

SUBCOMMITTEE ON MATERIALS

2017 Annual Meeting – Phoenix, AZ

Tuesday August 8, 2017

1:00 – 3:00 PM EST

TECHNICAL SECTION 4b
Flexible and Metallic Pipe

I. Call to Order and Opening Remarks

II. Roll Call

Voting Members

Name	State	Present
Bailey, William R.	Virginia	
Peoples, Christopher A.	North Carolina	
San Angelo, Michael	Alaska	
Pinkerton, Jennifer M.	Delaware	
Knight, Chase	Florida	
Douds, Richard	Georgia	
Trepanier, Jim	Illinois	
Davis, Jason	Louisiana	
Bradbury, Richard L	Maine	
Kline, Therese R.	Michigan	
Trautman, Brett	Missouri	
Streeter, Donald A.	New York	
Horner, Ron	North Dakota	
Lane, Becca	Ontario	
Ramirez, Timothy	Pennsylvania	
Short, Temple	South Carolina	
Egan, Brian	Tennessee	
Williams, Kurt	Washington	

Friends and Non-Voting Members

Name	Affiliation	Present
Rothblatt, Evan	AASHTO - Liaison	
Malusky, Katheryn	AASHTO - Liaison	
Fragapane, Ryan	AASHTO	
Lenker, Steven E.	AMRL	
Uherek, Greg	AMRL	
Knake, Maria	AMRL	
McGough, Michael	NCSPA	
Chestnut, Brian W	Lane	
Currence, Daniel	PPI	

Christensen, Heather	Prinsco, Inc.	
Beakley, Josiah W	ACPA	
Pluimer, Michael	Crossroads Eng.	
Delery, Oliver	Forterra	
Jim Goddard	JG3 LLC	
Sarcinella, Robert	AASHTO	
Stolarski, Phil	California	
Kemp, Peter	Wisconsin	

III. Approval of Technical Section Minutes

Approval of January 18, 2017 Mid-Year Webinar minutes

IV. Old Business

A. **SOM Ballot Items** – Items were addressed at Mid-Year Webinar

B. **TS Ballots**

SOM TS4B 17-01 Summer Ballot results are due July 25, 2017

Item 1 Revise M 252-09 (2017) Standard Specification for Corrugated Polyethylene Drainage Pipe. These proposed revisions were based on last year’s reconfirmation ballot comments.

Task Force 2017-2 reviewed M252 and revised the definitions in Section 3 for crease, buckling and delamination to correlate with visual evaluations associated with performing the pipe flattening test in Section 9.2. These are the same changes incorporated into M294 last year.

The standard specification passed technical section ballot with 16 affirmative votes, 0 negatives and 2 no votes.

Pennsylvania Comments:

1. In Section 7.1.1, add to the end of the existing sentence the following "in the pipe or fittings as furnished. There shall be no evidence of cracking or delamination when tested in accordance with Section 9.2".
2. In Section 7.6, suggest revising this section completely (to move existing text around differently) since the definition of buckling was added in Section 3.2 and the definition of buckling is a decrease or downward deflection in the load-deflection curve. Suggest revising this Section completely as follows: "There shall be no evidence of buckling (a decrease or downward deviation in the load-deflection curve), cracking, splitting, or delamination when the pipe is tested in accordance with Section 9.2."
3. In Section 7.8, revise from "pipe wall when" to "pipe wall or liner when".
4. In Section 9.2, with addition of Section 3.2 (buckling definition), suggest revising the 3rd sentence completely to read "The specimen shall fail if buckling (a decrease or downward deviation in the load-deflection curve), cracking, splitting, or delamination is observed with the unaided eye at 20 percent or less deflection."

5. In Section 9.2, end of 3rd sentence which indicates "at 20 percent or less deflection", does the language "or less" require visual observation for cracking, splitting, or delamination during loading? The 4th sentence was revised to visually check for evidence of cracking, splitting or delamination immediately after the specimen has started to unload. Can the "or less" part be visually evaluated during the specimen unloading?
6. In Section 13.1, should the keywords "corrugated; drainage; polyethylene; pipe" be added?
7. Section 7.6 is missing the associated verbiage from M294. "Pipe specimens shall show no visual evidence of cracking, splitting or delamination when tested in accordance with section 9.2. (Dave Kuniega)

Illinois Comments:

1. Section 1.1.2: Workmanship and brittleness should be included in the list. In addition, to be consistent with M 294 and other specifications, revise "forms of marking" to "form of markings."
2. Section 2.2: ASTM D4218 does not appear to be referenced in AASHTO M 252-09 (2017).
3. Section 7.4.2: Should the section also state perforations shall be uniformly spaced along the length and the circumference of the pipe?

