

COMMITTEE ON MATERIALS AND PAVEMENTS (COMP)

Meeting (Annual or Mid-Year)	Annual
Date	August 6, 2019
Scheduled Time	1:00 p.m. – 3:00 p.m. EDT
Technical Subcommittee (TS) & Name	2c, Asphalt-Aggregate Mixtures
Chair Name and (State)	Allen Myers, Kentucky Transportation Cabinet
Vice Chair Name and (State)	Rick Bradbury, Maine Department of Transportation
Research Liaison Name and (State)	Allen Myers, Kentucky Transportation Cabinet

I. Introduction and Housekeeping

II. Call to Order and Opening Remarks

A. Brief Summary of Activities

(Briefly explain the goals of today's meeting and what you hope to accomplish. Get everyone up to speed and on the same page.)

III. Roll Call of Voting Members

Present	Member Name	State	Present	Member Name	State
<input type="checkbox"/>	Scott George	AL	<input type="checkbox"/>	James Williams	MS
<input type="checkbox"/>	Michael San Angelo	AK	<input type="checkbox"/>	Brett Trautman	MO
<input type="checkbox"/>	Jesus Sandoval-Gil	AZ	<input type="checkbox"/>	Oak Metcalfe	MT
<input type="checkbox"/>	Michael Benson	AR	<input type="checkbox"/>	Darin Tedford	NV
<input type="checkbox"/>	Craig Wieden	CO	<input type="checkbox"/>	Chuck Dusseault	NH
<input type="checkbox"/>	James Connery	CT	<input type="checkbox"/>	Russell Thielke	NY
<input type="checkbox"/>	Jennifer Pinkerton	DE	<input type="checkbox"/>	Eric Biehl	OH
<input type="checkbox"/>	Wasi Khan	DC	<input type="checkbox"/>	Matt Romero	OK
<input type="checkbox"/>	David Webb	FL	<input type="checkbox"/>	Sean Parker	OR
<input type="checkbox"/>	Anita Joaquin	HI	<input type="checkbox"/>	Tim Ramirez	PA
<input type="checkbox"/>	Mike Santi	ID	<input type="checkbox"/>	Michael Byrne	RI
<input type="checkbox"/>	Jim Trepanier	IL	<input type="checkbox"/>	Brian Egan	TN
<input type="checkbox"/>	Matthew Beeson	IN	<input type="checkbox"/>	Scott Nussbaum	UT
<input type="checkbox"/>	Richard Barezinsky	KS	<input type="checkbox"/>	Robert Crandol	VA
<input type="checkbox"/>	Allen Myers	KY	<input type="checkbox"/>	Kurt Williams	WA
<input type="checkbox"/>	Rick Bradbury	ME	<input type="checkbox"/>	Paul Farley	WV
<input type="checkbox"/>	Sejal Barot	MD	<input type="checkbox"/>	Barry Paye	WI
<input type="checkbox"/>	Curt Turgeon	MN	<input type="checkbox"/>	Becca Lane	ON

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.)

IV. Approval of TS 2c Minutes from Mid-Year Web Meeting (February 7, 2019) – ATTACHMENT A (pp. 14-22)

V. Old Business

A. Review of 2018 COMP Ballot 18-04 (Rolling Ballot Group 3, November 2018-January 2019)

COMP Ballot #	Standard	Results (neg/affirm)	Comments/Negatives	Action
18-04 (Item 20)	R 96 (<i>Installation, Operation, and Maintenance of Ignition Furnaces</i>)	0/43	Comments from Missouri, Pennsylvania, South Carolina, and Texas	Published in 2019.
18-04 (Item 21)	R 97 (<i>Sampling Asphalt Mixtures</i>)	0/43	Comments from Illinois, Pennsylvania, Texas, and Wisconsin	Published in 2019.
18-04 (Item 22)	R 47 (<i>Reducing Samples of Asphalt Mixtures to Testing Size</i>)	0/43	Comments from Missouri and Texas	Published in 2019.
18-04 (Item 23)	R 79 (<i>Vacuum Drying Compacted Asphalt Specimens</i>)	0/43	Comments from Missouri	Published in 2019.
18-04 (Item 24)	T 30 (<i>Mechanical Analysis of Extracted Aggregate</i>)	0/43	Comments from Pennsylvania and Tennessee	Published in 2019. Consider harmonizing with T 27 (<i>Sieve Analysis of Fine and Coarse Aggregates</i>).
18-04 (Item 25)	T 209 (<i>Theoretical Maximum Specific Gravity (G_{mm}) and Density of Asphalt Mixtures</i>)	0/43	Comments from Georgia, Illinois, Kansas, Missouri, Pennsylvania, and Texas	Published in 2019.
18-04 (Item 26)	T 209 (<i>Theoretical Maximum Specific Gravity (G_{mm}) and Density of Asphalt Mixtures</i>)	1/42	Negative from Illinois Comments from South Carolina and Texas ATTACHMENT B (pp. 23-31)	Revisions were not published. Consider results of survey from AASHTO re:source to determine future action. Survey indicated disallowing mallet would have major impact on one agency and minor impact on one agency. Does use of mallet decrease test accuracy?


			③	Add identification of agitation method to future AASHTO resource proficiency samples in attempt to determine if using mallet negatively impacts ratings.
18-04 (Item 27)	T 324 (Hamburg Wheel-Track Testing of Compacted Asphalt Mixtures)	0/43	Comments from Missouri and Pennsylvania	Published in 2019.


B. Review of TS 2c Ballot 19-01 (2018 TS 2c Reconfirmation Ballot, January-February 2019)

Reconf. Ballot #	Standard	Results (neg/affirm)	Comments/Negatives	Action
19-01 (Item 1)	M 17 (Mineral Filler for Bituminous Paving Mixtures)	0/30		Reconfirmed.
19-01 (Item 2)	R 59 (Recovery of Asphalt Binder from Solution by Abson Method)	0/30	Comments from New York <i>R59 5.3.6 only allows the use of a liquid thermometer. Allow other temperature measuring devices such as a calibrated PRT. See AASHTO T59 Section 6.3.4.3 for wording.</i>	Reconfirmed.
19-01 (Item 3)	T 319 (Quantitative Extraction and Recovery of Asphalt Binder from Asphalt Mixtures)	0/30	Comments from Tennessee <i>Suggest removing language "mercury-in-glass" from 11.1. and removing "mercury manometer" from 11.2. The industry is moving away from mercury thermometers.</i>	Reconfirmed.
19-01 (Item 4)	T 329 (Moisture Content of Asphalt Mixtures by Oven Method)	0/30		Reconfirmed.
19-01 (Item 5)	TP 114 [Determining the Interlayer Shear Strength (ISS) of Asphalt Pavement Layers]	0/30	Comments from Illinois <i>Section 4.1: The second sentence references Figure 1. It is suggested to reference Figures 1 and 2 as "The device (see Figures 1 and 2)..."</i> <i>Section 6.1, first sentence, second line: Replace "shall be designed" with "was designed and shall be produced".</i> <i>Section 6.1: This section states "accommodates sensors that measure the vertical and horizontal</i>	Extended for two years.



			<p><i>displacements” in the 3rd and 4th lines. It is suggested to reference Table 1 with the vertical and horizontal displacement sensors similar to “accommodates sensors that measure the vertical and horizontal displacements and meet the requirements shown in Table 1”.</i></p> <p><i>Section 8.3.1: The final sentence of this section states “ensure the air void content of the entire specimen is $6.0 \pm 1.0\%$”. How is this determined on a composite specimen?</i></p> <p><i>Two different asphalt mixtures with a tack coat placed between them could have significantly different Gmm values.</i></p> <p><i>Section 9.5: This section states that the displacement rate is 2.54 mm/min until failure. Is there a tolerance associated with this rate? If so, it would be appropriate to add it.</i></p> <p><i>Section 10.1: The ultimate load shown in the plot in Section 9.5 has a negative value. Should the ultimate load be inside of an absolute value to produce a positive interlayer shear strength value?</i></p> <p><i>Section 11.1.2: Can the failure ever occur somewhere other than the interface of the two materials? If so, what does that indicate?”</i></p> <p><i>Section 11.1.5.1 and 11.1.5.2: Can a range of “typical” values be provided as well as suggestions for “good” and “poor” values?</i></p> <p><i>Section 11.1.5.4: This section states that the average and standard deviation should be determined for the cores. Should this be generalized from “cores” to “test specimens” to encompass both cores and gyratory compacted specimens?</i></p>	
19-01 (Item 6)	TP 115 (Determining the Quality of Tack Coat Adhesion to the Surface of an Asphalt Pavement in the Field or Laboratory)	0/30	<p>Comments from Illinois</p> <p><i>Section 6.2: This section discusses the computer and software needed for the procedure. What are the data acquisition rate requirements needed for the computer and software? It is suggested to add this information to the specification.</i></p> <p><i>Section 6.4: This section details the thermometer used. It is suggested to add a reference to an applicable AASHTO or ASTM standard for the thermometer.</i></p> <p><i>Section 8.3 Note 1: The note refers to application rates greater than 0.05 gal/yd². It is suggested to add the metric equivalent to this note and show the English rate in parentheses to remain consistent with the remainder of the specification.</i></p> <p><i>Section 9.1: This section states that the softening point of the tack coat material should be determined. Is the softening point of the residue being determined? If so, it may be more appropriate to state “determine the softening point of the tack coat residue”.</i></p> <p><i>Section 9.4: This section states that the displacement rate is 0.2 mm/sec until failure. Is there a tolerance</i></p>	Extended for two years.

			<p><i>associated with this rate? If so, it would be appropriate to add it.</i></p> <p><i>Section 9.4: How much effect does applying a 920 lb. compressive load to the specimen have on the subsequent tensile load on the bond?</i></p> <p><i>Section 9.6: Does Pult always represent the strength of the bond of the tack coat or sometimes of the mix also?</i></p> <p><i>Section 11.1.4: This section states that the loading plate dimensions should be reported. However, there is no detail regarding the nearest dimension (tenth of a millimeter for example). It is suggested to add this information.</i></p>	
19-01 (Item 7)	TP 128 (Evaluation of Oxidation Level of Asphalt Mixtures by a Portable Infrared Spectrometer)	0/30	<p>Comments from Idaho</p> <p><i>Idaho would like to have this method extended for another 2 years. ITD was involved in the development of the method through research done for ITD RP 249.</i></p> <p><i>Because of other priorities, we have not been able to use this method on any projects or develop specifications. We intend to do so in the future.</i></p> <p>Comments from Illinois</p> <p><i>Section 3.1.1: This section defines the asphalt aging rate as “the change of asphalt chemical properties with time”. It is suggested to add specific definitions about the term “chemical properties”.</i></p> <p><i>Section 4.3: This section discusses asphalt mixtures containing RAP. Can this method also be applied to mixtures with combinations of RAP and recycled asphalt shingles (RAS)? If so, it is suggested to modify this section to allow asphalt mixtures with recycled asphalt materials</i></p> <p><i>Section 5.2.2: Is there a NMAS limit on the mix that will be put in this tube?</i></p> <p><i>Section 5.2.3: This section details the optional sampling cylinder and metal tube. No dimensions are stated for these items.</i></p> <p><i>Section 5.2.4: This section discusses the use of an ordinary hammer to compact the asphalt mixture. It is suggested to define ordinary hammer.</i></p> <p><i>Section 5.2.5: When is the sieving done? Since this is messy, how is clean-up recommended to be done?</i></p> <p><i>Section 6.1.2, 6.2.3, and 6.3.5: How is the degree of compaction controlled? When does it end? Are air voids measured?</i></p> <p><i>Section 6.2: This section describes the preparation of laboratory asphalt mixture specimens. Why is this material sieved while the plant produced material is not sieved? It seems that difference could affect the final results produced in the test.</i></p> <p><i>Section 6.2.1: What is the temperature of the mix? Does this gradation correlate to the gradation of the field mix?</i></p>	Extended for two years.

		<p>Section 9.2.1: This section shows an example of the oxidation data for JMF, plant, and pavement. It is suggested to change the “pavement” axis title to “In-Place Pavement”.</p> <p>Section 10.1: This section details the precision and bias statement of the specification. The coefficient of variation maximum is given as 6%. Is there a reference or further information on the 6% maximum criteria?</p>	
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C. Outstanding Items from 2019 Mid-Year Web Meeting

1. Missouri inquiry about length of test count in T 287 (Asphalt Binder Content of Asphalt Mixtures by the Nuclear Method) – **ATTACHMENT C (pp. 32-34)**
 - a. Missouri requires 16-minute count instead of 4-minute count specified in T 287
 - b. Modify standard to require *minimum* count time of 4 minutes
2. Accuracy of digital manometer (0.1 kPa or 1 mmHg) – **ATTACHMENT D (pp. 35-40)**
 - a. AASHTO re:source assessor noted finding
 - b. Most equipment in use does not satisfy requirement
 - i. Brief search produced no devices that meet requirement
 - ii. Devices that satisfy requirement may exist but are likely cost-prohibitive
 - c. Is requirement important for determining accurate test results?
 - i. What is origin of 27.5 ± 2.5 mmHg requirement?
 - a) Early research indicates that vacuum pressure was not thoroughly evaluated
 - b) Recent research maintained vacuum of 25 to 30 mmHg during testing
 - d. Correct interpretation of standard
 - i. Term “accurate to” may have been used when intent was to define resolution (“readable to”)
 - e. Should requirement be modified to accommodate equipment that is widely available and typically being used?
 - i. More work is necessary to determine if tolerance on vacuum pressure is significant


D. Review of TS 2c Ballot 19-02 (TS 2c Ballot # 1, June-July 2019) – **ATTACHMENT E (pp. 41-48)**

TS Ballot #	Standard	Results (neg/affirm)	Comments/Negatives	Action
19-02 (Item 1)	R 67 [Sampling Asphalt Mixtures after Compaction (Obtaining Cores)]	2/30	<p>Negative from New Hampshire</p> <p>Negative from Ohio</p> <p><i>The Appendix portion on removing the side material: Is there any data to prove the method described actually is better than not doing it? I feel there is more of a chance to segregate the aggregate by hand, chiseling, spatula, trowel, or pressing a cylinder tube one inch less than diameter of pill. If there is data to prove the method is actually better, then I would change my negative to a positive.</i></p> <p>Comments from Arizona</p>	


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TS Ballot #	Standard	Results (neg/affirm)	Comments/Negatives	Action
			<p><i>In 4.1, should the core drilling machine be capable of receiving water for the purpose of water cooling the core bit (as mentioned in 5.2)?</i></p> <p><i>In 5.1, should a maximum pavement temperature be defined prior to coring?</i></p> <p><i>In 5.3, should air be "compressed air"?</i></p> <p><i>In 5.8, would additional instructions for filling the hole (and compacting/consolidating the material) be beneficial if asphalt or non-shrink grout is used?</i></p> <p><i>Would additional instruction for sealing patches with an emulsion product be beneficial?</i></p> <p><i>In 6.1, would additional instruction for packaging be beneficial, such as not to stack or other protections?</i></p> <p>Comments from Florida</p> <p><i>There is a reference to "Section X2.6" in the Appendix that does not exist in the standard. The copy of the standard that was attached ends at Section X2.2.3.</i></p> <p>Comments from Maryland</p> <p><i>This procedure has been followed in Maryland for forensic analysis when we had to perform gradation analysis from pavement cores. Concur with the process.</i></p> <p>Comments from Missouri</p> <p><i>In Section X2.2.1, the third line references Section X2.6. AASHTO R 67 does not have a Section X2.6. We believe Section X2.2.2 should be referenced instead of Section X2.6.</i></p> <p>Comments from Ontario</p> <p><i>Section 5.8 "Fill the hole made from the coring operation with asphalt mixture, non-shrink grout, or other suitable material. " - suggest appending "acceptable to the owner agency"</i></p> <p><i>Section 8 If applicable, information about the paving contract such as contract number, lot, sub-lot, name of contract administrator, sample testing request, name and address of testing laboratory, etc.</i></p> <p>Comments from Oregon</p> <p><i>Would recommend modifying the following sections: Under the new proposed Appendix section X2.2.1, 2nd sentence refers to section X2.6, which isn't part of the Appendix. Believe the reference should be section X.2.2.2. Under section X2.2.2, last sentence "Dispose of the removed portion of the core", doesn't make sense regarding the context of the paragraph. Doesn't</i></p>	


