



Standard Test Method for Determination of Pack-Set Index of Portland Cement¹

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1. Scope

1.1 This test method covers the determination of the pack-set index, which provides an indication of the mechanical force needed to overcome the consolidation of portland cement.

1.2 The pack-set index number provides a numerical value useful for manufacturers who desire to measure and control the effect that vibration-induced consolidation has upon the manufactured cement.

1.3 The values stated in SI units are to be regarded as the standard. Values stated in Inch-Pound units are for informational purposes only and are enclosed in parentheses. Values stated in SI units shall be obtained by measurement in SI units or by appropriate conversion, using the rules of Conversion and rounding given in Standard IEEE/ASTM SI 10, of measurements made in other units.

1.4 *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. (WARNING—Fresh hydraulic-cementitious mixtures are caustic and may cause chemical burns to skin and tissue upon prolonged exposure.)*²

2. Referenced Documents

2.1 ASTM Standards:

C 150 Specification for Portland Cement³

C 1005 Specification for Reference Masses and Devices for Determining Mass and Volume for Use in the Physical Testing of Hydraulic Cements³

IEEE/ASTM SI 10 International System of Units (SI) The Modernized Metric System⁴

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 *maximum voltage, n* —as pertaining to this method only, the energy in volts applied to consolidate the sample, which results in the maximum pack-set index for a particular cement and the apparatus used for the measurement.

3.1.2 *pack set, n* —a condition of hydraulic cement, exhibited in varying degrees, following silo storage or transport in bulk railcars or trucks, that causes the cement to resist flowing until considerable mechanical effort has been applied.

3.1.3 *pack-set index, n* —the numerical indication of the degree of pack set a particular cement exhibits when subjected to the procedures of this test method.

4. Summary of Test Method

4.1 Portland cement is placed into a flask and then consolidated on a vibrating table by a vibration force controlled by time and energy (volts). The consolidated bed is measured for relative strength by turning the flask to a horizontal position and rotating in 180° increments until the bed collapses from the bottom of the flask. The number of half turns is a relative indication of the force required to overcome the consolidation and is designated the pack-set index, or P.S.I.

5. Significance and Use

5.1 This method is intended to help manufacturers determine the relative pack-set tendency of their cement(s). The test establishes a pack-set index which, when properly correlated with field performance, is useful in predicting or preventing field unloading difficulties.

5.2 The test is an aid to routine control during cement production and is not suitable for specification purposes.

5.3 In general, field performance of cement flowability is satisfactory when the pack-set index as determined on freshly ground cement averages 0 to 15 and is unsatisfactory when the index exceeds 25. Any prediction of field performance of cement flowability measuring 16 to 25 is tenuous. These are general ranges and the field performance of individual cements may not necessarily fall within these ranges. Additional conditions, after the cement has left the control of the manufacturing facility, can affect the apparent pack set index as well.

5.4 Any attempt to apply the critical range of pack-set index numbers based on freshly ground cement to job cement without special treatment of the sample would be problematic. The test

¹ This test method is under the jurisdiction of ASTM Committee C01 on Cement and is the direct responsibility of Subcommittee C01.20 on Additions.

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² Section on Safety, Manual of Cement Testing, *Annual Book of ASTM Standards*, Vol 04.01.

³ *Annual Book of ASTM Standards*, Vol 04.01.

⁴ *Annual Book of ASTM Standards*, Vol 14.02.