Missouri Comments:

1. On Page 4, it appears the section number '7.2.4' was deleted inadvertently

Resolution:

Item 2 Revise M330 Standard Specification for Polypropylene Pipe, 300- to 1500-mm (12- to 60-in.) Diameter. These proposed revisions were based on last year's reconfirmation ballot comments. Task Force 2017-2 reviewed M330 and revised the definitions in Section 3 for crease and delamination. The Task force eliminated the definition for buckling because the pipe flattening test is run to a 40 percent deflection. The Task Force also attempted to clarify the terms; pipe liner and pipe wall in several places in the specification.

The specification passed technical section ballot with 15 affirmative votes, 1 negative and 2 no votes.

Florida Negative:

No objection to the principle of the changes, however there are some instances where the language needs further clarification and requires terminology in agreement with diagram labels.

1. Page 5: The definition of delamination for Type D pipe should include terminology consistent with Figure 1 labels.
2. Page 6: Diagram labels should be updated and the same terminology used throughout the Specification. Suggestions: Corrugated Wall, Inner Wall (Liner), Outer Wall
3. Page 17: Measurement of thickness should include outer wall thickness for Type D pipe.
4. Page 18: Terminology used for delamination should be consistent with Figure 1 labels.

5. Page 19: Labels on Figure 4 should be consistent with Figure 1.

Pennsylvania comments:

1. In Section 3.1.1, add "or liner" to the end of existing language".
2. In Section 4.1.3, 1st sentence, revise from "smooth waterway braced" to "smooth waterway liner braced" or "smooth liner waterway braced".
3. In Section 4.1.3, 2nd sentence, revise from "Both walls shall" to "Both liner and outer wall shall".
4. In Figure 1, for Type C, revise label from "Corrugations or Ribs" to "Wall" or "Wall (Corrugations and Ribs)". For Type S, revise label from "Corrugations or Ribs" to "Outer Wall" or "Outer Wall (Corrugations or Ribs)" and revise label from "Inner Wall (Liner)" to "Inner Liner". For Type D, revise label from "Exterior Wall" to "Outer Wall" and revise label from "Inner Wall (Liner)" to "Inner Liner".
5. In Section 6.3, at end, revise from "Section 3.5" to "Section 3.1.5".
6. In Section 7.1.1, add new sentence to end as follows "There shall be no evidence of cracks, splits or delaminations when tested in accordance with Section 9.2." Perhaps this is already adequately covered in Section 7.5?.
7. In Section 7.1.2, 1st sentence, revise from "corrugated shell" to "corrugated wall".
8. In Section 7.1.2, 2nd sentence, revise from "both walls shall" to "both liner and outer wall shall".
9. In Section 7.2.2, revise from "outer walls" to "outer wall".
10. In Section 7.5, revise from "of wall cracking, splitting, or delamination" to "of liner or outer wall cracks, splits, or delaminations" to match up with Section 3.1.1 and definition of "crack" not "cracking".
11. In Section 9.2, Note 2, end of 1st sentence, revise from "pipe wall" to "pipe wall profile" or "pipe wall and liner profile".
12. In Section 9.7, 1st paragraph, end of 1st sentence, revise from "Section 3.4" to "Section 3.1.3".
13. In Section 9.7, 2nd paragraph, 1st line, revise from "Section 3.4" to "Section 3.1.3".
14. In Section 9.7, 2nd paragraph, last 2 lines, revise from "the inner or outer wall" to "the inner liner or outer wall".
15. In Section 13.1, should the keyword "pipe" be added?
16. Minor edits to align this spec with associated properties in M294. Note that buckling was never in M330. Question why it is stricken from this version? (David Kuniega)

Michigan Comment:

1. Page M-330-9 is blank: please mark as purposefully blank or remove.

Illinois Comments:

1. Section 1.1.2: Perforations should be included in the list.
2. Section 2.1: R 16 and Standard Specifications for Highway Bridges do not appear to be referenced in AASHTO M 330-13 (2017).
3. Section 3.1.1: Should "or liner" be added at the end of the sentence?
4. Figure 1 : For the Type D pipe, should "Exterior Wall" be revised to "Outer Wall" to be consistent with 3.1.3 and 4.1.3?
5. Section 7.2.2: Revise "outer walls" to "outer wall."
6. Section 9.6.4: Should outer wall also be referenced?

