

## COMMITTEE ON MATERIALS AND PAVEMENTS

Meeting ( <i>Annual or Mid-Year</i> )	Annual
Date	August 5, 2019
Scheduled Time	10:15am – 12:15pm
Technical Subcommittee & Name	TS 1a – Soils and Unbound Recycled Materials
Chair Name and (State)	Andy Babish (VA)
Vice Chair Name and (State)	Griffin Sullivan (MS)
Research Liaison Name and (State)	Kaye Davis (AL)

### I. Introduction and Housekeeping

### II. Call to Order and Opening Remarks

- A. Brief Summary of Activities
  - 1. Review of T311 and needed actions
  - 2. Next steps for T90 (balloted through TS in Spring 2019)
  - 3. Discuss potential edits for T176 and T88 raised by WAQTC

### III. Roll Call of Voting Members

Present	Member Name	State	Present	Member Name	State
<input type="checkbox"/>	Michael San Angelo	AK	<input type="checkbox"/>	Darin Tedford	NV
<input type="checkbox"/>	Kaye Davis	AL	<input type="checkbox"/>	Paul Hanczyark	NJ
<input type="checkbox"/>	Craig Wieden	CO	<input type="checkbox"/>	????	NY
<input type="checkbox"/>	Robert Lauzon	CT	<input type="checkbox"/>	Becca Lane	ONT
<input type="checkbox"/>	Hany Fekry	DE	<input type="checkbox"/>	Sean Parker	OR
<input type="checkbox"/>	David Horhota	FL	<input type="checkbox"/>	Tim Ramirez	PA
<input type="checkbox"/>	Rick Douds	GA	<input type="checkbox"/>	Jose Lima	RI
<input type="checkbox"/>	Daniel Tobias	IL	<input type="checkbox"/>	Joe Feller	SD
<input type="checkbox"/>	Sejal Barot	MD	<input type="checkbox"/>	Travis Smith	TN
<input type="checkbox"/>	Clement Fung	MA	<input type="checkbox"/>	Mladen Gagulic	VT
<input type="checkbox"/>	Griffin Sullivan	MS	<input type="checkbox"/>	Ron Stanevich	WV

*Quorum Rules Met?*

Annual Meeting: Simple majority of voting members (☐y/ ☐n) | Mid-Year Meeting: Voting members present (☐y/ ☐n)

- A. Review of Membership (*New members, exiting members, etc.*)
  - 1. Don Streeter (NY) retired.

### IV. Approval of Technical Subcommittee Minutes

See attachment A for Mid-year Meeting Minutes.

**Action:** Approve TS1a Midyear Minutes;    **Motion:** ?    **Second:** ?

### V. Old Business

*(Outstanding or action items from previous meeting; use Heading 1 through Heading 6 styles to get outline format.)*

- A. T311- NY negative on 2018 reconfirmation ballot; **see section V of attachment A; 2019 Midyear meeting minutes.** Chair has not conducted TS ballot yet. Potential action is to copy language from T265 Section 6.1 and include in Note 10 of T311. Another potential course of action is to reference PP97 for determining constant mass. This would require more editing in the standard than simply addressing Note 10.

**Action:** COMP concurrent ballot to revise T311, to include defining language for constant weight such as in T265, Section 6.1 or referencing PP97?

B. COMP Ballot Items *(Include any ASTM changes/equivalencies, including ASTM standards' revision years.)*

COMP Ballot #	Standard	Results (neg/affirm)	Comments/Negatives	Action
N/A			Addressed at Midyear Meeting	

C. Technical Subcommittee Ballots

TS Ballot #	Standard	Results (neg/affirm)	Comments/Negatives	Action
COMP_TS1A-19-01	T90	0/17	There were no comments or negatives to address. <u>See attachment B</u>	Move to COMP ballot at 2019 Annual Meeting

D. Reconfirmation Ballots

Reconf. Ballot #	Standard	Results (neg/affirm)	Comments/Negatives	Action
N/A			Addressed at Midyear Meeting	

E. Task Force Reports

Task Force #	Title	Members	Status/Update
17-01	T90 Revisions for Section 6.4	AASHTO Resource, FL, PA, AK	Standard revised through TS ballot # COMP_TS1A-19-01, TS ballot passed. Next step is COMP ballot.

VI. New Business

A. AASHTO re:source/CCRL/NTPEP *(Observations from assessments, as applicable.)*

- Chair received AASHTO Re:source inquiry for T88 Particle Size Analysis of Soils; regarding height of sedimentation cylinder tolerances stated in Section 3.1.5 of T88. Issue was

standard states “approximately 18 inches” and Lab assessors desired clarity on what were acceptable tolerances on height of sedimentation cylinder to meet “approximately 18 inches” requirement. 17.25 inches is common manufactured length, but was this height enough to safeguard against loss of material upon insertion and action of hydrometer in the cylinder.

Chair’s response: ASTM D422 doesn’t have any tolerances on total cylinder height (18 in.) either. VA Dot experience; never been an issue using 17.25 inch cylinder regarding loss of material upon insertion and action of hydrometer. Recommend to AASHTO Re:source to use a tolerance of 18” +/- 1” for guidance to assessors, this tolerance is also consistent with the 14” +/- 1” at the 1000 mL mark stated in section 3.1.5. Tighter tolerances may have significant impact on manufacturers and other DOTs without improving accuracy of method.

