Designation: C948 – 81 (Reapproved 2016)

Standard Test Method for Dry and Wet Bulk Density, Water Absorption, and Apparent Porosity of Thin Sections of Glass-Fiber Reinforced Concrete[1]

This standard is issued under the fixed designation C948; 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 test method covers the determinations of dry and wet bulk density, water absorption, and apparent porosity of thin sections of glass-fiber reinforced concrete.

NOTE 1—This test method does not involve a determination of absolute specific gravity. Therefore, such pore space as may be present in the specimen that is not emptied during the specified drying or is not filled with water during the specified immersion is considered "impermeable" and is not differentiated from the solid portion of the specimen for the calculations, especially those for percent voids.

Depending upon the pore size distribution and the pore entry radii of the specimen and on the purposes for which the test results are desired, the procedures of this method may be adequate, or they may be insufficiently rigorous. In the event that it is desired to fill more of the pores than will be filled by immersion, various techniques involving the use of vacuum treatment or increased pressure may be used. If a rigorous measure of total pore space is desired, this can only be obtained by determining absolute specific gravity by first reducing the sample to discrete particles, each of which is sufficiently small so that no impermeable space can exist within any of the particles.

1.2 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.3 *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. Significance and Use

2.1 Material properties determined by this test method are useful for quality control of glass-fiber reinforced concrete, ascertaining compliance with governing specifications, and research and development.

3. Apparatus

3.1 *Balance,* sensitive to 0.025 % of the mass of the specimen, suitable for determining the mass of the specimen in water as well as in air.

3.2 *Container,* suitable for immersing the specimen and suitable wire for suspending the specimen in water.

4. Sampling

4.1 Sampling method shall be in accordance with governing specifications.

5. Test Specimen

5.1 Whenever possible, the sample shall consist of individual portions of glass-fiber reinforced concrete, each to be tested separately. The individual portions may be pieces of any desired shape or size, except that the volume of each portion shall be not less than 25 cm^3 (or 50 g nominal mass glass-fiber reinforced concrete, approximately 1.7 oz, and shall not be greater than 650 cm^3 or 1300 g nominal glass-fiber reinforced concrete, approximately 46 oz); and each portion shall be free of observable cracks, fissures, or shattered edges.

6. Procedure

6.1 *Immersed Mass and Saturated Surface—Dry Mass After Immersion:*

6.1.1 Immerse the specimen in water at approximately 21°C (70°F) for not less than 24 h and until two successive determinations of mass of the surface-dried specimens at intervals of 2 h show an increase in mass of less than 0.5 % of the heavier mass. Determine the mass of the specimen suspended in water to the nearest 0.01 g (0.00034 oz). Designate this mass as *A*.

NOTE 2—Take care during this operation to ensure that air bubbles do not adhere to the surface of the specimen.

6.1.2 Remove the specimen from the water and quickly surface dry the specimen by removing surface moisture with a towel. Immediately determine the mass in air to the nearest 0.01 g. Designate this saturated surface-dry mass as *B*.

6.2 *Oven-Dry Mass*—Dry the specimen in an oven at a temperature of 100 to 110°C (212 to 230°F) for not less than 24

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h and until two successive determinations of mass of the dried specimen at intervals of 2 h show a decrease in mass of less than 0.5 % of the lowest mass obtained. After removing the specimen from the oven, allow it to cool in dry air (preferably in a desiccator) to room temperature and determine its mass to the nearest 0.01 g (0.00034 oz). Designate this mass as *C*.

7. Calculation

7.1 Using the masses determined in accordance with the procedures described in Section 6, make the calculations as follows (Note 3):

$$\text{Dry bulk density, g/cm}^3 = \frac{C}{B - A} \quad (1)$$

$$\text{Wet bulk density, g/cm}^3 = \frac{B}{B - A} \quad (2)$$

$$\text{Water absorption, \%} = \frac{B - C}{C} \times 100 \quad (3)$$

$$\text{Apparent porosity, \%} = \frac{B - C}{B - A} \times 100 \quad (4)$$

where:

A = immersed mass, g,
B = saturated-surface-dry mass, g, and
C = oven-dry mass, g.

NOTE 3—Assuming the specific gravity of water to be 1 g/cm^3, the difference in the weight of a saturated sample weighed in air and in water is equal to the apparent volume of the sample in cm^3. Therefore, the density determination calculations have the units of g/cm^3.

8. Report

8.1 The report shall include the following:
8.1.1 Identification number of specimen,
8.1.2 Sample description and specimen size,
8.1.3 Date of testing, and
8.1.4 Test results:
8.1.4.1 Dry bulk density to the nearest 0.01 g/cm^3 (1 lb/ft^3),
8.1.4.2 Wet bulk density to the nearest 0.01 g/cm^3 (1 lb/ft^3),
8.1.4.3 Water absorption to the nearest 0.1 %, and
8.1.4.4 Apparent porosity to the nearest 0.1 %.

9. Precision and Bias

9.1 The precision and bias criteria are being developed.