



# Standard Specification for Bonding Compounds for Interior Gypsum Plastering<sup>1</sup>

This standard is issued under the fixed designation C 631; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

## 1. Scope

1.1 This specification covers minimum requirements for bonding compounds for adhering interior gypsum plaster to structurally sound surfaces.

1.2 This specification also covers test methods for determining performance requirements and physical properties.

1.3 The values stated in inch-pound units are to be regarded as the standard. The SI equivalents of inch-pound units are approximate.

1.4 The following safety hazards caveat pertains only to the test methods described in this specification: *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

## 2. Referenced Documents

### 2.1 ASTM Standards:<sup>2</sup>

C 11 Terminology Relating to Gypsum and Related Building Materials and Systems

C 28 Specification for Gypsum Plasters

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

C 511 Specification for Mixing Rooms, Moist Cabinets, Moist Rooms, and Water Storage Tanks Used in the Testing of Hydraulic Cements and Concretes

## 3. Terminology

3.1 *Definitions*—For definitions relating to gypsum and related building materials and systems, see Terminology C 11.

## 4. Physical Properties

4.1 *General*—The bonding compound shall be a film forming, non-oxidizing, non-toxic, non-flammable composition

suitable for application by brush, roller, and spray. The compound shall be tinted to show, by visual inspection, where it has been applied. The tinting material shall not show through the material being bonded. The surfaces to which bonding compounds are applied shall be relatively smooth, clean, and dry. Surface coatings shall be removed if their nature indicates an unsatisfactory condition. Surfaces shall be prepared in accordance with the manufacturer's directions.

4.2 *Consistency*—The bonding compound shall be of a homogeneous nature with no settling of the solids. The compound shall be free of foreign matter, and when applied in accordance with the manufacturer's directions, shall cover evenly.

4.3 *Film Characteristics*—A dry film of the bonding compound shall be uniform and smooth and shall remain flexible. The film shall not be noticeably affected by mild acid or alkali.

## 5. Performance Requirements

5.1 *Bonding Capability*—A dry film of bonding compound shall be capable of bonding gypsum plaster immediately after drying and 10 days after drying when tested as specified in Section 12.

5.2 *Degradation*—Bonding compound that separates shall be able to be re-mixed to a uniform consistency when tested as specified in Section 10.

5.3 *High Temperature Stability*—The bond strength shall be not less than 20 psi (138 kPa) when tested as specified in Section 9.

5.4 *Freeze-Thaw Stability*—The bond strength shall be not less than 20 psi (138 kPa) when tested as specified in Section 11.

5.5 *Bond Strength*—Bond strength of a fresh sample or a 30 day old sample shall be not less than 20 psi (138 kPa) when tested as specified in Section 12.

## 6. Sampling

6.1 Take a sample of not less than 1 kg from each shipment or consignment for analysis and tests. Except in special cases, take the sample from not less than three separate containers, chosen at random. In addition, take samples from containers that appear to be nonrepresentative, and test separately. Immediately place the samples in airtight glass containers and transport to the testing laboratory in these containers. Take precautions to reduce evaporation or drying to a minimum.

<sup>1</sup> 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 C11.02 on Specifications and Test Methods for Accessories and Related Products.