Any additional thoughts or feedback from committee on this matter?

B. Presentation by Industry/Academia - None

C. Revisions/Work on Standards for Coming Year

See attachment C for standards requiring reconfirmation in 2019

1. There are 5 standards up for reconfirmation this cycle;

R74 – NV

T90 – VA

T216 – SD

T290 – WV

T296 - AL

D. Review of Stewardship List - See attachment C for stewardship assignments to standards

E. Proposed New Standards - None?

F. NCHRP Issues – Any?

G. Correspondence, Calls, Meetings

Inquiry from WAQTC regarding T176 and T88, dimensional discrepancies. See attachment D for inquiry details.

Action: ?? Potential concurrent COMP ballot items (2) to revise T176 and T88 to resolve dimensional discrepancies.

H. Proposed New Task Forces *(Include list of volunteers to lead and/or join TF.)*

I. New TS Ballots ?

## VII. Open Discussion

A. Any?

## VIII. Adjourn

## TS Meeting Summary

Meeting Summary		
Items Approved by the TS for Ballot <i>(Include reconfirmations.)</i>		
Standard Designation	Summary of Changes Proposed	Ballot Type
		<input type="checkbox"/> TS <input type="checkbox"/> COMP <input type="checkbox"/> CONCURRENT
		<input type="checkbox"/> TS <input type="checkbox"/> COMP <input type="checkbox"/> CONCURRENT

Meeting Summary		
		<input type="checkbox"/> TS <input type="checkbox"/> COMP <input type="checkbox"/> CONCURRENT
		<input type="checkbox"/> TS <input type="checkbox"/> COMP <input type="checkbox"/> CONCURRENT
		<input type="checkbox"/> TS <input type="checkbox"/> COMP <input type="checkbox"/> CONCURRENT
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		<input type="checkbox"/> TS <input type="checkbox"/> COMP <input type="checkbox"/> CONCURRENT
		<input type="checkbox"/> TS <input type="checkbox"/> COMP <input type="checkbox"/> CONCURRENT
New Task Forces Formed		
Task Force Name	Summary of Task	TF Member Names and (States)
Research Proposals <i>(Include number/title/states interested.)</i>		
Other Action Items		



## COMMITTEE ON MATERIALS & PAVEMENTS

2018 - 2019 Mid Year Meeting (*Webinar*)

Monday January 28, 2019

12:00 – 2:00 PM EST

### TECHNICAL SUBCOMMITTEE 1a

#### Soils and Unbound Recycled Materials

**I. Introduction and Housekeeping** (*AASHTO Liaison*)

**II. Call to Order and Opening Remarks**

A. Brief summary of activities (*Please briefly explain the goals of today's meeting and what you hope to accomplish. Get everyone up to speed and on the same page.*)

The objective of today's Subcommittee meeting is to discuss the following topics;

2018 Reconfirmation ballot results

2018 COMP Ballot results (1 ballot item)

TF 17-01 Work and status

**III. Roll Call**

For any DOT staff desiring to be a member of this Technical Subcommittee, please email the Vice Chairman, Griffin Sullivan at [wsullivan@mdot.ms.gov](mailto:wsullivan@mdot.ms.gov)

See attachment 1 for membership roster. Chair call roll by State.

re:source (Knake, Barnhart, Baker); AL, CO, CT, FL, IL, MS, VA, MD

**IV. Approval of Technical Subcommittee Minutes**

See attachment 2 for minutes from 2018 Annual Meeting held in Cincinnati, OH.

**Action:** Approved minutes as written, Motion - CT, Second – CO- motion passes

**V. Old Business**

A. COMP Ballot Items (Including any ASTM Changes/equivalencies)

1 item - COMP Ballot to revise T 88, Standard Method of Test for Particle Size Analysis of Soils, Revised section 12.1 to move first sentence in Note 6 to last sentence in Section 12.1 to make it mandatory language and part of the procedure.

43 Affirmatives, 0 Negatives, passed. Changes to T88 will be published as balloted. See attachment 3 for standard changes balloted.

B. TS Ballots - None

C. Reconfirmation Ballots

10 standards were up for reconfirmation;

M 318 - reconfirmed

M 319 – 1 Negative; NY, NJ had a comment ..See attachment 4 for M 319 standard

NY - "Note 9 should be clarified to percent by mass or volume - maybe editorial and negative can be addressed."



*Chair response: Standard reflects by mass in Sections 7.1 and 7.2., standard implies by mass in Note 9. Chair deems NY negative comment to be editorial and can edit standard to reflect by mass as noted in earlier sections 7.1 and 7.2 of the standard.*

**Action:** If TS membership agrees with Chair, is NY willing to withdraw negative vote? If so, chair edit standard accordingly for publications this upcoming printing.

The chair reviewed the rationale and the standard's language in previous sections. The TS agreed that this was editorial in nature to reconcile the language to be consistent throughout the section.

NY agreed to withdraw the negative with editorial changes made through publications.

NJ comment – "NJDOT refers to this item as "Recycled Concrete Aggregate". Could that version of the name be captured in Section 5? Just a thought."

*Chair response: This change would need to be promulgated throughout standard. Terminology is different across many states. No further action needed.*

R 27 - reconfirmed

R 52 - reconfirmed

R 58 - reconfirmed

T 100 - reconfirmed

T 208 – reconfirmed, VA comment – Add "Undrained" in title of 3.2 for clarification..See attachment 5 for T 208 Standard.

