ing should not be done, since excessive troweling materially changes the surface of the test piece. The preparation of the last specimen shall be completed not more than 20 min. after completion of mixing of the cement.

(*b*) *Storage of Test Specimens.*—All test specimens shall be retained in the molds on the plane plates for a minimum of 12 hr. after final set, when they shall be freed from the forms and stored under standard conditions as prescribed in Section 3.

Procedure

5. Turn the test specimen face down with respect to its position as molded and center it on the bearing blocks. With two-point loading, bring the load-applying blocks in contact with the upper surface at the third points between the supports. With single-point loading, apply the load at the mid-point of the specimen between the supports. Apply load at the rate of 20 ± 0.5 lb. per min. The breaking strength shall be the average flexural strength of nine breaks. Break each 23 ± 1-in. bar three times on 10-in. spans, first by breaking in the center and subsequently breaking each of the halves resulting from the first break. If the fracture occurs more than 1 in. either side of the middle of the span length, discard the results of the test.

Measurement of Specimens After Test

6. Measurements to the nearest 0.01 in. shall be made to determine the width and thickness of the specimen at the section of failure. Three thickness measurements shall be made and averaged.

Calculations

7. (*a*) If the fracture occurs within 1 in. on either side of the middle of the 10-in. span length, calculate the modulus of rupture as follows:

In the case of two-point loading:

$$R = \frac{3W(L - l)}{2bh^2}$$

In the case of single-point loading:

$$R = \frac{3WL}{2bh^2}$$

where:

R = modulus of rupture in pounds per square inch,
W = maximum applied load indicated by the testing machine, in pounds,
L = span length in inches,
l = distance in inches between points of load application for two-point loading,
b = width of specimen in inches, and
h = average thickness of specimen in inches, to the nearest 0.01 in.

(*b*) Round off the average modulus of rupture for nine breaks to the nearest 100 psi., in accordance with the rounding-off method given in Section 3 (*d*) to (*h*) of the Recommended Practices for Designating Significant Places in Specified Limiting Values (ASTM Designation: E 29).[3]

Report

8. The report shall include the following:

(*1*) Identification of sample tested,
(*2*) Age of specimen at time of test,
(*3*) Average modulus of rupture, to the nearest 100 psi.,
(*4*) Applied load in pounds for each break,
(*5*) Width to the nearest 0.01 in. for each break, and
(*6*) Average thickness to the nearest 0.01 in. for each break.

Standard Method of Test for

COMPRESSIVE STRENGTH OF MAGNESIUM OXYCHLORIDE CEMENTS[1]

ASTM Designation: C 257 – 52

ADOPTED, 1952.[2]

This Standard of the American Society for Testing Materials is issued under the fixed designation C 257; the final number indicates the year of original adoption as standard or, in the case of revision, the year of last revision.

Scope

1. This method of test covers procedures for the determination of the compressive strength of oxychloride magnesia and magnesium oxychloride cements.

Apparatus

2. (*a*) *Molds.*—Molds for 2-in. cube test specimens shall be provided. The molds shall be tight-fitting. The parts of the molds, when assembled, shall be positively held together. The molds shall be made of hard metal not attacked by the cement mortar. For new molds, the Rockwell hardness number of the metal shall be not less than B 55 (the Brinell hardness number not less than 95). There shall be sufficient material in the sides of the molds to prevent spreading or warping. The interior faces of the molds shall be true plane surfaces with a permissible variation of 0.001 in. for new molds and 0.002 in. for molds in use. The distance between opposite faces of the molds shall be 2 ± 0.005 in. for new molds, or 2 ± 0.01 in. for molds in use. The height of the molds, measured separately for each cube compartment, shall be 2 in. with permissible variations of plus 0.01 in. and minus 0.005 in. for new molds, or plus 0.01 in. and minus 0.015 in. for molds in use. The angle between adjacent interior faces and between interior faces and top and bottom planes of the mold shall be 90 ± 0.5 deg. Molds shall be coated with a saturated solution of stearic acid in trichlorethylene.

(*b*) *Testing Machine.*—The testing machine may be of either the hydraulic or the screw type, with sufficient opening between the upper bearing surface and the lower bearing surface of the machine to permit the use of verifying apparatus. The load applied to the test specimen shall be indicated with an accuracy of plus or minus 1.0 per cent. The upper bearing shall be a spherically seated, hardened metal block firmly attached at the center of the upper head of the machine. The center of the sphere shall lie at the center of the surface of the block

[1] Under the standardization procedure of the Society, this method is under the jurisdiction of the ASTM Committee C1 on Magnesium Oxychloride and Magnesium Phosphate Cements.

