
Standard Method of Test for Unconfined Compressive Strength of Cohesive Soil

AASHTO Designation: T 208-15 (2023)

Technically Revised: 2015

Reviewed but Not Updated: 2023

Editorially Revised: 2021

Technical Subcommittee: 1a, Soil and Unbound Recycled Materials

ASTM Designation: D2166-00



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1.	SCOPE
1.1.	This test method covers the determination of the unconfined compressive strength of cohesive soil in the undisturbed, remolded, or compacted condition, using strain-controlled application of the axial load.
1.2.	This test method provides an approximate value of the strength of cohesive soils in terms of total stresses.
1.3.	This test method is applicable only to cohesive materials that will not expel bleed water (water expelled from the soil due to deformation or compaction) during the loading portion of the test and that will retain intrinsic strength after removal of confining pressures, such as clays or cemented soils. Dry and crumbly soils, fissured or varved materials, silts, peats, and sands cannot be tested with this method to obtain valid unconfined compressive strength values. Note 1—The determination of the unconsolidated, undrained strength of cohesive soils with lateral confinement is covered by T 296.
1.4.	This test method is not a substitute for T 296.
1.5.	The values stated in SI units are to be regarded as the standard.
1.6.	<i>This standard may involve hazardous materials, operations, and equipment. This standard does not purport to address all of the safety concerns associated with its use. It is the responsibility of whoever uses this standard to consult and establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.</i>
1.7.	<i>The quality of the results produced by this standard are dependent on the competence of the personnel performing the procedure and the capability, calibration, and maintenance of the equipment used. Agencies that meet the criteria of R 18 are generally considered capable of competent and objective testing/sampling/inspection/etc. Users of this standard are cautioned that compliance with R 18 alone does not completely assure reliable results. Reliable results depend on many factors; following the suggestions of R 18 or some similar acceptable guideline provides a means of evaluating and controlling some of those factors.</i>

2. REFERENCED DOCUMENTS

2.1. AASHTO Standards:

- < M 231, Weighing Devices Used in the Testing of Materials
- < R 18, Establishing and Implementing a Quality Management System for Construction Materials Testing Laboratories
- < T 88, Particle Size Analysis of Soils
- < T 89, Determining the Liquid Limit of Soils
- < T 90, Determining the Plastic Limit and Plasticity Index of Soils
- < T 100, Specific Gravity of Soils
- < T 207, Thin-Walled Tube Sampling of Soils
- < T 223, Field Vane Shear Test in Cohesive Soil
- < T 265, Laboratory Determination of Moisture Content of Soils
- < T 296, Unconsolidated, Undrained Compressive Strength of Cohesive Soils in Triaxial Compression

2.2. *ASTM Standards:*

- < D653, Standard Terminology Relating to Soil, Rock, and Contained Fluids
- < D4220/D4220M, Standard Practices for Preserving and Transporting Soil Samples

3. TERMINOLOGY

3.1. Refer to ASTM D653 for standard definitions of terms.

3.2. *Description of Terms Specific to This Standard:*

3.2.1. *Unconfined Compressive Strength (q_u)*—The compressive stress at which an unconfined cylindrical specimen of soil will fail in a simple compression test. In this test method, unconfined compressive strength is taken as the maximum load attained per unit area or the load per unit area at 15 percent axial strain, whichever is secured first during the performance of a test.

3.2.2. *Shear Strength (s_u)*—For unconfined compressive strength test specimens, the shear strength is calculated to be one half of the compressive stress at failure, as defined in Section 3.2.1.

4. SIGNIFICANCE AND USE

4.1. The primary purpose of the unconfined compression test is to quickly obtain the approximate compressive strength of soils that possess sufficient cohesion to permit testing in the unconfined state.

4.2. Samples of soils having slickensided or fissured structure, samples of some type of loess, very soft clays, dry and crumbly soils and varved materials, or samples containing significant portions of silt or sand, or both (all of which usually exhibit cohesive properties), frequently display higher shear strengths when tested in accordance with T 296. Also, unsaturated soils will usually exhibit different shear strengths when tested in accordance with T 296.

4.3. If both an undisturbed and a remolded test are performed on the same sample, the sensitivity of the material can be determined. This method of determining sensitivity is suitable only for soils that can retain a stable specimen shape in the remolded state.

Note 2—For soils that will not retain a stable shape, a vane shear test or T 223 can be used to determine sensitivity.