



AASHTO
COMMITTEE ON MATERIALS & PAVEMENTS
Technical Subcommittee 4b
Flexible and Metallic Pipe
Mid-Year Meeting
 Wednesday, January 3, 2018
 2:00 – 4:00 PM EST

Agenda

I. Introductions and Opening Remarks

The meeting began with Bill Bailey, chair of technical subcommittee (TS) welcoming everyone and wishing them a happy new year.

II. Voting Members

Roll call was not conducted at the meeting. The Chair stated that if there was a need for a vote, a roll call will be performed. Attendance was exported from the AASHTO Webinar registration site. The attendance table below was filled in based on the registration report. (See Excel spreadsheet labeled list of attendees.) There were 29 DOT members registered, 4 AASHTO, 9 listed as friends of committee, 13 listed as affiliated with the Concrete Industry (CI) and 3 listed as affiliated with Plastic (P) Industry. It appears from the registration list that 15 technical subcommittee voting members or their proxies were in attendance.

Name	State	Present
Bailey, William R.	Virginia	X
Peoples, Christopher A.	North Carolina	X
Steve Ingram	Alabama	X
San Angelo, Michael	Alaska	
Dan Speer	California	X
Pinkerton, Jennifer M.	Delaware	
Knight, Chase	Florida	X
Douds, Richard	Georgia	X
Jim Trepanier	Illinois	
Jason Davis	Louisiana	X
Bradbury, Richard L	Maine	
Fung, Clement W.	Massachusetts	X
Kline, Therese R.	Michigan	X
Trautman, Brett	Missouri	X
Streeter, Donald A.	New York	X

Becca Lane	Ontario	
Ramirez, Timothy	Pennsylvania	X
Temple Short	South Carolina	
Brian Egan	Tennessee	X
Williams, Kurt	Washington	X
Kemp, Peter	Wisconsin	X

Friends and Non-Voting Members

Name	Affiliation	Present
Rothblatt, Evan	AASHTO - Liaison	X
Malusky, Katheryn	AASHTO - Liaison	X
Lacinak, Henry	AASHTO - Liaison	X
Lenker, Steven E.	AMRL	
Uherek, Greg	AMRL	
Knake, Maria	AMRL	
McGough, Michael	NCSPA	X
Chestnut, Brian W	BTB	X
Currence, Daniel	PPI	X
Christensen, Heather	Prinsco, Inc.	X
Beakley, Josiah W	ACPA	X
Pluimer, Michael	Crossroads Eng.	X
Sarcinella, Robert	AASHTO - NTPEP	X
Oliver Delery	Forterra	X
Jim Goddard	JG3 LLC	
Baryluk, Greg	ADS	X
Paredes, Mario	TRI/ENV	X

III. Approval of Technical Section Minutes

A motion was made by Brian Egan, TN to approve TS Minutes of the August 8, 2017 Flexible and Metallic pipe meeting in Phoenix, Arizona. The motion was seconded by Don Streeter, NY. All were in favor of approving minutes.

IV. Old Business

A. Concurrent SOM & TS Ballot Items

Item 1: Concurrent ballot to revise M 252-09 (2017) Standard Specification for Corrugated Polyethylene Drainage Pipe

The revision to M 252-09 (2017) passed SOM ballot with 46 affirmative votes, 0 negatives and 6 no votes. The TS ballot results were 17 affirmative votes, 0 negatives and 2 no votes. There were two editorial corrections suggested by PA and OR. The Chair will make recommended changes. The revised M 252 standard will be published in June 2018.

Item No.	Description
1	Concurrent ballot to revise M 252-09 (2017) Standard Specification for Corrugated Polyethylene Drainage Pipe

State	Vote	Comment	Chair Review	Resolution
PA SOM/TS	Affirmative	In Section 9.4.4, 1st line, revise from "bottom plate with the the longitudinal" to "bottom plate with the longitudinal" (i.e., delete 1 of 2 words "the").	Editorial	Will make recommended change
OR	Affirmative	Section 7.4.2 - Spelling "uniformly" Section 13.1 - Spelling "Polyethylene"	Editorial	Will make recommended change

Item 2: Concurrent ballot to revise M 330 Standard Specification for Polypropylene Pipe, 300- to 1500-mm (12- to 60-in.) Diameter.

The revision to M 330 passed SOM ballot with 46 affirmative votes, 1 negative and 6 no votes. The TS ballot results were 17 affirmative votes, 0 negatives and 2 no votes.

LA technical section member voted affirmative while the LA SOM member voted negative at the committee level. LA withdrew their negative with the understanding that the buckling definition will be removed from the section on terminology of the standard.

PA had 11 editorial comments. The chair will review these with PA and the Publication staff in the next few weeks. Once this review is completed and changes made the revised M 330 standard will be published in June 2018.