[2] Prior to adoption as standard, this method was published as tentative from 1950 to 1952.

in contact with the specimen. The block shall be closely held in its spherical seat, but shall be free to turn in any direction. The diagonal or diameter of the bearing surface shall be only slightly greater than the diagonal of the face of the 2-in. cube, in order to facilitate accurate centering of the specimens. A hardened metal bearing block shall be used beneath the specimen to minimize wear of the lower plate of the machine. The bearing block surfaces intended for contact with the specimen should have a hardness not less than Rockwell number C 60 (Brinell number 620). These surfaces shall not depart from plane surfaces by more than 0.0005 in. when the blocks are new, and shall be maintained within a permissible variation of 0.001 in.

Storage and Test Conditions

3. The complete preparation of test specimens, including storage of solutions and materials and the curing, shall be carried out in an atmosphere maintained at 70 ± 1 F. and at a relative humidity of 50 ± 5 per cent (corresponding to a wet bulb temperature range of 56.5 to 60.5 F.). After removal from the molds, the test specimens shall be stored, for the designated duration of the test, on a rack or grating that will permit access of the standard atmosphere at a velocity of not less than 20 nor more than 500 ft. per min. to all sides of the test specimen.

Test Specimens

4. (*a*) *Molding Test Specimens.*—Prepare the plastic cement in accordance with the Standard Method for Mixing Magnesium Oxychloride Cement Compositions with Gauging Solution (ASTM Designation: C 251).[3] Immediately after mixing the plastic cement, place the cement in the cube molds, resting on plane nonabsorbent plates. Fill the molds heaping full. Remove the entrapped air and completely fill the corners of the molds by using a cutting and stabbing motion with a small spatula for a period of 15 sec. Heap additional wet mix above the molds and strike off level and smooth with a trowel. Three strokes of the trowel shall be all the troweling permitted to level and smooth the cubes. The preparation of the last specimen shall be completed not more than 20 min. after completion of mixing of the cement.

(*b*) *Storage of Test Specimens.*—All test specimens shall be retained in the molds on the plane plates for not less than 12 hr. and not more than 24 hr. after final set, when they shall be freed from the forms and stored under standard conditions.

Procedure

5. (*a*) At the end of the designated curing period, remove the cubes from the constant temperature, constant humidity storage, and break them on the compression testing machine. Apply the load to the faces of the cubes that were in contact with the true plane surfaces of the mold. Check these faces by application of an accurate straightedge. If appreciable curvature is present, grind the face or faces to a plane surface before loading, or discard the specimens.

(*b*) Remove loose sand grains or incrustations from the contact faces, and carefully place the cubes in the testing machine below the center of the upper bearing block. No cushioning or bedding materials shall be used. Apply the loading up to 25 per cent of the expected maximum load at any convenient rate, after which load the specimens continuously to failure at a rate or rates which shall at no time be less than 1000 or more than 6000 psi. per min. (Note).

[3] Appears in this publication, see Contents in Numeric Sequence of ASTM Designations at front of book.

NOTE.—This is the rate of loading specified in the Standard Method of Test for Compressive Strength of Hydraulic-Cement Mortars (ASTM Designation: C 109).[2]

(*c*) Test nine cubes as directed in Paragraphs (*a*) and (*b*).

Calculations

6. (*a*) The total maximum load indicated by the testing machine shall be recorded, and the compressive strength calculated in pounds per square inch from the cross-sectional area of the cube tested. Cubes that are manifestly faulty or that give strengths differing by more than 10 per cent from the average value of all test specimens made from the same sample and tested at the same period shall not be considered in determining the compressive strength. Calculate the average compressive strength of the nine cubes tested.

(*b*) The average compressive strength value for the average of nine cubes shall be rounded off to the nearest 100 psi. in accordance with the rounding-off method given in Section 3 (*d*) to (*h*) of the Recommended Practices for Designating Significant Places in Specified Limiting Values (ASTM Designation: E 29).[3]

Report

7. The report shall include the following:

(*1*) Identification of test sample,

(*2*) Age of specimen,

(*3*) Applied load in pounds for each cube, and

(*4*) Average compressive strength calculated to nearest 100 psi.