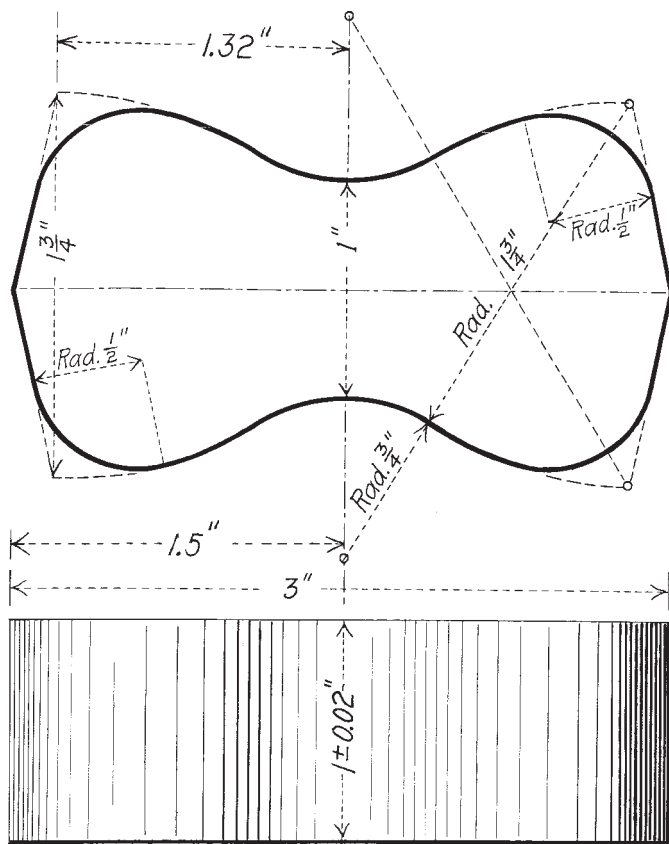
Current edition approved Oct. 10, 1995. Published December 1995. Originally approved in 1988. Last previous edition approved in 1995 as C 631 – 95.

<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

Thoroughly mix the bonding compound in the container if there is a tendency for liquid phase separation.

**7. Apparatus**

- 7.1 *Moist Cabinet*—Specification C 511.
- 7.2 *Oven*—A forced draft type oven, having a temperature controlled at  $140 \pm 5$  °F ( $60 \pm 3$  °C) for high temperature tests and  $100 \pm 5$  °F ( $38 \pm 3$  °C) for drying of the briquets.
- 7.3 *Freezer*—A freezer having a controlled temperature of  $-10 \pm 2$  °F ( $-23 \pm 1$  °C).
- 7.4 *Balance*—A balance capable of weighing at least 2500 g at a precision of 0.1 g.
- 7.5 *Timing Device*—A standard clock or watch with second hand.
- 7.6 *Tamper*—A tamper made up of a nonabsorptive, non-abrasive, non-brittle material and having a cross section of 1/2 in. by 1 in. (13 by 25 mm) and approximately 5 to 6 in. (130 to 150 mm) long. The tamping face shall be flat and at right angles to the length of the tamper.
- 7.7 *Straight Edge*—A steel straight edge not less than 4 in. (100 mm) long and not less than 1/16 in. (1.6 mm) nor more than 1/8 in. (3.2 mm) in thickness.
- 7.8 *Spatula*—A spatula with a metal blade 6 in. (150 mm) in length and 1/2 in. (13 mm) in width, with straight edges.
- 7.9 *Paint Brush*—A standard 1 in. (25 mm) wide brush, with natural or synthetic bristles.
- 7.10 *Testing Machine*—Any type that is of sufficient capacity and that is capable of applying the load continuously and without shock at the rate of 0.05 in. (1.27 mm)/min, with provision for adjustment of the rate of loading.
- 7.11 *Briquet Molds*—The molds for making test specimens shall be made of metal not attacked by the plaster mortar and shall have sufficient material in the sides to prevent spreading during molding. Gang molds, when used, shall be of the type shown in Fig. 1. The dimensions of the briquet molds shall conform to the following requirements: width of mold, between inside faces, at waist line of the briquet, 1 in. (25.4 mm) with permissible variations of  $\pm 0.01$  in. (0.25 mm) for molds in use and  $\pm 0.005$  in. (0.13 mm) for new molds; thickness of molds measured at the point of greatest thickness on either side of the mold at the waist line, 1 in. (25.4 mm) with permissible variations of  $+ 0.004$  in. (0.10 mm) and  $- 0.002$  in. (0.05 mm) for new molds and  $- 0.02$  in. (0.5 mm) for molds in use. The inside faces at the waist line shall have a vertical slot 0.03 in. (0.75 mm) wide by 0.06 in. (1.5 mm) deep to accept the divider. The briquet specimens shall conform to the dimensional requirements shown in Fig. 2.
- 7.12 *Divider*—Sheet brass 0.02 in. (0.05 mm) thick, 1.1 in. (27.8 mm) wide by 1 in. (25.4 mm) high.