Item No.	Description			
2	Concurrent ballot to revise M330 Standard Specification for Polypropylene Pipe, 300- to 1500-mm (12- to 60-in.) Diameter.			
State	Vote	Comment	Chair Review	Resolution
LA	Negative on SOM Ballot Affirmative on TS Ballot	I am voting affirmative with these comments, but LA is voting negative at committee level, as this needs discussion and resolution. Having no buckling requirement is not consistent with HDPE specifications. We define buckling in the definitions but do not reference it in the test requirements. M 252, M 294, and M 326 all reference buckling as a failure but M 330 does not. M 278 for PVC includes "breaking" with other failure modes. M 330 only includes cracking, splitting, and delamination. I made this comment on the 4b ballot as well. The response indicated it isn't an included test in M 330 and a note on the test development for M 294. The test isn't included in the ASTM version of polypropylene pipe either, but these specifications were likely introduced through the same proposal. If it didn't appear in one, it wouldn't be in the other. If it is not a concern on PP pipe, remove the definition from the document (which should be considered editorial).	Remove the buckling definition from the standard. Consider adding buckling criteria to the standard in the future.	LA withdrew their negative with the understanding that the buckling definition will be removed from the section on terminology of the standard.
PA SOM/TS	Affirmative With Editorial Comments	1) In Section 4.1.3, end of 2nd and beginning of 3rd line, revise from "smooth inner exterior walls" to "smooth exterior wall" as the inner wall (liner) has already been accounted for in the 1st line of this Section. 2) In Section 6.3, last line at very end, revise from "in Section 3.5" to "in Section 3.1.6". 3) In Section 7.1.2, 2nd line, revise from "at all internal corrugation crests" to "at all corrugation or rib valleys" as Figure 1 refers to the internal crests as "Valleys". 4) In Section 7.1.2, 2nd line, revise from "both inner wall (liner) and exterior walls" to "both the internal wall (liner) and the exterior wall" for better readability. 5) In Section 7.2.2, revise from "both inner wall (liner)	Editorial	Chair will make changes in consultation with Publication Staff and PA.

P A		and exterior walls" to "both the internal wall (liner) and the exterior wall" for better readability. 6) In Section 7.2.2 and in the table footnote a at bottom of table, revise from "liner" in both italic and superscript font to "liner" in only italic font (no superscript font). 7) In Section 7.5, revise from "inner (liner)" to "inner wall (liner)" for consistency with Figure 1 labeling and text in previous Sections. 8) In Section 7.9, Note 9, 2nd line, suggest revising from "pipe wall and liner profile" to "pipe profile including the inner wall (liner), corrugations or ribs, and exterior wall (if Type D pipe)" for consistency with Figure 1 labels and consistency with text used in previous Sections. 9) In Section 9.6.4, suggest revising from "and exterior wall" to "and the exterior wall". 10) In Section 9.7, 2nd paragraph, 3rd line, revise from "and the liner and exterior wall" to "and both the inner wall (liner) and the exterior wall". 11) In Section 9.7, 2nd paragraph, last line, revise from "inner or exterior wall" to "inner wall (liner) or the exterior wall".		
I t e m 3 :				

Item 3: Concurrent ballot to revise M 326-08 (2017) Standard Specification for Polyethylene (PE) Liner Pipe, 300- to 1600-mm Diameter, Based on Controlled Outside Diameter.

The revision to M 326-08 (2017) passed SOM ballot with 46 affirmative votes, 0 negatives and 6 no votes. The TS ballot results were 17 affirmative votes, 0 negatives and 2 no votes. PA had 3 editorial comments and KS had one comment. The chair will review these with PA, KS and the Publication staff in the next few weeks. Once this review is completed and changes made the revised M 326 standard will be published in June 2018.

Item No.	Description			
3	Concurrent ballot to revise M 326-08 (2017) Standard Specification for Polyethylene (PE) Liner Pipe, 300- to 1600-mm Diameter, Based on Controlled Outside Diameter.			
State	Vote	Comment	Chair Review	Resolution
KS	Affirmative on SOM Ballot	9.2 need a period after deflection.	Editorial	Chair will make change.
PA SOM/TS I t	Affirmative With Editorial Comments	1) In Section 3.4, add a comma after the word "testing". 2) In Section 9.2, 3rd line, revise from "in load-deflection" to "in the load-deflection". 3) In Section 9.2, 5th line, revise from "evidence of for cracking" to "evidence of cracking".	Editorial	Chair will make changes in consultation with Publication Staff and PA.

Item 4: Concurrent ballot to revise M 294 Standard Specification for Corrugated Polyethylene Pipe, 300- to 1500-mm (12- to 60-in.) Diameter

The revision to M 294 passed SOM ballot with 41 affirmative votes, 5 negatives and 6 no votes. The TS ballot results were 13 affirmative votes, 4 negatives and 2 no votes. FL, IN, LA, MI and WA all voted negative on the SOM ballot. FL, GA, MI and WA all voted negative on the TS ballot. Two meetings were held to discuss the negatives. LA withdrew their negative after a discussion on the OIT requirement. WA withdrew their negative once they understood Report 870 was located on the TRB website. GA, IN and MI withdrew their

negatives based on these meetings and the proposal to incorporate more information and guidance to owners in the ordering, classification and marking sections of the standard. FL also withdrew their negative with the proposal of Option 8 and the agreement to add further clarification in the Quality Assurance section on virgin and recycled resins. PA, KS, TN, SC, TRI, VA and MO provided comments. See comment sheet below for more details and the attachment to the agenda titled “Option 8 + Section 12”. Option 8 + section 12 is the standard M 294 as voted on with editorial additions to ordering, classification, marking and quality assurance sections.