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			<p><i>the user want to utilize the removed portion of the core? All of the cut particles are on the outside of the core section that was removed. Under section X2.2.3 the first sentence should be placed with the last section of X2.2.2. The following sentence could clarify the intent of section X2.2.2. regarding the core section: "The material outside of the core tube apparatus should be discarded".</i></p> <p>Comments from Pennsylvania</p> <p>1) In Section 2.1, revise from "D3549, Standard Test Method" to "D3549/D3549M, Standard Test Method".</p> <p>2) In Section 3.1, suggest revising from "in accordance with the procedure" to "according to this procedure".</p> <p>3) In Section 4.1, 4th line, revise from "perpendicular to the pavement during" to "perpendicular to the pavement surface during".</p> <p>4) In Section 4.2, 3rd line, revise from "in order to drill through the compacted asphalt mixture cleanly" to "in order to cleanly drill through the compacted asphalt mixture".</p> <p>5) In Section 4.3, suggest revising from "A saw or other method(s) that provide" to "A saw or other equipment that provide" since Section 4 is for apparatus and not for procedures or methods.</p> <p>6) In Section 4.4, Note 1, suggest revising from "wire, or banding material" to "wire, banding material, or tongs".</p> <p>7) In Section 5.2, revise from "Provide a means such as water or air to aid" to "Provide a means, such as, water or air, to aid" (i.e., add three commas).</p> <p>8) In Section 5.3, 2nd line, revise from "Slowly advance the bit" to "Slowly advance the core drill bit" for consistency with defined apparatus in Section 4.2.</p> <p>9) In Section 5.4, 1st line, revise from "Keep the core bit" to "Keep the core drill bit" for consistency with defined apparatus in Section 4.2.</p> <p>10) In Section 5.4, Note 3, 2nd & 3rd lines, revise from "may cause the bit to bind or distort the core" to "may cause the core drill bit to bind or the core sample to distort" for consistency with defined apparatus in Section 4.2 and for sentence consistency in the "noun to verb" between the two "or" options.</p> <p>11) In Section 5.6, 2nd line, revise from "device or other suitable means" to "device or, other suitable means" (i.e., add comma after "or").</p> <p>12) In Section 5.6, 3rd line, revise from "Carefully brush off any loose particles" to "Carefully brush off or, wash off with water, any loose particles".</p> <p>13) In Section 5.6, 4th line, revise from "field cores taken immediately over" to "field cores taken directly over".</p>	

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TS Ballot #	Standard	Results (neg/affirm)	Comments/Negatives	Action
			<p>14) In Section 5.6, last line, revise from "material" to "material from the bottom of the core sample".</p> <p>15) In Section 5.6, Note 4, revise from "If the core is damaged" to "If the core sample is damaged", revise from "a new core shall be obtained" to "a new core sample shall be obtained", and revise from "of the original location" to "of the original core sample location".</p> <p>16) In Section 5.7, revise from "core with" to "core sample with".</p> <p>17) In Section 5.8, 1st and 2nd lines, suggest deleting ", non-shrink grout, or other suitable material" as it is a best practice to fill asphalt mixture core sample holes with in-kind material (i.e., with asphalt mixture).</p> <p>18) In Section 5, add new Section 5.9 that reads "Seal the surface of the filled core sample hole with asphalt tack coat or other asphalt sealant material".</p> <p>19) In Section 5, add new Section 5.10 that reads "If layer thickness is required to be determined in the field using the drilled core sample, perform thickness determination of the core sample according to Section X1."</p> <p>20) In Section 6.1, 1st line, revise from "protective containers" to "protective package containers" for consistency with defined apparatus in Section 4.7.</p> <p>21) In Section 6.1, Note 5, end of 1st line and beginning of 2nd line, revise from "suitable containers" to "suitable package containers" for consistency with defined apparatus in Section 4.7.</p> <p>22) In Section 6.2, revise from "Transport cores in a manner" to "Transport core samples in the protective package containers and in a manner".</p> <p>23) In Section 6.3, revise completely to read "Prevent core sample exposure to freezing temperatures and to excessive high temperatures during storage or transport of the core samples in the protective package containers to ensure the core samples do not break or deform."</p> <p>24) In Section 6.3, Note 6, revise from "insulated container" to "insulated package container" for consistency with defined apparatus in Section 4.7.</p> <p>25) In Section 6.4, revise from "If the core is damaged in transport" to "If the core sample is damaged during transport".</p> <p>26) In Section X1.1, revise from "of the designated lift according" to "of the designated lift or layer according" for consistency with ASTM D3549/D3549M which does not use the term "lift", but does use the term "layer".</p> <p>27) In Section X1.1, delete the 2nd sentence which reads "Calculate an average of three or more measurements taken around the lift." as ASTM D3549/D3549M, Method A, Section 7.2.2. already</p>	

D. Review of TS 2c Ballot 19-02 (TS 2c Ballot # 1, June-July 2019) – ATTACHMENT E (pp. 41-48)

TS Ballot #	Standard	Results (neg/affirm)	Comments/Negatives	Action
			<p><i>requires four measurements and recording the average of these four measurements as the thickness.</i></p> <p>28) In Section X2.1, last line, revise from "by the coring drill" to "by the core drill bit" for consistency with defined apparatus in Section 4.2.</p> <p>Comments from Jay Sengoz, PennDOT Bituminous Lab Manager</p> <p>29) We suggest not using non-shrink grout to backfill the hole as indicated in procedure 5.8, because non-shrink grout is a dissimilar material. We recommend to revise procedure 5.8. as follows: "Fill the hole made from the coring operation with asphalt mixture of the same Job Mix Formula or with mixture used for subsequent courses or with other suitable material within 24 hours after coring. Compact and seal the mixture by applying PG Binder or an appropriate emulsion type as 'tack coat' in full depth around the perimeter of the hole."</p> <p>Comments from Rhode Island</p> <p>In Section X1.1, consider allowing lift measurement to the nearest one-tenth of an inch, which we've always found more practical and convenient than the other options.</p> <p>Comments from Washington</p> <p>Appendix section X2.2.1 refers to X2.6 which is not included in the procedure...should be X2.2.2?</p>	
19-02 (Item 2)	T 209 [Theoretical Maximum Specific Gravity (G _{mm}) and Density of Asphalt Mixtures]	0/32	<p>Comments from Maryland</p> <p>Agree with the change of weighted average change in calculation.</p> <p>Comments from Missouri</p> <p>We recommend an equation be added below new Section 12.3 to ensure the weight average is determined properly. The past couple of years, MoDOT and Industry have experienced a high turnover rate resulting in less technical experience in the field. Adding an equation will help ensure this calculation is done correctly.</p> <p>Comments from Ohio</p> <p>There should be language added that describes how to do the weighted average. Is this based off dry asphalt mix weight "A"? Should the above also be added to the SUPPLEMENTAL PROCEDURE FOR MIXTURES CONTAINING POROUS AGGREGATE section also?</p> <p>Comments from Pennsylvania</p>	


D. Review of TS 2c Ballot 19-02 (TS 2c Ballot # 1, June-July 2019) – ATTACHMENT E (pp. 41-48)

11

TS Ballot #	Standard	Results (neg/affirm)	Comments/Negatives	Action
			<p>1) In Section 12.2, revise from "Theoretical maximum density (Gmm) at 25°C (77°F)" to "Theoretical maximum density at 25°C (77°F)" [i.e., delete "(Gmm)" as this term is for specific gravity not density].</p> <p>2) In Section 12.2.1, 1st line, revise from "theoretical maximum density (Gmm) at 25°C (77°F)" to "theoretical maximum density at 25°C (77°F)" [i.e., delete "(Gmm)" as this term is for specific gravity not density].</p> <p>3) In Section 12.3, revise completely to read "For large samples tested a portion at a time, calculate the weighted average theoretical maximum specific gravity (Gmm) using the mass of the oven-dry sample in air and the theoretical maximum specific gravity (Gmm) of each portion tested." This makes it more consistent with language in Section 6.3 and also provides what values are to be used in the weighted average calculation.</p> <p>4) It is also suggested to move the proposed Section 12.3 up to be Section 12.2 and then revise the existing Section 12.2 to be Section 12.3. Most users would likely calculate the weighted average for the theoretical maximum specific gravity (Gmm) before converting the weighted average theoretical maximum specific gravity (Gmm) to the weighted average theoretical maximum density.</p> <p>Comments from Jay Sengoz, PennDOT Bituminous Lab Unit Manager</p> <p>5) To avoid any confusion or misunderstanding, provide an example to show how to calculate the weighted average in Section 12.3.</p> <p>Comments from Tennessee</p> <p>Suggest rewording to: If the sample was tested in multiple portions due to the volume of a container, Add an equation to the proposed section 12.3 as an example. $(\text{Mass1} * \text{Gmm1} + \dots + \text{MassX} * \text{GmmX}) / \text{Total Mass}$</p> <p>Comments from Washington</p> <p>Section 6.1.1 should also refer to AASHTO R 67 as well as R 97.</p>	

E. Task Force Reports

Task Force #	Title	Members	Status/Update
2c-2008-02	Recommendations for amplitude and frequency for	Rich Barezinsky, Chair (Kansas) Matthew Corrigan (FHWA)	Transportation Research Board website states that completion date for report is July 31, 2019. Project status indicates "awaiting draft final report."

Task Force #	Title	Members	Status/Update
	mechanical agitation devices in T 209 [<i>Theoretical Maximum Specific Gravity (G_{mm}) and Density of Asphalt Mixtures</i>]	Oak Metcalfe (Montana) Tim Ramirez (Pennsylvania)	
2c-2017-02	AASHTO standards related to measuring or calculating specific gravity	Brian Johnson, Chair (AASHTO re:source) Bob Lauzon (Connecticut) Matthew Corrigan (FHWA) Oak Metcalfe (Montana)	
2c-2019-01	Stripping inflection point in T 324 (<i>Hamburg Wheel-Track Testing of Compacted Asphalt Mixtures</i>)	Derek Nener-Plante, Chair (Maine) Bryan Engstrom (Massachusetts) Oak Metcalfe (Montana) Scott Nussbaum (Utah) Aaron Schwartz (Vermont)	

VI. New Business

- A. AASHTO re:source/CCRL/NTPEP (*Observations from assessments, as applicable.*)
 1. E-mail message from Maria Knake (AASHTO re:source) about T 324 (*Hamburg Wheel-Track Testing of Compacted Asphalt Mixtures*) – **ATTACHMENT F (pp. 49-63)**
 - a. How will assessors check for and enforce new requirements?
 - i. Determining maximum level of deviation from sinusoidal wave in Section 5.1 (Hamburg wheel-tracking device)
 - a) Utilizing “GoPro” and plotting data in Excel is unrealistic for assessors
 - b) Standard does not require user to record data
 - b. Frequent usage of term “unless otherwise specified by agency”
 - a) Difficult for assessors to determine which agencies are enforcing something different and what those agencies are enforcing
- B. Presentation by Industry/Academia
 1. Presentation by Skip Paul on behalf of Association of Modified Asphalt Producers (AMAP)
 - a. Committee comprised of state agency staff acting as advisory board to AMAP
 - b. Source of information and “sounding board” for concerns
- C. Revisions/Work on Standards for Coming Year
- D. Review of Stewardship List
(*List of subcommittee’s standards flagging those requiring action; include as separate attachment.*)
- E. Proposed New Standards
 - 1.
- F. NCHRP Issues
 1. Update from Amir Hanna (NCHRP)
- G. Correspondence, Calls, Meetings
 1. E-mail message from Lyndi Blackburn (Alabama) about Task Force on Asphalt Specifications Harmonization – **ATTACHMENT G (p. 64)**
 - a. Charter provides for six members each from AASHTO and ASTM

b. Meet quarterly by conference call or web meeting

c. Any interest from TS 2c?

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

I. New TS Ballots

1.

VII. Open Discussion

A.

B.

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
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		<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		

ATTACHMENT A

AMERICAN ASSOCIATION
OF STATE HIGHWAY AND
TRANSPORTATION OFFICIALS

AASHTO

14

COMMITTEE ON MATERIALS AND PAVEMENTS (COMP)

2018 - 2019 Mid-Year Meeting (Webinar)

Thursday, February 7, 2019

11:00 a.m. – 1:00 p.m. EST

TECHNICAL SUBCOMMITTEE (TS) 2c

Asphalt-Aggregate Mixtures

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.)*

III. Roll Call – Voting states in attendance: KY (C), ME (VC), AZ, AR, CO, ID, IL, IN, MN, MO, MT, NV, NY, OH, PA, TN, UT, and WA

Last Name	First Name	Email Address
Beeson	Matt	mbeeson@indot.in.gov
Benson	Michael	michael.benson@ardot.gov
Bergold	Desna	desna@dbconllc.com
Bradbury	Rick	richard.bradbury@maine.gov
Brum	Mark	Mark.Brum@dot.state.ma.us
Burch	Paul	pburch@azdot.gov
Corrigan	Matthew	matthew.corrigan@dot.gov
Davis	Steve	davissj@wsdot.wa.gov
Davis	Jason	jason.davis@la.gov
Doran	mike	michael.doran@tn.gov
Flournoy	Monica	mflournoy@dot.ga.gov
Heiser	Steven	steve.heiser@dot.ny.gov
Horan	Robert	bhoran@asphaltinstitute.org
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Knake	Maria	mknake@ashtoresource.org
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Myers	Allen	allen.myers@ky.gov
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Pan	Charlie	cpan@dot.nv.gov
Ramirez	Timothy	tramirez@pa.gov
Santi	Mike	mike.santi@itd.idaho.gov
Schumaker	Clayton	cschumaker@nd.gov
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Trepanier	Jim	james.trepanier@illinois.gov
Turgeon	Curt	curt.turgeon@state.mn.us
Wieden	Craig	craig.wieden@state.co.us
Wu	Peter	pwu@dot.ga.gov
Andrus	Scott	scottandrus@utah.gov
Biehl	Eric	eric.biehl@dot.ohio.gov
Johnson	Brian	bjohnson@ashtoresource.org
Egan	Brian	TN DOT
Hall	Heather	TN DOT
Chandler	Matt	TN DOT
Sadler	Frank	TN DOT
Wilson	Craig	AZ DOT

IV. Approval of 2018 TS 2c Minutes

Motion to approve minutes: MT

Second: MO

Minutes approved as written without discussion

V. Old Business

A. Review of 2018 COMP Ballot 18-04 (Rolling Ballot Group 3, November 2018-January 2019)

1. AASHTO R ABC, Installation, Operation, and Maintenance of Ignition Furnaces (Item 20) – 43 affirmative/0 negative/8 not returned (COMP concurrent)

Comments from Missouri:

In Section 2.1, there is a reference to AASHTO T 308 entitled, "Determining the Asphalt Binder Content of Hot Mix Asphalt (HMA) by the Ignition Method". Recently, the title was changed to reflect warm mix technology. The new title for AASHTO T 308 is "Determining the Asphalt Binder Content of Asphalt Mixtures by the Ignition Method". To be consistent, we recommend the title be changed to reflect this change in the proposed specification.

Comments from Pennsylvania:

- 1) *In Section 3.2.1.2, 2nd line, revise from "beside furnace for cooling" to "beside or below furnace for cooling".*
- 2) *In Section 3.2.1.2, 4th line, revise from "on the right side of the furnace" to "on the right side of or below the furnace".*
- 3) *In Section 3.2.1.3 and at end of last sentence, revise from "is recommended" to "is recommended by the ignition furnace manufacturer".*

Comments from South Carolina:

We question the need for this standard practice in its current form. It has a lot of detailed information and will have to change every time a manufacturer makes a change. Why not just allow the manufacturers to set up their equipment's parameters and maintenance like we do with all other equipment?

