

SUBCOMMITTEE ON MATERIALS

**Mid-Year Web Meeting
 Thursday, February 19, 2015
 2:00 pm – 4:00 pm EST**

**TECHNICAL SECTION 4b
 FLEXIBLE AND METALLIC PIPE**

I. Call to Order and Opening Remarks

II. Roll Call

Voting Members:

Name	State	Present
San Angelo, Mike	Alaska	
Stolarski, Phil J. (Glenn DeCou)	California	X
Pinkerton, Jennifer M.	Delaware	
Knight, Chase C.	Florida	X
Douds, Richard	Georgia	
Abadie, Christopher David (Jason Davis)	Louisiana	X
Bradbury, Richard L	Maine	
Kline, Therese R.	Michigan	X
Fung, Clement W.	Massachusetts	X
Trautman, Brett	Missouri	X
Streeter, Donald A.	New York	X
Peoples, Christopher A.	North Carolina	X
Ramirez, Timothy	Pennsylvania	X
Bailey, William R.	Virginia	X
Williams, Kurt	Washington	

Friends:

Name	Affiliation	Present
Malusky, Katheryn	AASHTO	X
Rothblatt, Evan	AASHTO	X
Lenker, Steven E.	AMRL	
Uherek, Greg	AMRL	
Knake, Maria	AMRL	
Ferry, Steve	MICROBAC	X
McGough, Michael	NCSPA	X
Beakley, Josiah W	ACPA	X
Chestnut, Brian W	LANE	X
Currence, Daniel	PPI	X
Christensen, Heather	PRINSCO	

III. Approval of Technical Section Minutes

- A. Minneapolis MN - July 29, 2014 Meeting sent out September, 2014

Motion to accept the minutes as written was made by Michigan and seconded by New York. There was no discussion. All were in favor. The minutes are approved.

IV. Old Business

A. SOM Ballot Items

i. All items on the SOM ballot passed with 45 affirmative, 1 negative (on each ballot) and 7 no votes.

ii. **Item 88 Concurrent Ballot Item to revise M278 Class PS46 Poly (Vinyl Chloride) (PVC) Pipe M 278-14.** Modifications were proposed to M 278 to replace Section 3.4 which contained the definition for Industrial plastic scrap that was allowed for the multilayer pipe with an external recycled material definition and an internal recycled material definition labeled section 3.4 and section 3.5 respectively. This required other revisions to sections on Scope, Classification, Materials, Requirements, Markings and Quality assurance.

1. **Negative** from Virginia:

a. Procedures for controlling contaminants need to be strengthened to include sieving external recycled constituents over #100 sieve. In NCHRP Report 696 on recycled polyethylene it was pointed out that it was important to sieve recycled material to avoid contaminants that would be tensile stress risers. The tensile stress risers seemed to occur where recycled material was greater than the #100 sieve size. The researchers were finding bits of rubber or other materials in the external recycled plastic. This standard is allowing recycled PVC and requires the recycled PVC to meet a cell class, but does not address solid PVC particles greater than #100 sieve. Assuming that recycled PVC behaves the same as for PE plastic could particles greater than #100 sieve still cause tensile strength issues in finished pipe not picked up in resin testing? Also the brief mention of procedures for controlling contamination being available to auditors should be strengthened.

Larry Gill's written response to chair on the Negative was: In general contaminants in both PVC and PE are more critical for pressure pipe than non-pressure pipe; however it is always important to control contaminants. For PVC the basis for the negative is the assumption that PVC behaves the same as PE in relation to particle size. In fact they behave very differently. The tensile strength of PVC is not affected by particle size. I checked with our R and D staff and they advise that "elongation at break of extrusion grade PVC compounds is near 200%. The tensile strength is usually taken at the yield (5% elongation) because it is the maximum point in the stress-strain curve. It is expected that the presence of a large particle that will not have been fully fused into the bulk of the PVC will affect elongation and not maximum tensile strength. Thus it will have an effect on impact, not tensile strength or hydrostatic capability. Another supporting argument is PPI TR-02 does not specify particle size requirements for PVC resins."

Response from Larry Gill during the meeting for TS 4b consideration:

We have tests in the M278 standard for impact and in addition only the center layer of the products contains the recycled materials. We do control the particle size of the dry pulverized material to 2mm but I don't think we need to add this to the standard. The bottom line is that we meet all of the performance tests in the standard.

I am not sure what else Virginia is requesting for the audit section. We can add whatever is needed there. A buyer is entitled to see exactly what they are buying.