NOTE 1—1 in. = 25.4 mm  
**FIG. 2 Briquet Specimen for Tensile Strength Test**

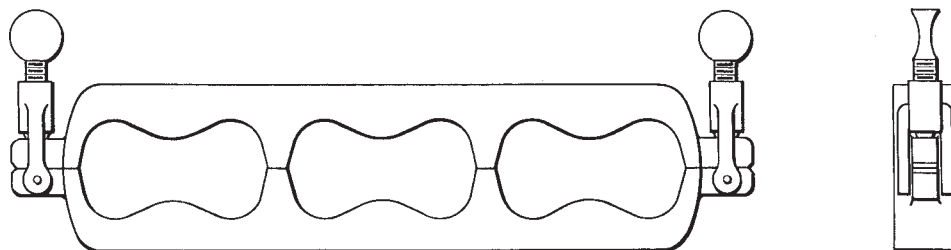
7.13 *Clips for Briquet Testing Machine*— The clips for holding the tension test specimen shall be in accordance with Fig. 3.

**8. Conditioning**

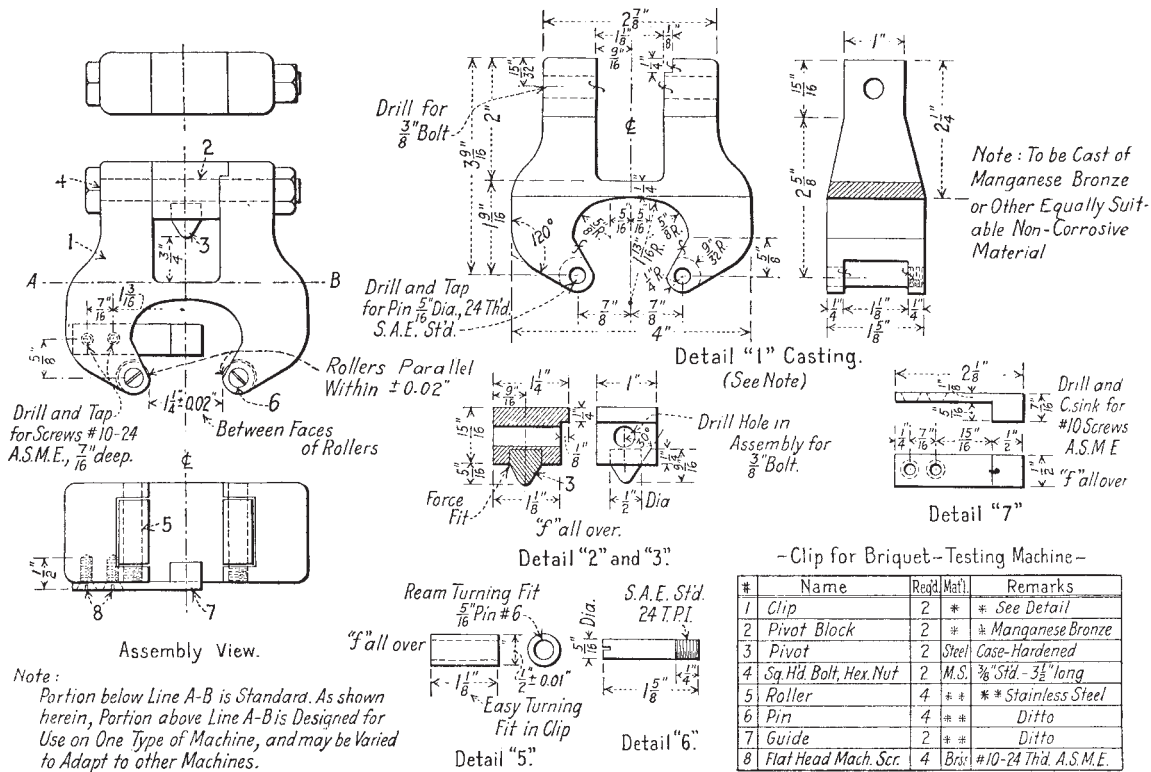
- 8.1 *Room Temperature and Humidity*— Maintain the air temperature in the vicinity of the mixing and testing area,  $70 \pm 5$  °F ( $21 \pm 3$  °C). Maintain the relative humidity at  $50 \pm 2$  %.
- 8.2 *Temperature of the Mixing Water*—  $72 \pm 2$  °F ( $22 \pm 1$  °C).

