
Standard Method of Test for Diamond Core Drilling for Site Investigation

AASHTO Designation: T 225-16 (2024)

Technically Revised: 2016

Reviewed but Not Updated: 2024

**Technical Subcommittee: 1b, Geotechnical Exploration,
Instrumentation, Stabilization, and Field Testing**



**American Association of State Highway and Transportation Officials
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1.	SCOPE
1.1.	This method covers a procedure for diamond core drilling designed to secure intact samples of rock and some soils that are too hard to sample by soil sampling methods. This method is primarily for obtaining data for foundation and slope design and similar civil engineering purposes, rather than for mineral development and mining.
1.2.	<i>The quality of the results produced by this standard is 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.	<i>AASHTO Standards:</i> ■ R 18, Establishing and Implementing a Quality Management System for Construction Materials Testing Laboratories ■ T 206, Penetration Test and Split-Barrel Sampling of Soils ■ T 207, Thin-Walled Tube Sampling of Soils
2.2.	<i>ASTM Standard:</i> ■ D4220/D4220M, Standard Practices for Preserving and Transporting Soil Samples
3.	EQUIPMENT
3.1.	<i>Rotary Drilling Machine</i> —capable of providing a rotary motion and hydraulically, or mechanically, actuated feed or thrust.
3.2.	<i>Water or Drilling Mud Pump</i> —or air compressor capable of delivering sufficient drilling fluid volume and pressure for the size of the hole to be drilled.
3.3.	<i>Core Barrels</i> —as required.

- 3.3.1. *Single-Tube Core Barrel*—consisting of a hollow tube with a threaded head at the upper end to fit the drill rod. The lower end of the barrel is fitted with a blank or set reaming shell, a core lifter, and a core bit.
- 3.3.2. *Double-Tube Core Barrel, Swivel-Type*—having a swiveling inner barrel that is contained in the core barrel suspended on a bearing hanger. Drilling fluid is routed between the inner and outer barrels. This method improves core recovery. More sophisticated double tubes are available having an inner tube that extends into the core bit, and the core lifter mounted inside the inner tube to protect cores of a soft or friable formation.
- 3.3.3. *Single-Tube Type, WG Design*—consisting of a hollow steel tube, with a head at one end threaded for drill rod, and a threaded connection for a reaming shell and core bit at the other end. A core lifter, or retainer located within the core bit, is normal but may be omitted at the discretion of the geologist or engineer.
- 3.3.4. *Double-Tube, Swivel-Type, WG Design*—an assembly of two concentric steel tubes joined and supported at the upper end by means of a ball or roller-bearing swivel arranged to permit rotation of the outer tube without causing rotation of the inner tube. The upper end of the outer tube, or removable head, is threaded for drill rod. A threaded connection is provided on the lower end of the outer tube for a reaming shell and core bit. A core lifter located within the core bit is normal but may be omitted at the discretion of the geologist or engineer.
- 3.3.5. *Double-Tube, Swivel-Type, WT Design*—is essentially the same as the double tube, swivel-type, WG design, except that the WT design has thinner tube walls, a reduced annular area between the tubes, and takes a larger core from the same diameter bore hole. The core lifter is located within the core bit.
- 3.3.6. *Double-Tube, Swivel-Type, WM Design*—is similar to the double tube, swivel-type, WG design, except that the inner tube is threaded at its lower end to receive a core lifter case that effectively extends the inner tube well into the core bit, thus minimizing exposure of the core to the drilling fluid. A core lifter is contained within the core lifter case on the inner tube.
- 3.3.7. *Double-Tube, Swivel-Type, Large-Diameter Design*—is similar to the double tube, swivel-type, WM design, with the addition of a ball valve to control fluid flow in all three available sizes and the addition of a sludge barrel to catch heavy cuttings on the two larger sizes. The large-diameter design double-tube, swivel-type core barrels are available in three-core-per-hole sizes as follows: 2³/₄ in. (69.85 mm) by 3⁷/₈ in. (98.43 mm), 4 in. (101.6 mm) by 5¹/₂ in. (139.7 mm), and 6 in. (152.4 mm) by 7³/₄ in. (196.85 mm). Their use is generally reserved for very detailed investigative work or where other methods do not yield adequate recovery.
- 3.3.8. *Double-Tube, Swivel-Type, Retrievable Inner-Tube Method*—in which the core-laden inner-tube assembly is retrieved to the surface and an empty inner-tube assembly returned to the face of the borehole through the matching, large-bore drill rods without need for withdrawal and replacement of the drill rods in the borehole. This system is also known as the wire-line method. The inner-tube assembly consists of an inner tube with removable core lifter case and core lifter at one end and a removable inner-tube head, swivel bearing, suspension adjustment, and latching device with release mechanism on the opposite end. The inner-tube latching device locks into a complementary recess in the wall of the outer tube such that the outer tube may be rotated without causing rotation of the inner tube and such that the latch may be actuated and the inner-tube assembly transported by appropriate surface control. The outer tube is threaded for the matching, large-bore drill rod and internally configured to receive the inner-tube latching device at one end and threaded for a reaming shell and bit, or bit only, at the other end.
- 3.3.9. *Triple-Tube, Swivel-Type*—is similar to the double tube, swivel-type, WM design, with an inner liner into which the core is directly housed. The inner liner is commonly made of a split steel tube,