1 SCOPE

a. This specification establishes the requirements for modified two part paste epoxy adhesives for general purpose use.

b. This specification requires qualified products.

1.1 CONTENTS

1.1 CONTENTS (Continued)

LIST OF FIGURES

LIST OF TABLES

2 CLASSIFICATION

This specification consists of the following Types and Classes.

2.1 TYPES

Type I	A viscous liquid two–part gray colored adhesive	
	Part A	Hardener, gray colored
	Part B	Resin, white colored
	If no Class is specified on the Engineering drawing, use Class 4	
Type II	Obsolete. Use Type I.	
Type III	A viscous liquid two–part adhesive	
	Part A	Hardener
	Part B	Resin
	If no Class is specified on the Engineering drawing, use Class 2	
Type IV	A viscous liquid two–part amber translucent adhesive	
	Part A	Hardener, amber
	Part B	Resin, clear
	If no Class is specified on the Engineering drawing, use Class 3	
Type V	A viscous liquid two–part adhesive	
	Part A	Hardener, amber
	Part B	Resin, dark gray or white
	If no Class is specified on the Engineering drawing, use Class 1 or 2	

2.2 CLASSES

The Class of the material refers to the pot life of the blended adhesive.

Class 1	–	20 minutes from blending
Class 2	–	60 minutes from blending
Class 3	–	90 minutes from blending
Class 4	–	120 minutes from blending

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 1875	–	Density of Adhesives in Fluid Form, Test Method for
BAC5010	–	Application of Adhesives
BAC5514	–	Common Bonding Requirements for Structural Adhesive
BAC5514–589	–	Application of Corrosion Inhibiting Adhesive Primer
BAC5524	–	Manufacture of Glass/Epoxy Laminates and Sandwich Panels Using 260 F Cure
BAC5564	–	Fabrication of Crushed Core Sandwich Panels
BSS7202	–	Shear, Lap, Adhesive Bond
BSS7206	–	Peel, Metal to Metal, Adhesive Bonded
BSS7211	–	Environmental Exposure, High Humidity
BSS7230	–	Flammability Properties of Aircraft Materials, Determination of
OSHA 1910.1200	–	Hazard Communication Standard
RE–ADD–030	–	Hazard Communication Program

4 DEFINITIONS

Not applicable to this specification.

5 MATERIAL REQUIREMENTS

Health hazard evaluation shall be performed for each new material qualified to this specification in accordance with RE–ADD–030 to establish its usage precautions.

5.1 GENERAL

a. The materials shall be uniform and free from foreign materials.

b. The two parts of the adhesive shall be capable of being easily mixed individually using either mechanical or manual mixing.

c. The two parts of the adhesive shall be capable of being easily blended to form a homogeneous adhesive.

d. The material, when stored at 33 to 80 F, shall meet all requirements of this specification for a minimum of 12 months from date of acceptance.

5.2 PHYSICAL PROPERTIES

The adhesive shall meet the requirements of Table I.

TABLE I PHYSICAL PROPERTIES

PROPERTY	REQUIREMENT		TEST METHOD
Weight **FL 1**			ASTM D 1875
Type I			
Part A	10.3 to 11.2 lb/gallon		
Part B	10.9 to 11.8 lb/gallon		
Type III			
Part A	9.1 to 11.2 lb/gallon		
Part B	8.3 to 11.8 lb/gallon		
Type IV			
Part A	8.0 to 8.4 lb/gallon		
Part B	9.4 to 9.8 lb/gallon		
Type V			
Part A	8.9 to 9.5 lb/gallon		
Part B	9.2 to 9.8 lb/gallon		
Pot Life All Types **FL 1**	Shall meet 70 ± 10 F shear strength requirement after:		Section 8.4
Class 4	120 minutes from blending		
Class 3	90 minutes from blending		
Class 2	60 minutes from blending		
Class 1	20 minutes from blending		
Shear Strength at:	Minimum Average	Minimum Individual	Sections 8.1, 8.3,
70 ± 10 F			and 8.5
Type I and III	2500 psi	2200 psi	
Type IV	1500 psi	1250 psi	
Type V	4200 psi	4000 psi	
160 ± 10 F			
Type I and III	850 psi	820 psi	
Type IV	270 psi	250 psi	
Type V	1100 psi	1000 psi	
70 ± 10 F after 14 days condensing humidity			
Type I and III	2250 psi	2000 psi	
Type IV	1300 psi	1150 psi	
Type V	4000 psi	3800 psi	
Peel Strength			Sections 8.2, 8.3
Type I	23 lbs/inch width	20 lbs/inch width	and 8.6
Type III	45 lbs/inch width	40 lbs/inch width	
Type V	90 lbs/inch width	80 lbs/inch width	