**9. High Temperature Test**

- 9.1 *Significance and Use*—This test method provides procedures for evaluating the bond strength of adhesives after being exposed to accelerated aging at high temperature.
- 9.2 *Specimen Preparation*—For each test specimen, transfer the bonding compound, taken from the sample obtained, into a standard 1 pt (400 mL) glass container.



**FIG. 1 Briquet Gang Mold**



NOTE 1—1 in. = 25.4 mm  
**FIG. 3 Clips for Briquet Testing Machine**

9.3 Procedure—Place the specimen in the oven for 30 days. Remove the container, allow the compound to cool to room temperature, mix the compound to a uniform consistency, and test as specified in Section 12.

9.4 Test and Retests—Test six briquets and report the average of the test results. If the result of any one of the six tests varied more than 15 % from the average, reject it and report the average of the other five tests. If the results from more than two tests vary more than 15 % from the average, reject the series and retest.

9.5 Precision and Bias—The precision and bias of the High Temperature Test for determining bond strength after exposure to high temperature is essentially the same as specified in the test method for bond strength, 12.7.

**10. Degradation Test**

10.1 Significance and Use—This test method simulates the effects of high temperature storage on the physical properties of bonding compound.

10.2 Specimen Preparation—For each test, transfer the bonding compound, from the sample obtained, into a standard 1 pt (400 mL) glass container.

10.3 Procedure—Place the specimen in the oven for 15 days. Remove the container from the oven and examine the contents for settling and separation. Place the container back in the oven for an additional 15 days. Remove the container and examine the contents again for settling and separation. Allow the compound to come to room temperature, and mix to a uniform consistency. Mix by hand, stirring with a wood, metal, or plastic paddle for not more than 5 min.

10.4 Tests and Retests—Bonding compound that fails to be remixed to a uniform consistency shall be considered to have failed the test.

10.5 Report—Determine the extent of settling and separation by measuring, and report as a percentage of the height of the specimen in the clear glass container, represented by the location of the liquid/solid interface.

10.6 Precision and Bias—No information is presented about either the precision or bias of the degradation test for measuring settling, separation, or the ability to be mixed to a uniform consistency since the test result is nonquantitative.

**11. Freeze-Thaw Cycle Test**

11.1 Significance and Use—This test method provides procedures for determining the bond strength of bonding compounds after being exposed to accelerated storage conditions of alternate freezing and thawing.

11.2 Specimen Preparation—For each test specimen, transfer the bonding compound, taken from the sample obtained, into a standard 1 pt (400 mL) glass container having a screw on or friction fit cover.

11.3 Procedure—Place a covered specimen in the freezer for 16 h. Remove the specimen and allow to thaw at room temperature for 8 h. Repeat this procedure for 5 cycles. After the fifth cycle, allow the compound to come to room temperature, and then test as specified in Section 12.

11.4 Tests and Retests—Test six briquets and report the average of the test results. If the result of any one of the six tests varies more than 15 % from the average, reject it and report the average of the other five tests. If the results from

more than two tests vary more than 15 % from the average, reject the series and retest.

11.5 *Precision and Bias*—The precision and bias of the freeze-thaw cycle test for determining bond strength after exposure to alternate freezing and thawing are essentially the same as specified in the test method for bond strength, 12.7.

## 12. Bond Strength Test

12.1 *Significance and Use*—This test method provides a method for determining the relative ability of bonding compound, after being subject to various simulated conditions of aging and exposure to temperature extremes, to adhere cementitious materials to a properly prepared substrate.

### 12.2 *Materials*:

12.2.1 *Gauging Plaster*—Specification C 28, at normal consistency (Test Methods C 472).

12.2.2 *Retarder*—Sodium citrate.

