

EPOXY RESIN, TETRAGLYCIDYL METHYLENEDIANILINE (TGMDA)  
10,000 - 14,000 Centipoise Viscosity

1. SCOPE:

- 1.1 Form: This specification covers a prepolymer in the form of a liquid.
- 1.2 Application: Primarily for use in manufacture of high-temperature composite matrices and adhesive resins.

2. APPLICABLE DOCUMENTS: The following publications form a part of this specification to the extent specified herein. The latest issue of Aerospace Material Specifications and Aerospace Recommended Practices 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

2.1.2 Aerospace Recommended Practices:

ARP 1610 - Physio-Chemical Characterization Techniques, Epoxy Adhesive and Prepreg Resin Systems

- 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 D2393 - Viscosity of Epoxy Resins and Related Components

SAE Technical Board Rules provide that: "This report is published by SAE to advance the state of technical and engineering sciences. The use of this report is entirely voluntary, and its applicability and suitability for any particular use, including any patent infringement arising therefrom, is the sole responsibility of the user."

AMS documents are protected under United States and international copyright laws. Reproduction of these documents by any means is strictly prohibited without the written consent of the publisher.

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

3. TECHNICAL REQUIREMENTS:

3.1 Material: Shall be tetraglycidyl methylenedianiline (TGMDA), a single-component, tetrafunctional epoxy resin derived from the reaction of epichlorohydrin with methylene dianiline.

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

|                                  |       |            |
|----------------------------------|-------|------------|
| 3.2.1 Hydrolyzable Chlorine, max | 0.35% | ASTM D1726 |
| 3.2.2 Volatile Content, max      | 0.7%  | 4.5.1      |
| 3.2.3 Acetone Solubles, max      | 0.5%  | 4.5.2      |

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

|                                        |                                           |            |
|----------------------------------------|-------------------------------------------|------------|
| 3.3.1 Viscosity at 50°C (122°F)        | 10,000 - 14,000 cps                       | ASTM D2393 |
| 3.3.2 Epoxy Content (equiv. per 100 g) | 0.75 - 0.95                               | ASTM D1642 |
| 3.3.3 Molecular Weight Distribution    |                                           | 4.5.3      |
|                                        | $\overline{M}_w$ 400 - 800                |            |
| 3.3.4 Thermal Analysis by DSC          |                                           |            |
|                                        | $T_{OS}$ 262° - 282°C<br>(502° - 540°F)   | 4.5.4      |
|                                        | $T_{PEAK}$ 282° - 302°C<br>(540° - 574°F) |            |

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

#### 4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of 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:

4.2.1 Acceptance Tests: Tests to determine conformance to requirements for impurities (3.2), viscosity (3.3.1), and epoxy content (3.3.2) are classified as acceptance tests and shall be performed on each lot.

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

#### 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 material 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 smaller quantities under the basic lot approval provided lot identification is maintained.

4.3.1.2 A batch shall consist of 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) for resin 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.