This is an undrained test so it is editorial in nature.

T 233 - reconfirmed

T 265 - reconfirmed

T 311 – 1 negative, NY ...See attachment 6 for T 311 standard.

NY – "Note 10: Definition or reference to what is constant weight should be added such as described in T 265 section 6.1"

**Action:** NY Negative finding Persuasive or Non-Persuasive? If persuasive, work with NY to edit standard and then generate TS ballot with change in Spring 2019 for potential COMP ballot in Fall 2019. If non persuasive, publish standard as is.

CO – agrees that it is technical in nature and that constant mass should be defined. CO and MS agree. Motion to find negative persuasive, work with NY to edit, and (action item:) generate a TS ballot in the Spring. The current standard will be published as is and will be balloted next year with the above changes.

CO motions; AL second. No discussion – motion passes.

Note: PP 97 is going to be published in April. This provisional practice is for determining constant mass.

#### D. Task Force Reports

TF 17-01 – T90, revisions to procedure language in section 6.4, Roxanne Baker of aashto re:source is TF lead, TF members are PA (T. Ramirez), FL (D. Horhota), AK (M. San Angelo) Roxanne Baker report out on status. See attachment 7 for T90 with proposed revisions. Roxanne gave an overview. Clarify a satisfactory endpoint. Adding language and clarification that will hopefully help the endpoint of PL be determined. The TF is still working on addressing some of the comments received, and the task force may need one more meeting before presenting final recommendations.



Do a TS ballot and address any comments now or wait until the TF reconvenes and then do a voice vote at the annual meeting?

CO & MS want to wait until the TF has collected all comments before balloting. The TF will address outstanding comments and feedback then will be a discussion item at the annual meeting and can hopefully be balloted next year.

**Action:** Propose TS ballot for Spring 2019 - Revise T90 with recommended changes from TF 17-01.

#### VI. New Business

- A. Research Proposals - none
- B. AASHTO Re:source/CCRL/NTPEP - Observations from Assessments, as applicable? - None
- C. NCHRP Issues - None
- D. Correspondence, calls, meetings - None
- E. Presentation by Industry/Academia - None
- F. Revisions/Work on Standards for Coming Year –
  - 1. Standards are available to be adopted by members for stewardship. Andy is going to follow up to try to communicate to stewards to begin review.
  - 2. If you are a member and would like to be a steward of a standard please get in touch with Andy
- G. Proposed New Standards - None
  - 1. Permission forms for drawings/photos
- H. Proposed New Task Forces – None ?  
(Include list of volunteers to lead and/or join TF)
- I. New TS Ballots? T90 based on TF17-01 work?
- J. Technical Subcommittee membership  
See attachment 1 for membership listing. Please email Vice Chairman Griffin Sullivan at [wsullivan@mdot.ms.gov](mailto:wsullivan@mdot.ms.gov) if desire to become a member of the Technical Subcommittee.

#### VII. Open Discussion

#### VIII. Adjourn

Adjourn 12:45 pm Thank you!

## AASHTO Electronic Balloting System

# Ballot Detail Report

### Ballot Detail

Ballot Name:	T90 - Rev to Sec 6.4 from TF 17-01
Ballot Manager:	Charles A. Babish
Ballot Start Date:	4/22/2019
Ballot Due Date:	5/13/2019

### T90 - Rev to Sec 6.4 from TF 17-01

<b>Item Number:</b>	<b>1</b>
Description:	Revisions to Section 6.4 to clarify when a satisfactory endpoint for the plastic limit has been reached.
Decisions:	<p>Affirmative: 17 of 23</p> <p>Negative: 0 of 23</p> <p>No Vote: 6 of 23</p>

Agency (Individual Name)	Comments	Decision	Response Attachment
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Ontario Ministry Of Transportation  
 (Carole Anne MacDonald)  
 (Caroleanne.macdonald@ontario.ca)

American Association of State  
 Highway and Transportation  
 Officials (Casey Soneira)  
 (csoneira@aaashto.org)

Ontario Ministry Of Transportation  
 (Anne Lee Holt)  
 (anne.holt@ontario.ca)

Federal Highway Administration  
 (Azmat Hussain)  
 (azmat.hussain@dot.gov)

Alaska Department of  
 Transportation and Public Facilities  
 (Daniel Gettman)  
 (daniel.gettman@alaska.gov)

D B Consulting and Associates, LLC  
 (Desna Bergold)  
 (desna@dbconllc.com)



Troxler Electronic Laboratories, Inc.  
(Dick Reaves)

(dreaves@troxlerlabs.com)

GGfGA Engineering, LLC

(Georgene M Geary)

(ggeary@ggfga.com)

AASHTO re:source (Gregory V  
Uherek)

(guherek@ashtoresource.org)

Mississippi Department of  
Transportation (James A. Williams)

(jwilliams@mdot.state.ms.us)

Connecticut Department of  
Transportation (James P. Connery)

(James.Connery@ct.gov)

ingevity (Jason Bausano)

(jason.bausano@ingevity.com)

AASHTO re:source (John James  
Malusky)

(jmalusky@ashtoresource.org)

AASHTO re:source (Maria Knake)

(mknake@ashtoresource.org)

AASHTO re:source (Roxanne  
Baker)

(rbaker@ashtoresource.org)

American Association of State  
Highway and Transportation  
Officials (Ryan Fragapane)

(rfragapane@ashto.org)

