for seven days at 140 °F (60 °C) in a closed container. At the end of the exposure period, the specimens shall be removed from the fluid, dipped momentarily in methyl alcohol, and reweighed in air (W_3) and in water (W_4). The specimens shall be dried for 24 hours at 120 °F (49 °C), cooled to standard conditions (4.5.1.1) in a desiccator, and weighed (W_5). The percent swell shall be calculated using Equation 3 and percent weight loss shall be calculated using Equation 4.

$$\text{Percent Swell} = \frac{(W_2 + W_3) - (W_1 + W_4)}{W_1 - W_2} \times 100 \qquad \text{(Eq.3)}$$

$$\text{Percent Weight Loss} = \frac{(W_1 - W_5)}{W_1} \times 100 \qquad \text{(Eq.4)}$$

4.5.20.3 After weighing, the specimens shall be bent 180 degrees over a 0.125-inch (3.18-mm) mandrel. Visual evidence of cracking or checking is not acceptable.