7. Section 9.7: In the first and second paragraph, revise "Section 3.4" to "Section 3.1.3."
8. Section 11.1: U.S. Customary Units should be provided.

Louisiana Comment:

1. I understand taking the pipe to 40% deflection is harsh and evidence of "buckling" would be pronounced in the latter stage of the test. However, is it possible to have buckling at less than 20% deflection and still pass the test for cracking, splitting, or delamination? If the pipe lost strength at 15% but did not split or crack, are we opening ourselves to a possible weak pipe technically meeting the specification?

Comments from Friends of the Committee:

American Concrete Pipe Association (Josiah W Beakley)

1. It appears the definition for buckling was removed without adding a replacement. Should it not have the same definition as the one used in M252?
2. In the definition for delamination, I believe the second sentence should say, "For Type D pipe, delamination is a separation of the inner and/or outer wall and the corrugation as evidenced by a visible gap extending completely between the wall and corrugation at any point around the circumference of the pipe." I believe this wording matches better with Figure 1.
3. Section 7.2.2. I am not sure how anything is termed a "wall" in this standard. If the liner is only there for water flow, and is not a major part of the structure, as continuously stated by the manufacturers of this product, then how does putting that same thickness on the outside of the pipe suddenly make it a "wall".
4. Section 9.2. Why do you wait until you unload the specimen to look for cracking, splitting, and delamination? Can you hold the specimen at 20% deflection for 5 minutes and examine it for damage?
5. Section 9.7. I don't believe you are trying to insert a feeler gauge between the "inner supports and the liner" and the "outer wall". You are not inserting it between the outer wall, but rather the outer wall and the corrugation. Thus, it might read better as, "between the bottom of the corrugation ('supports' if you would prefer to call it that) and the inner liner, and the top of the corrugation ('supports' if you would prefer to call it that) and outer liner".

Resolution:

Item 3 Revise M 326-08 (2017) Standard Specification for Polyethylene (PE) Liner Pipe, 300- to 1600-mm Diameter Based on Controlled Outside Diameter. These proposed revisions were based on last year's reconfirmation ballot comments, Task Force 2017-3 reviewed M326 and revised the definitions in Section 3 for crease and buckling to correlate with visual evaluations in section 7.5 associated with performing the pipe flattening test in Section 9.2. These are the same changes incorporated into M294 last year.

The standard specification passed technical section ballot with 16 affirmative votes, 0 negatives and 2 no votes.

Michigan Comment:

1. Page spacing M 326-10 and M 326-11 between X 1.2.3 and X 1.3

Pennsylvania comments:

1. In Section 3.3, suggest deleting the text ", generally associated with wall buckling" to be consistent with similar language in M 294, Section 3.4.
2. In Section 7.2, add new sentence to end as follows "There shall be no evidence of cracks, splits or delaminations when tested in accordance with Section 9.2." Perhaps this is already adequately covered in Section 7.5?
3. In Section 7.5, since definition of buckling in Section 3.4 was revised, suggest moving text around to read "There shall be no evidence of buckling (a decrease or downward deviation in the load-deflection curve), cracking, splitting, or delamination when the pipe is tested in accordance with Section 9.2."
4. In Section 9.2, 3rd sentence, since definition of buckling in Section 3.4 was revised, suggest moving text around in 3rd sentence to read "The specimen shall fail if buckling (a decrease or downward deviation in the load-deflection curve), cracking, splitting, or delamination is observed with the unaided eye at 20 percent or less deflection."
5. In Section 9.2, end of 3rd sentence, it indicates "at 20 percent or less deflection", does the language "or less" require visual observation for cracking, splitting, or delamination during loading? The 4th sentence was revised to visually check for evidence of cracking, splitting or delamination immediately after the specimen has started to unload. Can the "or less" part be visually evaluated during the specimen unloading?
6. In Section 13.1, should the keywords "liner pipe" be added?