Alabama Department of  
Transportation (Scott W. George)

(georges@dot.state.al.us)

Ontario Ministry Of Transportation  
(Stephen Lee)

(stephen.lee@ontario.ca)

AASHTO re:source (Tracy  
Barnhart)

(tbarnhart@ashtoresource.org)

Tennessee Department of  
Transportation (Travis W. Smith)

(travis.w.smith@tn.gov)

Mississippi Department of  
Transportation (William Griffin  
Sullivan)

(wsullivan@mdot.ms.gov)

Affirmative

Affirmative

Utah Department of Transportation (William J Lawrence) (BillLawrence@Utah.gov)	Affirmative
Pennsylvania Department of Transportation (Timothy L Ramirez) (tramirez@pa.gov)	Affirmative
Connecticut Department of Transportation (Robert G Lauzon) (robert.lauzon@ct.gov)	Affirmative
Oregon Department of Transportation (Sean P. Parker) (Sean.P.Parker@odot.state.or.us)	Affirmative
Vermont Agency of Transportation (Mladen Gagulic) (mladen.gagulic@vermont.gov)	Affirmative
Rhode Island Department of Transportation (Jose S Lima) (JOSE.LIMA@DOT.RI.GOV)	Affirmative
Alabama Department of Transportation (Kaye C Davis) (chancellork@dot.state.al.us)	Affirmative
Delaware Department of Transportation (Jennifer M Pinkerton) (Jennifer.Pinkerton@state.de.us)	Affirmative
South Dakota Department of Transportation (Joe J. Feller) (joe.feller@state.sd.us)	Affirmative
New Jersey Department of Transportation (Edward Inman) (Edward.Inman@dot.nj.gov)	Affirmative
Illinois Department of Transportation (Daniel H Tobias) (daniel.tobias@illinois.gov)	Affirmative
Virginia Department of Transportation (Charles A. Babish) (andy.babish@vdot.virginia.gov)	Affirmative
Massachusetts Department of Transportation (Clement Fung) (clement.fung@state.ma.us)	Affirmative
Colorado Department of Transportation (Craig Wieden) (craig.wieden@state.co.us)	Affirmative

Florida Department of Transportation (David Horhota) (david.horhota@dot.state.fl.us)	Affirmative
Nevada Department of Transportation (Darin Tedford) (dtedford@dot.nv.gov)	No Vote
Ontario Ministry Of Transportation (Becca Lane) (becca.lane@ontario.ca)	No Vote
New York State Department of Transportation (F. Steven Heiser) (steve.heiser@dot.ny.gov)	No Vote
Georgia Department of Transportation (Richard Douds) (rdouds@dot.ga.gov)	No Vote
Maryland Department of Transportation (Sejal Barot) (sbarot@sha.state.md.us)	No Vote
West Virginia Department of Transportation (Ron Stanevich) (Ron.L.Stanevich@wv.gov)	No Vote

Date: 7/18/2019

<b>TS</b>	<b>Std Sort</b>	<b>Designation No</b>
1a	M 318-02 (2019)	M 318-02 (2019)
1a	M 319-02 (2019)	M 319-02 (2019)
1a	R 027-01 (2019)	R 27-01 (2019)
1a	R 051-13 (2017)	R 51-13 (2017)
1a	R 052-10 (2019)	R 52-10 (2019)
1a	R 058-11 (2019)	R 58-11 (2019)
1a	R 074-16	R 74-16
1a	T 088-19	T 88-19
1a	T 089-13 (2017)	T 89-13 (2017)
1a	T 090-16	T 90-16
1a	T 100-15 (2019)	T 100-15 (2019)
1a	T 176-17	T 176-17
1a	T 190-14 (2018)	T 190-14 (2018)
1a	T 193-13 (2017)	T 193-13 (2017)
1a	T 194-97 (2018)	T 194-97 (2018)
1a	T 208-15 (2019)	T 208-15 (2019)
1a	T 215-14 (2018)	T 215-14 (2018)
1a	T 216-07 (2016)	T 216-07 (2016)
1a	T 217-14 (2018)	T 217-14 (2018)
1a	T 220-66 (2018)	T 220-66 (2018)
1a	T 226-90 (2018)	T 226-90 (2018)
1a	T 233-02 (2019)	T 233-02 (2019)
1a	T 236-08 (2018)	T 236-08 (2018)
1a	T 258-81 (2018)	T 258-81 (2018)
1a	T 265-15 (2019)	T 265-15 (2019)
1a	T 267-86 (2018)	T 267-86 (2018)
1a	T 273-86 (2018)	T 273-86 (2018)
1a	T 288-12 (2016)	T 288-12 (2016)
1a	T 289-91 (2018)	T 289-91 (2018)
1a	T 290-95 (2016)	T 290-95 (2016)
1a	T 291-94 (2018)	T 291-94 (2018)
1a	T 296-10 (2016)	T 296-10 (2016)
1a	T 307-99 (2017)	T 307-99 (2017)
1a	T 311-00 (2019)	T 311-00 (2019)

