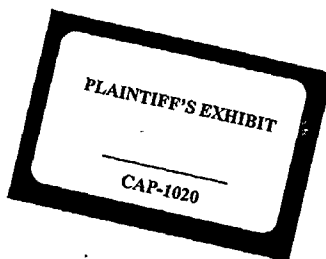




**Johns-Manville
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RECEIVED SEP 18 1981

September 10, 1981

Mr. Joe Jackson
A/C Pipe Producers Association
1600 Wilson Blvd.
Suite 1008
Arlington, VA 22209

Re: Repair Guidelines for Asbestos-Cement Sewer Pipe

Dear Joe:

We have thoroughly reviewed these guidelines and recommend the following changes:

General

The draft generally allows for pipe repair rather than replacement. Also, chemical grouting is recommended in many instances. J-M's basic policy is stated as follows:

Repairing (or Replacing) Damaged Pipe AFTER Installation

Some engineers and officials believe that damaged pipe discovered during testing should be replaced with new material rather than repaired with such accessories as repair clamps, etc. This is a policy decision which falls outside the scope and purpose of this manual. The purpose here is simply to present the various options available for repairing or replacing damaged pipe and to leave the selection of the repair method to those responsible for this aspect of the job.

General Method of Repair

The option to replace damaged pipe with sound material is always available, regardless of the extent of the damage to the pipe. However, a pipe length damaged extensively, such as being crushed or repeatedly bruised at various locations along the barrel, should be replaced with sound material.

(1) Repairs Prior to Installation

Section A, paragraph 2, line 6:

Delete "unless it is used to enter or leave a manhole,"
and end sentence with "pipe".

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Delete the last sentence in the same paragraph and replace it with: "The sections need not be machined when used in conjunction with many types of manhole connections that are in current use."

Section B, paragraph 1, line 1:

Include at the end of the first sentence, "or pipe damaged in transit", to read "...of mishandled pipe or pipe damaged in transit."

Section C, paragraph 1, lines 8 and 9:

Insert "damaged" between "the" and "area" and insert "pipe" between "and" and "remachined" to read, "...mentioned, the damaged area should be trimmed off and pipe remachined."

Paragraph 2, line 1:

Delete "when" and insert "for"

Paragraph 2, line 4:

Delete "be" and delete "seated" and insert "seat to read, "...ring will seat properly..."

Paragraph 3:

Delete entire paragraph and replace with the following:

"Cuts, gouges, scratches, chips or scrapes located at points along the pipe barrel where the rubber ring is not to be positioned should be repaired by either field cutting and removing the damaged portion from the pipe. The remaining sections may be remachined in the field for use as short lengths or connections to manholes. Alternatively, a repair clamp may be used around the damaged section.

It should be noted that this type of damage need not be repaired if the depth does not exceed 0.25 inches or 20% of the wall thickness, whichever is less, and does not exceed 0.50 inches in width and does not exceed 2 inches in length."

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Repairs After Pipe Installation

Section A, paragraph 1, line 1:

Delete "or" and insert "and" to read "shear and flex breaks.."

Paragraph 3, lines 1 and 2:

Delete "integrity relative to its" to read, "... the pipe's crush strength..."

Subparagraph 1, Repairable Displacement, line 1:

Delete "it is found that" to read, "If the pipe section..."

Same subparagraph, line 6:

Delete "through the" to read, "...be repaired with the proper..."

Same subparagraph, lines 7 and 8:

Reconstruct the sentence to read:

"...Chemical Grout as outlined in the section entitled, Chemical Grouting Procedures , page 12 or by utilizing a repair clamp as noted in the section, Repair Clamp or Flexible Sleeve Procedures , page 9."

Section C, item 2:

Delete "Heavy" and insert "Severe" to read, "Severe impact by equipment."

Page 7

Paragraph 1, second sentence:

Rewrite the sentence to read:

"If the puncture diameter or the length of the crack does not exceed 1.5 inches, the damaged area may be repaired using a repair sleeve or concrete collar. If the extent of the damage is greater than that specified above, the pipe must be replaced."

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Page 4

Section D, first sentence:

Rewrite sentence to read:

"Leakage at the joint of nonpressure gravity sewer pipe can be attributed to any of the following:"

Section D, item 2:

Rewrite to read:

"2. Displaced rubber ring."

Section D, last paragraph, second sentence:

Delete "This pipe" and insert "The joints" to read: "The joints can be repaired..."

Same sentence:

Alter parenthetical reference to read:

"(See section on Chemical Grouting Procedures, page 11.)"

Page 9

Repair Clamp or Flexible Sleeve Procedures

Main sections should be referenced with letter (ie. A and B) and paragraphs should be numbered to be consistent with other sections.

Title:

Insert "Installation" between "Sleeve" and "Procedures" to read: "...Flexible Sleeve Installation Procedures".

Section 1 (new section A), subparagraph 1, first sentence:

Delete "holes", and insert "holes, circumferential" to read: to repair punctures, circumferential breaks and displacements..."

Insert "gravity sewer" between "cement" and "pipe" to read "...asbestos-cement gravity sewer pipe.."