5.2 PHYSICAL PROPERTIES (Continued)

TABLE I PHYSICAL PROPERTIES (Continued)

PROPERTY	REQUIREMENT			TEST METHOD
Flammability 60 second vertical	Burn Length (in., max. avg.)	Extinguishing Time (sec., max. avg.)	Drip Extinguishing Time (sec., max. avg.)	Sections 8.7 and 8.8
Type I and V	5	6	3	
Type III	5	12	3	
Flammability **FL 1** 15 second horizontal	Burn Rate (in./min., max)			Section 8.9
Type I	3.0			
Type III and V	3.8			

FL 1 Quality control test for each batch.

6 QUALIFICATION

a. Direct all requests for qualification to a Supplier Management and Procurement (SM&P) organization of The Boeing Company. SM&P coordinates all communication between material suppliers and the appropriate Boeing departments.

b. The material supplier shall have facilities capable of testing in accordance with this specification, or the supplier shall identify a testing facility. Boeing Engineering and Quality Assurance shall verify the adequacy of all test facilities and test procedures.

c. Prior to submitting a material for qualification to this specification, the material supplier shall provide a Material Safety Data Sheet and, a chemical formulation for the candidate material. Agreements for non–disclosure and control of proprietary information shall be considered and executed as appropriate. The information provided shall be submitted to the appropriate Boeing Safety, Health, and Environmental Affairs organizations to perform a health hazard evaluation. These organizations determine whether the information is adequate, or whether additional information is necessary, to identify and document appropriate precautions for the material's use.

d. No changes in approved product formulation, raw materials, basic methods of manufacture, or plant site for a material qualified to this specification shall be made without notification and prior approval in writing from The Boeing Company. It may be necessary to requalify material manufactured with the proposed change, and a revised product designation may be required.

e. Production material shall be capable of meeting all qualification requirements.

f. Qualified products are listed in the Qualified Products List.

g. After receiving written authorization from SM&P, the manufacturer shall submit a report with qualification data and two quarts of each part for qualification testing at Boeing. Three production batches shall be evaluated. It is important for the qualification material to be manufactured in the supplier's production environment, and in accordance with a process control document.

6 QUALIFICATION (Continued)

h. An audit of the manufacturer's process shall be a part of the qualification to assure that processing is documented and complies with this specification.

i. Handling tests shall be performed to show that material and packaging is suitable for use.

j. Design related tests such as allowable loads may be required to show suitability for use.

7 QUALITY CONTROL

7.1 SUPPLIER QUALITY CONTROL

Supplier shall furnish actual test data showing conformance with the weight and potlife requirements of Section 5, for each batch of material, and shall identify such data with the specification revision letter in effect.

7.2 PURCHASER QUALITY CONTROL

a. Purchaser Quality Assurance shall review all supplier test data submitted with shipment and perform any additional inspection or testing necessary to assure that the production material meets all the requirements specified herein.

b. Purchaser Quality Assurance shall perform the following tests on every production shipment:

Pot Life	Section 8.4
15 Second Horizontal Flammability **FL 1**	Section 8.9

FL 1 Required on material to be used in facilities manufacturing parts under the auspices of D6–49225.

c. When consistent conformance 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 approved by Boeing Quality Assurance.

NOTE: Outside contractors may omit quality control tests providing they receive evidence from the supplier that representative samples of the batch have been tested and approved by a Boeing Company Quality Assurance laboratory or the material was purchased from or provided by The Boeing Company, has a dated Boeing inspection stamp, and has not exceeded the storage requirements of Section 5.1d.