“Option 8 + Section 12” was reviewed during the webinar. Option 8 allows the owners to specify that M 294 pipe is to be manufactured with virgin or recycled material and the pipe will be labelled according to the classification cited in the ordering information. M 294 is a performance based specification so when virgin and or recycled resins are blended, the final blend of materials will meet the requirements of this specification. States can specify when they are ordering if they want a maximum or a minimum percentage of recycled used when the pipe is manufactured. The pipe will also include markings to indicate the pipe was manufactured using recycled material. Section 12 includes clarification that resin can be virgin or recycled and the manufacturer’s data sheets will be available to show the percent virgin or recycled resin used in production of the pipe if the state requests this data. FL, GA, and MI withdrew these negatives based on these additions to the specification. IN was also in favor of these additions. The chair spoke with WA and WA wanted to make sure all the states were able to read and review the NCHRP report. When WA realized the report was on the TRB website, they withdrew their negative. LA was concerned with the OIT requirements in this specification in addition to the OIT temp requirement, which is in Section 6.1. The OIT temp requirement is for both virgin and recycled polyethylene pipe. The OIT (Oxidation Induction Time) requirement is just for pipe made from recycled polyethylene pipe. LA felt reassured once they understood the additional requirement was to ensure the recycled material going into the manufacture of M 294 had a sufficient oxidation package. MI DOT expressed concern with the markings currently being used to depict recycled material. Mike Pluimer stated a label will be included on the inside of the pipe with this information as well. Michael also indicated that the industry would work with MI to improve these markings.

Item No.	Description			
4	Concurrent ballot to revise M 294 Standard Specification for Corrugated Polyethylene Pipe,			
State	Vote	Comment	Chair Review	Resolution
GA	Negative on TS Ballot	The current AASHTO M294 Standard Specification is being revised to allow pipe with recycled materials. Because it is being revised in lieu of creating a new standard specification, there is no provision to allow GDOT to track the use of pipe with virgin and recycled material. If we moved forward without a new specification, GDOT would not be able to create separate pay items that would distinguish the pipe. It appears that a new Standard Specification needs to be created for plastic pipe with	An Initial meeting was held on December 4, 2017 to discuss the negatives from the SOM and TS ballots. During the discussion several items within the research were explained	Georgia withdrew their negative based on supporting option 8 the addition of clarifications to M 294 Sections on ordering,

		<p>recycled materials.</p> <p>As during the webinar, a manufacturer can possibly use up to 98% recycled material. It was noted the life prediction significantly decreased when that amount of recycled material was used. However, no allowance was made in M294 to limit the percentage of recycled material. In addition after reviewing the NCHRP report, it appears that the actual measured strains were relatively low when predicting the crack life, therefore, a Finite Element Analysis was then used. It also would seem that additional research would be needed to evaluate this method of prediction.</p> <p>Although it is stated that plastic pipe with recycled material has been research thoroughly, only one size pipe was included in your field evaluation of the railroad site. It real world live load situations, various sizes of pipe would be under constant load based on the differing ADT of the roadway.</p> <p>For these reasons mentioned above, GDOT would have to cast a negative vote or a no vote at the minimum.</p>	<p>and debated.</p> <p>The main point of debate was that GA, FL and MI thought the specification should allow the owner to specify virgin resin or limit the percentage of recycled material in M 294 pipe installations in their highway systems. These states wished to perform additional investigations and track installations in highway applications.</p> <p>A Task Force 2017-06 was formed to look at Florida's suggestion of a modification to the classification section of M 294 (section 4) to clearly delineate pipes manufactured with and without recycled content in the hope of resolving negatives. At the Task Force meeting held on December 18, 2017 a couple of options were proposed to resolve the negatives.</p>	<p>classification and markings.</p>
IN	Negative on SOM Ballot	<p>If it wasn't apparent that the goal of the NCHRP Project 4-39 was to conclude that recycled material in Corrugated HDPE pipe was acceptable, then I would have thought the report was trying to argue for the use of virgin resins. The majority of the data presented in 4-39 made it evident that the performance of virgin HDPE pipe is superior to any of the recycled pipes tested. The field work in the report was also very lacking - one installation under rail is not sufficient.</p> <p>The modification to allow recycled materials is at best unnecessary and at worst extremely damaging to long term performance.</p> <p>If this passes, Indiana will be forced to modify our specs to disallow recycled materials in HDPE pipes.</p>	<p>Indiana will be forced to modify their specifications to disallow recycled materials in HDPE pipes. IN was unable to attend Task Force meeting but reviewed meeting summary.</p>	<p>Indiana DOT is satisfied with Option 8 as presented, and would like to withdraw the negative.</p>
FL	Negative on Both TS and SOM Ballot	<p>The layout of the specification needs to be structured such that there is a clear delineation between pipes manufactured with and without recycled content. This includes potentially modifying the title to indicate two different categories of pipe (M 294/M 294 R) and/or assigning additional types or classes indicative of recycled content. This will enable owners to clearly specify, as they see fit, where each category of pipe is allowed for specific projects depending on factors including location and desired service life. It will also provide a tool for tracking the use of "R-pipe", as owners will be able to request specific pipe types to be included on certifications accompanying lots or shipments.</p> <p>We recommend the following or similar that clearly</p>	<p>See Chair review above on GA negative. Florida believes there should be further classifications related to limits on recycled content.</p>	<p>Florida withdrew their negative with the addition of Option 8 plus the addition of clarification language on virgin and recycled resins and tracking quantities of recycled in the Quality Assurance section of M 294.</p>