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Page 5

Paragraph 2:

Delete "pipe" to read: "...in various sizes..."

Insert "to be repaired" at the end of the sentence to read: "... of the pipe to be repaired".

Section 2 (new section B), paragraph a

(new paragraph 1), second sentence 2:

Insert "thoroughly" between "be" and "cleaned" to read: "...should be thoroughly cleaned".

Paragraph b (new paragraph 1), first sentence:

Insert "recommended by the clamp manufacturer" between "lubricant" and "to" to read: "...joint lubricant recommended by the clamp manufacturers to the rubber lining."

Last sentence:

Delete "adjustment" and insert "assembly" to read: "...the final assembly."

Page 10

Paragraph C (new paragraph 3), first sentence:

Rewrite sentence to read: "The clamp is placed around the pipe so as to completely cover the damaged area."

Paragraph d (new paragraph 4), first sentence:

Rewrite the sentence to read: "First tighten the nuts lightly, then rotate the clamp slightly in the direction of the overlap on the rubber lining."

Paragraph e (new paragraph 5)

Insert "evenly" between "by" and "tightening" to read: "...by evenly tightening..."

Delete "and distribute it" to read: "...will exert pressure on the lining evenly around the pipe."

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Page 12

First paragraph:

Delete "effects" and insert "results" to read:
"...grouting results in order..."

Delete "sanitary" and insert "...gravity" to read:
"asbestos-cement gravity sewer..."

Paragraph 5:

Delete "repair".

Insert "the repair of" between "for" and "Asbestos" and
insert "Gravity" between "Cement" and "Sewer" to read:
"These guidelines for the repair of Asbestos-Cement Gravity
Sewer Pipe..."

End the sentence with "grout" and begin the second
sentence with "However" to read: "...grout. However,..."

Page 13

Place section entitled,
Precautions for Handling Acrylamide Chemical Grout ,
beginning on page 21, before Section A,
Procedure for Chemical Grouting , beginning on page 13.

Also, given the seriousness of exposure to the solution,
we suggest that this section include the recommendation
that protective clothing be worn.

Paragraph 2, sentence 3:

(Beginning with "The sleeves") The context is a little
unclear. Also, typo, "expanded".

Page 14

First paragraph, line 7:

Delete "the" to read: "...with pressures in excess of..."

Second paragraph, first sentence:

Insert "grouting" between "the" and solution to read:
"...the grouting solution..."

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Page 7

Page 15

First paragraph, last line:

Delete "joints pass the" and add "is passed" at the end of the sentence to read: "...until the air test is passed."

Page 22

Third paragraph, third line:

Insert "worn and" between "be" and "working" to read:
"...respirator must be worn and working at all times."

Joe, regarding our August 27, 1981 reply to you relative to the proposed U.S.B.R. revisions to the Asbestos-Cement Pressure Pipe specification, we would like to replace our Item 7 with a new Item 7 shown below. Note that we have included a section of ASTM D2992 to indicate why this change is needed.

7. Page 4-27: right column.

Add the following after paragraph (5) and before section "d":

"(6) The long term hydrostatic strength of the coupling shall be determined by one of the methods of ASTM D-2992 with the exception that all surfaces of the coupling shall be exposed to water during the testing. For this specification the long term hydrostatic strength shall be defined as the internal hydrostatic pressure that will cause failure of the coupling after 150 x 10 pressure cycles (by Procedure A of ASTM D2992) or after 100,000 h. of pressure applied continuously (by Procedure B of ASTM D2992). The minimum long term hydrostatic strength in pounds per square inch shall be 10 times the maximum numerical classification for which the coupling is manufactured.

This test is considered to be a qualification test to establish the adequacy of the manufacturer's design. All coupling sizes and classes may be qualified in this test by selecting one size and class provided they all have similar:

- (a) theoretical designs
- (b) manufacturing processes
- (c) raw materials

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Page 8

The manufacturer shall furnish copies of the test results and thereby certify that the tests outlined in this subparagraph have been performed."

Very truly yours,



Alan A. Verploegh
Staff Manager
PIPE DIVISION

AAV:bja

attachment

Standard Method for OBTAINING HYDROSTATIC DESIGN BASIS FOR REINFORCED THERMOSETTING RESIN PIPE AND FITTINGS²

This Standard is issued under the fixed designation D 2992; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval.

¹NOTE—The appendices were corrected editorially in September 1979.

1. Scope

1.1 This method describes two alternative procedures for obtaining a hydrostatic design basis for reinforced thermosetting resin pipe, fittings, and piping systems. The method is applicable to reinforced thermosetting resin pipe where the ratio of outside diameter to wall thickness is 10:1 or more and for any practical temperature.

2. Summary of Method

2.1 *Procedure A* consists of exposing a minimum of 18 specimens of pipe (or fittings or both) to cyclic internal pressures at a cycle rate of 25 cycles/min and at several different pressures. Elevated test temperatures are obtained by circulating a hot liquid through the specimens or by testing in an air environment where the temperature is controlled.