Illinois Comment:

1. Section 7.5: Should "delamination" be deleted from Section 7.5? If not, a definition of delamination should be included in Section 3. Terminology.
2. Section 7.6.4: In the second sentence revise "small" to "smaller."

Missouri Comment:

1. On Page 5, it appears the section number '7.4' was deleted inadvertently

Comments from Friends of the Committee:

American Concrete Pipe Association (Josiah W Beakley)

1. Section 9.2. Why do you wait until you unload the specimen to look for cracking, splitting, and delamination? Can you hold the specimen at 20% deflection for 5 minutes and examine it for damage?

Resolution:

Item 4 Revise M294 Standard Specification for Corrugated Polyethylene Pipe, 300- to 1500-mm (12- to 60-in.) Diameter. "NCHRP 4-39 Study on the Field Performance of Corrugated HDPE Pipe Manufactured with Recycled Content" is complete. The Author, Michael Pluimer drafted a recommended practice for incorporation into M294 for HDPE pipe manufactured with recycled materials. The practice requires the manufacturer to perform an un-notched constant ligament strength test. This test has been developed to insure HDPE manufactured pipe with recycled HDPE will have an estimated performance life of 100 years. These proposed changes were presented during last year's Technical section Meeting and an additional presentation will be given during this year's TS meeting.

The standard specification passed technical section ballot with 13 affirmative votes, 3 negatives and 2 no votes.

California Negative:

While Caltrans supports use of recycled material wherever possible, we do not support at this time the proposed modifications to the Standard Specification for Corrugated Polyethylene Pipe, 200 to 1500 mm (12-60 in) Diameter, AASHTO Designation M294, for the following reasons:

1. The proposed modifications do not provide for a distinction of pipe made with recycled materials. It's desirable to differentiate recycled verses non-recycle pipe so that Departments can appropriately account for the very different Environmental Product Declarations (EPDs) associated with pipe made from recycled materials. Beyond accurate EPDs, an ability to differentiate recycled verses non-recycle will also provide a means by which limitations of use can be established and thus aid with recycled material implementation within a large DOT.
2. These modifications are largely based upon NCHRP Study 4-39, Field Performance of Corrugated HDPE Pipes Manufactured with Recycled Content. This report is an unedited final report yet to be published. As such, the Subcommittee is encouraged to pursue recycled material changes after publication of this report and when the transportation engineering community has a reasonable time to consider its findings.

Florida Negative:

The subject research seems to have good value; however more time is needed to thoroughly review the data, details of the report, and adequacy of the proposed test method in identifying the presence of contaminants. Since the UCLS method is a recently implemented ASTM Standard, there is still no sufficient data on precision. I would like to read the report before proceeding, please.

Michigan Negative:

I would like to read the report before proceeding, please.

New York Comments:

Comments: concerned with long term creep with use of recycled materials. Would prefer more testing of this durability aspect before accepting use with 100 year assumptions.

Pennsylvania Comments:

1. In Section 2.2, for ASTM D4883, revise from "Techniques" to "Technique".
2. In Section 3.5, revise from "micro-cracks and around" to "micro-cracks around".
3. In Section 6.1.1.1, consider revising from "specimens taken" to "specimens die cut".

