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400 COMMONWEALTH DRIVE, WARRENDALE, PA 15096

AEROSPACE MATERIAL SPECIFICATION

AMS 3706

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Revised

EPOXY RESIN, POLYFUNCTIONAL SOLID

1. SCOPE:

1.1 Form: This specification covers a polyglycidyl ether of a bisphenol A Novalac prepolymer in the form of a solid.

1.2 Application: Primarily for use in manufacture of high temperature composite matrices and adhesives requiring a hard resin.

2. APPLICABLE DOCUMENTS: The following publications form a part of this specification to the extent specified herein. The latest issue of Aerospace Material Specifications shall apply. The applicable issue of other documents shall be as specified in AMS 2350.

2.1 SAE Publications: Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096.

2.1.1 Aerospace Material Specifications:

AMS 2350 - Standards and Test Methods
AMS 2825 - Material Safety Data Sheets

2.2 ASTM Publications: Available from American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.

ASTM D1652 - Epoxy Content of Epoxy Resins
ASTM D1726 - Hydrolyzable Chlorine Content of Liquid Epoxy Resins
ASTM D1763 - Epoxy Resins

2.3 U.S. Government Publications: Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

2.3.1 Military Standards:

MIL-STD-794 - Parts and Equipment, Procedures for Packaging and Packing of

REAFFIRMED

3. TECHNICAL REQUIREMENTS:

3.1 Material: Shall be a polyglycidyl ether of a bisphenol A Novalac possessing an average epoxide group functionality of approximately eight.

3.2 Impurities: Shall be as follows, determined in accordance with specified test methods:

3.2.1	Hydrolyzable Chlorine, max	0.8%	ASTM D1726
3.2.2	Volatile Content, max	5.0%	4.5.1
3.2.3	Acetone Insoluble, max	1.0%	4.5.2

3.3 Properties: Resin shall conform to the following requirements, determined in accordance with specified ASTM methods:

3.3.1	Epoxy Content (equiv. per 100 g)	0.40 - 0.56	ASTM D1652
3.3.2	Softening Point (Durrans)	78° - 88°C (172° - 190°F)	ASTM D1763

3.4 Quality: The resin, as received by purchaser, shall be uniform in quality and condition, clean, and free from foreign materials and from contaminants detrimental to usage of the resin.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of the resin shall supply all samples for vendor's tests and shall be responsible for performing all required tests. Results of such tests shall be reported to the purchaser as required by 4.6. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the resin conforms to the requirements of this specification.

4.2 Classification of Tests: Tests to determine conformance to all technical requirements of this specification are classified as acceptance tests and as preproduction tests and shall be performed prior to or on the initial shipment of resin to a purchaser, on each lot, when a change in material, processing, or both requires reapproval as in 4.4.2, and when purchaser deems confirmatory testing to be required.

4.2.1 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, the contracting officer, or the request for procurement.

4.3 Sampling: Shall be as follows:

4.3.1 For Acceptance Tests: Each lot of resin shall be sampled at random to provide sufficient resin to perform all required tests. The number of determinations for each requirement shall be as specified in the applicable test procedure or, if not specified therein, not less than three.

4.3.1.1 A lot shall be all resin produced in a continuous production run from the same batches of raw materials under the same fixed conditions and presented for vendor's inspection at one time. A lot may be packaged in small quantities under the basic lot approval provided lot identification is maintained.

4.3.1.2 A batch shall be the quantity of material run in a reactor or mixer at one time.

4.3.1.3 When a statistical sampling plan and acceptance quality level (AQL) have been agreed upon by purchaser and vendor, sampling shall be in accordance with such plan in lieu of sampling as in 4.3.1 and the report of 4.6.1 shall state that such plan was used.

4.3.2 For Preproduction Tests: As agreed upon by purchaser and vendor.

4.4 Approval:

4.4.1 Sample resin shall be approved by purchaser before resin for production use is supplied, unless such approval be waived by purchaser. Results of tests on production resin shall be essentially equivalent to those on the approved sample.

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

4.5 Test Methods: Shall be as follows:

4.5.1 Volatile Content: Shall be determined by accurately weighing (W_1) to the nearest 0.0001 g, each of four samples weighing not less than 1.0 g each. Using porcelain crucibles (preferably covered) previously brought to constant weight by igniting at 845°C ± 25, (1555°F ± 45), dry samples in a circulating-air oven at 175°C ± 5 (350°F ± 9) for 15 min. ± 1. Cool

4.5.1 (Continued):

in a desiccator and reweigh (W_2). Calculate the individual results of the four determinations, using the following equation:

$$\text{Volatile Content, \%} = \frac{(W_1 - W_2)}{W_1} \times 100$$

4.5.1.1 Report both the individual results and the arithmetic mean.

4.5.2 Acetone Insoluble: Shall be determined on the four samples of 4.5.1 from which volatiles have been removed.

4.5.2.1 Record weight of volatile-free samples, each about 1 g, to the nearest 0.0001 g (W_2).

4.5.2.2 Place the samples in separate containers and extract the resin by heating in 50 mL of acetone for not less than 2 minutes. Time starts when the acetone starts to boil. After 2 min. of boiling, decant the solvent. Repeat the extraction for three complete wash cycles. Report the temperature used.

4.5.2.3 Dry the specimens by placing them in a circulating-air oven maintained at 175°C ± 5 (350°F ± 9) for not less than 1 hr or until the weight is constant. Remove and place in a desiccator.

4.5.2.4 After 10 min., remove specimens from the desiccator and weigh to the nearest 0.0001 g (W_3).

4.5.2.5 Calculate the individual results for acetone insoluble content, using the following equation:

$$\text{Acetone Insoluble, \% by weight} = \frac{W_3}{W_2} \times 100$$

where, W_2 = Original volatile-free weight of the specimen, g

W_3 = Final weight of specimen, g

4.5.2.6 Report both the individual results and the arithmetic mean.

4.6 Reports:

4.6.1 The vendor of resin shall furnish with each shipment a report showing the results of tests to determine conformance to the technical requirements of this specification. This report shall include the purchase order number, AMS 3706, vendor's product designation, lot number, date of manufacture, and quantity.