### 12.3 *Preparation of Briquets*:

12.3.1 Prepare not less than six briquets for each series of tests.

12.3.2 Partition the briquet molds by placing the divider in the slots formed at the waist of the mold.

12.3.3 Add the plaster to the required amount of water and allow to soak for 30 s. Add approximately 0.1 g of retarder per 100 g of plaster to achieve a 2 to 3 h plaster set.

12.3.4 Prepare the molds by coating them with a thin film of mineral oil. Support the molds on a lightly oiled glass or metal plate. Protect the divider from contamination with oil (wrap in plastic food wrap) and carefully insert into the mold slots.

12.3.5 Cast the briquets immediately after completely mixing the mortar; half fill the molds and puddle the mortar uniformly with the tamper, taking care not to displace the divider. Slightly over fill the molds with additional mortar and repeat the puddling. After the mortar has set, cut off the excess to a plane surface flush with the top of the mold, using a broad knife or similar implement.

12.3.6 Immediately after molding, place the molds, on the base plate, into the moist cabinet for not less than 16 h.

12.3.7 Remove the briquets from the mold and store them at room temperature and humidity for not less than 48 h.

12.3.8 Examine the specimens, and discard any that have air holes or excessively rough surfaces.

### 12.4 *Procedure*:

12.4.1 Apply the bonding compound, in accordance with the producer's directions, to the flat waist surface of the briquet by means of a paint brush.

12.4.2 Remove the divider from the mold. Place the half briquet, coated with bonding compound, into the mold. Fill the remaining space in the mold with gypsum plaster, mixed and molded as specified in 12.2.

12.4.3 The time between coating the briquet with compound and casting the plaster against it shall be immediately after the compound has dried, or as recommended by the manufacturer, except when otherwise specified for a ten day waiting period.

12.4.4 Place the filled briquet mold in the moist cabinet for not less than 16 h. Remove the briquets from the molds as soon as they are thoroughly hardened, but retain them in the moist cabinet for not less than 16 h.

12.4.5 The briquets are then dried to constant weight in a forced draft oven maintained at  $100 \pm 5$  °F ( $38 \pm 3$  °C) and a relative humidity not more than 50 %.

12.5 *Test Method*—Test the briquets immediately after removing them from the oven. Remove any loose particles or flash from the surfaces that will be in contact with the clips of the testing machine. Make sure the bearing surfaces of the clips are clean and free of sand, and the roller bearings are lubricated and maintained to ensure freedom of turning. Keep the stirrups supporting the clips free of accumulations. Keep the pivots in proper adjustment so that the clips swing freely on the pivots without binding the stirrups. Carefully center the briquets in the clips and apply the load continuously at the rate of 0.05 in. (1.27 mm)/min.

12.6 *Tests and Retests*—Test six briquets and report the average of the test results. If the result of any one of the six tests varies more than 15 % from the average, reject it and report the average of the other five tests. If the results from more than two tests vary more than 15 % from the average, reject the series and retest.

12.7 *Precision and Bias*—Precision and bias have not been determined for the test method specified.

## 13. Inspection

13.1 Inspection of the bonding compound shall be agreed upon between the producer or purchaser and the supplier as part of the purchase agreement.

## 14. Rejection

14.1 Rejection of bonding compound that fails to conform to the requirements of this specification shall be reported to the producer or supplier promptly and in writing. The notice of rejection shall contain a statement documenting how the product has failed to conform to the requirements of this specification.

## 15. Certification

15.1 When specified in the purchase agreement, the producer or supplier shall furnish a report certifying that, at the time of shipment, the bonding compound is in compliance with the requirements of this specification.


## 16. Packaging and Package Marking

16.1 *Packaging*—The bonding compound shall be packed in standard commercial containers. The containers shall be so constructed as to ensure acceptance by common or other carriers for safe transportation at the lowest rate to the point of delivery, unless otherwise specified in the purchase order.

16.2 *Marking*—Shipping containers shall be marked with the name of the bonding compound, the quantity contained therein, the name, brand, or trademark of the producer or supplier, the shelf life, the batch number, and the ASTM designation.

## 17. Keywords

17.1 bond; bonding compound; compound; plaster

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