A lot of these recommendations resulted from the NCHRP study, and proper maintenance is critical to good test results coming from this piece of equipment. If people utilize this standard it will help them

achieve more accurate results. Maintenance is critical for all the equipment we use, but this one happened to be the focus of the study.

Comments from Texas:

I agree this should be its own standard and agree with the changes proposed. I have one consideration for Section 3.2.1.2 which would allow a protective shield that covers the hot basket when set on a steel floor on the countertop and includes a warning sign that states "caution hot".

2. AASHTO R XYZ, Sampling Asphalt Mixtures (Item 21) – 43 affirmative/0 negative/8 not returned (COMP concurrent)

This is a new standard to replace T 168. Should be an R practice, and this used to be a "C" standard shared with ASTM. This is now a solely owned standard.

Comments from Illinois:

Section 5.3.2 - recommend deleting "dense graded"

Section 5.9.2.1 and Note 1 seem to conflict, consider rewording

Sections 5.9.2.9 and 5.9.3.3 - is it beneficial to overfill the hole somewhat with loose asphalt mix to ensure proper compacted density?

Comments from Pennsylvania:

- 1) *In Section 5.1.1, revise from "of asphalt mixture run" to "of an asphalt mixture production run".*
- 2) *In Section 5.11.1.3, revise from "rolling the asphalt out" to "rolling the asphalt mixture out".*

Comments from Texas:

I agree but one consideration is the sample thickness. Very thick samples require more time in the oven to break down which can influence results especially performance tests. We state a maximum of 3".

Comments from Wisconsin:

Voted affirmative, but sampling at the auger is unsafe, and should not be included in the AASHTO standard.

There were multiple concerns involving safety issues voiced about this practice. The standard tried to address the concerns, though there are some inherent safety issues related to most forms of asphalt mixture sampling and testing.

3. AASHTO R 47, Reducing Samples of Hot Mix Asphalt (HMA) to Testing Size (Item 22) – 43 affirmative/0 negative/8 not returned (COMP)

Comments from Missouri:

In Section 12.1, it appears the use of heat-resistant plastic and other suitable materials has been deleted from the section. Not sure if this was intended. The minutes shown on Pages 5 and 6 do not mention this change. Also, Section 11.2 still references the use of heat-resistant plastic. We would recommend the deletions not be made.

Non-stick paper was the material of choice, but if there are strong opinions that plastic can be used, then it could be added back editorially. There was no strong preference, so the chair will make the editorial revisions to eliminate references to "heat-resistant plastic" throughout the practice.

Comments from Pennsylvania:

- 1) *In Section 1.1, 2nd line, revise from "asphalt mixtures" to "asphalt mixture" (singular).*
- 2) *In Section 6.1, 1st line, revise from "asphalt mixtures" to "asphalt mixture" (singular).*

Comments from Texas:

I agree with this except perhaps we should consider specify using the mixing temperature as opposed to maximum mixing temperature for consistency.

4. AASHTO R 79, Vacuum Drying Compacted Asphalt Specimens (Item 23) – 43 affirmative/0 negative/8 not returned (COMP concurrent)

Comments from Missouri:

In Section 5.4, the second sentence, we recommend adding the word 'surface' for clarification purposes. The sentence would read as follows:

*"Make sure specimen **surface** temperature is above 15 deg. C (60 deg. F)."*

5. AASHTO T 30, Mechanical Analysis of Extracted Aggregate (Item 24) – 43 affirmative/0 negative/8 not returned (COMP)

Comments from Pennsylvania:

1) Negative is due to moving critical requirements for not overloading sieves from the body of the standard to Annex A2. This criteria is part of the test procedure and is to be evaluated during each test. This criteria needs to be readily available (in the body of the standard) and known by the technician who is performing the test.

2) Moving the sieve timing or shaker efficiency criteria is OK to move to an Annex A1 as this should be done prior to performing any tests.

The point of this comment is that instructions moved to the annex may be regarded as less important. PA made a similar comment to TS 1c for T 27. Matt Beeson (IN), TS 1c chair, and Allen Myers (KY), TS 2c chair, would like to keep T 27 and T 30 as similar and consistent as possible. There are a few suggestions on both standards that need to be reconciled. TN commented that since T 30 involves an extraction, then a wash, then a gradation, T 11 and T 27 could be referenced rather than repeating this information.

AI: Matt and Allen will work together to reconcile T 27 and T 30. The annexes will be moved, labeled properly, and as much as can be addressed editorially will be. In the future there may be references to T 11 and T 27 in T 30, but that will have to be included on future ballot items.

Comments from Tennessee:

Why does this not simply reference T 27 and T 11 after 7.1.2? This would save repeated changing of standards. We proposed some changes to T 27 under TS 1c.

6. AASHTO T 209, Theoretical Maximum Specific Gravity (G_{mm}) and Density of Hot Mix Asphalt (HMA) (Item 25) – 43 affirmative/0 negative/8 not returned (COMP concurrent)

History of T 209: There have been a myriad of changes to T 209 proposed. A task force was created, and a new ballot was circulated with favorable response from the TS and COMP. Good comments were submitted!

There are some substantial comments that the TS is hoping that WAQTC can address. WAQTC agreed to help make the edits to this method in preparation for its publication.

Comments from Georgia:

Subsection 5.7 is missing.

Comments from Illinois:

Section 3.1.2 - does residual pressure need further clarification, relative to gauge, atmospheric, or absolute pressure?

Comments from Kansas:

12.1.2. Not sure why we are changing the equation, but if adding the mass of the container in water to the denominator, the "C" is now the mass of the sample and container in water.

Comments from Missouri:

In Section 12.1.2, the value C is defined as "mass of the sample in water at 25 deg. C (77 deg. F), g". All of the other values in this section do not mention the temperature of the water. This information is provided in Section 11.1 and 12.1.1. For consistency purposes, recommend removing the reference to water temperature so the value C is defined as "C = mass of the sample in water, g".

In Section 11.2, there is a reference to Section A1.5.1 (Annex). There is no Section A1.5 shown in the Annex. Believe the correct reference is Section A1.2.1.

Comments from Pennsylvania:

- 1) Section 5. What is the harm in keeping this summary of test method with any needed corrections?
- 2) In Section 5.2.5 and for consistency, include a glass capillary stopper and capillary lid (machined lid?) as these items are specifically mentioned in A1.2.1.
- 3) In Section 5.4.1, consider including an electric device like the Pumpsaver as an acceptable alternative to the filter flasks.

Comments from Texas:

Agree but I like only using the metal vibratory pycnometer or mechanical agitation. We allow both as well but as you can see on slide 17 on page 23, there is a notable difference. We (TxDOT) should consider only the metal vibratory pycnometer, but some districts use this method. The idea is to be consistent and we should also consider the absorption of water by the aggregates. The absorption could be greater when using the manual approach which could impact the Rice gravity.

7. AASHTO T 209, Theoretical Maximum Specific Gravity (G_{mm}) and Density of Hot Mix Asphalt (HMA) (Item 26) – 42 affirmative/1 negative/8 not returned (COMP concurrent)

There were two ballot items on this test. There was a question of whether striking the bucket with a rubber mallet is sufficient for manually agitating the container. The result of discussion at the 2018 COMP meeting was that striking the bucket doesn't constitute manual agitation, and the standard was revised accordingly.

Negative from Illinois:

Our lab consistently achieves re:source PSP ratings of 5 on Gmm and we have always used a rubber mallet. We have investigated other types of agitation in the past and have found that the type of agitation makes little significant difference in the final Gmm value. We recommend allowing the rubber mallet as an option.

IL has always used the mallet for manual agitation and achieved good PSP scores. They would argue that the mallet works and question what the rationale is for eliminating it. There is no definition for shaking, e.g., what amplitude, level of vigor, etc.

MT manually shakes and routinely obtains 5's on PSP ratings.

AASHTO re:source reports that some people are using mallets. They want to ensure consistency in the way the method is being performed. If allowing the mallet, then its proper usage should be defined. There's an NCHRP study that discusses the impact of mechanical agitation, so there would have to be a corollary for manual agitation or the difference between both.

Could AASHTO re:source collect data from PSP as to whether labs are using manual or mechanical agitation?

IL suggested a note that allows use of a mallet but does not recommend it for use with a glass pycnometer.

MO asked how often should a mallet be used? There's nothing defined for how to use the mallet. This is something that AASHTO re:source assessors encounter.

TN asked if AASHTO re:source assessors note inconsistencies in performing "in-air" method or "in-water" methods.

Chair: negative is considered persuasive, and the standard will not be published with this change.

AI: A survey will be circulated to see what people are doing among COMP members and AASHTO re:source customers. Maria Knake (AASHTO re:source) and Rick Bradbury (ME) will help.

Comments from South Carolina:

We find the mallet to be useful when testing finer graded mixtures. The kneading-vibratory tables often tend to consolidate the sample and the sample sometimes comes out in one large mass instead of in loose condition.

Comments from Texas:

Agree but again there are noticeable differences between mechanical agitation versus manual agitation.

8. AASHTO T 324, Hamburg Wheel-Track Testing of Compacted Asphalt Mixtures (Item 27) – 43 affirmative/0 negative/8 not returned (COMP concurrent)

Comments from Missouri:

In Section 2.3, the citation to the NCHRP study needs to be corrected to be consistent with other AASHTO standards. The name of the report and date issued needs to be added. The name of the report is "Hamburg Wheel-Track Test Equipment Requirements and Improvements to AASHTO T324" and it was issued "September 2015".

Comments from Pennsylvania:

- 1) *The included revisions in the ballot are acceptable.*
- 2) *In a future revision, Sections 6.2.6.2 and 6.4.2 need further clarified as to compaction or cutting SGC specimens to meet the thickness requirements of the polyethylene molds in Figure 2.*
UT reported that changes have been incorporated as appropriate by the task force. Scott Andrus (UT) recommends to sunset the current task force. Derek Nener-Plante (ME) volunteered to chair a new task force to consider the inflection point which continues to be a major issue for some states.

B. 2018 TS 2c Reconfirmation Ballot (January-February 2019)

1. AASHTO M 17-11 (2015), *Mineral Filler for Bituminous Paving Mixtures* (Item 1)
2. AASHTO R 59-11 (2015), *Recovery of Asphalt Binder from Solution by Abson Method* (Item 2)
3. AASHTO T 319-15, *Quantitative Extraction and Recovery of Asphalt Binder from Asphalt Mixtures* (Item 3)
4. AASHTO T 329-15, *Moisture Content of Asphalt Mixtures by Oven Method* (Item 4)
5. AASHTO TP 114-18, *Determining the Interlayer Shear Strength (ISS) of Asphalt Pavement Layers* (Item 5)
 - a. Extend standard for two years
6. AASHTO TP 115-16 (2017), *Determining the Quality of Tack Coat Adhesion of an Asphalt Pavement in the Field or Laboratory* (Item 6)
 - a. Extend standard for two years
7. AASHTO TP 128-17, *Evaluation of Oxidation Level of Asphalt Mixtures by a Portable Infrared Spectrometer* (Item 7)
 - a. Extend standard for two years

ID would like to extend this standard but they would like to make some revisions as well.

C. Task Force Reports

1. Task Force 2c-2008-02
This task force will continue

- a. Rich Barezinsky, Chair (Kansas), Matthew Corrigan (FHWA), Oak Metcalfe (Montana), and Tim Ramirez (Pennsylvania)
 - b. Provide recommendations for amplitude and frequency for mechanical agitation devices in AASHTO T 209 [*Theoretical Maximum Specific Gravity (G_{mm}) and Density of Hot Mix Asphalt (HMA)*]
 - i. NCHRP 20-07 research submittal, *Energy Criteria for Maintaining Fully Animated Particles of Loose Asphalt in AASHTO T 209*, selected for funding in September 2015 (NCHRP 20-07, Task 391)
 - c. Task force awaiting results of research project for incorporation into AASHTO T 209 as appropriate
 - d. Draft of final report forthcoming soon
2. Task Force 2c-2012-01
- a. Scott Andrus, Chair (Utah), Matthew Corrigan (FHWA), Oak Metcalfe (Montana), Tim Ramirez (Pennsylvania), and Joe DeVol (Washington)
 - b. Implement findings from NCHRP 20-07, Task 361, study into AASHTO T 324 (*Hamburg Wheel-Track Testing of Compacted Asphalt Mixtures*)
 - c. Generally maintain AASHTO T 324 to reflect latest features and ideas
 - d. Update from Scott Andrus (Utah)
 - e. Continue task force?
- Scott Andrus (UT) recommends retiring this task force, but there are other issues with this method. The Chair thanks Scott for everything that he's done for this group and for COMP. Scott recommends starting a new T 324 task force to address the stripping inflection point issue. Derek Nener-Plante (ME) has volunteered to chair this group. MA (Bryan Engstrom), MT (Oak Metcalfe), UT (Scott Nussbaum), and VT (Aaron Schwartz) will also serve on Task Force 2c-2019-01.
3. Task Force 2c-2015-01
- a. Garth Newman, Chair (Idaho), Mike San Angelo (Alaska), Matthew Corrigan (FHWA), Rick Bradbury (Maine), Oak Metcalfe (Montana), Tim Ramirez (Pennsylvania), and Kurt Williams (Washington)
 - b. Address negative votes and incorporate comments as appropriate from 2014 SOM ballot into AASHTO T 209 [*Theoretical Maximum Specific Gravity (G_{mm}) and Density of Hot Mix Asphalt (HMA)*]
 - c. Suggestions from Richard Giessel (Alaska)
 - i. Clarify application of vacuum in method summary
 - ii. Improve figure depicting arrangement of testing apparatus
 - iii. Modify and add notes concerning removal of water vapor
 - d. Update from Garth Newman (Idaho)
 - e. Continue task force?
- The Chair recommends retiring this task force.
4. Task Force 2c-2017-01
- a. Scott Andrus, Chair (Utah), Georgene Geary (GGfGA Engineering), Allen Myers (Kentucky), Rick Bradbury (Maine), and Tim Ramirez (Pennsylvania)
 - b. Address negative votes and incorporate comments from 2017 TS 2c ballot into AASHTO R XYZ (*Sampling Asphalt Mixtures*)
 - c. Proposal from Western Alliance for Quality Transportation Construction (WAQTC)
 - d. Update from Scott Andrus (Utah)
 - e. Continue task force?
- This task force will be sunsetted.
5. Task Force 2c-2017-02
- a. Brian Johnson, Chair (AASHTO re:source), Bob Lauzon (Connecticut), Matthew Corrigan (FHWA), Garth Newman (Idaho), and Oak Metcalfe (Montana)

- b. Consider AASHTO standards related to measuring or calculating specific gravity
- c. Issue resulting from FHWA negative vote on AASHTO T 166 [*Bulk Specific Gravity (G_{mb}) of Compacted Asphalt Mixtures Using Saturated Surface-Dry Specimens*] as presented on 2015 SOM ballot
 - i. Basis for negative vote was definition of bulk specific gravity
- d. Add "gas-free distilled water" to Apparatus section
 - i. Concern about availability of distilled water in remote laboratories
 - ii. Richard Giessel (Alaska) provided guidance for using non-distilled water and correction factors
- e. Update from Brian Johnson (AASHTO re:source)

There has been some progress on this issue. This has revealed other changes that need to be addressed in the standard. The task force has a call on the calendar to continue the effort. AI: If anyone is using Method B, please contact Brian Johnson to explain your use of Method B and how you came to select that method.

D. Previously Balloted Standard

- 1. AASHTO R 67, *Sampling Asphalt Mixtures after Compaction (Obtaining Cores)*
 - a. Add appendix for preparing pavement cores for asphalt binder content or gradation testing
 - b. Technical subcommittee ballot last year produced one negative vote and many comments
 - c. Modify standard based on comments and ballot within TS 2c again
 - d. Update from Brian Egan (Tennessee)

TN has made some progress and will report back to the Chair in the next week or so.