4. In Section 6.1.1.1, consider revising from "ground-up pieces of pipe that have" to "ground-up pieces of pipe (from liner and/or outer wall) that have" to provide clarification that this material can come from anywhere and not just the liner as is required for the specimens die cut directly from the pipe liner.
5. In Section 6.1.1.1, next to last line, revise from "in accordance to ASTM F2136" to "in accordance with ASTM F2136".
6. In Section 6.1.1.1.1, revise from "finished pipe inner liner" to "finished pipe liner".
7. In Section 6.1.1.2, 1st & 2nd lines, revise from "in accordance to ASTM F3181" to "in accordance with ASTM F3181".
8. In Section 6.1.1.2, 2nd line, revise from "ASTM F3181 and Section 9.4" to "ASTM F3181 and the procedures described in Section 9.4" for consistency with similar language at end of Section 6.1.1.1.
9. In Section 6.1.1.2, 6th line, consider revising from "conservatively assumed" to "conservatively specified" or "conservatively required".
10. In Section 6.1.1.3, 2nd line, revise from "in accordance to ASTM D3895" to "in accordance with ASTM D3895".
11. In Section 6.1.1.3, 2nd & 3rd line, revise from "in accordance to ASTM D638" to "in accordance with ASTM D638".
12. If the UCLS and OIT tests are only required for pipes manufactured from recycled materials, how will the purchasing agency know for sure the pipe contains recycled materials to ensure/verify the manufacturer is performing the required UCLS and OIT testing on some frequency? Will the use of recycled materials in the manufacture of pipe be indicated within the pipe markings and/or in the pipe certification documentation?
13. In Figure 2, revise definition from "C = Distance from Centroid to Inner Wall" to "C = Distance from Centroid to Inner Liner".
14. In Section 9.4.1.2, consider revising from "specimens are taken" to "specimens are die cut".
15. In Section 9.4.1.2, add a new sentence to the end that reads "Specimens die cut from the finished pipe liner shall be tested as noted in Section 6.1.1." to be consistent with similar/same language contained in Section 9.4.1.3 at end.
16. In Section 9.4.1.3, consider revising from "If specimens are taken" to "If specimens are die cut".
17. In Section 9.4.1.3, revise from "ground-up pieces of pipe that have" to "ground-up pieces of pipe (from liner and/or outer wall) that have".
18. In Section 9.4.2, 3rd line, consider revising from "on specimens taken" to "on specimens die cut" or "on specimens die cut or machined" as ASTM F3181, Section 5.1 indicates "Alternatively, specimens may be prepared by machining"; however, ASTM F3181, Section 6.2 indicates "The specimen is prepared by cutting out a Test Method D638 Type I specimen" which does not seem to include the alternative machining method for specimen preparation.
19. In Section 9.4.2, 4th line, revise from "in accordance to" to "in accordance with".
20. Following Section 12, consider adding new Section 13 for KEYWORDS and adding the keywords "corrugated; pipe; polyethylene; recycled material" and perhaps others consistent with the keywords added to M 252 for example.
21. Use of the NCLS and UCLS will probably NOT be done by DOT's as a routine test (for reasons including sample prep as well as the actual testing). Given the latitude of the manufacturer to provide EITHER virgin or recycled resin, the owner will have to TRUST the certification of the manufacturer OTHERWISE the recycled testing will

have to be done as A DEFAULT for confirmation purposes. This will require the owner to pay for 3rd party testing of these products. (David Kuniega)

22. Have Author clarify the background and distinctions between Comment [MP5] on page M 294-5 and Section A1.2.1 as they relate to different NCLS testing times. (David Kuniega)

Illinois Comments:

1. Section 1.1.2: Perforations should be included in the list.
2. Section 2.1: R 16 does not appear to be referenced in AASHTO M 294-16.
3. Section 2.2: D4218 and D5397 do not appear to be referenced in AASHTO M 294-16.
4. Section 3.5: In the second sentence it reads "and micro-cracks and around a contaminant..." Should the second "and" be deleted?
5. Section 5.1.6: The wording for Section 5.1.6 (Certification, if desired (Section 12.1)) has been included in the heading for Section 6.
6. Section 7.8.4: In the second sentence revise "small" to "smaller."
7. Section 9.7: Should references to Figures 3 and 4 be revised to Figures 5 and 6 in both paragraphs in Section 9.7?

Missouri Comments:

1. On Page 3, Section 3.11, recommend adding the word 'containers' at the end of the sentence for clarification. The sentence word read as follows:
Proposed: "... laundry detergent bottles, milk bottles and other consumer good containers."
2. On Page 4, it appears the section number '5.1.6' was deleted inadvertently.
3. On Page 5, Section 6.1.1.1, need to define 'NCLS' before utilizing the abbreviation in the rest of the specification.
4. On Page 5, Section 6.1.1.2, need to define 'UCLS' before utilizing the abbreviation in the rest of the specification.
5. On Page 5, Section 6.1.1.3, recommend the last part of the last sentence be placed into a note. It is providing information on why the ultrasound technique can be used to determine the density. The new note would read as follows:
Proposed "Note # - Ultrasound density is not affected by colorant and other inorganic compounds that may be present in these materials."