		<p>indicates the type/class:</p> <ol style="list-style-type: none"> 1) Add new pipe types using "R" with the existing M 294 Types: C, S and D, indicating recycled content. e.g. Type CR, SR, and DR. 2) Sub-classes of "R-pipe" such as I, II, III, etc., indicating percentage content range of PCR or PIR resin (I = less than 10%, 2 = 10 to 20%, etc.). Example: Type SR-II pipe would be readily identified as a Type S with 10 to 20% recycled content. 		
MI	Negative on Both TS and SOM Ballot	<p>Would prefer to see recycled material products supported by its' own standard.</p> <p>Would prefer that recycled product pipe have its own standard.</p> <p>Note that AASHTO informs us on page 15 of 19 that "...3 plants this past year to lose their certification of compliance from 3 different companies, all for pipe/resin comparison testing failures."</p>	See Chair review above on GA negative.	Michigan withdrew their negative based on supporting option 8 (the addition of clarifications to M 294 Sections on ordering, classification and markings).
WA	Negative on Both TS and SOM Ballot	<p>While WSDOT supports the use of recycled materials we are concerned about the proposal to move forward with this standard without the final report for NCHRP 04-39 being published and available to all.</p> <p>Currently (11-7-17) the NCHRP website shows the status of NCHRP 04-39 as completed and the final report is to be published in early 2018.</p> <p>Given the amount of interest in this change it is critical to take the time to ensure all have time to review and comment on the final published report.</p>	WSDOT clarified that their negative was not to allow WSDOT more time to review, but to ensure the research report NCHRP 04-39 was published and available to anyone who wanted to see it.	Washington Withdrew their negative upon seeing the report was available on line.
LA	Affirmative On TS Ballot Negative On SOM Ballot	<p>I am voting affirmative with these comments, but LA is voting negative at committee level, as this needs discussion and resolution. OIT rationale needs clarification. The OIT on polypropylene pipe, M 330, is 25 minutes, but OIT on recycled HDPE material is only 20 minutes. If the test is a concern, shouldn't this be consistent? NCLS for M 330 is higher than M 294, so it's possible we have more conservative requirements for polypropylene. However, if recycled materials are a concern, perhaps 20 minutes is not sufficient. Mike Pluimer suggested this test is to ensure the manufacturer adds an antioxidant package to account for oxidation in the recycled material, so it does seem to be a concern. If this has been discussed and 20 minutes for the OIT requirement is considered sufficient, we will be okay.</p> <p>Section 6.1.1 states "the requirements in 6.1.1.2 and 6.1.1.2 shall be met." This should be "...6.1.1.1 and 6.1.1.2".</p>	The OIT requirement for pipes manufactured with polyethylene materials is different than those manufactured with polypropylene materials is because polypropylene materials are generally more prone to oxidative failure than polyethylene materials due to the differences in their crystallinity (PE is a more crystalline structure than PP). Virgin as well as recycled resins for M 294 pipes must meet the requirements of ASTM D 3350 and cell	LA withdrew their negative based on the explanation and discussion provided. A detailed explanation is provided below this table on page 9.