VI. New Business

- A. AASHTO re:source/CCRL/NTPEP - Observations from Assessments, as applicable?
 - 1. AASHTO re:source inquiry about large samples in AASHTO T 209 [*Theoretical Maximum Specific Gravity (G_{mm}) and Density of Hot Mix Asphalt (HMA)*]
 - a. Average test results and allowable difference for split samples
 - b. Move information from note to body of text?
 - c. Balloted version of AASHTO T 209 deletes this portion of the test method. Basically what happens when the sample is larger than the container?

AASHTO re:source will investigate the issue and propose wording to revise the standard.

Considering a separate issue about T 209, an AASHTO re:source assessor wrote a finding in a report about the digital manometer accuracy (0.1 kPa or 1 mmHg). Most of the manometers being used in labs don't actually meet this requirement. The question is whether this accuracy requirement is important or should it be modified to match the equipment that is widely available and being used? AASHTO re:source will add this item to their list of T 209 issues to be investigated.

AI: The results of these inquiries will be included as an item on the TS 2c annual meeting agenda.

B. Correspondence, calls, meetings

- 1. Missouri inquiry about length of test count in AASHTO T 287 (*Asphalt Binder Content of Asphalt Mixtures by the Nuclear Method*)]]
 - a. Missouri requires 16-minute count instead of 4-minute count specified in AASHTO T 287
 - b. Modify standard to require minimum count time of 4 minutes

MO noted the importance of ensuring that the standards don't assume any historical knowledge and they are as clear as possible on their own. It would be beneficial to include a sentence in T 287 stating that 4 minutes would be the *minimum* count time. OH agrees that this revision would be beneficial.

AI: Include this as an item on the TS 2c annual meeting agenda.

VII. Open Discussion

None

VIII. Adjourn

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TRANSPORTATION OFFICIALS

AASHIO

Motion to adjourn: ME

Second: TN

Meeting adjourned at 1:00 p.m.

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ATTACHMENT B

(23)

Standard Method of Test for

Theoretical Maximum Specific Gravity (G_{mm}) and Density of Hot Mix Asphalt (HMA)

AASHTO Designation: T 209-12



TEST METHOD B—MANUAL AGITATION

12. PROCEDURE

Remove air trapped in the sample by applying gradually increased vacuum until the residual pressure manometer reads 3.7 ± 0.3 kPa (27.5 ± 2.5 mm Hg). Maintain this residual pressure for 15 ± 2 min. Agitate the container and contents during the vacuum period by vigorously shaking at intervals of about 2 min. Glass vessels should be shaken on a resilient surface such as a rubber or plastic mat, and not on a hard surface, so as to avoid excessive impact while under vacuum. Striking the side of the container with a rubber mallet or a similar object is not considered sufficient agitation.

- 12.1. At the end of the vacuum period, release the vacuum by increasing the pressure at a rate not to exceed 8 kPa (60 mm Hg) per second and proceed with one of the mass determination methods in Section 13.

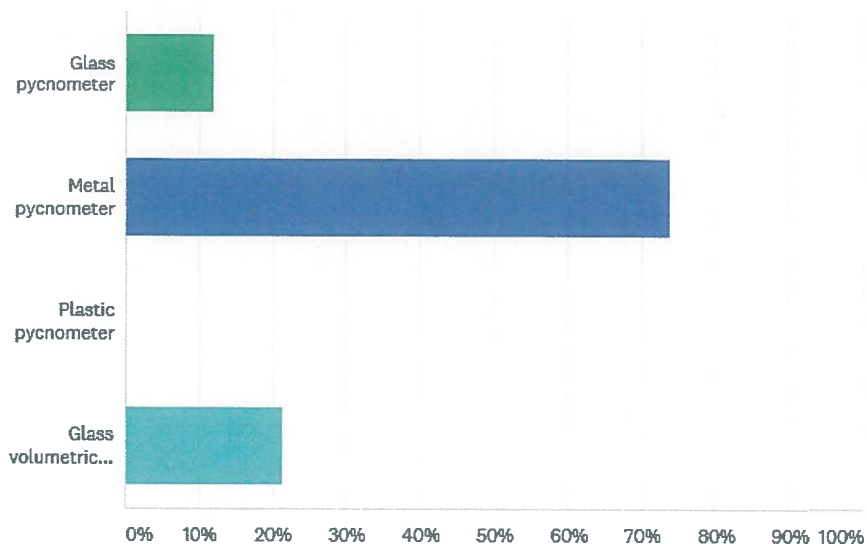
24

Agency	Individual Name	Item No. 26 - Concurrent ballot item to revise T 209, Theoretical Maximum Specific Gravity (Gmm) and Density of Hot Mix Asphalt (HMA), to disqualify the use of a rubber mallet (or similar object) for manually agitating the container. See p. 5 and pp. 97-98 of the minutes.		
		Decision	Comments	Response Attachments
Illinois Department of Transportation	Brian Pfeiffer	Negative	Our lab consistently achieves re:source PSP ratings of 5 on Gmm and we have always used a rubber mallet. We have investigated other types of agitation in the past and have found that the type of agitation makes little significant difference in the final Gmm value. We recommend allowing the rubber	

What type of specific gravity vessels are used in your agency's labs? (Check all that apply)

Answered: 42 Skipped: 0

25

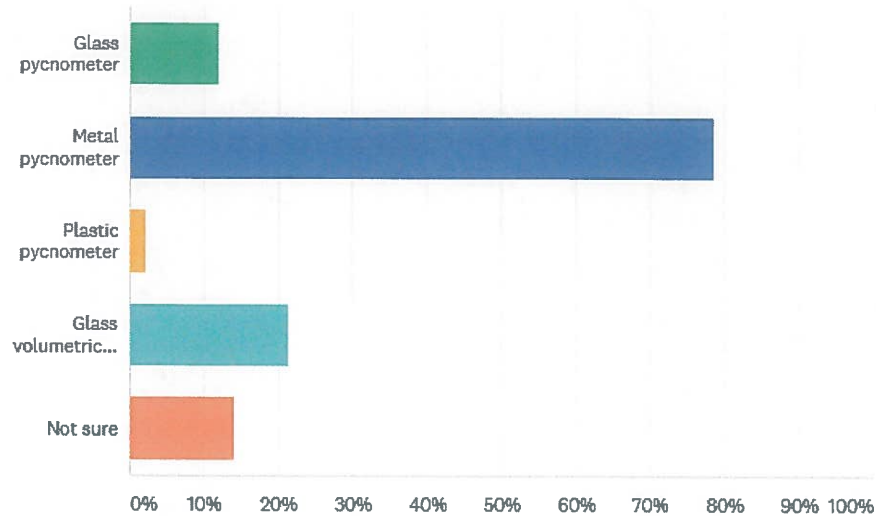


ANSWER CHOICES	RESPONSES
▼ Glass pycnometer	11.90% 5
▼ Metal pycnometer	73.81% 31
▼ Plastic pycnometer	0.00% 0
▼ Glass volumetric flask	21.43% 9
Total Respondents: 42	

What type of specific gravity vessels are used in contractor/consultant labs in your state? (Check all that apply)

Answered: 42 Skipped: 0

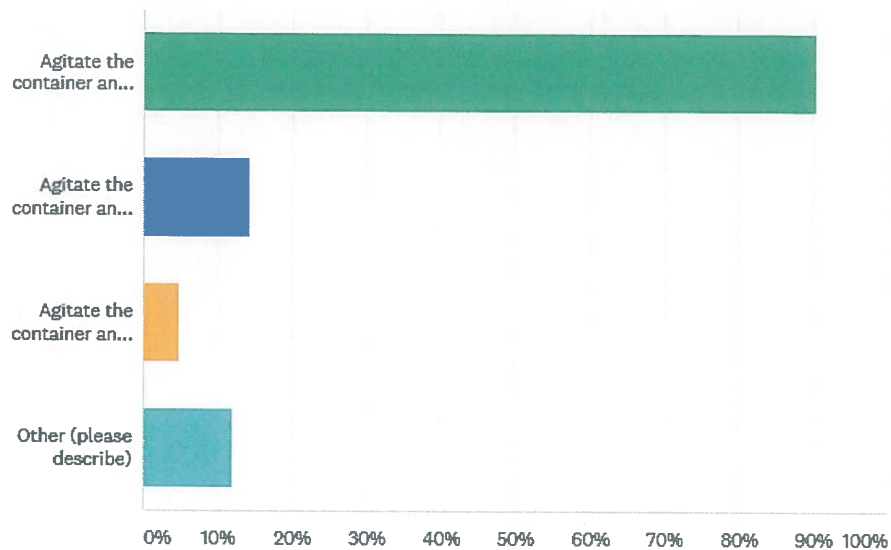
26



ANSWER CHOICES	RESPONSES	
▼ Glass pycnometer	11.90%	5
▼ Metal pycnometer	78.57%	33
▼ Plastic pycnometer	2.38%	1
▼ Glass volumetric flask	21.43%	9
▼ Not sure	14.29%	6
Total Respondents: 42		

Which agitation method is used in your agency's labs? (Check all that apply)

Answered: 42 Skipped: 0



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ANSWER CHOICES

RESPONSES

▼ Agitate the container and contents using a mechanical device	90.48%	38
▼ Agitate the container and contents during the vacuum period by vigorously shaking at intervals of about 2 min.	14.29%	6
▼ Agitate the container and contents during the vacuum period by rapping with a rubber mallet at intervals of about 2 min.	4.76%	2
▼ Other (please describe)	Responses	11.90% 5

Total Respondents: 42

Other Responses

Agitate the container and contents using a mechanical device during the vacuum period for 10 minutes.

Agitate 4 times at evenly spaced intervals in a 15 +/- 2 minute period.

mechanically agitated during the vacuum period [15 min] only.

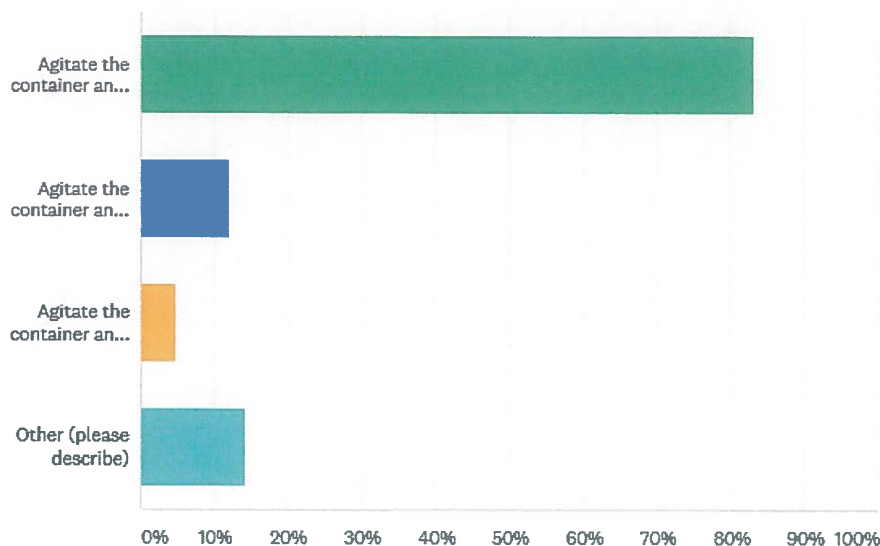
with a mechanical device during vacuum period

Our newest HMA specification requires everyone follow T 209 Method A.

Which agitation method is used in contractor/consultant labs in your state?

Answered: 42 Skipped: 0

28



ANSWER CHOICES	RESPONSES
▼ Agitate the container and contents using a mechanical device	83.33% 35
▼ Agitate the container and contents during the vacuum period by vigorously shaking at intervals of about 2 min.	11.90% 5
▼ Agitate the container and contents during the vacuum period by rapping with a rubber mallet at intervals of about 2 min.	4.76% 2
▼ Other (please describe)	Responses 14.29% 6
Total Respondents: 42	

Other Responses

Agitate the container and contents using a mechanical device during the vacuum period for 10 minutes.

Same as #3

We do not have information about this question

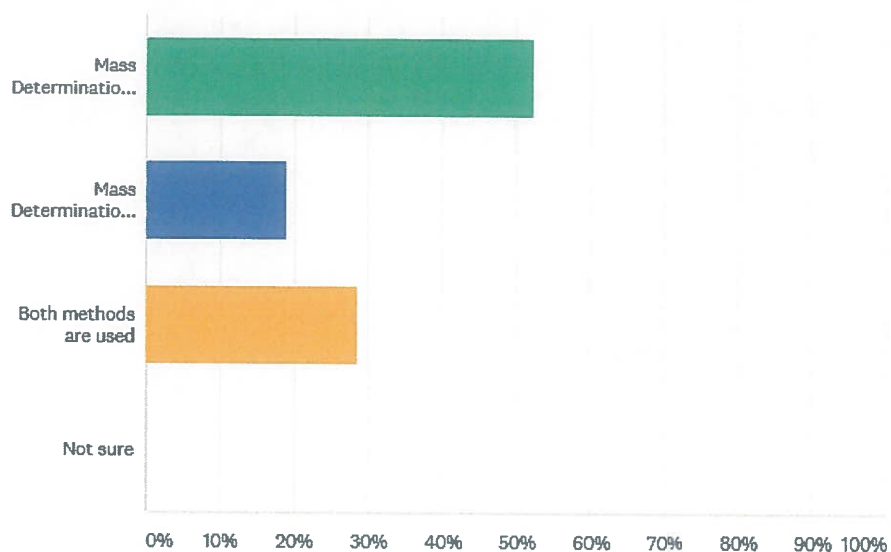
Not sure, whatever is allowed.

Not Sure

not sure what they do

Which method of mass determination is used in your agency's labs?

Answered: 42 Skipped: 0

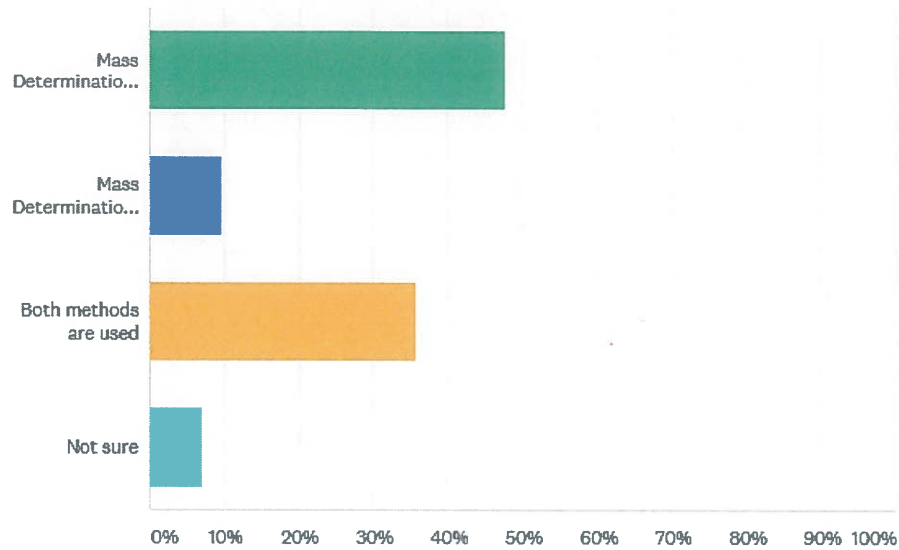


ANSWER CHOICES	RESPONSES	
▼ Mass Determination in Water	52.38%	22
▼ Mass Determination in Air	19.05%	8
▼ Both methods are used	28.57%	12
▼ Not sure	0.00%	0
TOTAL		42

Which method of mass determination is used in contractor/consultant labs in your state?