Comments from Friends of the Committee:

Forterra Pipe and Precast (Oliver Stanislaus Delery Jr)

ASTM Committee F-17 recently balloted similar changes to their specification and due to the negative votes submitted, the ballot item was pulled as apparently a number of those negatives were found to be persuasive. While I cannot copy all of the ASTM submittals, this committee should consider the major objections including:

1. Very limited research of only 6 pipe samples;
2. Service life predictions use a very limited range of service temperatures;
3. A separate specification should be used for recycled resins as it is too confusing to not only the designer but his/her coordination with the field inspectors who will have to check each pipe to determine whether recycled content is in use.
4. Most of the research is based on "post consumer" resins but the specification allows "post industrial" also.
5. The installation used in the research paper is a very high quality and not the typical installation used in most pipe projects.

Resolution:

C. Task Force Reports

Task Force 2017-01 - Assignment was to review the corrugated metal pipe specification for M190 and consider adding a subsection for determining the coating thickness to Section 7. The task force was also asked to review M243 and to determine if a method should be specified to measure the coating thickness of 1.27 mm. Should the specified measurement be modified to “minimum of 1.3 mm” given this is a field applied asphalt mastic coating?
Task Force Members are Mike McGough (NCSPA), Tim Ramirez (PA) and VA.

Report from Mike McGough

Task Force 2017-02 - Assignment was to review the HDPE pipe specification M252 and the polypropylene pipe specification M330 and incorporate the same changes made in M294 related to definitions for crease, buckling and delamination used in the visual evaluations associated with performing the pipe flattening test in these standards.
Task Force Members are: Dan Currence (PPI), Tim Ramirez (PA), Therese Kline (MI), Don Streeter (NY), Brian Chestnut (Lane), Heather Christensen (Prinsco), and Jim Goddard.

Report – Revisions were made to both M252 and M330. The revisions are Item 1 and 2 on SOM TS4B 17-01 Summer Ballot

Task Force 2017-03 - Assignment was to review the HDPE pipe liner specification M326 and incorporate the same changes made in M294 related to definitions for crease, buckling and delamination used in the visual evaluations associated with performing the pipe flattening test in these standards.
Task Force Members are: Tim Toliver (Advanced Pipe Services), Tim Ramirez (PA), Don Streeter (NY), Dan Currence (PPI), Jim Goddard and VA.

Report – Revisions were made to M326. The revisions are Item 3 on SOM TS4B 17-01 Summer Ballot

Task Force 2017-04 - Assignment was to review the provisional steel reinforced HDPE pipe specification MP20 and incorporate the same changes made in M294 related to definitions for crease, buckling and delamination used in the visual evaluations associated with performing the pipe flattening test in MP20 if they apply. If they are they should be handled by TS ballot.
Task Force Members are: Darrell Sanders (Contech) and Stewards (MI and NC) of MP 20

Report from Darrell Sanders

V. New Business

A. Research Proposals

1. 20-7 RPS
2. Full NCHRP RPS

No Proposals to date

B. AMRL/CCRL - Observations from Assessments

C. NCHRP Issues

Final report on “NCHRP 4-39 Update: Field Performance of Corrugated HDPE Pipe Manufactured with Recycled Content”

D. Correspondence, calls, meetings, webinar,

On April 28th a technical presentation on the Pipe Flattening test in AASHTO M294 was given by Michael Pluimer with Crossroads Engineering. Michael presented information to help the DOT members better understand the reasoning behind using a decrease in the load deflection curve as the buckling limit, how to calculate corrugation height for the buckling deflection limit equation and factors of safety included in the deflection limit equation.

E. Presentation by Industry/Academia

Katheryn Malusky – NTPEP Corrugated Metal Pipe program update (20 minutes)

Michael Pluimer, PhD - “Summary of NCHRP Project 4-39: Field Performance of Corrugated HDPE Pipes Manufactured with Recycled Materials” (30 minutes)

Tim Toliver P.E. – “Steel Reinforced Corrugated Polyethylene Pipe – Materials and Design Method” (20 minutes)

F. Proposed New Standards

G. Proposed New Task Forces

H. Standards Requiring Reconfirmation

MP020 This provisional standard is in its last year and must be approved as a full standard or deleted.

