1 SCOPE

a. This specification defines the requirements for room temperature curing two–part epoxy paste adhesive systems for general use where moderate peel strength and high shear strength is required over a temperature range of –67 F to 300 F.

b. This specification requires qualified products.

1.1 CONTENTS

Not applicable to this standard.

2 CLASSIFICATION

Not applicable to this standard.

3 REFERENCES

The issue of the following references in effect on the date of invitation for bid shall form a part of this specification to the extent indicated herein.

ASTM D 2471 – Gel Time and Peak Exothermic Temperature of Reacting Thermosetting Resins

ASTM E 595 – Total Mass Loss and Collected Volatile Condensable Materials from Outgassing in a Vacuum Environment

BAC5514–589 – Application of Corrosion Inhibiting Adhesive Primer

BAC5555 – Phosphoric Acid Anodizing of Aluminum for Structural Bonding

BSS7202 – Shear, Lap, Adhesive Bond

BSS7206 – Peel, Metal to Metal, Adhesive Bonded

BSS7226 – Flow Test for Adhesives/Sealants

4 DEFINITIONS

Batch – A batch of adhesive is defined as a quantity of homogeneous material manufactured in one continuous production run.

5 MATERIAL REQUIREMENTS

5.1 GENERAL

a. Materials shall be uniform, contain no lumps or unmixed ingredients, and be free from foreign materials.

b. The two parts of the adhesive shall be capable of being easily mixed by mechanical or manual methods to form a homogeneous system of uniform consistency and color.

c. The base resin and hardener shall be of different colors to show that complete mixing is achieved when a uniform color results.

5.2 PHYSICAL PROPERTIES

The adhesives shall meet the requirements of Table I when tested per Section 8.

5.3 SHELF LIFE

The adhesives shall be capable of meeting all the requirements of this specification when stored below 80 F in original unopened containers for 1 year after date of receipt.

TABLE I PHYSICAL PROPERTY REQUIREMENTS

Property	Requirements			Test Method
	Maximum	Minimum Average	Minimum Individual	Section
Lap Shear Strength, psi				8.1
–67 ± 5 F	–	3000	2750	
75 ± 5 F	–	3000	2750	
180 ± 5 F	–	2500	2250	
300 ± 5 F	–	1500	1250	
400 ± 5 F	–	450	400	
75 ± 5 F after 30 +1/–0 days salt spray	–	3000	2750	
75 ± 5 F after 30 +1/–0 days at 120 F/100% RH	–	3000	2750	
75 ± 5 F after 30 +1/–0 days soak in distilled water	–	3000	2750	
75 ± 5 F after 168 ± 2 hours in:				
MIL–H–5606 hydraulic fluid	–	3000	2750	
BMS3–11, Type IV fluid	–	3000	2750	
JP–4 fuel per MIL–T–5624	–	3000	2750	
MIL–L–23699 oil	–	3000	2750	
Peel Strength, ppi	–	4.0	2.5	8.2
Pot Life, minutes, (minimum)	–	(60)		8.3
Outgassing				8.4
Total Mass Loss (TML), %, max	1.5	–	–	
Collected Volatile Condensable Material (CVCM), %, max	0.1	–	–	
Dry Mass Loss (TML–WVR), %, max	1.2	–	–	8.4
Flow, inches, max	0.5	–	–	8.5

6 QUALIFICATION

a. All requests for qualification shall be directed to a Boeing Materiel department which will request data and samples when desired for qualification purposes. Materiel will forward the request to the appropriate Engineering department for evaluation. After receiving written authorization from Materiel, the manufacturer shall submit data demonstrating conformance with the requirements of the specification and samples required for qualification purposes.

b. No changes in approved product formulation, raw material, basic methods of manufacture, or plant site shall be made without notification and prior approval in writing. Requalification of the revised material may be required and a revised supplier designation may be requested in these instances. Qualified products will be listed in the QPL.

7 QUALITY CONTROL

7.1 SUPPLIER QUALITY CONTROL

Suppliers shall furnish actual test data showing conformance to Table I lap shear test requirements at 75 F and 300 F, and the pot life requirement for each material batch. Such data shall also be identified with the specification revision letter in effect at the time of bid.