PVC is an inner and outer layer of recycled PVC that never touches the soil. The ballot was to allow this type of pipe to be used. The negative is related to controlling the contamination based on research conducted for HDPE regarding stress risers. The stress risers in HDPE come from contaminants, which can be controlled by sieve sizing for contaminants. It seems like Virginia would like the same control to apply to PVC. Larry Gill's company produces HDPE, PVC, and other similar products. Producers can't necessarily sieve PVC as this may hurt the material, therefore the recycled materials included must be pulverized to pass a 2 mm sieve then the recycled material is heated. If there are any particles larger than a #100 sieve in PVC, this should not have an effect on impact testing. We have made these products in accordance with ASTM for years.

VA: *Is the testing on that resin (cell class) good enough for contamination?*

Gill: *if there was contamination it would be in the inner wall area, thus should not effect. Impact, pipe flattening, and <one other test missed> conducted for quality control.*

This spec will allow for the virgin or recycled material; both products will be tested to meet the same requirements.

LA: *are there any long term test results to show performance over time?*

Gill: *the products are like products – it is 100% PVC – so should be meeting cell classification and such.*

Pluimer: *conducted research on HDPE (Rick Thomas conducted original research). From a long term perspective – pipe under stress over a long period of time – this can be an issue. Inquired if there is any long term testing to validate. Should include in the spec the fact that the recycled materials are pulverized to 2 mm.*

Gill: *Stress risers should not be an issue in PVC, but can add in the spec the pulverization and sieving to 2mm screens.*

Kuniega: *reiterated the inquiry as to whether any long term studies have been conducted.*

VA: *how do they determine no rocks or other contaminants getting in?*

Gill: *should be cleaned (*though did not confirm there is any way to assure these contaminants are not included).*

VA: *Task Force should be created with Larry Gill to verify contaminants do not affect the pipe. CA agrees that this should be looked into further, as this is not limited to plant regrind, and materials are being brought in from external sources. MI, KS, LA, MO, PA, NY agree with this as well.*

If Task Force created, VA will withdraw its negative.

ACTION ITEM **Task Force 15-01: Larry Gill, CA (Glen DeCou), MI (Therese Kline), and VA (Bill Bailey) to look into this.

2. Comment from Michigan:

- a. Will the product variation type M and/or MP be manufactured with a color variation from the S and SP products so that an on-site inspector may more easily identify it?

Response from Larry Gill for TS 4b consideration: *the products will not have different colors. The "P" means perforated so an inspector will easily be able to determine this. For the difference in S vs. M the M products will be clearly marked with "contains recycled content" for the information of the installer and the inspector.*

Recycled layer is a different color, thus will be able to tell it is a 3 layer product. The letters printed on the pipe will be printed in indelible ink.

3. Comment from Illinois:

- a. Change "material" in second sentence to "PVC" to match what is terminology.
- b. **Response from Larry Gill for TS 4b consideration:** *This is an editorial change. Not sure where the reference to the change is. Is it the definition for delamination? Delamination—the separation of the layers of PVC material in a multilayer pipe.*

ACTION ITEM: Chair will contact IL to follow up on editorial change.

iii. **Item 89 Concurrent Ballot Item to revise M294 High Density Polyethylene (HDPE) Pipe.**

This proposed change clarifies the definition of buckling when conducting the pipe flattening test and sets the maximum deflection in the pipe flattening test to the calculated value from the equation in Section 9.2.1. There is also an attempt to clarify the definition of wall/liner in several sections.

1. **Negative** from Pennsylvania:

- a. Section 3.4 Buckling-Last sentence in Section 3.4. A statement has been added that "deformation in the corrugations due to direct contact of the test specimen with the parallel plates shall not be considered buckling". If that statement, (we believe originally recommended by industry), is allowed to remain in the standard, then we believe it infers that any and all visual buckling will be negated (i.e. found acceptable) by that statement in the revised standard because it is our experience that all visual buckling occurs under the parallel plates. Through our conversations with industry suppliers, we've been advised that from their perspective, buckling under the parallel plates is considered a concentrated point load and that those types of loads are not present as installed. Our opinion is that this type of loading can occur in the field, especially under poorly compacted situations. Furthermore, our conversations with industry suppliers earlier in 2014 indicated that they wanted any and all references to visual buckling removed from the standard and wanted buckling to only be considered a failure solely based upon a decrease in the load/deflection curve.