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

VI. Open Discussion

VII. Adjourn

VIII. Appendix - Comments

Comments from Friends of Committee

American Concrete Pipe Association (Josiah W Beakley)

My initial comment is that HDPE pipe using recycled resin should be incorporated into a standard of its own. The differences between virgin resin and recycled resin and their requirements should not get confused within a single standard. Additionally, there is very little supporting data on the accuracy of the test methods incorporated for recycled resin. There needs to be additional research that focuses on the variables of size, manufacture, installation quality, installation depth, etc. What is presented here is something that would otherwise be in a provisional standard when it is ready. That is where this should start, in a provisional standard of its own.

Section 2.1 – Does an “AASHTO Standard Practice for Service Life Determination of Corrugated HDPE Pipes Manufactured with Recycled Materials” exist? If so, shouldn’t it have an AASHTO number designation?

Section 2.3 – While the thesis referenced in this section provides information with regards to the use of recycled resins in HDPE pipe, it is not sufficient to validate the added test methods or justify the addition of recycled resin to this standard. The NCHRP 04-39 research report is supposed to be published in late 2017. The distribution of the draft report to the TS 4b members one week before the ballot is due is not sufficient time for review of the report. The fact that the ballot came out before the report indicates this is being rushed.

Section 6.1.1.1 – I would disagree with Dr. Pluimer’s assessment that Report 631 showed a 24 hour test to be equivalent to an 18 hour test on the liner. It showed some correlation for the limited tests that were run, and even with that there was some very large deviations. The whole point is that every profile and manufacturing process will develop its own induced stresses, and should be tested accordingly. The basis of the research for NCHRP Report 631 was to develop a desperately needed test for the finished product. This test should not be thrown away on a whim.

Section 6.1.1.2 – This section should start out, “For pipes manufactured with recycled materials, UCLS testing shall be conducted in addition to the NCLS test...”. How often is this test to be performed? How often is the NCLS test performed? Both tests should be performed at a higher rate for recycled resin since the quality is probably not as consistent. Thus, it would be appropriate to have a stand alone standard for HDPE pipe with recycled resins to address these issues.

I am not sure that a factored tensile design stress of 500 psi is conservative. AASHTO design allows for much higher tensile stress than this. We have not seen any legitimate effort to address the tension stresses that go across the liner of the profile, and are often the critical limit state in these profiles.

If you are concerned with the effect of potential contaminants in the resin, then you should be testing more than the standard 5 samples used for virgin resins, since the contaminants are random and may be different in size, making it hard to correlate a service life with such a small sample.

Service temperature is defined as the temperature “at which the pipe will be operating for the life of the project”. This temperature is critical in determining the service life. It would seem apparent that

depending upon the location of the installation, the service temperature will fluctuate greatly, possibly down to 0 deg. C in freezing environments and up to 27 deg. C in shallow installations in warmer environments. In some locations it will be subjected to both. Is the service life the average, or should it be determined in a different manner?

There is a great variance between the required average failure time and the minimum failure time. I am not aware of any other test method for pipe materials that allows such a great disparity between the average value used for determining a property of the pipe material, and the minimum value allowed within that average. This variance needs to be tightened. Additionally, if you are only testing a very small sampling of the resin, such as is done here, it may be that the test with the lowest value is representative of what occurs when you have a contaminant in the sample, versus the other test values that may have been fortunate enough to have not had a contaminant. Would you not want to use the lowest value, since that is representative of what can occur in the field? If you only take 5 samples, then in essence you have a 20% chance that the material will exhibit a problem much earlier than the prediction you made based on the much higher average value. Is that an acceptable risk?

Section 6.1.1.3 - The determination of the OIT test time is not really covered in reference 3, and very little information is given here with respect to how 20 minutes was established. There are a few ASTM Standards that use 25 minutes for gravity pipe, but even that value would be suspect when applying it to recycled resin material that will have stress risers.

Section 9.4.1 – This should remain as is. The standard needs a test for the finished product.

Section 9.4.1.3 – There is almost no occasion where a sample cannot be cut from the liner. This section should be removed in its entirety. At the very least, it should not be modified.

Section 9.4.2 – This section is not appropriate. It is not a test on the finished product, and more research needs to be presented to justify the test values.

Section A2 – Does an AASHTO procedure, as referenced in 2.1 exist for this?