8 MATERIAL TEST METHODS

All tests shall be performed at 75 ± 5 F except when otherwise specified.

8.1 LAP SHEAR PANEL PREPARATION

a. Use 2024–T3 aluminum specimens in accordance with BSS7202, Type I.

b. Prepare specimen bonding surfaces in accordance with BAC5514.

c. Apply and cure BMS5–89 primer in accordance with BAC5514–589.

8.2 MODIFIED ROLLER PEEL PANEL PREPARATION

a. Use 2024–T3 aluminum specimens in accordance with BSS7206.

b. Prepare specimen bonding surfaces in accordance with BAC5514.

c. Apply and cure BMS5–89 primer in accordance with BAC5514–589.

8.3 ADHESIVE PREPARATION

Blend the adhesives weighed to an accuracy of ±2 percent as follows:

a. Type I – Blend 58 grams of Component A with 42 grams of Component B

b. Types III and V – Blend Component A with Component B in accordance with vendor instructions

c. Type IV – Blend 50 grams of Component A with 50 grams of Component B

8.4 POT LIFE DETERMINATION

a. For Types I, III and IV, blend a nominal 100 grams of adhesive and for Type V, blend a nominal 20 grams of adhesive.

b. Store the blended adhesive for the following time periods prior to use:

All Types:

Class 4	–	120 +0/–10 minutes
Class 3	–	90 +0/–10 minutes
Class 2	–	60 +0/–10 minutes
Class 1	–	20 +0/–10 minutes

c. Prepare aluminum specimens for bonding in accordance with Section 8.1.

d. Apply a thin layer of adhesive to each of the bonding surfaces and assemble in accordance with BAC5010 and BSS7202, Type I.

e. Apply 2 to 5 psi pressure and cure the specimens for 7 days minimum at 70 ± 10 F or for 3 to 4 hours at 130 to 180 F.

f. Test a minimum of five specimens at 70 ± 10 F for lap shear strength in accordance with BSS7202, Type I.

8.5 SHEAR STRENGTH

a. Prepare aluminum specimens for bonding in accordance with Section 8.1.

b. Apply a thin layer of blended adhesive to each of the bonding surfaces and assemble in accordance with BAC5010 and BSS7202, Type I.

c. Apply 2 to 5 psi pressure and cure the specimens for 7 days minimum at 70 ± 10 F or for 3 to 4 hours at 130 to 180 F.

d. Test a minimum of five specimens in accordance with BSS7202, Type I at the following conditions:

(1) 70 ± 10 F

(2) 160 ± 10 F after conditioning at 160 ± 5 F for 30 minutes

(3) 70 ± 10 F after 14 days exposure to condensing humidity at 160 ± 10 F in accordance with BSS7211.

8.6 PEEL STRENGTH

a. Prepare aluminum specimens for bonding in accordance with Section 8.2.

b. Apply a thin layer of blended adhesive to each of the bonding surfaces and assemble in accordance with BAC5010 and BSS7206, Type II.

c. Apply 2 to 5 psi pressure and cure the specimens for 7 days minimum at 70 ± 10 F.

d. Test a minimum of five specimens in accordance with BSS7206, Class 2 at 75 ± 5 F.

8.7 FLAMMABILITY PANEL PREPARATION

a. Fabricate one 0.080 ± 0.005 F by 10 by 13 inch nominal crushed core panel in accordance with BAC5564, Method C using the layup as shown in Figure 1.

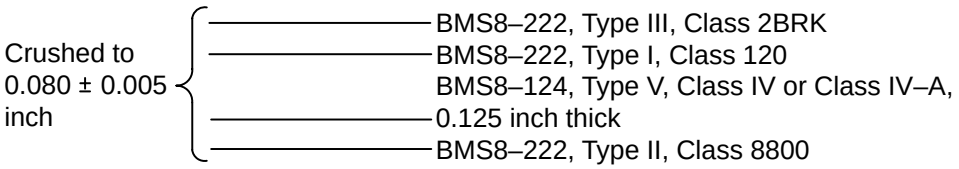

FIGURE 1 CRUSHED CORE PANEL LAYUP

b. Apply BMS5–127, Type II adhesive to the panel in accordance with BAC5010, Type 72 and bond a non–reinforced decorative Tedlar laminate (NRDTL) using the layup as shown in Figure 2.