			classification 435400C which includes the Oxidation Induction Temperature (OI Temp) requirement.	
PA	PA Affirmative Comments on Both TS and SOM Ballots	1) In Section 6.1.1, I am a little confused by the 1st and 2nd sentences. The 1st sentence adds "and/or recycled" for PE resins and this sentence indicates the PE resin compounds are to meet the cell classification. However, the 2nd sentence indicates that "The cell classification shall be based on the virgin PE resin compounds". Obviously if recycled PE resins are used they will be blended with the virgin PE resins. Should the cell classification be based on the blend of virgin and recycled PE resin compounds when recycled PE resin compounds are used? Also, see Section 6.3 for blended resins and where the word "virgin" is proposed to be deleted and this Section indicates the blended resin must meet the requirements of Section 6.1.1.		Chair will review with PA and Publication staff.
PA	Affirmative Comments	2) In Section 6.1, 8th and 10th lines in redline version, revise from "For slow crack growth resistance, the requirements in 6.1.1.2 and 6.1.1.2 shall be met" to "For slow crack growth resistance, the requirements in Sections 6.1.1.1 and 6.1.1.2 shall be met".		Chair will review with PA and Publication staff.
PA	Affirmative Comments	3) In Section 6.1.1.2, 1st line, suggest revising from "recycled materials" to "recycled PE materials (PCR and/or PIR)" for consistency with Sections 3.11, 3.12, and 6.1.1, 1st sentence. 4) In Section 6.1.1.3, 1st line, suggest revising from "recycled materials" to "recycled PE materials (PCR and/or PIR)" for consistency with Sections 3.11, 3.12, and 6.1.1, 1st sentence. 5) In Section 6.1.1.3, 3rd line, suggest revising from "recycled materials" to "recycled PE (PCR and/or PIR) materials". 6) In Section 6.1.1.3, Note 2, suggest revising from "these materials" to "recycled PE (PCR and/or PIR) materials".		Chair will review with PA and Publication staff.
PA	Affirmative Comments	7) In Section 7.1, it requires "shall be free of foreign inclusions", but Section 3.3 refers to inclusions possible from recycled PE (PCR and/or PIR) material contaminants. I know that the recycled PE materials are filtered to remove contaminants and foreign inclusions, but is the phrase in Section 7.1 "free of foreign inclusions" now correct terminology that should be used here? Perhaps, should it say "free of visible foreign inclusions and foreign inclusions that result in crack initiation as determined by the UCLS testing"? 8) In Section 7.1.1, 2nd sentence, suggest rewording whole sentence to read "Delaminations shall be determined in accordance with the procedures in Section 9.7". 9) In Section 7.7, 3rd line, revise from "AASHTO T 341" to "T 341".		Chair will review with PA and Publication staff.
PA	Affirmative Comments	10) In Section 9.4.1.1, 3rd line, revise from "as shown below in Figure 4" to "as shown in Figure 4". The word "below" is not necessary. 11) In Section 9.4.1.2, 2nd line, revise from "made per		Chair will review with PA and Publication staff.

		ASTM D4703" to "prepared in accordance with ASTM D4703".		
PA	Affirmative Comments	12) In Figure 6, revise figure labels from "Outer Corrugated Shell" to "Outer Corrugated Wall" and from "Delamination between Inner and Outer Shell" to "Delamination between Inner Liner and Outer Wall".		Chair will review with PA and Publication staff.
PA T h e	Affirmative Comments	13) In Section 11.1.5, revise from "recycled content" to "recycled PE materials (PCR and/or PIR)".		Chair will review with PA and Publication staff.
PA e	Comment	14) In Section A2, revise from "RECYCLED MATERIALS" to "RECYCLED PE MATERIALS".		Chair will review with PA and Publication staff.
TN f o l l o w i n g	Affirmative Comment	As an editorial comment suggest adding a section 5.1.7 that states- " If recycled resins are not allowed, or recycled resins are allowed, or recycled resins are allowed at a maximum substitution rate of <i>x percent</i> ." Also, future consideration should be made to establish a maximum limit of recycled resins with the limited research data available and more importantly actual field performance for highway applications.	Restricting the percent recycled would be more of a technical change than an editorial change. TN participated in Task force meeting.	
SC n g	Affirmative Comment On TS Ballot	Since part of the service life determination comes from the dissertation and not directly from the NCHRP report, should a new AASHTO Rx standard be proposed for these equations to go along with the revisions to M294?	Yes, the technical section will take up the service life as an AASHTO standard practice this year.	
TRI/ENV e x p l a n a t i o n	Comment Friend	A very important item that has not been stressed enough is that the ASTM D638 tensile test now has to be done with extensometer in order to accurately measure the amount of elongation. As described in NCHRP report 696, pipe must have elongation higher than 150% in order to be clean enough for transportation applications. So this is a double check on the UCLS test.		This is information was shared with the states participating in the meetings on M 294 negatives. December 4th and 18th.
KS t i o n	Affirmative Comment	6.1.1 states that 6.1.1.2 needs to be met twice. Should be 6.1.1.1 and 6.1.1.2. 9.4. Is there a reason why is the UCLS not permitted to be run on specimens taken from the pipe unless they have been compression molded into a plaque?	Section 9.4 - The dimensions for the test specimen require the UCLS test to be run on a molded specimen.	The Chair will make the change to Section 6.1.1 so that both 6.1.1.1 and 6.1.1.2 are stated individually.
SC w a s p r o	Affirmative Comment On SOM Ballot	Section 2.3 - Why is a dissertation referenced and not either the related NCHRP report or a standard practice? Is the equation listed in A2.2 contained in the AASHTO practice for Service Life Determination (listed in Section 2.1) or NCHRP Report 870? It will be much easier for users of this practice to obtain an AASHTO publication than a dissertation. A2.1 - NCHRP Report 870 is not listed in the Referenced Documents	The technical section will take up the service life as an AASHTO standard practice this year.	Will review Section 2.3 and A2.1 with Publication staff.
VA v i d e d	Comment	In Section 3.3 Definition, include organic as well as inorganic in the definition of contaminant. A contaminant can also be organic, as NCHRP 696 Page 18 "The Effects of Contamination" pointed out polypropylene bottle caps and other organics in with the HDPE bottles are a contaminant as are rubber particles in the recycle streams.		Will review with Publication staff.
MO d	Comment	Affirmative Vote. Button for inputting decision (affirmative or negative) not provided with the ballot.		Informed AASHTO Staff.