Dave Kunienga representing PA *considers the area under the parallel plates in their visual evaluation of a pipe for buckling failure. PA feels this represents point loading that could be encountered in the field. Industry interprets the area under the parallel plates where there is any visual buckling does not define failure. There is disparity in the interpretation.*

McGrath: *was the research on NCHRP631 introducing the language to industry to help define buckling. Some buckling is tolerable, and any product that survives this loading should be a quality product.*

VA: *Posed question to industry: Should there be buckling for 3 corrugations or more (defined by section 3.4 of M294), after 30 minutes, then should this be a failure?*

Pluimer: *discussed issues seen where no downward trend in the deflection curve that showed visible buckling, hence the reasoning behind the changes to the standard.*

PA: *initial failures were based upon the 20% and not on the sliding scale (for smaller diameter pipes). The parallel plate testing starts as a point load, then the pipe elongates and such.*

Currence: *Industry does not view pipe failure for pipe where a point load was placed (e.g a crease of the pipe where the plates were in contact with the pipe).*

ACTION ITEM: **TF-14-01 should get together and put a note in the standard to better clarify the criteria that the area underneath the parallel plates is

considered a failure due to buckling, i.e. a buckle over 3 corrugations or more remaining in the pipe for a period of time extending past 30 minutes.

- b. This standard does not have a stated way to determine/measure buckling. Industry and PENNDOT verbally agreed with that "Corrugation buckling shall be determined by placing a straight edge perpendicular to the direction of buckling. Any visible gap between the straightedge and the pipe shall confirm the presence of corrugation buckling". After initially being receptive to defining this in an updated standard this statement was missing from the revised specification. Again not defining more specifically a method of measuring buckling allows each organization to define it as they see fit. Generally, this lack of specificity of a method of measuring buckling favors industry and minimizes buckling failures. It is our recommendation therefore that the recommended verbiage in parenthesis above needs to be added to the standard to remove any ambiguity with respect to buckling.

Dave Kunienga representing PA would like to, with the help of Dan Currence of PPI, get more clarity on M294. These negatives posed are meant to glean more insight as to how industry interprets failure from buckling.

A Suggestion was posed to the technical section to publish the standard as is because this language is an improvement over the current standard and find PENNDOT's negatives persuasive. This will keep the negatives in front of the technical section so they will continue to be addressed. PENNDOT agreed to get together with PPI to go over the issue. Then PA and PPI will get together with TF-14-01 to develop a note to better improve this standard.

*Motion RI, Second MI; to move these negatives to a task force.
Motion passes.*

ACTION ITEM: **TF-14-01 (NC, VA, PA, IL, KS, PPI and Michael Pluimer) should develop a note to improve the standard by determining a method to measure buckling.

2. **Comment** from Michigan:

- a. 3.2 Crack - any break that or split that extends 'through the wall.'
Should this be 'through the liner'? See Figure 2, 9.4.2 Are the words 'wall' and 'liner' interchangeable?

Dan Currence with PPI responded: *these terms are not interchangeable, and should say through the wall or liner.*

ACTION ITEM: Editorial change will be made by Chair.

iv. **Item 90 Concurrent Ballot Item to revise M246 Steel Sheet, Metallic-Coated and Polymer-Precoated, for Corrugated Steel Pipe M 246-05 (2011).** The proposed change is to include 25 % Maleic Anhydride Grafted Polymer as an option to the required laminated film comprised of at least 85 % ethylene acrylic acid copolymer in Section 6.2 of Section 6 General Requirements.

1. **Negative** from Florida:

- a. The presentation by the National Corrugated Steel Pipe Association states that the proposed film materials were "laminated to Galvanized [steel]" for testing (Page 96 of TS 4b minutes). My concern is that the proposed revision to M 246 would allow this new coating to also be placed on aluminized steel by the statement "capable of being applied to the sheet specified in 6.1," since Section 6.1 specifies both galvanized (6.1.1) and aluminized (6.1.2) steel. I recommend voting NO on this item and suggest requesting either:

- i. 1) clarification of the wording to state that the proposed coating is allowed only on galvanized steel;
Or
- ii. 2) Test results or other proof that the coating is suitable on an aluminized steel substrate.

Mike McGough with NCSA cleared up the negative by Florida with the explanation: *The polymer coating is only going to be applied to zinc coated pipe. The default (if nothing is specified) is always zinc coated pipe, and if otherwise applied to other types of pipe, the owner of the pipe must furnish this information.*

Section 6.1 of M246 was reviewed by the technical section.

A motion was made to find the negative persuasive and address it by including a note in section 6.2 to clarify that the polymer coating is intended for galvanized pipe only.

Motion NC, Second RI. Motion passes.

ACTION ITEM: Chair will get together with Mike McGough of NCSA to put this note together.

- 2. Comment from Virginia:
 - a. The slides in the attachment state the coating was tested per ASTM D542, should that be D543? Will the results of the testing be made available prior to implementation? Will the markings on the pipe note which polymer coating is used, EAA or MAH?
Mike McGough with NCSA answered each of the questions with:
The coating test referenced in the power point slides should have been ASTM D543. The states may contact NCSA for results of the coating tests if they were interested. The markings on the pipe will denote which polymer coating is used.

