Designation: C 1355/C 1355M – 96 (Reapproved 2001)

Standard Specification for Glass Fiber Reinforced Gypsum Composites[1]

This standard is issued under the fixed designation C 1355/C 1355M; 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.

2. Referenced Documents

2.1 *ASTM Standards:*

C 11 Terminology Relating to Gypsum and Related Building Materials and Systems[2]

C 472 Test Methods for Physical Testing of Gypsum, Gypsum Plasters, and Gypsum Concrete[2]

C 473 Test Methods for Physical Testing of Gypsum Board Products and Gypsum Lath[2]

C 947 Test Method for Flexural Properties of Thin-Section Glass Fiber Reinforced Concrete (Using Simple Beam with Third-Point Loading)[3]

D 256 Test Methods for Determining the Pendulum Impact Resistance of Specimens of Plastics[4]

D 578 Specification for Glass Fiber Strands[5]

D 696 Test Method Coefficient of Linear Thermal Expansion of Plastics Between − 30°C and 30°C[4]

D 2583 Test Method for Indentation Hardness of Rigid Plastics by Means of a Barcol Impresser[6]

E 84 Test Method for the Surface Burning Characteristics of Building Materials[7]

E 136 Test Method for the Behavior of Materials in a Vertical Tube Furnace at 750°C[7]

3. Terminology

3.1 *Definitions:* Definitions of terms shall be in accordance with Terminology C 11.

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 $CaSO_4 \cdot 2H_2O$.

4.1.2 *"E" Glass Fiber*—Chopped glass fiber strands or continuous strand mats of calcia-alumina silicate glasses conforming to Specification D 578.

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 D 578.

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 C 472.

[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] *Annual Book of ASTM Standards*, Vol 04.01.

[3] *Annual Book of ASTM Standards*, Vol 04.05.

[4] *Annual Book of ASTM Standards*, Vol 08.01.

[5] *Annual Book of ASTM Standards*, Vol 07.01.

[6] *Annual Book of ASTM Standards*, Vol 08.02.

[7] *Annual Book of ASTM Standards*, Vol 04.07.

5.1.2 Compressive Strength shall be not less than 6000 psi (41.4 MPa) when tested in accordance with Test Methods C 472.

5.1.3 Hardness shall be not less than 33 Barcol when tested in accordance with Test Method D 2583.

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 C 947, 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 C 473.

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 D 256, 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 D 2583. Specimens shall be conditioned according to Test Methods C 473.

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 D 696.

5.2.1.5 *Humidified Deflection*—Average humidified deflection shall be not more than ⅛in. (3 mm) when tested on a 3⁄16in. specimen (5 mm) in accordance with Test Methods C 473.

5.2.1.6 *Surface Burning Characteristics*—Flame spread index shall be 0 and smoke developed index shall be less than 10 when tested in accordance with Test Method E 84.

5.2.1.7 *Behavior at 750°C*—Shall pass all criteria when tested in accordance with Test Method E 136.

5.2.1.8 *Nail Pull Resistance*—Shall be not less than 110 lbf (489 N) when tested on a 3⁄16 in. specimen (5 mm) in accordance with Test Methods C 473 (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