**t
o Louisiana DOT requested the information below be shared with the technical subcommittee in order to resolve their negative vote on OIT:**

The primary question identified in the negative was with regards to the proposed 20-minute OIT (Oxidation Induction Time) value in the balloted standard. LA noted that AASHTO M 330 requires a 25-minute OIT for polypropylene pipes and LA was seeking some clarification on the proposed 20-minute OIT value in M 294. As discussed on the call, the current AASHTO M 294 standard for pipes manufactured with virgin materials does not have an OIT requirement. Instead, Section 6.1.1 states that the PE resin compounds shall “meet the requirements of ASTM D 3350 and cell classification 435400C”. To ensure adequate protection against oxidation, section 6.3 of ASTM D 3350 states that “the PE material shall contain sufficient antioxidant so that the minimum induction temperature shall be 220 deg. C when tested in accordance with 10.1.9”, and Section 10.1.9 outlines the procedure for conducting the test. Essentially, the test requires the resin compound to be heated at a rate of 10 deg. C per minute in a Differential Scanning Calorimeter (DSC), and the onset of oxidation must be at least 220 deg. C. This test is sometimes referred to as an oxidation induction temperature test, or OITemp. On the proposed ballot, the OITemp requirement was kept in the standard for both pipes manufactured with recycled materials and virgin materials since there is good historical precedence that this is a sufficient level of protection for corrugated HDPE pipes. So the ASTM D3350 cell classification and thermal stability requirements are identical for both pipes manufactured with virgin and recycled materials. This should ensure the performance of pipes manufactured with recycled materials is the same as those manufactured with virgin materials relative to oxidation.

To add another level of conservatism for pipes manufactured with recycled materials, an additional test requirement was included. This additional requirement is known as the Oxidation Induction Time, or OIT. The test is conducted in accordance with ASTM D 3895 and is similar to the thermal stability test described above, but instead of heating the specimen at a rate of 10 deg. C per minute, the specimens are held at a constant temperature of 200 deg. C in an inert gas. Oxygen is then introduced into the chamber, and the time to oxidation of the resin compound is recorded. An OIT (“oxidation induction time”) requirement was included in the M 294 specification for recycled materials that must be at least 20 minutes. This duration is consistent with the performance of materials used in the pressure pipe industry (though most pressure pipe standards in North America typically only specify the thermal stability requirement per ASTM D 3350, similar to what is currently in M 294 for virgin materials). Since the OIT test is a redundant test beyond the 220 deg. C thermal stability requirement specified in Section 6.1.1, and pipes manufactured with recycled materials must meet both the 220 deg. thermal stability requirement as well as the 20-minute OIT requirement, we feel this is a conservative approach. The main reason for adding the OIT test for pipes manufactured with recycled materials is to force manufacturers to include an antioxidant package to their formulations to add an extra level of protection in the event that some of the antioxidants in the recycled materials were used up in their prior service history.

The reason that the OIT requirement for pipes manufactured with polyethylene materials is different than those manufactured with polypropylene materials is because polypropylene materials are generally more prone to oxidative failure than polyethylene materials due to the differences in their crystallinity (PE is a more crystalline structure than PP).

Though not directly related to LA negative, LA also brought up a question as to what will be done to ensure the consistent quality of pipes manufactured with recycled materials. It was

discussed that since M 294 is currently part of the National Transportation Product Evaluation Program (NTPEP), the incorporation of recycled materials into the standard will mean the recycled material resins will also fall under the scrutiny of NTPEP. The PPI is currently working on draft language to propose to NTPEP regarding the frequency of testing required for pipes manufactured with recycled materials, and once the proposed revisions to M 294 are adopted by AASHTO, NTPEP will update their work plan accordingly.

Resolution:

The chair will work with the publication staff and the states with editorial comments to prepare M 294 for publication in June 2018.

Item 5: COMP ballot to adopt MP 20 Provisional Standard Specification for Steel-Reinforced Polyethylene (PE) Ribbed Pipe, 300- to 1500-mm (12- to 60-in.) Diameter as a full standard.

The COMP ballot to adopt MP 20 passed SOM ballot with 45 affirmative votes, 0 negatives and 6 no votes.

PA had eleven editorial comments. The chair will review these with PA and the Publication staff in the next few weeks. MP 20 will be published as full standard in June 2018.