Answered: 42 Skipped: 0

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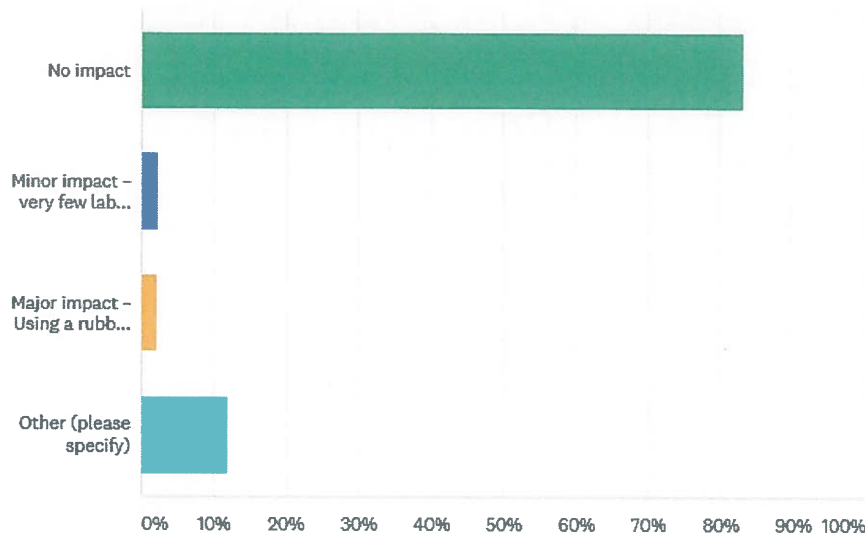


ANSWER CHOICES	RESPONSES	
▼ Mass Determination in Water	47.62%	20
▼ Mass Determination in Air	9.52%	4
▼ Both methods are used	35.71%	15
▼ Not sure	7.14%	3
TOTAL		42

If the use of a rubber mallet is disallowed in the standard test method, what will the impact be in your state?

Answered: 42 Skipped: 0

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ANSWER CHOICES	RESPONSES	
▼ No impact	83.33%	35
▼ Minor impact - very few labs use a mallet during agitation	2.38%	1
▼ Major impact - Using a rubber mallet is a common practice that's proven successful	2.38%	1
▼ Other (please specify)	Responses 11.90%	5
TOTAL		42

Other Responses

not applicable to our test method.

Our ARIZ 417 test method is silent on the use of a mallet; it just says to agitate. However, we are not aware of laboratories in our state using rubber mallets.

There will be no impact to our lab as we use mechanical agitator. However, we do not know what method is used by other labs in our province. Therefore, we are not able to determine the level of impact to other labs

Because we are using mechanical device to remove air from sample. We do not use rubber mallet to remove air. It does not have any impact on our testing.

We think that most techs will likely not on time to tap the pot every 2 minutes and go about their business running other tests like T308. We have seen some issues with vibratory tables not being level or vibrating so much that the asphalt mix seem to strip and the water becomes discolored. The vibration can be high enough at times to have concerns over the mix re-compacting somewhat to a degree, which is evident when discarding the samples after testing.

From: Myers, Allen H (KYTC-WSC)
Sent: Tuesday, January 08, 2019 2:19 PM
To: 'Brett Trautman'
Cc: Bradbury, Rick
Subject: RE: AASHTO T287 - Proposed Change

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Thank you, Brett. I will add this topic to our Technical Subcommittee 2c mid-year web meeting agenda, scheduled for February 7th. If the group agrees, we can ballot a revised AASHTO T 287 later in the year.

Allen H. Myers, P. E.

Director

Division of Materials

Department of Highways

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From: Brett Trautman [mailto:Brett.Trautman@modot.mo.gov]
Sent: Monday, January 07, 2019 3:22 PM
To: Myers, Allen H (KYTC-WSC) <Allen.Myers@ky.gov>
Subject: AASHTO T287 - Proposed Change

Good Afternoon Allen:

The Missouri DOT would like to propose some possible changes to AASHTO T287. Just prior to Christmas, AASHTO:resource inspected MoDOT's Central Laboratory located in Jefferson City. They noted that we determine the asphalt binder content utilizing a 16 minute count. According to Section 8.7, the test is to be performed using a 4-minute count.

8.7. If the gauge has the ability to store multiple calibrations, activate the calibration for the particular asphalt mixture. Place the pan into the gauge, and perform a 4-min count.

Missouri requires the background count be performed for 16-minutes. According to Section 7.1, the background count time should be the same as that used for testing.

7.1.

Obtain and record a background count in accordance with the manufacturer's procedure each day prior to taking test measurements or whenever the gauge has been moved or the conditions within 1 m (3.3 ft) of the gauge have changed. The measurement time for the background count should be the same as that used for the test measurements.

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The inspectors thought about considering this a 'nonconformity' but since the specification requires the test count match the background count they decided not to.

MoDOT started utilizing nuclear asphalt content gauges during the late 80's. Information we received from the gauge manufacturer (i.e. Troxler) at that time indicated the precision of the device could be increased by increasing the testing time.

MEASUREMENT SPECIFICATIONS

Gauge Precision at 6% ASPHALT (one standard deviation)

100 mCi americium-241:beryllium

<u>1 Min.</u>	<u>4 Min.</u>	<u>8 Min.</u>	<u>16 Min.</u>
±0.084%	±0.042%	±0.029%	±0.021%

300 mCi americium-241:beryllium

<u>1 Min.</u>	<u>4 Min.</u>	<u>8 Min.</u>	<u>16 Min.</u>
±0.070%	±0.035%	±0.025%	±0.018%

To improve testing precision, MoDOT decided to require testing be performed for 16 minutes.

We believe specifying a 4 minute test time penalizes agencies that want to utilize a longer testing time in order to improve the precision of the gauge. We suggest the following changes be considered by Technical Subcommittee 2c:

- 1) In Section 8.7, the second sentence, add the words 'at least' after the word 'perform' so it reads as follows:

"Place the pan into the gauge, and perform at least a 4-min. count."

2) Add a note indicating the gauge precision can be increased by increasing the testing time.

If you have any questions, please feel free to contact me.

Have a great day!
Brett Trautman, P.E.
Physical Laboratory Director
Construction and Materials Division
Missouri DOT
Office: 573-751-1036
Email: Brett.Trautman@modot.mo.gov

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Myers, Allen H (KYTC-WSC)

ATTACHMENT D

From: Myers, Allen H (KYTC-WSC)
Sent: Saturday, January 26, 2019 1:14 PM
To: Maria Knake
Cc: Bradbury, Richard
Subject: Re: Manometer issue

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Thank you, Maria. I will add this item to the Technical Subcommittee 2c mid-year web meeting agenda.

From: Maria Knake <mknake@ashtoresource.org>
Sent: Friday, January 25, 2019 2:37:32 PM
To: Myers, Allen H (KYTC-WSC); Bradbury, Richard
Cc: Sonya Puterbaugh
Subject: FW: Manometer issue

Allen and Rick,

I feel like T209 has been quite the hot topic for me lately! I have another issue regarding this standard to bring to your attention.

A calibration agency contacted us, as you can see below, with concerns regarding the accuracy requirement of the manometer required in T209. I am wondering if the accuracy specified in the standard is truly realistic or necessary for this test? It seems that, according to the calibration agency, that finding a device that has this level of accuracy may be difficult to obtain. There has been a lot of research work done on how agitation impacts the test results, but I cannot find anything recent on how the vacuum itself (and the accuracy of this measurement) impacts the results. I briefly reviewed the ASTM version of the standard and there is no accuracy requirement for the residual pressure manometer listed.

I thought this might be useful to bring up at the 2c meeting coming up (if not too late). Perhaps Sonya could bring this up at WAQTC next week as well.

Thanks!

-Maria

From: Marshall Doyle <marshall@cal-cert.com>
Sent: Thursday, January 17, 2019 1:33 AM
To: Maria Knake <mknake@ashtoresource.org>
Subject: FW: Manometer issue

Maria,

I hope you enjoyed the holidays! We are hitting the ground running for 2019. A2LA will be in our Portland Office this week and California next week.

I am forwarding a question coming to me from one of our Service Managers regarding a finding from AMRL. The issue is an accuracy that is stated in T-209 for a residual pressure manometer. The finding was that we issued a calibration with a stated accuracy of .5% of full scale or 5 mmHg and the standard requires an accuracy of 1mmHg. The challenge is the predominate device used in nearly all labs in the country is the Gilson MA-170. Which will not meet this requirement with any reliability.

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Please let me know how we should proceed.

Marshall Doyle

President

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Laboratory Code: 4986.01



From: Tony Lewandowski

Sent: Wednesday, January 2, 2019 12:10 PM

To: Marshall Doyle <marshalld@cal-cert.com>; Robert Owens <roberto@cal-cert.com>

Subject: Manometer issue

Hello Marshall

In AASHTO T 209-12 section 6.5 it states.

Vacuum Measurement Device-Residual pressure manometer or vacuum gauge to be connected directly to the vacuum vessel and capable of measuring residual pressure down to 4.0 kPa (30 mmHg) or less (preferably to zero). The gauge shall be standardized at least annually and be accurate to 0.1 kPa (1 mmHg). It shall be connected at the end of the vacuum line using an appropriate tube and either a "T" connector on the top of the vessel or a separate opening (from the vacuum line) in the top of the vessel to attach the hose. To avoid damage, the manometer shall not be situated on top of the vessel.

Gilson MA-170 Digital Absolute Pressure Manometer specifications are below.

Accuracy	±0.5% of full scale
Resolution	0.1mm
Display	Digital
Electrical	115V/60Hz or 230V/50Hz
Power Requirements	9V Battery or AC adapter
Product Dimensions	3.1 x 6.5 x 1.18in (78.7 x 165.1 x 30mm) WxDxH
Estimated Shipping Weight	3.0lbs (1.36kg)

The full scale on the Gilson is 1000mmHg so the accuracy would be +/- 5mmHg

Thank you

Anthony Lewandowski

Midwest Regional Service Manager

Cal-Cert Company | Cell: 913-302-5936 | Office: 1-800-983-7832 | www.cal-cert.com

CAL-CERT
CALIBRATION CERTIFICATION



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Myers, Allen H (KYTC-WSC)

From: Maria Knake <mknake@ashtoresource.org>
Sent: Tuesday, June 18, 2019 12:30 PM
To: Myers, Allen H (KYTC-WSC); Bradbury, Richard
Cc: Joe Williams
Subject: Concerns Regarding AASHTO T 209 Manometer Requirements
Attachments: Concerns Regarding AASHTO T 209 Manometer Requirements.docx

Allen and Rick,

At the mid-year meeting for TS 2c, the issue of the digital manometer accuracy requirement was discussed, and AASHTO re:source committed to looking into the issue a little bit further. Attached are our conclusions. Please feel free to send this to the subcommittee or attach to your meeting agenda if you see fit.

The report from James M. Rice referenced in the attachment does reference work done "showed the need for some reduction in pressure." I cannot locate a copy of this research report. Perhaps one of you will have more luck than we did. Here is the reference: F.J. Benson, "Specific Gravity of Aggregates in Asphaltic-Paving Mixtures," Proceedings, Highway Research Board, Vol. 34, p. 320 (1955).

The research work is pretty old, so I am not sure how useful it would be anyway given how much the test has changed over the years, which is why we did not lose sleep over it. It would be interesting to read, but I doubt it would be particularly valuable in helping us make a decision on how to move forward with the standard as it stands today.

I am sorry that our conclusions are pretty limited. Based on the data that is available, I don't think there is an easy solution to this one.

-Maria

Concerns Regarding AASHTO T 209 Manometer Requirements

By Maria Knake and Joe Williams, AASHTO re:source
June 2019

Summary of Issue

AASHTO re:source received an inquiry from a calibration agency stating that the devices commonly used for this purpose are unable to meet the 0.1 kPa (1 mmHg) accuracy requirement. One of the most common devices is the digital absolute pressure manometer pictured. The accuracy specified by the manufacturer is $\pm 0.5\%$ of full scale. The full scale of this device is 1000 mmHg, which would provide an accuracy of ± 5 mmHg.

Section 6.5 of AASHTO T 209 requires a vacuum measurement device as follows:

Residual pressure manometer or vacuum gauge to be connected directly to the vacuum vessel and capable of measuring residual pressure down to 4.0 kPa (30 mmHg) or less (preferably to zero). The gauge shall be standardized at least annually and be accurate to 0.1 kPa (1 mmHg).

Accuracy	$\pm 0.5\%$ of full scale
Resolution	0.1mm
Display	Digital
Electrical	115V/60Hz or 230V/50Hz
Power Requirements	9V Battery or AC adapter
Product Dimensions	3.1 x 6.5 x 1.18in (78.7 x 165.1 x 30mm) WxDxH
Estimated Shipping Weight	3.0lb (1.36kg)
Meets Standard(s): AASHTO T 209, ASTM D2041	



This brings forth three questions regarding the requirements in AASHTO T 209 for the vacuum measuring device: 1) Are there devices available that meet the accuracy requirement? 2) Does the accuracy requirement make sense, and does it impact the test results? 3) Are we correctly interpreting the standard as intended?

1) Are there devices available that meet the accuracy requirement?

A brief internet search found no devices that meet the accuracy requirement, measure in the correct range and in the correct units according to the manufacturer's specifications. One common supplier of asphalt testing equipment was contacted, and a representative from this supplier confirmed this to be the case. It is possible that devices that meet this requirement do exist, but they are likely cost prohibitive.

2) Does the accuracy requirement make sense, and does it impact the test results?

The requirement for the vacuum applied to the specimen is 27.5 ± 2.5 mmHg. If the ± 2.5 mmHg is indeed critical, the accuracy requirement is likely appropriate. If it is possible that the tolerance on the vacuum requirement could be widened without impacting the test results, then the accuracy requirement could be widened as well. This leads to the question of where the 27.5 ± 2.5 mmHg requirement came from. Early research papers reviewed indicate that vacuum pressure was not thoroughly researched.ⁱ More recent research was conducted in 2010 as part of Dr. Haleh' Azari's research on the test methodⁱⁱ. In her research, the time of agitation and applied vacuum was thoroughly researched, but a vacuum of 25 to 30 mm Hg was maintained during testing. It is possible that this research does exist, but it could not be located through the brief search conducted.

3) Are we correctly interpreting the standard as intended?

It is possible that when the standard was written the phrase “accurate to” was used when the intent was to state that the device should be “readable to.” If this is the case, the devices in frequent use do meet this resolution.

Conclusions: It is likely that the term *accuracy* was used when the standards developers truly intended define *resolution*. Regardless, more work is necessary to determine if the tolerance on the vacuum pressure plays a significant role in the test results. Based on research work that was reviewed, it does not appear that the significance of this testing parameter has been closely evaluated.

ⁱ M. J. Rice, "Maximum Specific Gravity of Bituminous Mixtures by Vacuum Saturation Procedure," in *Symposium on Specific Gravity of Bituminous Coated Aggregates*, ed. H. Williams (West Conshohocken, PA: ASTM International, 1957), 43-61. <https://doi.org/10.1520/STP48029S>

ⁱⁱ Dr. Haleh Azari, *Refinement of AASHTO T 209*, National Cooperative Highway Research Program, Transportation Research Board, National Research Council, Project No. 10-87, July 2010. http://onlinepubs.trb.org/onlinepubs/nchrp/docs/NCHRP10-87_FR.pdf

Standard Practice for

Sampling Asphalt Mixtures after Compaction (Obtaining Cores)

AASHTO Designation: R 67-20¹

AASHTO

Technical Section: 2c, Asphalt–Aggregate Mixtures

Release: Group 3 (August 2020)

1. SCOPE

- 1.1. This method describes the process for removal of a core sample of compacted asphalt mixture from a pavement for laboratory testing. Cores may range in diameter from 2 in. to 12 in.
- 1.2. *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.*

2. REFERENCED DOCUMENTS

- 2.1. ASTM Standard:
- D3549, Standard Test Method for Thickness or Height of Compacted Asphalt Mixture Specimens

3. SIGNIFICANCE

- 3.1. Samples obtained in accordance with the procedure may be used for measuring asphalt mixture thickness, density, and other testing.