*Note: Currently, there are no 1a provisional standards.*

































Title
Glass Cullet Use for Soil–Aggregate Base Course
Reclaimed Concrete Aggregate for Unbound Soil–Aggregate Base Course
Assessment of Corrosion of Steel Piling for Non-Marine Applications
Compost for Erosion/Sediment Control (Filter Berms and Filter Socks)
Compost for Erosion/Sediment Control (Compost Blankets)
Dry Preparation of Disturbed Soil and Soil–Aggregate Samples for Test
Wet Preparation of Disturbed Soil Samples for Test
Particle Size Analysis of Soils
Determining the Liquid Limit of Soils
Determining the Plastic Limit and Plasticity Index of Soils
Specific Gravity of Soils
Plastic Fines in Graded Aggregates and Soils by Use of the Sand Equivalent Test
Resistance R-Value and Expansion Pressure of Compacted Soils
The California Bearing Ratio
Determination of Organic Matter in Soils by Wet Combustion
Unconfined Compressive Strength of Cohesive Soil
Permeability of Granular Soils (Constant Head)
One-Dimensional Consolidation Properties of Soils
Determination of Moisture in Soils by Means of a Calcium Carbide Gas Pressure Moisture Tester
Determination of the Strength of Soil–Lime Mixtures
Triaxial Compressive Strength of Undrained Rock Core Specimens without Pore Pressure Measurements
Density of Soil In-Place by Block, Chunk, or Core Sampling
Direct Shear Test of Soils under Consolidated Drained Conditions
Determining Expansive Soils
Laboratory Determination of Moisture Content of Soils
Determination of Organic Content in Soils by Loss on Ignition
Soil Suction
Determining Minimum Laboratory Soil Resistivity
Determining pH of Soil for Use in Corrosion Testing
Determining Water-Soluble Sulfate Ion Content in Soil
Determining Water-Soluble Chloride Ion Content in Soil
Unconsolidated, Undrained Compressive Strength of Cohesive Soils in Triaxial Compression
Determining the Resilient Modulus of Soils and Aggregate Materials
Grain-Size Analysis of Granular Soil Materials

































ASTM Eq	Immediate Action Needed?
	No
	No
	No
	No
	No
	No
	Revise or Reconfirm
	No
	No
	Revise or Reconfirm
D854-00	No
	No
D2844-07	No
	No
	No
D2166-00	No
	No
D2435-04	Revise or Reconfirm
	No
	No
D2664-86	No
	No
D3080-72(2003)	No
	No
	No
	No
	No
	No
	No
	No
	Revise or Reconfirm
	No
	Revise or Reconfirm
	No
	No

































TC Notes (MD, etc. denotes member stewardship assignment)
MD
MD
NY
DE
DE
NV
NV
NJ
MS
VA
VA
NJ
UT
RI
RI
TN
VT
SD
PA
MS
AL
GA
CO
OR
ON
GA
SD
FL
FL
WV
CT
AL
IL
MA



**Date:** May 7, 2019

**To:** Charles A. Babish, P.E.  
AASHTO COMP Technical Subcommittee 1a Chair  
State Materials Engineer  
Virginia Department of Transportation  
[andy.babish@vdot.virginia.gov](mailto:andy.babish@vdot.virginia.gov)

**From:** David M. Jones, P.E. *D. M. Jones*  
WAQTC Executive Board Chair  
Assistant State Materials Engineer – Materials Quality  
Washington State Department of Transportation  
[JonesDa@wsdot.wa.gov](mailto:JonesDa@wsdot.wa.gov)

Mr. Babish,

The WAQTC Qualification Advisory Committee (QAC) has found discrepancies in the apparatus requirements of two Technical Section (TS) 1a test methods, *T 176; Plastic Fines in Graded Aggregates and Soils by Use of the Sand Equivalent Test* and *T 88; Particle Size Analysis of Soils*. In both instances, WAQTC could not determine the correct values and is unable to recommend a solution. This is to inform you of the issue and suggest asking the test methods Champion(s) assistance in finding a solution.

T 176 Section 4.1, the dimensions in the table in Figure 1 do not agree with the diagrams (highlighted excerpt attached).

T 88 Section 3.1.4 requires that hydrometers conform to *ASTM E100, Standard Specification for ASTM Hydrometers* but the dimensions in 'Figure 5 – Hydrometer' do not agree with E100 (highlighted excerpts attached). There is also an internal discrepancy in E100 between the Figure 2 dimensions and those listed on the 'Soil Hydrometer' table. Evan Rothblatt, ASTM, has indicated that the technical contact for E100 is aware of the discrepancy and it will be addressed.

Please let us know if we can help in any way.

Thank you,

DMJ/DAB/dab

## 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  $915 \pm 25$  mm ( $36 \pm 1$  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 $\times$ 400	Copper tube	
	2	Siphon hose	4.8 ID $\times$ 1220	Rubber tube	
	3	Blow hose	4.8 ID $\times$ 50.8	Rubber tube	
	4	Blow tube	6.4 dia $\times$ 50.8	Copper tube	
	5	Two-hole stopper	No. 6	Rubber	
	6	Irrigator tube	6.4 OD 0.89 wall $\times$ 500 stainless tube, type 316		
	7	Clamp	Pinchcock, Day, BKH No. 21730 or equivalent		
B		Graduate Assembly			
	8	Tube	38.1 OD $\times$ 430	Trans acrylic plastic	
	9	Base	12.7 $\times$ 102 $\times$ 102	Trans acrylic plastic	
C		Weighted Foot Assembly			
	10	Sand reading indicator	6.4 dia $\times$ 14.9	Nylon 101 Type 66	Annealed
	11	Rod	6.4 dia $\times$ 438.2	Brass	
	12	Weight	50.8 dia $\times$ 52.78	Cold rolled steel, or equivalent	
	13	Roll pin	0.16 dia $\times$ 12.7	Steel	
	14	Foot	0.16 Hex $\times$ 13.7	Brass	
	15	Solid stopper	No. 7	Rubber	