Item No.	Description				
5	COMP ballot to adopt MP 20 Provisional Standard Specification for Steel-Reinforced Polyethylene (PE) Ribbed Pipe, 300- to 1500-mm (12- to 60-in.) Diameter as a full standard.				
	State	Vote	Comment	Review	Resolution
B.	PA SOM/TS e c o n f i r m a t i o n b a l l o t s	Affirmative With Editorial Comments	1) In Section 1.1.2, revise from "dimensions, pipe stiffness" to "dimensions, perforations, pipe stiffness" (i.e., add "perforations"). 2) In Section 3.2.3, the text indicates "welded lap seam" but Figure 1 shows "Weld Seam". Although Figure 1 is not referred to in Section 3.2.3, the terms should be consistent throughout the standard. 3) In Section 3.2.8, suggest revising from "seam" to "weld seam" for consistency with Figure 1 labeling which is located immediately below this Section. 4) In Figure 1, could the figure be enlarged or revised to show a thicker waterway wall thickness to better show the beginning and ending of the wrap width locations? 5) In Section 3.2.10, suggest revising from "(see Figure 1)" to "(see Figure 1 and Figure 2)" since the "reinforcing strips encapsulated with the ribs" is better shown in Figure 2. 6) In Figure 2, revise dimensional labels from "0.059 in. (1.5 mm) min." to "1.5 mm (0.059 in.) min." and from "0.0315 in. (0.8 mm) min." to "0.8 mm (0.0315 in.) min." to be consistent with Section 1.4 where it indicates SI units are the standard with U.S. Customary units in parenthesis. 7) In Figure 2, suggest adding a label to show the "Waterway Wall" as indicated in Section 3.2.14 as Section 3.2.14 refers to Figure 2, but there is no label in Figure 2 for the waterway wall. 8) In Sections 11.1.1, 11.1.2, 11.1.3 revise from a period at end of each Section to a semi-colon. 9) In Section 11.1.4, revise from a period at the end of the Section to "; and". 10) In Section 11.1.5, revise from "The date and location of manufacture" to "The date of manufacture" as the location (plant designation code) is specified in Section 11.1.4. 11) In Section 13.1, suggest adding the additional key words "polyethylene; pipe; steel reinforced".	Editorial	Chair will make changes in consultation with Publication Staff and PA.

There were no Technical Section 4b Reconfirmation Ballots

C. Task Force Reports

Task Force 2017-06 met twice in December to resolve the negatives from the SOM Rolling Ballot 2. This task force can now be retired.

V. New Business

None

A. Research Proposals

1. 20-7 RPS?
2. Full NCHRP RPS?

No Proposals to date. There are some research needs statements that will be coming out of the TRB meeting for flexible pipe.

B. AMRL/CCRL - Observations from Assessments

None

C. NCHRP Issues

None

D. Correspondence, calls, meetings, webinar,

Correspondence, calls, meetings and webinars revolved around M 294 the past several months.

E. Presentation by Industry/Academia

There were no presentations given at this meeting.
If there is an interest in presenting at annual meeting please contact Bill Bailey.

F. Proposed New Standards

Service life for Polyethylene pipe – SC suggestion. This would be a standard practice from the research report 870.
Steel Reinforced Polyethylene pipe – Tim Toliver. Tim may be proposing a new standard. Bill will talk to Tim about which direction he wants to take, whether this will be its own standard or not.

G. Proposed New Task Forces

None

H. Standards Requiring Work this coming year

M 190 Asphalt/Bituminous coated measurement method

M 243 Asphalt/Bituminous coated measurement method

Bill will be working with Mike McGough to include the measurement in these two standards.

M 330 Polypropylene – consider buckling requirements (LA negative)

M 167 Corrugated Metal Pipe – update to correspond to changes in ASTM A796
Thicknesses, bolt patterns and seam strengths for the 16x6 profile. Changes
may have an effect on the values listed in M 167 Tables 6 & 7

Bill asked Mike McGough and Dan Currence if they knew of any other standards that needed to be reviewed.

Dan does not have anything. A standard practice for Design may go through Bridge, but Dan suggests it stays with Materials. Bill will contact T13 to make sure this is acceptable. Mike did not have any other standards.

I. SOM Ballot Items (including any ASTM changes/equivalencies)

VI. Open Discussion

The new specification with recycled content will be issued in June 2018.

Chase with FL DOT wanted to make sure all Florida's comments are incorporated in the revised version of M 294. Bill will review and discuss with Florida.

Bill thanked all of the states who worked together on the task force to make sure M 294 included all of the necessary changes to meet the states expectations.

VII. Adjourn

Note: The meeting minutes are in blue text and highlighted.

Information not highlighted was contained in the agenda sent out for this webinar.