7.2 PURCHASER QUALITY CONTROL

a. Purchaser Quality Assurance (QA) shall review the supplier test data submitted with the shipment and shall perform the room temperature lap shear test. QA may also perform any additional inspection or testing necessary to assure that the production material meets all the requirements specified herein.

b. When consistent performance to specification acceptance (receiving) requirements has been demonstrated, Quality Assurance may implement reduced testing in accordance with a suitable sampling plan. Authorization of a reduced testing plan shall be on a Boeing division basis and shall be documented by that Boeing division.

8 MATERIAL TEST METHODS

8.1 LAP SHEAR

a. Use aluminum alloy panels as described in BSS7202, Type I, for all tests.

b. A minimum of five specimens are required for each property test.

c. Unless stated otherwise, test temperature shall be room temperature (75 ± 5 F).

d. Aluminum bond surfaces shall be anodized per BAC5555 and primed per BAC5514–589.

e. Thoroughly mix a suitable quantity of adhesive using the base/hardener proportions listed in the applicable QPL entry.

8.1 LAP SHEAR (Continued)

f. Apply a uniform coating of mixed adhesive to all faying surfaces of the test panels. Bondline thickness shall be controlled between 0.003 and 0.010 inch by applying fine inert threads in the bondline preferably in a discard portion of the panel and parallel to the longitudinal axis of the specimens.

g. Assemble the test panels and apply 5 to 15 psi contact pressure to insure uniform adhesive squeezeout and the removal of entrapped air. Pressure may be applied by dead weight or by vacuum bag. Vacuum bag is preferred. Pressure may be removed after a minimum of 16 hours cure at 70 ± 10 F.

h. For qualification test, cure at 70 ± 10 F for a minimum of 7 days. For receiving inspection test, specimens may be cured as described above or may be cured at 70 ± 10 F for 16 hours followed by curing at 150 ± 20 F for 130 ± 10 minutes.

i. Report test values, mode of bond failure, and bondline thickness.

j. Individual specimens failing Table I requirements shall be examined visually. Specimens showing too thin or thick bondlines, or less than 90 percent cohesive failure within the adhesive or incomplete adhesive coverage shall be discarded. Additional specimens shall be run, if necessary to provide a minimum of five valid tests.

8.2 PEEL

Peel test shall be conducted in accordance with BSS7206, Class 1, with the following conditions:

a. Aluminum bond surfaces shall be anodized per BAC5555 and primed per BAC5514–589.

b. Thoroughly mix a suitable quantity of adhesive using the base/hardener proportions listed in the applicable QPL entry. Apply a thin, uniform coating of adhesive to both faying surfaces and assemble the test panel.

c. Bondline thickness shall be 0.003 to 0.010 inch.

d. Panels shall be cured 7 days, minimum, at 70 ± 10 F under 1 to 5 psi. Cure pressure may be applied either by dead weight or by vacuum bag. Vacuum bag is preferred. Pressure may be removed after a minimum of 16 hours cure. For receiving inspection test, specimens may be cured as described above or may be cured at 70 ± 10 F for a minimum of 16 hours followed by curing at 150 ± 20 F for 130 ± 10 minutes.

8.3 POT LIFE

Measure the pot life according to ASTM D 2471 using a 100 gram sample blended at the mix ratio indicated in the QPL.

8.4 OUTGASSING

Determine the total mass loss (TML), collected volatile condensable material (CVCM) and water vapor regained (WVR) in accordance with ASTM E 595 using a sample blended for at least 2 minutes at the mix ratio indicated in the QPL and cured 7 days minimum at 70 ± 10 F. Calculate the dry mass loss as follows:

Dry mass loss = (TML)–(WVR)

8.5 FLOW

a. Thoroughly mix a suitable quantity of adhesive using the base/hardener proportions listed in the applicable QPL entry.

b. Conduct flow test in accordance with BSS7226.

9 MATERIAL IDENTIFICATION

Each container shall be durably and legibly marked with the following information:

a. BMS5–141 (including latest revision letter)

b. Supplier's name and product designation

c. Date of manufacture and date of shipment

d. Batch number

e. Quantity

f. Mix ratio per the QPL

10 PACKAGING AND MARKING

a. Packaging shall be such as to insure safe delivery.

b. Mark each container durably and legibly with the following information:

(1) Items 9a. through 9e. above.

(2) Purchase order number.