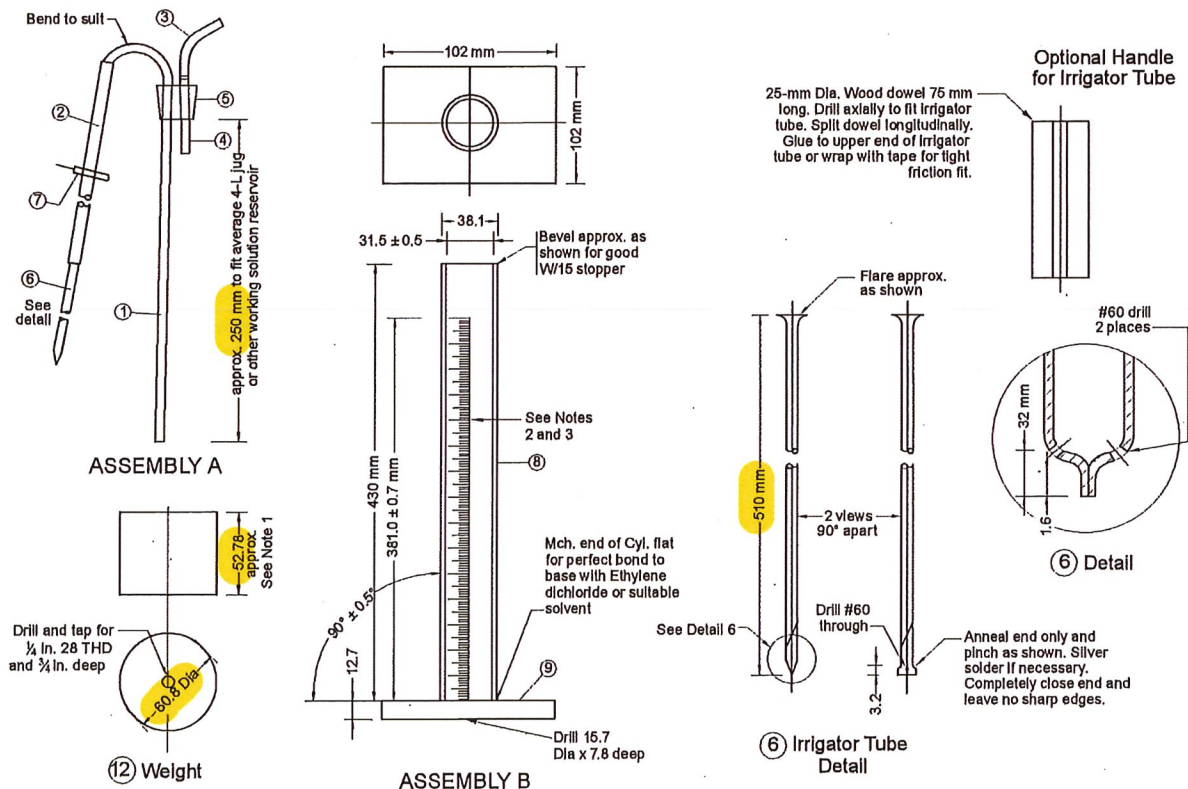
Notes: 1. "C" Weighted Foot Assembly to Weigh  $1000 \pm 5$ g.

2. 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.

3. Accuracy of scale to be  $\pm 0.25$  mm per 2.5 mm. Error at any point on scale to be  $\pm 0.75$  mm of true distance to zero.

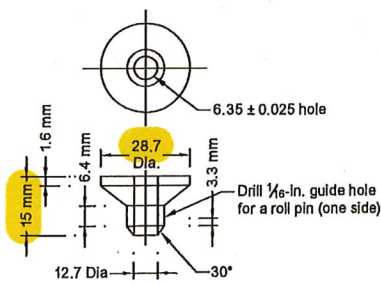
4. Glass or stainless steel may be substituted as a material type for the copper siphon and blow tubing.

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

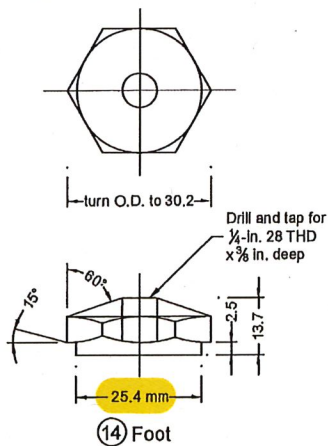


Note: All dimensions are shown in millimeters unless otherwise indicated.

