



Designation: C1355/C1355M – 96 (Reapproved 2020)

Standard Specification for Glass Fiber Reinforced Gypsum Composites¹

This standard is issued under the fixed designation C1355/C1355M; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This specification covers glass fiber reinforced gypsum (GRG) composites having minimum properties and quality suitable to allow the production of GRG parts for non-loading bearing, thin section, ornamental shapes for architectural embellishment of interior building construction.

1.2 The values stated in either inch-pound units or SI [metric] are to be regarded separately as standard. Within the text, the SI units are shown in brackets. The values stated in each system shall be independent of the other. Values from the two systems shall not be combined.

1.3 The text of this standard references footnotes which provide explanatory material. These footnotes shall not be considered as requirements of the standard.

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*²

[C11 Terminology Relating to Gypsum and Related Building Materials and Systems](#)

[C472 Test Methods for Physical Testing of Gypsum, Gypsum Plasters, and Gypsum Concrete](#)

[C473 Test Methods for Physical Testing of Gypsum Panel Products](#)

[C947 Test Method for Flexural Properties of Thin-Section Glass-Fiber-Reinforced Concrete \(Using Simple Beam](#)

¹ This specification is under the jurisdiction of ASTM Committee C11 on Gypsum and Related Building Materials and Systems and is the direct responsibility of Subcommittee C11.01 on Specifications and Test Methods for Gypsum Products.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[With Third-Point Loading\)](#)

[D256 Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics](#)

[D578 Specification for Glass Fiber Strands](#)

[D696 Test Method for Coefficient of Linear Thermal Expansion of Plastics Between –30°C and 30°C with a Vitreous Silica Dilatometer](#)

[D2583 Test Method for Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor](#)

[E84 Test Method for Surface Burning Characteristics of Building Materials](#)

[E136 Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750°C](#)

3. Terminology

3.1 *Definitions:* Definitions of terms shall be in accordance with Terminology C11.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *GRG composite, n*—a thin section laminate made from the combination of alpha gypsum cement, glass fiber, additives and water.

3.2.2 *GRG part, n*—an individual molded component used as architectural embellishment.

4. Materials and Manufacture

4.1 *Materials:*

4.1.1 *Alpha Gypsum Cement*—Alpha-calcium sulfate hemihydrate-plaster which is noncombustible, has a low water demand, neutral (pH) or low alkalinity, and a purity of not less than 90 % by weight of $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$.

4.1.2 *“E” Glass Fiber*—Chopped glass fiber strands or continuous strand mats of calcia-alumina silicate glasses conforming to Specification D578.

4.1.3 *Water*—Potable water.

4.1.4 *Additives*—In accordance with the alpha gypsum cement manufacturer's specifications.

4.2 *Manufacturer's Certification of Raw Materials:*

4.2.1 *Alpha Gypsum Cement*—Each lot of alpha gypsum cement shall be certified to be in compliance with 4.1 and 5.1.

4.2.2 *Glass Fiber Reinforcement*—Each lot of glass fiber reinforcement shall be certified to be in compliance with Specification D578.

4.3 Composite Preparation:

4.3.1 Prepare a flat, rectangular composite of sufficient size to obtain specimens required in 5.2. The composite prepared shall be the same formula as the intended GRG part.

5. Mechanical Properties

5.1 Neat Alpha Gypsum Cement:

5.1.1 Normal Consistency shall be not more than 30 when tested in accordance with Test Methods C472.

5.1.2 Compressive Strength shall be not less than 6000 psi [41.4 MPa] when tested in accordance with Test Methods C472.

5.1.3 Hardness shall be not less than 33 Barcol when tested in accordance with Test Method D2583.

5.2 Composite:

5.2.1 Specimen Preparation:

5.2.1.1 Flexural Strength—Average Flexural Yield (FY) shall be not less than 1200 psi [8.3 MPa] and an average Flexural Ultimate (FU) shall be not less than 2500 psi [17.2 MPa] when tested in accordance with Test Method C947, using a crosshead speed of 0.08 in./min [2 mm/min]. Specimens shall be conditioned to a constant weight in accordance with Test Methods C473.

5.2.1.2 Impact Resistance—Average impact resistance shall be not less than 3 ft-lb [4 j] when tested in accordance with Test Methods D256, Test Method A (Izod-unnotched Method).

5.2.1.3 Hardness—Average hardness shall be not less than 50 Barcol when tested in accordance with Test Methods D2583. Specimens shall be conditioned according to Test Methods C473.

5.2.1.4 Coefficient of Linear Thermal Expansion—Coefficient of linear thermal expansion shall be not more than 11.1×10^{-6} in./in. °F [20.0×10^{-6} mm/mm °C] when tested in accordance with Test Method D696.

5.2.1.5 Humidified Deflection—Average humidified deflection shall be not more than $\frac{1}{8}$ in. [3 mm] when tested on a $\frac{3}{16}$ -in. specimen [5 mm] in accordance with Test Methods C473.

5.2.1.6 Surface Burning Characteristics—Flame spread index shall be 0 and smoke developed index shall be less than ten when tested in accordance with Test Method E84.

5.2.1.7 Behavior at 750 °C—Shall pass all criteria when tested in accordance with Test Method E136.

5.2.1.8 Nail Pull Resistance—Shall be not less than 110 lbf [489 N] when tested on a $\frac{3}{16}$ in. specimen [5 mm] in accordance with Test Methods C473 (Method B).

6. Samples Taken at the Point of Manufacture

6.1 When specified by the purchase agreement, samples of the GRG composite shall be taken at the place of manufacture and tested for compliance with 5.2.

7. Number of Tests and Retests

7.1 The number of tests and type of tests to be performed shall be part of the purchase agreement. Data from prior tests showing compliance with Section 5 are permitted to be supplied by the producer showing compliance with the specified requirements.

8. Inspection

8.1 Inspection of the GRG composite shall be agreed upon between the purchaser and the producer or the supplier as part of the purchase agreement.

9. Rejection and Rehearing

9.1 GRG composite that fails to conform to the requirements of this specification shall be reported to the producer or the supplier promptly and in writing. In case of dissatisfaction with the results of the test, the producer or supplier, shall be permitted to make a claim for a hearing to retest.

10. Certification

10.1 When specified in the purchase agreement, a producer's or supplier's report certifying that the GRG composite is in compliance with this specification, shall be furnished at the time of shipment.

11. Quality Assurance

11.1 Testing for compliance with this specification is required whenever glass fiber reinforced gypsum formulae are initially established.

11.2 Additional testing for compliance with this specification is required whenever constituent materials are added or deleted.

11.3 Each producer's test specimens shall be representative of actual production procedures and materials.

12. Keywords

12.1 alpha gypsum cement; glass fiber reinforced gypsum; glass fiber reinforced gypsum composite; GRG; GRG composite

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