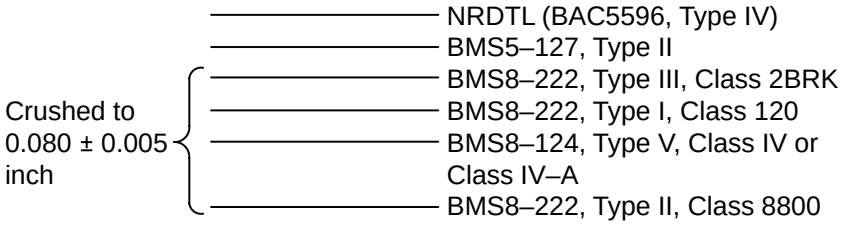

FIGURE 2 DECORATIVE TEDLAR LAMINATED CRUSHED CORE PANEL

8.7 FLAMMABILITY PANEL PREPARATION (Continued)

c. Cure under a minimum of 20 inch Hg vacuum at 200 ± 10 F for a minimum of 90 minutes.

d. Fabricate one 0.250 ± 0.005 F by 10 by 13 inch nominal vacuum bagged panel in accordance with BAC5524, Method A using the layup as shown in Figure 3.

BMS8–124, Type V, Class IV or Class IV–A, 0.250 ± 0.005 inch thick
BMS8–151, Type III, Class 1

FIGURE 3 VACUUM BAGGED PANEL LAYUP

e. Apply adhesive to the crushed core panel using a serrated scraper and assemble the two panels together as shown in Figure 4.

NRDTL (BAC5596, Type IV)
BMS5–127, Type II
BMS8–222, Type III, Class 2BRK
BMS8–222, Type I, Class 120
BMS8–124, Type V, Class IV or Class IV–A 0.125 ± 0.005 inch thick
BMS8–222, Type II, Class 8800
Adhesive
BMS8–124, Type V, Class IV or Class IV–A, 0.250 ± 0.005 inch thick
BMS8–151, Type III, Class 1

FIGURE 4 FLAMMABILITY TEST PANEL

f. Cure under a minimum of 20 inch Hg vacuum at 70 ± 10 F for 7 days minimum.

8.8 FLAMMABILITY – 60 SECOND VERTICAL

a. Trim a nominal 0.5 inch from each side of the test panel fabricated in Section 8.7.

b. Cut the resulting panels into three 3 by 12 inch nominal test specimens.

c. Test all three specimens for flammability in accordance with BSS7230, Method F1 (60–second ignition vertical test).

8.9 FLAMMABILITY – 15 SECOND HORIZONTAL

a. Cut three 3 by 13 inch nominal pieces of fiberglass tape, Style 116.

b. Coat one side of each specimen with a layer of adhesive 12 ± 5 mils thick.

c. Cure for 7 days minimum at 70 ± 10 F or 3 to 4 hours at 130 to 180 F.

d. Test all three specimens for flammability in accordance with BSS7230, Method F3 (15–second ignition horizontal test).

9 MATERIAL IDENTIFICATION

Individual containers shall be legibly and durably marked with the following information:

a. BMS5–92 (including latest revision letter), Type, and Class

b. Supplier’s name and product designation

c. Date of manufacture

d. Batch or lot number

10 PACKAGING AND MARKING

a. Packaging shall be accomplished in such a manner as to assure delivery of material capable of meeting the requirements of this specification.

b. All labeling shall conform to OSHA 1910.1200.

c. Each container shall be durably and legibly marked with the following information and in accordance with FED–STD–123.

(1) BMS5–92 (including the latest revision letter), Type, and Class

(2) Supplier’s name and product designation

(3) Date of manufacture

(4) Purchase order number

(5) Quantity

(6) Batch or lot number

(7) Supplier Blending Instructions (Types III and V)