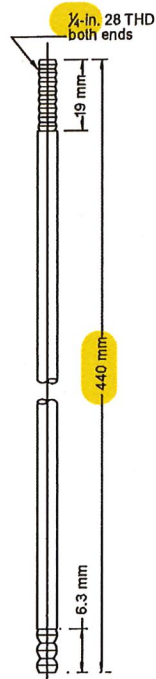
Figure 1—Sand Equivalent Apparatus (Continued on next page)



⑩ Sand Reading Indicator

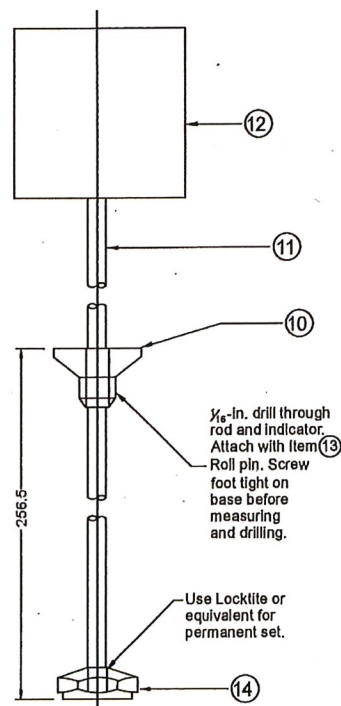


⑭ Foot



⑪ Rod

### ASSEMBLY C



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

Figure 1—Sand Equivalent Apparatus (Continued)

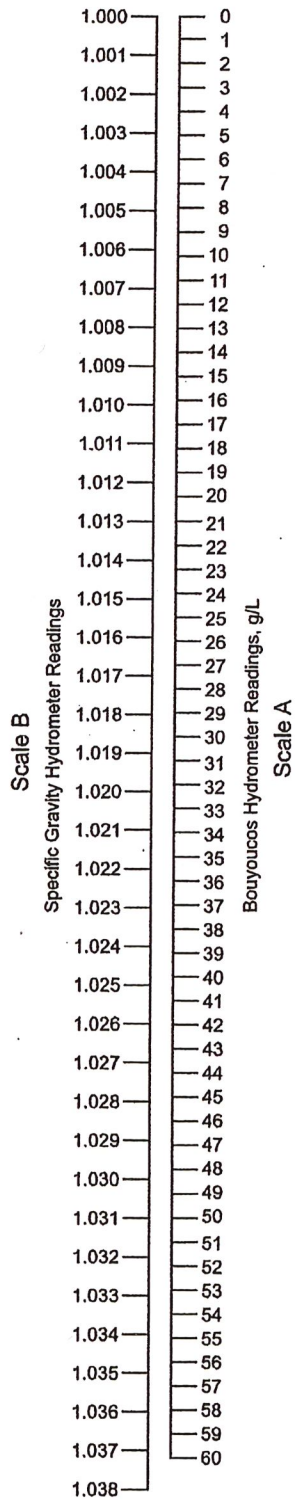


Although AASHTO T 88, *Particle Size Analysis of Soils*, references ASTM E100, *Standard Specification for ASTM Hydrometers*, in Section 3.1.4, in Figure 5 – Hydrometer, the dimensions are different than those given in E100.

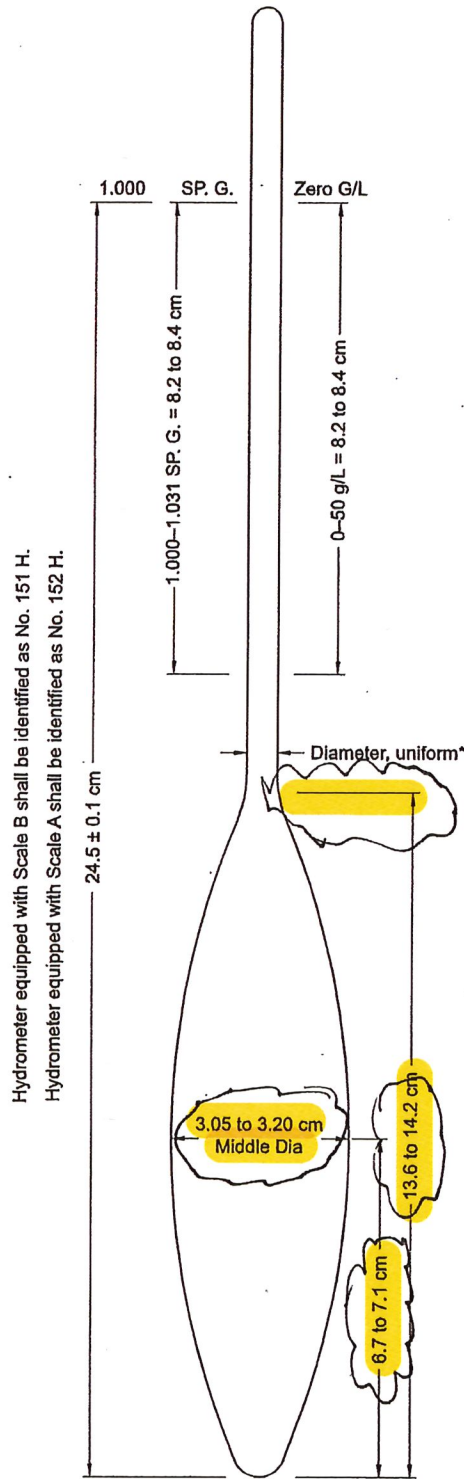
The requirements of T 88 are based on ASTM E100-95, which was revised in 2005, 2015, and 2017.