4. APPARATUS

- 4.1. *Core Drilling Machine*—A power-driven core drilling machine shall be used to obtain the sample. The device shall be capable of obtaining a core to the full depth of the asphalt mixture sampled and shall consist of a rigid frame or platform such that the core barrel can be maintained perpendicular to the pavement during the drilling process. The core drilling machine must be of sufficient horsepower and have the ability to reach a sufficient depth to minimize distortion of the compacted cores of asphalt mixture.
- 4.2. *Core Drill Bit*—The cutting edge of the core drill bit shall be made of hardened steel or other suitable material with diamond chips embedded in the metal or as recommended by the core drill bit manufacturer in order to drill through the compacted asphalt mixture cleanly. The inside diameter of the core barrel shall be as specified.
- 4.3. *Separation Equipment*—A saw or other method(s) that provides a clean, smooth plane representing the layer to be tested without damaging the specimen.

- 4.4. *Retrieval Device*—A device for removing core samples that will preserve the integrity of the core.
Note 1—Suitable devices have been made from steel rods, wire, or banding material.
- 4.5. *Cooling Agent*—Such as water, ice, dry ice, or liquid nitrogen.
- 4.6. *Sample Marking Tool*—A lumber crayon, paint stick, pen, or other suitable marking tool to mark the core sample for labeling, identifying the separation layers, identifying the layer to test, or as otherwise necessary.
- 4.7. *Package Containers*—Suitable packaging containers for securing and transporting the core samples.

5. PROCEDURE

- 5.1. Freshly compacted asphalt mixtures shall be allowed sufficient time to cool prior to coring in order to prevent damage to the core.
Note 2—To accelerate the coring process, compacted asphalt mixtures may be cooled to expedite the removal of the core by the following methods: water, ice, dry ice, or liquid nitrogen.
- 5.2. Provide a means such as water or air to aid in the removal of cuttings and to minimize the generation of heat caused by friction.
- 5.3. Position the coring machine above the selected location. Engage the power and water or air source to the coring machine. Slowly advance the bit until it contacts the compacted asphalt mixture surface.
- 5.4. Keep the core bit perpendicular to the compacted asphalt mixture surface, applying constant pressure during the process.
Note 3—If any portion of the coring machine shifts during the operation, the core may break or distort. Failure to apply constant pressure or applying too much pressure may cause the bit to bind or distort the core.
- 5.5. Continue the core drilling to the bottom or slightly below the bottom of the asphalt mixture intended to be sampled to allow separation of the core sample at the desired depth from the underlying pavement layers.
- 5.6. After drilling, separate the core sample from the underlying pavement layers using the retrieval device or other suitable means, without damaging or distorting the sample. Obtain the core sample using the retrieval device. Carefully brush off any loose particles adhering to the field cores. For field cores taken immediately over a granular base, carefully remove any imbedded granular material.
Note 4—If the core is damaged to a point that it cannot be used for its intended purpose, a new core shall be obtained within 6 in. of the original location.
- 5.7. Clearly label the core with a sample marking tool.
- 5.8. Fill the hole made from the coring operation with asphalt mixture, non-shrink grout, or other suitable material. Consolidate or compact the material in the hole in multiple lifts if necessary. Ensure that the final surface is level with the surrounding surface.

6. PACKAGING AND TRANSPORTING SAMPLES

- 6.1. Package core samples in suitable protective containers. If multiple core samples are packaged in one container, separate the samples from one another using a suitable separation material.
Note 5—Concrete cylinder molds and PVC or HDPE pipe have been found to be suitable containers for protecting and transporting core samples. Crumpled newspaper has been found to be a suitable separation material when packaging multiple core samples in one container.
- 6.2. Transport cores in a manner that prevents damage from jarring, rolling, or impact with any object.
- 6.3. Prevent cores from freezing or from excessive heat during transport to prevent breaking or deforming
Note 6—In extreme ambient temperature conditions, an insulated container should be used during transport.
- 6.4. If the core is damaged in transport to a point it cannot be utilized for its intended purpose, the core will not be used.

7. LAYER SEPARATION

- 7.1. Using appropriate separation equipment, separate two or more pavement courses, lifts, or layers along the designated lift line.
Note 7—Lift lines are often more visible by rolling a wetted core on a flat surface.

8. REPORT

- 8.1. *The report shall include the following:*
- 8.1.1. Date the cores were obtained.
- 8.1.2. Paving date.
- 8.1.3. Coring location.
- 8.1.4. The lift/layer being evaluated.
- 8.1.5. Average thickness if required.
- 8.1.6. If known, provide the core identification information, such as the nominal-maximum aggregate size of the mixture, asphalt mixture design identification, performance grade of the asphalt binder, etc.

9. KEYWORDS

- 9.1. Asphalt mixture; core drilling; core sample.

APPENDIXES

(Nonmandatory Information)

X1. THICKNESS DETERMINATION

- X1.1. Measure the thickness of the designated lift according to ASTM D3549/D3549M to the nearest 0.01 ft, 1/8 in., or 3 mm. Calculate an average of three or more measurements taken around the lift.

X2. PROCEDURE TO REMOVE CUT AGGREGATES FROM ASPHALT PAVEMENT CORES FOR LABORATORY TESTING

X.2. *Scope*

- X2.1 This procedure is used to remove aggregates that have been cut in the core drilling process. This procedure is only necessary in cases where the asphalt pavement core was obtained for the purpose of determining a mixture property that will be affected by the presence of aggregate cut by the coring drill.



(a) 30 min after oven storage at 230°F

(b) 60 min after oven storage at 230°F

Figure X1—Photographs of Cores Placed in Oven at 230°F

X2.2 *Procedure*

- X2.2.1 Place the core(s) in an oven at 230°F for a period of between 30 to 60 minutes. Remove the core(s) when the material is sufficiently softened to easily remove cut aggregate particles according to Section X2.6. Cores shall be placed in the vertical position to prevent premature breakdown of the cores. See Figure X1 for an example of vertical versus horizontal placement.
- X2.2.2 Separate cut aggregate particles by any of the following methods: hand, chisel, spatula, trowel or by pressing a cylindrical tube (with an internal diameter approximately 1 inch less than the diameter of the core) through the core. Dispose of the removed portion of the core.
- X2.2.3 The remainder of the core is ready to proceed with the desired testing. Cores consisting of the same pavement layer and obtained from the same roadway section may be combined to meet the requirements of the minimum sample size according to the applicable test method as needed.

¹ This full standard was first published in 2015.

Ballot to Revise AASHTO T 209-19

Rationale

Section 6.3 discusses testing portions of the sample at once if the container is not large enough, but there is no detail provided on how to calculate test results for a sample that is tested in portions.

Section 12.3 was added to indicate that if a sample is tested in portions, the weighted average should be reported. This is similar to the wording used in the ASTM version of the standard, ASTM D 2041.

Standard Method of Test for

**Theoretical Maximum Specific Gravity (G_{mm})
and Density of Asphalt Mixtures**

AASHTO Designation: T 209-19

AASHTO

**Technical Subcommittee: 2c, Asphalt–Aggregate
Mixtures**
Release: Group 3 (July)

6. SAMPLING
6.1. *Plant-Produced*
6.1.1. Obtain the sample in accordance with R 97.

6.1.2. Reduce the sample in accordance with R 47.

6.2. *Laboratory-Prepared*
6.2.1. When necessary, reduce samples prepared or produced in a laboratory in accordance with R 47.

6.3. The size of the sample shall conform to the following requirements. Samples larger than the capacity of the container may be tested a portion at a time.
Table 1—Minimum Sample Sizes

Nominal Maximum Aggregate Size, mm	Minimum Sample Size, g
37.5 or greater	4000
19 to 25	2500
12.5 or smaller	1500

12. CALCULATION
12.1. *Theoretical maximum specific gravity (G_{mm})*
12.1.1. Calculate the theoretical maximum specific gravity (G_{mm}) of the sample at 25°C (77°F) as follows:

12.1.2. *Mass Determination in Water:*

$$G_{mm} = \frac{A}{A + B - C} \quad (1)$$

where:

- A = mass of the oven-dry sample in air, g;
 B = mass of the container submerged in water, g, determined in accordance with Section A1.1; and
 C = mass of the sample and container in water, g.

12.1.3. *Mass Determination in Air:*

$$G_{mm} = \frac{A}{A + D - E} \quad (2)$$

where:

- A = mass of the oven-dry sample in air, g;
 D = mass of the container filled with water, g; determined in accordance with Section A1.2; and
 E = mass of the container filled with the sample and water, g.

12.2. *Theoretical maximum density (G_{mm}) at 25°C (77°F):*

12.2.1. Calculate the corresponding theoretical maximum density (G_{mm}) at 25°C (77°F) as follows:

Theoretical maximum density at 25°C (77°F) = theoretical maximum specific gravity \times 997.1 kg/m³ in SI units.

or

Theoretical maximum density at 25°C (77°F) = theoretical maximum specific gravity \times 62.245 lb/ft³ in inch-pound units.

where:

The density of water at 25°C (77°F) = 997.1 kg/m³ in SI units or 62.245 lb/ft³ in inch-pound units.

12.3 If the sample was tested in multiple portions, report the weighted average maximum specific gravity for all portions tested.

ATTACHMENT F

Myers, Allen H (KYTC-WSC)

From: Myers, Allen H (KYTC-WSC)
Sent: Wednesday, June 19, 2019 1:59 PM
To: Maria Knake
Cc: Bradbury, Richard; Brian Johnson
Subject: RE: AASHTO T324
Attachments: t 324.docx

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Thank you, Maria. I'll add this topic to the Technical Subcommittee 2c agenda.

From: Maria Knake [mailto:mknake@ashtoresource.org]
Sent: Wednesday, June 19, 2019 12:49 PM
To: Myers, Allen H (KYTC-WSC) <Allen.Myers@ky.gov>; Bradbury, Richard <Richard.Bradbury@maine.gov>
Cc: Brian Johnson <bjohnson@ashtoresource.org>
Subject: RE: AASHTO T324

I apologize. I somehow hit the send button before I was done typing.

Specifically some of the questions we have include:

- It seems that the only way to check the new requirements of Section 5.1 is to use a go-pro and plot the data in Excel. It is not realistic for our staff to do this during an assessment, but the standard does not seem to require the laboratory to keep a record of this kind of data either. How do we ensure this requirement is being met?
- The term "unless otherwise specified by the agency" is a term used frequently. It will be difficult for us to determine which agencies are enforcing something different and what they are enforcing.

Thanks again!

-Maria

From: Maria Knake
Sent: Wednesday, June 19, 2019 12:44 PM
To: Myers, Allen H (KYTC-WSC) <Allen.Myers@ky.gov>; Bradbury, Richard <Richard.Bradbury@maine.gov>
Cc: Brian Johnson <bjohnson@ashtoresource.org>
Subject: AASHTO T324

Hello Allen and Rick,

Me again! I apologize for the multiple emails from me over the past week. As you are aware, the new version of AASHTO T324 will be published on July 31. AASHTO re:source has some questions about how to check for and enforce some of the new requirements in the field. We are hoping that there might be time to discuss this during the TS 2c meeting in August. If not, perhaps we could arrange separate conference call to discuss?

Maria Knake

Manager, Laboratory Assessment Program



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Direct: 240-436-4804

AASHTO re:source (formerly AMRL)

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Standard Method of Test for

Hamburg Wheel-Track Testing of Compacted Hot Mix Asphalt Mixtures

AASHTO Designation: T 324-19



Technical Subcommittee: 2c, Asphalt–Aggregate
Mixtures

Release: Group 3 (July)

1. SCOPE

- 1.1. This test method describes a procedure for testing the rutting and moisture-susceptibility of asphalt mixture pavement samples in the Hamburg Wheel-Tracking Device.
- 1.2. The method describes the testing of a submerged, compacted asphalt mixture in a reciprocating rolling-wheel device. This test provides information about the rate of permanent deformation from a moving, concentrated load. A laboratory compactor has been designed to prepare slab specimens. Also, the Superpave Gyratory Compactor (SGC) has been designed to compact specimens in the laboratory. Alternatively, field cores having a diameter of 150 mm (6 in.), 250 mm (10 in.), or 300 mm (12 in.), or saw-cut slab specimens may be tested.
- 1.3. The test method is used to determine the premature failure susceptibility of asphalt mixture due to weakness in the aggregate structure, inadequate binder stiffness, or moisture damage. This test method measures the rut depth and number of passes to failure.
- 1.4. This test method measures the potential for moisture damage effects because the specimens are submerged in temperature-controlled water during loading.
- 1.5. *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.*

2. REFERENCED DOCUMENTS

- 2.1. *AASHTO Standards:*
 - R 30, Mixture Conditioning of Hot Mix Asphalt (HMA)
 - T 166, Bulk Specific Gravity (G_{mb}) of Compacted Asphalt Mixtures Using Saturated Surface-Dry Specimens
 - T 168, Sampling Bituminous Paving Mixtures
 - T 209, Theoretical Maximum Specific Gravity (G_{mm}) and Density of Hot Mix Asphalt (HMA)
 - T 269, Percent Air Voids in Compacted Dense and Open Asphalt Mixtures
 - T 312, Preparing and Determining the Density of Asphalt Mixture Specimens by Means of the Superpave Gyratory Compactor

2.2. *ASTM Standards:*

- D6027, Standard Test Method for Calibrating Linear Displacement Transducers for Geotechnical Purposes, Method A
- D8079, Standard Practice for Preparation of Compacted Slab Asphalt Mix Samples Using a Segmented Rolling Compactor

2.3. *NCHRP Study:*

- NCHRP Report Web-Only Document 219 (NCHRP Project 20-07/Task 361) "Hamburg Wheel-Track Test Equipment Requirements and Improvements to AASHTO T 324," issued September 2015.

3. SIGNIFICANCE AND USE

- 3.1. This test measures the rutting and moisture susceptibility of an asphalt mixture specimen.

4. SUMMARY OF METHOD

- 4.1. A laboratory-compacted specimen of asphalt mixture, a saw-cut slab specimen, or a core taken from a compacted pavement is repetitively loaded using a reciprocating steel wheel. The specimen is submerged in a temperature-controlled water bath at a temperature specified by the agency. The deformation of the specimen, caused by the wheel loading, is measured.
- 4.2. The impression is plotted as a function of the number of wheel passes. An abrupt increase in the rate of deformation may coincide with stripping of the asphalt binder from the aggregate in the asphalt mixture specimen.

5. APPARATUS

- 5.1. *Hamburg Wheel-Tracking Device*—An electrically powered machine capable of moving a 203.2 ± 2.0 -mm (8 ± 0.08 -in.) diameter, 47 ± 0.5 -mm (1.85 ± 0.02 -in.) wide steel wheel over the center (x and y axes) of the test specimen. The load on the wheel is 703 ± 4.5 N (158.0 ± 1.0 lb). The wheel reciprocates over the specimen, with the position varying sinusoidally over time. A maximum level of deviation from a perfectly sinusoidal wave is defined through the root-mean square error (RMSE), which is calculated as follows:

$$\text{RMSE} = \sqrt{\frac{\sum e_i^2}{n}} \quad (1)$$

where:

- e_i = deviation from a pure sinusoidal curve, and
 n = number of data points.

The maximum allowable deviation from a sinusoidal wave through the entire track length is set at an RMSE of 2.54 mm (0.1 in.) unless otherwise specified by the agency. The wheel makes 52 ± 2 passes across the specimen per minute. The maximum speed of the wheel, reached at the midpoint of the specimen, is 0.305 ± 0.02 m/s (1 ± 0.066 ft/s).

Note 1—Follow the NCHRP Report or available devices in the market meeting the relevant requirements as proposed in the NCHRP Report to verify the sinusoidal wave requirement of the Hamburg wheel tracking device.