Option 8 + Section 12

Standard Specification for

Corrugated Polyethylene Pipe,
300- to 1500-mm (12- to 60-in.)
Diameter

AASHTO Designation: M 294-17

Release: Group 2 (June 2016)



American Association of State Highway and Transportation Officials
444 North Capitol Street N.W., Suite 249
Washington, D.C. 20001

Standard Specification for

Corrugated Polyethylene Pipe, 300- to 1500-mm (12- to 60-in.) Diameter

AASHTO Designation: M 294-16
Release: Group 2 (June 2016)



4. CLASSIFICATION

- 4.1. *The corrugated PE pipe covered by this specification is classified as follows:*
- 4.1.1. *Type C*—This pipe shall have a full circular cross section, with a corrugated surface both inside and outside. Corrugations shall be annular.
- 4.1.1.1. *Type CP*—This pipe shall be Type C with perforations.
- 4.1.2. *Type S*—This pipe shall have a full circular cross section, with an outer corrugated pipe wall and a smooth inner liner. Corrugations shall be annular.
- 4.1.2.1. *Type SP*—This pipe shall be Type S with perforations.
- 4.1.3. *Type D*—This pipe shall consist of an essentially smooth liner braced circumferentially or spirally with projections or ribs joined to an essentially smooth outer wall.
- 4.1.3.1. *Type DP*—This pipe shall be Type D with perforations.
- 4.2. Two classes of perforations are as described in Sections 7.3.1 and 7.3.2.
- 4.3. This standard allows pipes to be manufactured with virgin and/or recycled materials. If only virgin materials are allowed, it shall be specified in the ordering information. All pipes shall be marked accordingly as described in Sections 11.1.4 and 11.1.5.
- 4.2.
- 4.3. If pipes contain recycled materials, they shall be marked accordingly as described in Section 11.1.5.

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5. ORDERING INFORMATION

- 5.1. *Orders using this specification shall include the following information, as necessary, to adequately describe the desired product:*
- 5.1.1. AASHTO designation and year of issue;
- 5.1.2. Type of pipe (Section 4);

5.1.3. Virgin and/or recycled resins (Section 4.3);

Note 2: This is a performance-based specification and does not include minimum or maximum limits on the recycled or virgin content, provided the performance requirements of the final blend are met. Specific limits on the recycled or virgin content, if desired, along with any specific marking requirements for such limits, shall be specified on the order.

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5.1.2. _____;

5.1.3.5.1.4. _____ Diameter and length required, either total length or length of each piece and number of pieces;

5.1.4.5.1.5. _____ Number of couplings;

5.1.5.5.1.6. _____ Class of perforations (Class 2 is furnished if not specified) (Section 7.3); and

5.1.6.5.1.7. _____ Certification, if desired (Section 12:1).

11. MARKING

11.1. *All pipe shall be clearly marked at intervals of no more than 3 m (10 ft) as follows:*

11.1.1. Manufacturer's name or trademark;

11.1.2. Nominal size;

11.1.3. The plant designation code;~~This specification designation, M 294;~~

11.1.4. This specification designation, M 294~~The plant designation code;~~

11.1.5. If the pipe was manufactured with only virgin materials, it shall be marked with the code "V"; If the pipe was manufactured with recycled content, it shall be ~~designated accordingly with~~ marked with the code "R" and the phrase "Contains Recycled Resins"; and

11.1.6. The date of manufacture or an appropriate code. If a date code is used, a durable manufacturer sticker that identifies the actual date of manufacture shall be adhered to the inside of each length of pipe.

Note 7—A durable sticker is one that is substantial enough to remain in place and be legible through installation of the pipe.

11.2. Fittings shall be marked with the designation number of this specification, M 294, and with the manufacturer's identification symbol.

12. QUALITY ASSURANCE

12.1. A manufacturer's certificate that the product was manufactured, tested, and supplied in accordance with this specification, together with a report of the test results, and the date each test was completed, shall be furnished on request. Each certification so furnished shall be signed by a person authorized by the manufacturer.

Manufacturer Records—Manufacturers shall keep records of the following: (1) resin manufacturer's data sheets and certification that the base resin meets minimum cell class requirements of the product specification; (2) manufacturer's data sheets and quantities for all additives blended with the resin by the pipe manufacturer; (3) test results to demonstrate that, if

virgin and/or recycled resins of two different cell classifications are blended, the resulting mixture meets the requirements of the specified cell classification; (4) correlation of virgin and/or recycled resin shipment source with pipe markings;. (5) data sheets, test results, and quantities for all recycled resins used to manufacture pipe.

Registration Report

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Jan 3, 2018 2:49 PM EST

General Information

Webinar Name

COMP TS 4b - Mid Year Web Meeting - Jan 3, 2018

Scheduled Start Date

Jan 3, 2018

Scheduled Start Time

2:00 PM EST

Scheduled Duration (minutes)

120

Webinar ID

243-422-515

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Kenny	Seward	OK
Brian	Chestnut	Friend
Danny	Lane	TN
Michael	Pluimer	Friend
Barry	Paye	WI
Jason	Ahrenholz	P
Wayne	Hodge	CI
Jason	Hewatt	CI
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Josh	Beakley	CI
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