
Standard Method of Test for

Plastic Fines in Graded Aggregates and Soils by Use of the Sand Equivalent Test

AASHTO Designation: T 176-22

Technically Revised: 2022

Technical Subcommittee: 1a, Soil and Unbound Recycled Materials



**American Association of State Highway and Transportation Officials
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1. SCOPE

- 1.1. This test is intended to serve as a rapid test to show the relative proportions of fine dust or claylike material in soils or graded aggregates.
- 1.2. The following applies to all specified limits in this standard: For the purpose of determining conformance with these specifications, an observed value or a calculated value shall be rounded off “to the nearest unit” in the last right-hand place of figures used in expressing the limiting value, in accordance with ASTM E29, Using Significant Digits in Test Data to Determine Conformance with Specifications.
- 1.3. The values stated in SI units are to be regarded as the standard.
- 1.4. *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 the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*
- 1.5. *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.*

2. REFERENCED DOCUMENTS

- 2.1. *AASHTO Standards:*
 - M 231, Weighing Devices Used in the Testing of Materials
 - M 339M/M 339, Thermometers Used in the Testing of Construction Materials
 - R 18, Establishing and Implementing a Quality Management System for Construction Materials Testing Laboratories
 - R 76, Reducing Samples of Aggregate to Testing Size
 - R 90, Sampling Aggregate Products
- 2.2. *ASTM Standards:*

- E1, Standard Specification for ASTM Liquid-in-Glass Thermometers
- E11, Standard Specification for Woven Wire Test Sieve Cloth and Test Sieves
- E29, Standard Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications
- E230/E230M, Standard Specification for Temperature-Electromotive Force (emf) Tables for Standardized Thermocouples
- E2877, Standard Guide for Digital Contact Thermometers

2.3. *International Electrotechnical Commission Standard:*

- IEC 60584-1: 2013 Thermocouples - Part 1: EMF Specifications and Tolerances

3. SIGNIFICANCE AND USE

- 3.1. This test method is used to determine the proportion of detrimental fines in the portion passing the 4.75-mm (No. 4) sieve of soils or graded aggregates.

4. APPARATUS

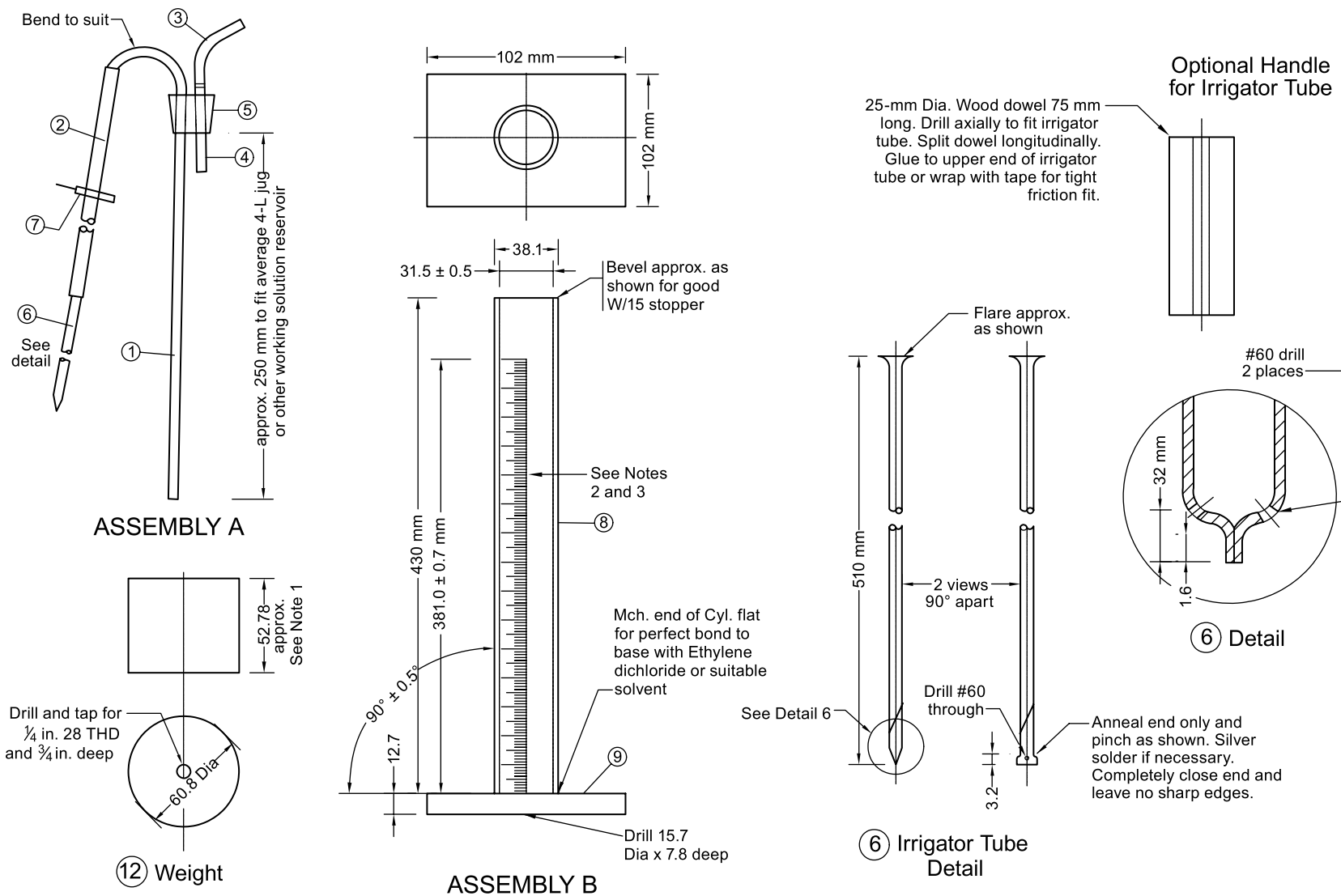
- 4.1. *Sand Equivalent Apparatus*—A graduated plastic cylinder, rubber stopper, irrigator tube, weighted foot assembly, and siphon assembly, all conforming to their respective specifications and dimensions shown in Figure 1. Fit the siphon assembly to a 4-L (1-gal) bottle of working calcium chloride solution (see Section 2.8) placed on a shelf 915 ± 25 mm (36 ± 1 in.) above the work surface. In lieu of the specified 4-L (1-gal) bottle, a glass or plastic vat having a larger capacity may be used provided the liquid level of the working solution is maintained between 915 and 1170 mm (36 and 46 in.) above the work surface (see Figure 2).