- 5.2. *Temperature Control System*—A water bath capable of controlling the temperature within $\pm 1.0^{\circ}\text{C}$ (1.8°F) over a range of 25 to 70°C (77 to 158°F) with a mechanical circulating system stabilizing the temperature within the specimen tank.
- 5.2.1. *Impression Measurement System*—A linear displacement transducer (LDT) device capable of measuring the depth of the impression (rut) of the wheel to within 0.15 mm (0.006 in.), over a minimum range of 0 to 20 mm (0 to 0.8 in.). The system shall measure the depth of the impression at a minimum at the following locations along the track length: -114 (-4.5), -91 (-3.6), -69 (-2.7), -46 (-1.8), -23 (-0.9), 0 (0), $+23$ ($+0.9$), $+46$ ($+1.8$), $+69$ ($+2.7$), $+91$ ($+3.6$), and $+114$ ($+4.5$) mm (in.) with zero being the midpoint of the track unless otherwise specified by the agency. The midpoint of the track shall be marked by the manufacturer. The system measures the rut depth, without stopping the wheel, at least every 20 passes. Rut depth is expressed as a function of the wheel passes. The device will also disengage if the average LDT displacement (read from the micro-control unit, not the screen) is 40.90 mm (1.6 in.) or greater for an individual specimen. Note that the screen readout subtracts the initial LDT reading from the total displacement.
- Note 2**—The locations of the deformation readings should be verified experimentally using the aluminum apparatus presented in Appendix X2. The maximum allowable RMSE at the 11 pre-set locations after taking into account the effect of curvature of the aluminum apparatus discussed in the NCHRP Report is 1.27 mm (0.05 in.).
- 5.3. *Wheel Pass Counter*—A non-contacting solenoid that counts each wheel pass over the specimen. The signal from this counter is coupled to the wheel impression measurement, allowing for the rut depth to be expressed as a function of the wheel passes.
- 5.4. *Slab Specimen Mounting System*—A stainless steel tray that is mounted rigidly to the machine. The mounting system must restrict shifting of the specimen to within 0.5 mm (0.02 in.) during testing and must suspend the specimen to provide a minimum of 20 mm (0.8 in.) of free circulating water on all sides of the mounting system.
- 5.5. *Cylindrical Specimen Mounting System*—An assembly consisting of two high-density polyethylene (HDPE) molds or plaster of Paris, in accordance with Section 8 to secure the specimen (as shown in Figures 1 and 2), placed on a stainless steel tray that is mounted rigidly to the machine. This mounting system must restrict shifting of the specimen to within 0.5 mm (0.02 in.) during testing and must suspend the specimen to provide a minimum of 20 mm (0.8 in.) of free circulating water on all sides of the mounting system.

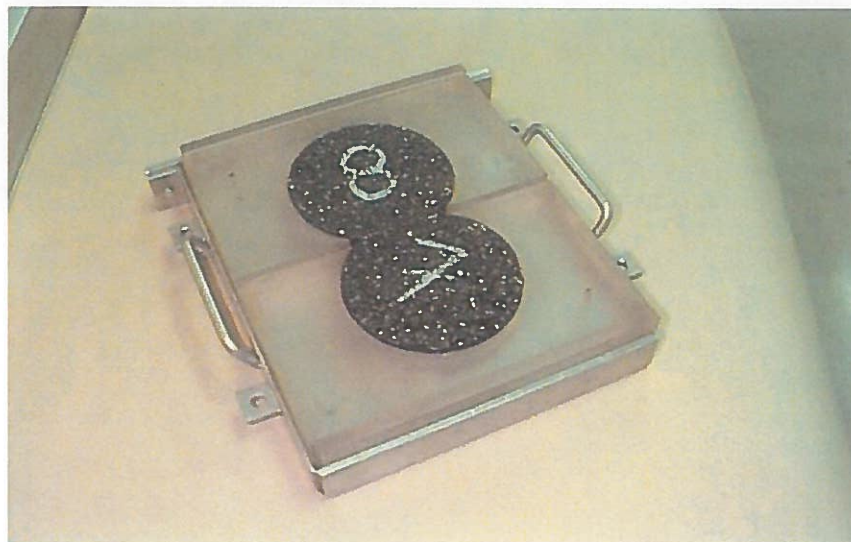
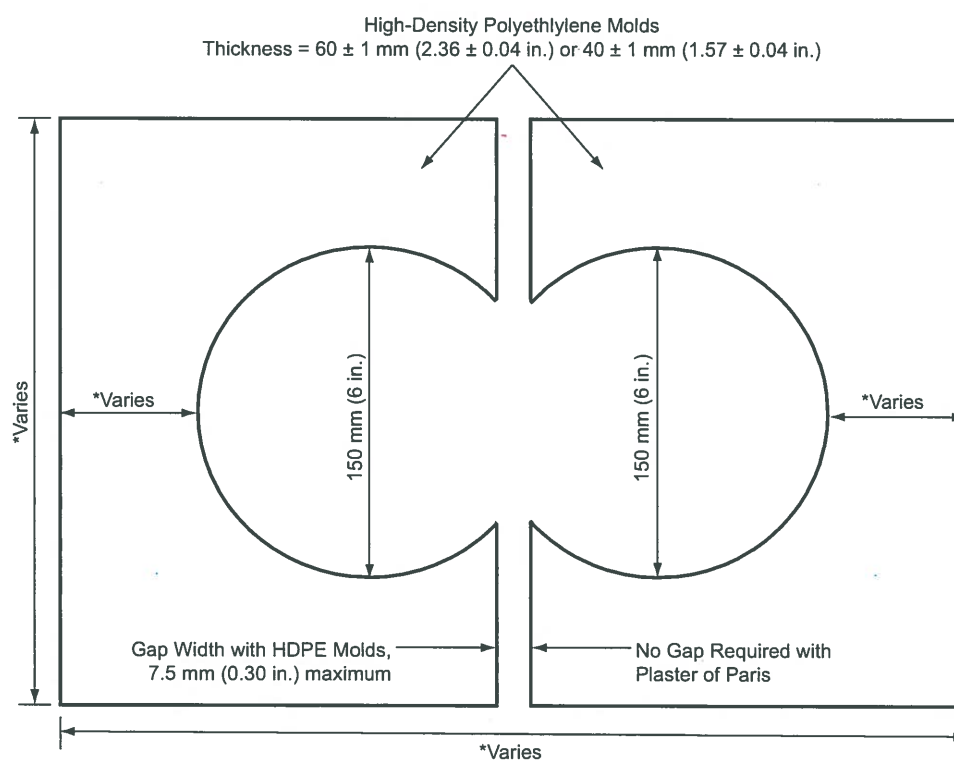


Figure 1—Cylindrical Specimen Mounting System



* Dimension may vary depending on manufacturer.

Figure 2—Schematic of Cylindrical Specimen Mounting System

- 5.6. *Linear Kneading Compactor*—A hydraulic-powered unit that uses a series of vertically aligned steel plates to compact molded asphalt mixtures into flat, rectangular slabs of predetermined thickness and density.

- 5.7. *Balance*—Of 12 000-g capacity, accurate to 0.1 g.
- 5.8. *Ovens*—For heating aggregate and asphalt binders.
- 5.9. *Superpave Gyratory Compactor (SGC)*—And molds conforming to T 312.
- 5.10. Bowls, spoon, spatula, etc.

6. SPECIMEN PREPARATION

- 6.1. *Number of Test Specimens*—Prepare two test specimens for each test, either slab specimens or cylinders.
- 6.2. *Laboratory-Produced Asphalt Mixture:*
 - 6.2.1. Batch mixture proportions in accordance with the desired job mix formula.
 - 6.2.2. Use the mixing temperature at which the asphalt binder achieves a viscosity of 170 ± 20 cSt. For modified asphalt binders, use the mixing temperature recommended by the binder manufacturer.
 - 6.2.3. Dry-mix the aggregates and mineral admixture (if used) first, then add the correct percentage of asphalt binder. Mix the materials to coat all aggregates thoroughly. (Wet-mix the aggregates if using a lime slurry or other wet material.)
 - 6.2.4. Condition test samples at the appropriate compaction temperature in accordance with the short-term conditioning procedure for mechanical properties in R 30.
 - 6.2.5. Use the compaction temperature at which the asphalt binder achieves a viscosity of 280 ± 30 cSt. For modified asphalt binders, use the compaction temperature recommended by the binder manufacturer.
 - 6.2.6. *Laboratory Compaction of Specimens*—Compact either slab specimens or SGC cylindrical specimens.
 - 6.2.6.1. *Compacting Slab Specimens*—Heat molds and tools to compaction temperature. Compact slab specimens 320 mm (12.5 in.) long and 260 mm (10.25 in.) wide using a Linear Kneading Compactor (or equivalent such as a compactor meeting ASTM D 8079). Specimen thickness must be at least twice the nominal maximum aggregate size, generally yielding a specimen 38 to 100 mm (1.5 to 4 in.) thick. Allow compacted slab specimens to cool at normal room temperature on a clean, flat surface until cool to the touch.
 - 6.2.6.2. *Compacting SGC Cylindrical Specimens*—Compact two 150-mm (6-in.) diameter specimens in accordance with T 312. Specimen thickness must be at least twice the nominal maximum aggregate size, generally yielding a specimen 38 to 100 mm (1.5 to 4 in.) thick. Allow compacted specimens to cool at normal room temperature on a clean, flat surface until cool to the touch.
- 6.3. *Field-Produced Asphalt Mixture—Loose Mix:*
 - 6.3.1. Obtain a sample of asphalt mixture in accordance with T 168.
 - 6.3.2. *Laboratory Compaction of Specimens*—Compact either slab specimens or SGC cylindrical specimens in accordance with Section 6.2.6.
- 6.4. *Field-Produced Asphalt Mixture—Field Compacted (Core/Slab Specimen):*

- 6.4.1. *Cutting Field Cores or Field Slab Specimens*—Field cores or field slab specimens consist of wet saw-cut compacted specimens taken from asphalt mixture pavements. Cut field cores 300 mm (12 in.), 250 mm (10 in.), or 150 mm (6 in.) in diameter. Cut field slab specimens approximately 260 mm (10.25 in.) wide by 320 mm (12.5 in.) long. Use a slab specimen thickness of 38 to 100 mm (1.5 to 4 in.). The height of a field core or field slab specimen is typically 38 mm (1.5 in.), but may be adjusted to fit the specimen mounting system by wet saw-cutting. Cut field cores in accordance with Section 6.4.2.

Note 3—Take care to load the sample so it is level to the surface of the mold. Trim the sample if it is too tall, or use shims if it is too short (supporting with plaster if needed). Calibrate the down pressure from the wheel to be 703 ± 4.5 N (158.0 ± 1.0 lb) at the center, level to the top of the mold position. Even a small change in elevation will change the down pressure significantly.

- 6.4.2. *Cutting SGC Cylindrical Specimens and Field Cores*—Cut specimens after they have cooled to room temperature using a wet or dry saw. Saw the specimens along equal secant lines (or chords) such that when joined together in the molds, there is no space between the cut edges. The amount of material sawed from the SGC cylindrical specimens may vary to achieve a gap width no greater than 7.5 mm (0.3 in.) between the molds.

Note 4—To cut specimens consistently may require the use of a jig.

7. DETERMINING AIR VOID CONTENT

- 7.1. Determine the bulk specific gravity of the specimens in accordance with T 166.
- 7.2. Determine the maximum specific gravity of the mixture in accordance with T 209.
- 7.3. Determine the air void content of the specimens in accordance with T 269. The recommended target air void content is 7.0 ± 0.5 percent for laboratory-compacted SGC cylindrical specimens and 7.0 ± 1.0 percent for laboratory-compacted slab specimens. Field specimens may be tested at the air void content at which they are obtained.

8. PROCEDURE

- 8.1. *Slab and Large Field Core Specimen Mounting*—Use plaster of Paris to rigidly mount the 300 mm (12 in.), 250 mm (10 in.), or slab specimens in the mounting trays. Mix the plaster at approximately a 1:1 ratio of plaster to water. Pour the plaster to a height equal to that of the specimen to fill the air space between the specimen and the sides of the mounting tray. The slab specimen will be in direct contact with the mounting tray; however, plaster may flow underneath the specimen. If the thickness of the Slab or Large Field Core Specimen is the same as the height of the mounting tray, the plaster underneath the specimen must not exceed 2 mm (0.08 in.). If the thickness of the Slab or Large Field Core Specimen is less than the height of the mounting tray, plaster and/or shims from aluminum, HDPE, or other suitable material shall be used underneath the specimen as necessary to bring the top of the specimen level with the top of the mounting tray and to prevent any movement of the specimen in the mounting tray during testing. Allow the plaster at least 1 h to set. If using other mounting material, it should be able to withstand 890 N (200 lb) of load without cracking.
- 8.2. *SGC Cylindrical and Field Core Specimen Mounting*—Rigidly mount the 150-mm [5.91-in.] or 152-mm [6-in.] diameter samples in the mounting tray using HDPE molds meeting the dimensions outlined in Figure 2 or use plaster of Paris. For HDPE molds, place the molds in the mounting tray and insert the cut specimens in the molds. Shim the molds in the mounting tray as necessary. Secure the molds into the mounting tray. If plaster of Paris is used, pour the plaster to a height equal to that of the specimen to fill the air space between the specimen and the sides of the mounting tray. The specimen will be in direct contact with the mounting tray; however, plaster

may flow underneath the specimen. For SGC Cylindrical Specimens the plaster underneath the specimen must not exceed 2 mm (0.08 in.) in thickness. For Field Core Specimens plaster and/or shims from aluminum, HDPE, or other suitable material shall be used underneath the specimen as necessary to bring the top of the specimen level with the top of the HDPE molds and to prevent any movement of the specimen in the molds during testing. Allow the plaster at least 1 h to set.

Note 5—Cores drilled with a 152-mm [6-in.] drill bit may not fit in the 150-mm [5.91-in.] HDPE mold and may require further trimming and mounting in plaster of Paris.

- 8.3. Place the mounting tray(s) with the test specimens into the device. Adjust the height of the specimen tray as recommended by the manufacturer, and secure by hand-tightening the bolts.
- 8.4. Turn the testing device and all components on.
- 8.5. Start the software used to communicate with the testing device.
- 8.6. Enter the pertinent project information and testing configuration requirements.
 - 8.6.1. Select the test temperature based on the applicable specifications.
 - 8.6.2. Select the maximum allowable rut depth based on the applicable specifications.
 - 8.6.3. Select the maximum number of passes based on the applicable specifications.
 - 8.6.4. Enter a start delay of 45 min to precondition the test specimens. The temperature of the specimens in the mounting tray will be the test temperature selected in Section 8.6.1 on completion of this preconditioning period.
- 8.7. Proceed to Section 8.8 to operate the testing device in “Auto” mode. Proceed to Section 8.9 to operate the testing device in “Manual” mode.

Note 6—Perform the test in “Auto” mode for testing devices manufactured in the United States later than 1998, where software will automatically open and close the valves to fill and drain the water bath. Perform the test in “Manual” mode for devices made available to the United States prior to 1998.
- 8.8. *Performing the Test in Auto Mode:*
 - 8.8.1. Adjust the height of the LDT in accordance with the manufacturer’s recommendations.

Note 7—The LDT for each steel wheel is automatically zeroed at the start of the test. The software will display a zero at the start of the test.
 - 8.8.2. If using cylindrical specimens, lower the wheels onto the edge of the test specimens such that a majority of the wheel is in contact with the HDPE molds in the mounting tray. If using slabs, lower the wheels onto the specimen no more than 5 min prior to the beginning of the test. In either case, the sample must not be submerged longer than 60 ± 5 min prior to starting the test. This includes the conditioning time.
 - 8.8.3. Start the test by selecting the “Start” button of the testing device software.

Note 8—The start delay time or preconditioning time will start after the water heats to the test temperature selected in Section 8.6.1.
 - 8.8.4. The wheel-tracking device will stop when 20,000 passes have occurred, when some other predetermined number of passes has occurred, or when the test has achieved the maximum impression depth established in Section 8.6.2. The testing device software automatically saves the test data file.