2.1.1 The long-term hydrostatic strength of pipe or fitting is obtained by an extrapolation to 150×10^6 cycles (11.4 years) of a log-log plot of the linear regression line for hoop stress versus cycles to failure.

2.1.2 The experimental basis for *Procedure A* shall be in accordance with ASTM Method D 2143, Test for Cyclic Pressure Strength of Reinforced Thermosetting Plastic Pipe,² which forms a part of this method. When any part of the procedure is not in agreement with Method D 2143, the provisions of this method shall be used.

²NOTE 1—When testing a piping system and no particular fitting has been designated, the fitting tested in conjunction with this procedure should be the tee, since it is the most highly stressed of the commonly used fittings when in actual service.

2.1.3 Joints between pipe and fitting specimens shall be typical of those normally used for the kind of piping being tested.

2.2 *Procedure B* consists of exposing a minimum of 18 specimens of pipe (or fittings or both) to constant internal hydrostatic pressures at differing pressure levels in a controlled environment and measuring the time to failure for each pressure level. Test temperatures are obtained by immersing the specimens in a controlled-temperature water bath or by testing in an air environment where the temperature is controlled.

2.2.1 The long-term hydrostatic strength of pipe or fitting is obtained by an extrapolation to 100,000 h of a log-log linear regression line for hoop stress versus time to failure.

2.2.2 The experimental basis for *Procedure B* shall be in accordance with ASTM Method D 1598, Test for Time-to-Failure of Plastic Pipe Under Constant Internal Pressure,² which forms a part of this method. When any part of the procedure is not in agreement with Method D 1598, the provisions of this method shall be used. (NOTE 1)

2.2.3 Joints between pipe and fitting specimens shall conform to 2.1.3.

3. Definitions

3.1 *long-term hydrostatic strength* (when expressed with reference to pipe and fittings):

¹This method is under the jurisdiction of ASTM Committee D-20 on Plastics and is the direct responsibility of Subcommittee D20.25 on Reinforced Plastic Piping Systems. Effective Oct. 29, 1971.

²Annual Book of ASTM Standards, Part 14.

method)—the estimated tensile stress in the wall of the pipe in the circumferential orientation due to internal hydrostatic pressure that will cause failure of the pipe after 150×10^6 pressure cycles (by *Procedure A*) or after 100,000 h of pressure applied continuously (by *Procedure B*).

3.2 *failure*—when the test specimen develops a leak, weeps, or ruptures, it shall be considered to have failed except that leakage or failure within one diameter of the end closure shall not be considered as failure of the specimen.

3.3 *hydrostatic design basis*—a stress developed for plastic pipe by this method that is multiplied by a service (design) factor to obtain a hydrostatic design stress.

3.4 *service (design) factor*—a number equal to 1.00 or less that takes into consideration all the variables and degree of safety involved in a plastic pressure piping installation so that when it is multiplied by the hydrostatic design basis, a hydrostatic design stress and corresponding pressure rating for a satisfactory and safe piping installation can be obtained, provided that good quality components are used and the installation is made properly.

3.5 *hydrostatic design stress* (when expressed with reference to pipe and this method)—the estimated maximum tensile stress in the wall of the pipe in the circumferential orientation due to internal hydrostatic pressure that can be applied continuously with a high degree of certainty that failure of the pipe will not occur.

3.6 *pressure rating* (when expressed with reference to pipe)—the estimated maximum pressure that the medium in the pipe can exert continuously with a high degree of certainty that failure of the pipe will not occur.

3.7 *hoop stress*—the force per unit area in the wall of the pipe in the circumferential orientation due to internal hydrostatic pressure.

3.7.1 The relation between stress and pressure shall be determined by using the ISO formula for hoop stress, as follows:

$$S = P(D - t)/2t$$

where:

S = hoop stress, psi,
 P = internal pressure, psi.

D = average outside diameter,

forced thermosetting pipe

ameter shall not include:

covering material, and

minimum wall thickness,

forced thermosetting pipe

reinforced wall thick-

3.7.2 Unreinforced liner thick-

be included in calculating hoop

3.7.3 The fitting thickness

thickness in the body of the fit-

section) and shall not include

liner thickness.

4. Significance

4.1 *Procedure A* for estimating hydrostatic strength of reinforced resin pipe and fittings an extrapolation with respect to made in accordance with Method Stress-failure plots versus number are obtained for the selected term, the extrapolation is made in such that the long-term hydrostatic strength for this temperature.

NOTE 2—It is recommended that the selected from ASTM Method for Testing, whenever possible, for determining the long-term hydrostatic strength for all pipe shall be the Standard 1, perature, 23°C (73.4°F) for comp-

4.2 *Procedure B* for estimating hydrostatic strength of reinforced resin pipe and fittings an extrapolation with respect to made in accordance with Method Stress-failure time plots are obtained selected temperature, and the extrapolation is made in such a manner that the hydrostatic strength is obtained pressure.

4.3 The values obtained by the applicable only to conditions of these procedures. It is not likely term strength of pipe or fittings ferent processes or made from materials will be the same. Results of temperature cannot be used to es-

¹ Annual Book of ASTM Standards, Part 14.