Assembly	No. Reg.	Description	Stock Size	Material	Heat Treatment
A		Siphon Assembly			
	1	Siphon tube	6.4 dia × 400	Copper tube	
	2	Siphon hose	4.8 ID × 1220	Rubber tube	
	3	Blow hose	4.8 ID × 50.8	Rubber tube	
	4	Blow tube	6.4 dia × 50.8	Copper tube	
	5	Two-hole stopper	No. 6	Rubber	
	6	Irrigator tube	6.4 OD 0.89 wall × 510 stainless tube, type 316		
	7	Clamp	Pinchcock, Day, BKH No. 21730 or equivalent		
B		Graduate Assembly			
	8	Tube	38.1 OD × 430	Trans acrylic plastic	
	9	Base	12.7 × 102 × 102	Trans acrylic plastic	
C		Weighted Foot Assembly			
	10	Sand reading indicator	6.4 dia × 15.0	Nylon 101 Type 66	Annealed
	11	Rod	6.4 dia × 444	Brass	
	12	Weight	50.8 dia × 52.78	Cold rolled steel, or equivalent	
	13	Roll pin	0.16 dia × 12.7	Steel	
	14A	Foot - hexagonal top	30.2 OD	Brass	
	14B	Foot - circular bottom	25.4 OD		
	15	Solid stopper	No. 7	Rubber	

Notes: 1. "C" Weighted Foot Assembly to Weigh 1000 ± 5g.

- Graduations on graduate to be 2.54 mm apart and every tenth mark to be numerically designated as shown. Every fifth line should be approximately 9.5 mm long. All other lines should be approximately 5.5 mm long. Depth is to be 0.4 mm. Width is to be 0.8 mm across the top.
- Accuracy of scale to be ±0.25 mm per 2.5 mm. Error at any point on scale to be ±0.75 mm of true distance to zero.
- Glass or stainless steel may be substituted as a material type for the copper siphon and blow tubing.
- Total height of foot (14A and 14B) to be 13.7 mm.

Figure 1—Sand Equivalent Apparatus (*continued on the following two pages*)



Note: All dimensions are shown in millimeters unless otherwise indicated.

Figure 1—Sand Equivalent Apparatus (*Continued on next page*)