B. TS letter ballots - None

C. Task Force Reports

- i. **Task Force 2014-01** Clarify Buckling definition in M 294 for concurrent ballot.
 - 1. There were several conference calls between SOM meeting and September 12, 2014, M294 submitted for ballot with suggested changes along with minutes. Based on ballot results all differences were not ironed out.
This task force will address PENNDOT's issues on buckling noted above for M294.
- ii. **Task Force 2014-02** Stub Compression Test Frequency – December 10, 2014
 - 1. Gather historical data and discuss how should the data be looked at and analyzed.
 - a. The discussion revealed that the amount of data would be less than 100 samples because the independent labs are only performing testing for NTPEP audits. The task Force moved on to determining the intent of the researchers.
 - 2. Engage the NCHRP Stub Compression Test lead researcher on test for design or test for design and QC.
 - a. The researcher expressed his opinion that the test is for both validation of design and periodic quality control testing. With that statement the task force moved to complete the following two actions:
 - i. Action Item 1: A group was established to review, edit and rewrite Section 7 of M 294 so that the language will clarify the intent of the technical section to conduct the test twice per year. The rewrite will establish the parameters so the NTPEP auditors will be able to understand how to measure the frequency. The dilemma is should the twice per year be per plant, per mold, per size?

- ii. Action Item 2: Industry will develop a trial involving several data points for a set of molds say 30" pipe molds. The trial would involve stub compression testing of the pipe over a time period then disassembling the mold and reassembling at another plant and then running the stub compression test over that same established time period. The details need to be worked out to insure that the variability of molds is established. This action is being taken to help with action 1.

The industry working group charged with developing a test plan (action item 2) that would assist the Task Force in determining the appropriate frequency of the stub compression testing (action item 1) for quality assurance on HDPE elected to propose reexamining NCHRP Report 631 as to whether the stub compression test is primarily for design purposes or for quality control before properly addressing the issue of frequency. The email from Dan Currence with PPI proposed contracting Crossroad Engineering Services to perform this review and report. The email dated February 17, 2014 was shared with the technical section.

The Chair summarized his perception that the state members of the task force had concluded from the task force meeting that the stub compression test had value as a quality assurance test and the industry members did not agree with this conclusion.

Anderson (IN): does not see the value of the stub compression test as a QA test. He supported this opinion by citing from the commentary of section 12 of the AASHTO Bridge Design standard.

Tim McGrath: indicated that he thought that there was value in performing the test as a QA test but he was not sure that a frequency of twice per year was appropriate.

Pluimer: was part of the original review panel for the NCHRP report, he suggests seeing what data is out there currently both routine QA test and stub compression test by contacting some of the test labs and manufacturers. Mike estimates there should be upwards of 300+ data points that could be used to consider frequencies of testing.

Kim Spahn of ACPA commented about other pipe types having production type QA testing (3 edge bearing, absorption) and that she thought stub compression test would be similar.

Kenny Anderson responded by explaining that there are several tests that HDPE pipe undergoes that are similar (parallel plate, wall thickness).

There were several other comments not captured.

The Chair: ended the discussion by inviting anyone that wished to join this task force to get their voice heard, could do so by contacting him. The task Force has done their best attempting to include SOM members, NTPEP Members, and industry members to have a well-rounded group. Kenny Anderson (IN) asked to join the task force.

Action Item: Task Force 2014-02 will take up this discussion at their next meeting. The task force is composed of Dan Currence (PPI), Mike McGough (NCSPA), Michael San Angelo (AK), Dave Meggers (KS), Steve Ferry (Microbac), Bill Bailey (VA), Dr. McGrath, Kenny Anderson (IN) and a couple members of Technical Committee 13 from AASHTO Subcommittee on Bridges.

V. New Business

- A. Research Proposals
- B. AMRL/CCRL Issues
- C. NCHRP Issues

i. Awaiting Task 347 to be complete.

1. Could result in changes to PP 63.

Research complete, Dr. Moore looking at designs for pipe. What is appropriate for the type of joint (concrete, plastic, metal). Based on findings would like to see what can be added to PP63 and convert to a full design standard. Goal is to help provide guidance for engineers to design for silt tight or water tight/leak resistant joint.

D. Correspondence, calls, meetings/ Presentation by Industry

E. Proposed New Standards

F. Proposed New Task Forces

G. Standards Requiring Reconfirmation

i. Reconfirmation ballot completed on **February 13, 2015**

H. SOM Ballot Items (including any ASTM changes)

VI. Open Discussion

VII. Adjourn

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