- 8.8.5. Raise the wheel(s) and remove the specimen mounting tray(s) and rutted specimens.
- 8.8.6. Proceed to Section 8.10.
- 8.9. *Performing the Test in Manual Mode:*
- 8.9.1. Close the drain valve(s) and fill the water bath of the wheel-tracking device with water until the float device(s) raises to a horizontal position.
Note 9—Adjust the amount of hot and cold water if necessary, as the water temperature may vary.
- 8.9.2. Precondition the test specimens in the water bath for 45 min after the water has reached the selected test temperature. Do not place the sample in the conditioning bath more than 60 ± 5 min prior to beginning the test. This includes the preconditioning time.
- 8.9.3. Lower the wheels onto the specimens after the test specimens have preconditioned at the selected test temperature for 45 min. For machines that start automatically after the selected preconditioning time, it is allowable to lower the wheels before the preconditioning cycle. The wheel must not be in contact with the specimen for more than 5 min prior to starting the wheel.
- 8.9.4. Ensure the micro-control unit's LDT reads between 10 and 18 mm (0.4 and 0.7 in.). Adjust the LDT height to obtain this reading. Loosen the two screws on the LDT mount and slide the LDT up or down to the desired height. Tighten the screws.
- 8.9.5. Start the test.
- 8.9.6. The wheel-tracking device will stop when 20,000 passes have occurred, when some other predetermined number of passes has occurred, or when the test has achieved the maximum impression depth established in Section 8.6.2.
- 8.9.7. Open the valve(s) beneath the tanks and drain the water bath. Raise the wheel(s) and remove the specimen mounting tray(s) and rutted specimens.
- 8.10. Clean the water bath, heating coils, wheels, and temperature probe with water and scouring pads or per the manufacturer's recommendations. Use a wet-dry vacuum to remove particles that have settled to the bottom of the baths. Clean the filter element and spacers after every test or per the manufacturer's recommendations. Do not use solvents to clean the water bath.
- 8.11. Turn the wheels after each test, so the same section of the wheel surface is not in contact with the test specimen from test to test. This rotation will provide for even wear over the entire wheel. The test should operate with a smooth movement across the test specimen.

9. CALCULATIONS

- 9.1. For the purposes of this method, a "test" is defined as:
- Two 320-mm (12.5-in.) long by 260-mm (10.25-in.) wide slab specimens, two 250-mm (10-in.) core specimens, or two 300-mm (12-in.) core specimens representing similar material run in the Hamburg Wheel-Tracking Device simultaneously; or
 - Four 150-mm (6-in.) diameter specimens grouped in pairs (1 and 1a) representing similar material run in the Hamburg Wheel-Tracking Device simultaneously.

The test results will be reported as the average value of both specimens (a) or both pairs of specimens (b).

- 9.2. The maximum rut depth shall be calculated based on the average rut depth for the five middle deformation locations (i.e., located at -46 (-1.8), -23 (-0.9), 0, + 23 (0.9), and + 46 (1.8) mm (in.)) or other suitable method as specified by the agency. Plot the rut depth versus number of passes for each test for each deformation location. Figure 3 shows a typical plot of the output produced by the Hamburg Wheel-Tracking Device. From this plot, obtain the following values:
- slope and intercept of the first steady-state portion of the curve, and
 - slope and intercept of the second steady-state portion of the curve.

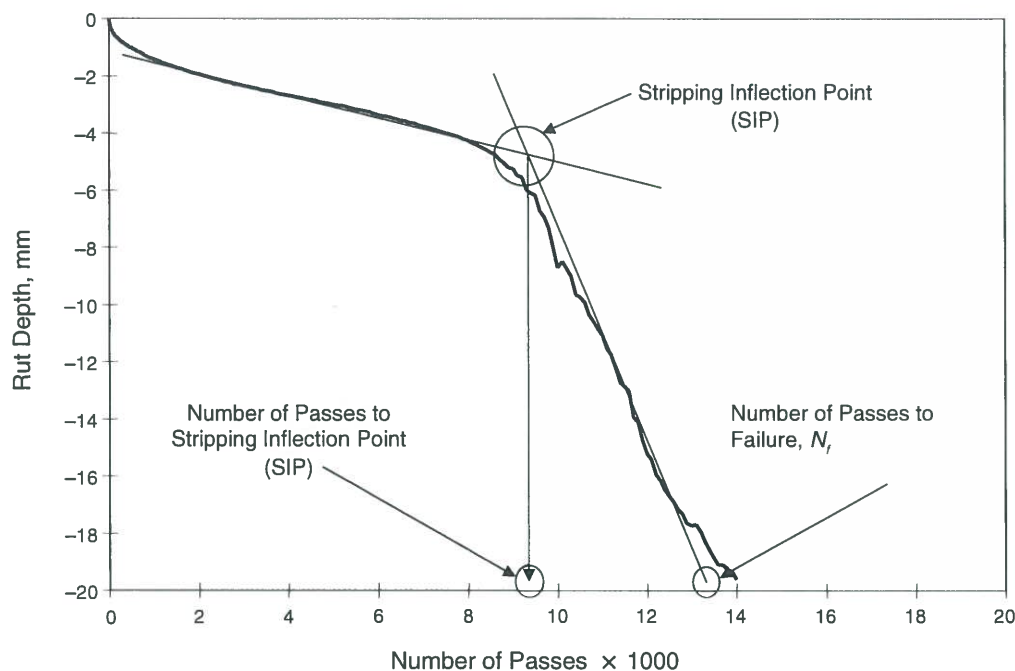


Figure 3—Hamburg Curve with Test Parameters

- 9.3. Calculate the following test parameters, all expressed in “Passes.”
- $$\text{stripping inflection point (SIP)} = \frac{\text{intercept (second portion)} - \text{intercept (first portion)}}{\text{slope (first portion)} - \text{slope (second portion)}} \quad (1)$$
- where:
- Failure rut depth is the specified maximum allowable rut depth for the test.

Note 10—The specifying agency may choose to define a “test” as an individual slab or core specimen or as a pair of specimens as defined in Section 9.1.

10. REPORT

- 10.1. *The report may include the following parameters:*
- 10.1.1. Asphalt mixture production (field or lab);
 - 10.1.2. Compaction method (slab or SGC cylindrical specimen);
 - 10.1.3. Number of passes at maximum impression;



- 10.1.4. Maximum impression;
- 10.1.5. Test temperature;
- 10.1.6. Specimen(s) air voids;
- 10.1.7. Type and amount of anti-stripping additive used;
- 10.1.8. Creep slope;
- 10.1.9. Strip slope; and
- 10.1.10. Stripping inflection point.

11. PRECISION AND BIAS

- 11.1. Work is underway to develop precision and bias statements for this standard.

12. KEYWORDS

- 12.1. Compacted asphalt mixture; moisture-susceptibility; rutting; wheel-track testing.

ANNEX A—EVALUATING HAMBURG WHEEL DIMENSIONS

(Mandatory Information)

A1. SCOPE

- A1.1. This Annex covers the evaluation of the steel wheel as a check for compliance with the requirements outlined in Sections 5.1. Measurements of the wheel's diameter and width, as well as visual inspection of critical surface conditions, are included.
Minimum frequency of this evaluation is 12 months.

A2. APPARATUS

- A2.1. *Measurement Instrument (Calipers or Micrometer)*—With appropriate range and a minimum resolution of 0.1 mm (0.004 in.). The measurement instrument shall be standardized annually.

A3. PROCEDURE FOR MEASURING THE DIAMETER OF THE HAMBURG WHEEL

- A3.1. *Perform a visual inspection of the wheel:* The wheel shall be free of residue and deep gouges. Identify any wear that may be visible on the wheel.
- A3.2. Determine the maximum diameter of the wheel by measuring it at several locations. Place a removable mark at the maximum diameter position. Record the maximum diameter to the nearest 0.1 mm (0.004 in.).
- A3.3. Measure the diameter at a 90-degree orientation to the maximum diameter. Record this diameter to the nearest 0.1 mm (0.004 in.).

- A3.4. Each individual diameter measurement shall be compared to the specified range and given a pass/fail rating. If any of the individual measurements are assigned a “fail” rating, the wheel is considered to be out of conformance and shall not be used.

A4. PROCEDURE FOR MEASURING THE WIDTH OF THE HAMBURG WHEEL

- A4.1. *Perform a visual inspection of the wheel loading surface:* The edge shall be free of residue and deep gouges. Identify any wear that may be visible on the edge of the wheel.
- A4.2. Determine the maximum width of the wheel by measuring it at several locations. Place a removable mark at this position. Record the maximum width to the nearest 0.1 mm (0.004 in.).
- A4.3. Measure the width at a 90-degree, 180-degree, and 270-degree orientation to the maximum width. Record each width to the nearest 0.1 mm (0.004 in.).
- A4.4. Each individual width measurement shall be compared to the specified range and given a pass/fail rating. If any of the individual measurements are assigned a “fail” rating, the wheel is considered to be out of conformance and shall not be used.

A5. INSPECTION REPORT

- A5.1. Record and report the following information:
- A5.2. Name of evaluator;
- A5.3. Date;
- A5.4. Equipment owner;
- A5.5. Location of evaluation;
- A5.6. Hamburg Wheel-Tracker model;
- A5.7. Diameter measurements of the wheel to the nearest 0.1 mm (0.004 in.);
- A5.8. Width of the loading surface of the wheel to the nearest 0.1 mm (0.004 in.).

APPENDIXES

(Nonmandatory Information)

X1. MAINTENANCE

- X1.1. Grease all of the grease fittings with fresh grease every 20 tests (not to exceed 2 months) per the manufacturer’s recommendations.

X2. CALIBRATION/EQUIPMENT VERIFICATION

- X2.1. Verify the water bath temperature is within $\pm 1.0^{\circ}\text{C}$ (1.8°F) of the temperature readout from the testing device or software every 6 months. Measure the water bath temperature at four locations per the manufacturer's recommendations. Average the four measurements and report this as the water bath verification temperature.
- X2.2. Verify the LDT calibration in accordance with ASTM D6027 or per the manufacturer's recommendations.
- X2.3. Verify the load from the wheel loading assembly at the level of the initial height of the test per the manufacturer's recommendations to be $703 \pm 4.5 \text{ N}$ ($158.0 \pm 1.0 \text{ lb}$). A calibrated load cell, accurate to 0.4 N (0.1 lb) is sufficient for this check. Align the center of the load cell with the middle of the wheel width as well as the center axis of the wheel.
- X2.4. Verify that the wheel is reciprocating on the test sample at 52 ± 2 passes per minute.
- X2.5. Verify that rut measurements are obtained at the 11 pre-set locations defined in Section 5.2.1. The aluminum apparatus presented in Figure X1.1 should be used.
- X2.6. The wheel position varying sinusoidally over time shall be verified to have a maximum RMSE of 2.54 mm (0.1 in) unless otherwise specified by the agency from a perfectly sinusoidal wave.

Table X1.1—Offset Values for Displacement Readings

Position (in.)	Position (mm)	Offset (mm)
-4.5	-114	0.79
-3.6	-91	0.50
-2.7	-69	0.28
-1.8	-46	0.13
-0.9	-23	0.03
0.0	0	0.00
0.9	23	0.03
1.8	46	0.13
2.7	69	0.28
3.6	91	0.50
4.5	114	0.79

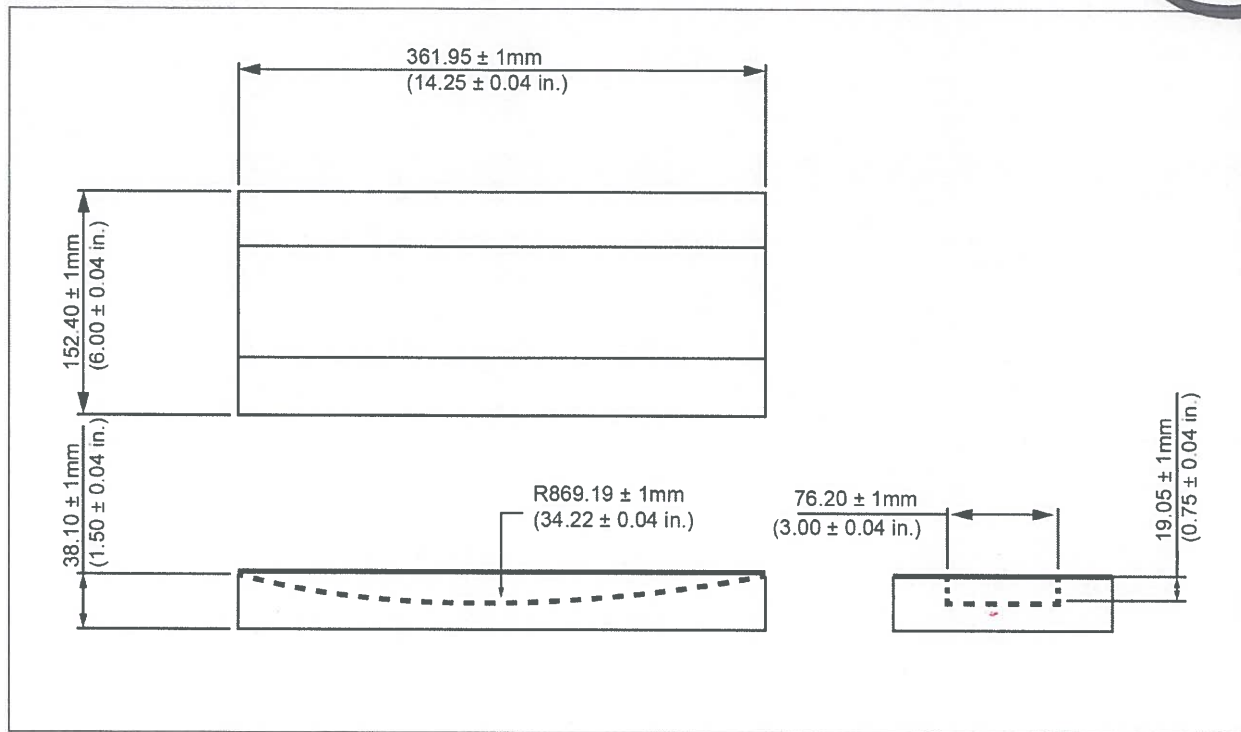


Figure X1.1—Details of the metal specimen

From: Blackburn, Lyndi <blackburnl@dot.state.al.us>

Sent: Wednesday, May 15, 2019 11:08 AM

To: Oak Metcalfe (<rmetcalfe@mt.gov> <rmetcalfe@mt.gov>; Barry Paye <Barry.Paye@dot.wi.gov>; DeVol, Joe <DeVolJ@wsdot.wa.gov>; Pfeifer, Brian A <Brian.Pfeifer@illinois.gov>; allen.myers@ky.gov; snussbaum@utah.gov, Bradbury, Richard <Richard.Bradbury@maine.gov>; Greg Milburn <greg.milburn@wyo.gov>

Cc: Soneira, Casey <csoneira@ashto.org>; Maria Knake <mknake@ashtoresource.org>

Subject: [External] Task Force on Asphalt Specifications Harmonization (TFASH)

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Leadership of Tech Sections 2a, 2b, 2c, and 2d;

Hello all, I hope your summer is off to a great start. I'm emailing to bring to your attention an opportunity for members of your respective technical sections. The TFASH Charter is just about written and provides for six members each from AASHTO and ASTM respectively. Ideally, it would be nice to have one member from each TS with two additional members that are say somewhat knowledgeable about all things asphalt.

So on behalf of TFASH, I'm respectfully hoping you can search your membership for individuals that are passionate about the details of specifications and have some technical expertise or a staff with technical expertise that would be willing to meet quarterly (likely by conference call or web meeting) to work with ASTM members on the harmonization of our shared standards.

If you have any questions or need additional information, please feel free to contact me or Maria or Casey. As always your participation and work on AASHTO is greatly appreciated and welcomed. Thanks for the consideration.



Lyndi Davis Blackburn, P.E.

Former Chair for TS 2b

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