Attached are excerpts from both procedures to illustrate the differences indicated by the highlighted, “clouded” text. Also summarized below:

- E100 requires 3.00 – 3.20 cm **max** diameter, T 88 requires 3.05 to 3.20 cm **middle** diameter.
- E100 requires 5.8 – 7.1 cm from the bottom of the body to the point of **max** diameter of the body, T 88 requires 6.7 to 7.1 from the bottom of the body to the point of **middle** diameter of the body.
- E100 requires 11.5 to 14.2 cm from the bottom of the body to **some unidentified point**, T 88 requires 13.6 to 14.2 cm from the bottom of the body to **the bottom of the stem**.
- E100 requires 62 – 72 cubic cm of displacement volume, T 88 has **no requirement for displacement volume**.
- E100 requires an actual scale range for Specific Gravity from 0.993 to 1.038, T 88 requires an actual scale range for Specific Gravity from 0.995 to 1.038. [ NOTE: E100 is in conflict with itself on the scale range and agrees with T 88 in one location, ASTM has been informed.]



\* The diameter of the stem may be varied to adjust the length of the scale specified but the stem shall be uniform in diameter from top to bottom. The accuracy of the scale shall be  $\pm 1$  scale division, distributed uniformly over the scale length.

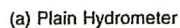


### Figure 5—Hydrometer

<sup>A</sup> For relative densities (specific gravities) less than 0.950, alcoholic solutions may be tested with hydrometers 84H to 87H

<sup>B</sup> Indication of the thermometer range is made by the use of the listed designation used as a suffix to the ASTM hydrometer number. For example, 42HL is an instrument with API gravity range of 22 to 30° API and thermometer range 0 to 150°F. An instrument with the same gravity range, but a thermometer range of 60 to 220°F would be designated 42HH. The number 45HM would identify an instrument with API gravity range of 43 to 51° API and a thermometer range of 30 to 180°F.

<sup>C</sup> Indication of the thermometer range is made by the use of the listed designation used as a suffix to the ASTM hydrometer number. For example, 54HL is an instrument with API gravity range of 29 to 47° API and thermometer range 0 to 150°F. An instrument with the same gravity range, but a thermometer range of 60 to 220°F would be designated 54HH. The number 57HM would identify an instrument with API gravity range of 59 to 71° API and a thermometer range of 30 to 180°F.



**FIG. 1 Typical Hydrometers Designs**





Subdivisions, °F	1
Intermediate lines at, °F	5
Main (numbered) lines at, °F	10
Scale error at any point not to exceed, °F	0.5
Scale length, mm	50 to 70

Relative Density (Specific Gravity) Hydrometers			
For Petroleum Products and Other Liquids of Similar Surface Tensions (33 dynes/cm or less)		For General Use	
ASTM Hydrometer No.	Nominal Rel. Density (Sp. Gr.) Range	ASTM Hydrometer No.	Nominal Rel. Density (Sp. Gr.) Range
102H-62	0.650 to 0.700	125H-62	1.000 to 1.050
103H-62	0.700 to 0.750	126H-62	1.050 to 1.100
104H-62	0.750 to 0.800	127H-62	1.100 to 1.150
105H-62	0.800 to 0.850	128H-62	1.150 to 1.200
106H-62	0.850 to 0.900	129H-62	1.200 to 1.250
107H-62	0.900 to 0.950	130H-62	1.250 to 1.300
108H-62	0.950 to 1.000	131H-62	1.300 to 1.350
		132H-62	1.350 to 1.400
		133H-62	1.400 to 1.450
		134H-62	1.450 to 1.500
		135H-62	1.500 to 1.550
		136H-62	1.550 to 1.600
		137H-62	1.600 to 1.650
		138H-62	1.650 to 1.700
		139H-62	1.700 to 1.750
		140H-62	1.750 to 1.800
		141H-62	1.800 to 1.850

Standard temperature, °F	60/60
Subdivisions	0.001
Intermediate lines at	0.005
Main (numbered) lines at	0.010
Scale error at any point not to exceed	0.001
Total length, mm	250 to 270
Length of nominal scale, mm	70 to 85
Scale extension beyond nominal range limits, max	0.005
Body diameter, mm	20 to 24
Stem diameter min, mm	4.0

Soil Hydrometers (55 dynes/cm or less)			
ASTM Hydrometer No.	Nominal Rel. Density (Sp. Gr.) Range	ASTM Hydrometer No.	Nominal Range
151H-05	0.995 to 1.038 sp gr	152H-05	-5 to + 60 g/L
Standard temperature, °F	68/68	68/68	
Divisions	0.001 sp gr	1 g/L	
Intermediate lines at	0.005 sp gr	5 g/L	
Main (numbered) lines at	0.010 sp gr	10 g/L	
Scale error at any point not to exceed	0.001 sp gr	1 g/L	
Length of nominal scale	See Fig. 2	See Fig. 2	
Total length, mm	278 to 282	278 to 282	
Body diameter	See Fig. 2	See Fig. 2	
Stem diameter	See Fig. 2	See Fig. 2	

Pounds Per Gallon Hydrometers	
For Petroleum Products and Other Liquids of Similar Surface Tensions (33 dynes/cm or less)	
ASTM Number	Nominal Range, lb/gal
293H-68	5.83 to 6.24
294H-68	6.24 to 6.66
295H-68	6.66 to 7.08
296H-68	7.08 to 7.50
297H-68	7.50 to 7.91
298H-68	7.91 to 8.33
Standard temperature, °F	60°F
Subdivisions	0.005
Intermediate lines at	0.01
Main (numbered) lines at	0.05
Scale error at any point not to exceed	0.005
Total length, mm	325 to 335
Length of nominal scale, mm	125 to 145
Scale extension beyond nominal range limits	0.025
Body diameter, mm	23 to 27
Stem diameter min, mm	5.0