



DEPARTMENT OF TRANSPORTATION
HAZARDOUS MATERIALS REGULATIONS BOARD
WASHINGTON, D.C. 20590

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Title 49—TRANSPORTATION

Chapter I—Hazardous Materials Regulations Board, Department of Transportation

[Amdt. 195-2; Docket No. HM-6]

PART 195—TRANSPORTATION OF LIQUIDS BY PIPELINE

Testing Requirements and Operating Pressure Limitations

The purpose of this amendment is to add to Part 195 regulations concerning hydrostatic testing, design pressure, and operating pressure of liquid pipelines. These regulations are the portions of Part 195 that were withheld when that new part was issued on September 29, 1969. The issuance of this amendment completes the rulemaking proceeding that was initiated by Notice 68-4 on July 12, 1968. Three unrelated amendments have also been included to modify the notice requirements of § 195.8, to clarify § 195.116, and to amend § 195.404.

In issuing Part 195 (34 F.R. 15473, Oct. 4, 1969), the Board indicated that a number of questions had arisen concerning certain proposals and that these questions required resolution before regulations based on those proposals would be issued. Consequently, regulations concerning design pressure, testing, surge pressure, and operating pressure limits were not issued with Part 195 and a public hearing on these subjects was conducted on January 20, 1970. Upon consideration of the information received at that hearing and further analysis of the comments on Notice 68-4, the remainder of Part 195 is issued.

These regulations differ significantly from those proposed in Notice 68-4. At the time of that notice, the Department's accident reporting system for liquid pipelines had been in operation for only 6 months. Now, with over 2½ years of accident reports, a much clearer picture of the causes of liquid pipeline accidents has emerged. The primary causes are corrosion, external forces, and defects in the pipe or seam. An analysis of these reports indicates that thicker wall pipe and lower operating pressures would have relatively little effect in reducing pipeline accidents. This conclusion was strongly reinforced by statements made at the public hearing. On the other hand, both the comments on the original notice and the information provided at the hearing indicated that both the costs of upgrading or looping existing lines in order to maintain present capacity and the increase in future construction costs would be considerable.

With respect to testing, the proposed test requirements have also been modified to be consistent with the other changes in the final regulation.

Definitions. As a result of changes that have been made to the proposed rules, the definitions of "internal design pressure" and "maximum operating pres-

sure" are no longer necessary and have been deleted.

Section 195.3. Due to the list of specifications in § 195.106(e), several new specifications have been added to this section.

Section 195.8. This section requires that at least 90 days before operating a nonsteel pipeline, the operator must notify the Administrator for a determination as to whether the operation might be unduly hazardous. This requirement was not directed so much at existing nonsteel pipelines, whose safety has been established by continued operation, but was intended primarily for newly constructed pipelines. However, the notice requirement was made applicable to existing pipelines in order to obtain information as to the type and quantity of these pipelines and the service in which they were used.

It now appears that a more appropriate and effective way to obtain this information would be through a direct reporting requirement under Subpart B. Therefore, § 195.8 has been revised so as to be applicable only to nonsteel pipelines constructed after October 1, 1970. A rulemaking proceeding will be initiated in the near future to revise Subpart B of this part and provide for reports on existing pipelines.

Section 195.106. Since the primary use of the design formula in these regulations is to establish pressure limitations, the formula has been restated to provide design pressure rather than wall thickness. The design pressure of the pipe is one of the limiting factors used in determining maximum operating pressure under § 195.406(a). In addition, the proposed maximum allowable stress value has been broken down into two separate factors. One of these is the yield strength of the material ("S"), and the other is a design factor of 0.72 ("F"). Reduction of design pressure to compensate for cold working and subsequent reheating is accomplished by requiring the use of a design factor of 0.54 when this has occurred. Yield strength is determined in accordance with paragraph (b) of this section which is based on a provision of the ANSI B31.4 Code. Paragraph (c) now contains the ANSI B31.4 Code method for determining wall thickness if this factor is not known. Paragraph (d) contains a limitation on the minimum wall thickness that will prevent the use of pipe with excessive underthickness tolerances and also requires consideration of concurrent external loads and pressures in determining final wall thickness.

Section 195.114. Since the methods of determining yield strength and wall thickness are now set forth in § 195.106, the references to the B31.4 Code in paragraph (a) of this section are deleted and appropriate reference is made to § 195.106.

Section 195.116. Paragraph (d) of this section required hydrostatic testing of all valves in accordance with API Standard 6D. This specification applies only to gate, ball, plug, and check valves and the testing requirement was intended to

have the same application. Since some persons have interpreted this to apply to other types of valves as well, this paragraph has been specifically limited to gate, ball, plug, and check valves. Paragraph (e) required each valve to have a means of indicating whether the valve is open or closed. This requirement was not intended to apply to check valves since these are controlled by the flow of the stream and knowledge of whether one is open or closed does not provide any significant safety benefit. The words "other than a check valve" have been inserted in paragraph (e) to clarify this point.

Subpart E. The proposed requirement for testing to 140 percent of maximum operating pressure was directly related to the proposal for including surge pressure in design pressure. Assuming an operator established a 10 percent allowance for surge pressure, his maximum operating pressure under the proposed rules would have been approximately 65 percent of yield strength and the hydrostatic test pressure would have been slightly over 90 percent of yield strength. However, with the final regulation permitting maximum operating pressures of 72 percent of yield strength with allowances for surge above that pressure, the proposed test requirement could have required testing at the yield strength of the pipe in some instances. While there were some statements at the public hearing and in the comments indicating that testing to the yield strength of the pipe would be beneficial, it also appears that there is substantial opinion to the contrary. Since considerable research is being conducted in this area, a requirement for yield strength testing would be premature at this time. Therefore, to avoid requiring test pressures in excess of 90 percent of yield strength, the test requirements are established at 125 percent of maximum operating pressure. At such time as the benefits from higher test pressures are more positively established, additional requirements may be considered.

Section 195.300. As with Subparts C and D, a sentence has been added to the scope section to make it clear that the movement of line pipe does not require hydrostatic testing of the pipeline.

Section 195.302. The specific test pressure requirements to which a line must be tested have been removed from this section and placed in § 195.406. Section 195.302 and the balance of Subpart E contain the requirements for testing and the methods to be followed but do not make reference to the pressures to be used. The operator will decide this based on § 195.406 and the pressure at which he desires to operate the pipeline.

In response to many comments indicating that the benefits would be minimal, the proposed cyclic test has not been required. In addition, since proposed Subpart G on qualification and requalification has been withdrawn, all references to qualifying and requalifying of pipe have been deleted.

Section 195.304. One commenter interpreted the proposal on this section as applying only to components installed in

new construction or major replacements. This was not intended and the only components that need not be tested are those which fall specifically within the second sentence of this section. These are components which are single item replacements or additions that the manufacturer certifies have been tested. Therefore, to avoid confusion on this point, the phrase "if they are part of new construction or a major replacement" has been deleted. In addition, an alternative has been added to permit the use of prototype testing for these individual replacement or additional components, if the component has been manufactured under a quality control system.

Section 195.306. In response to comments, the requirements that water used as a test medium be both alkaline and free of sedimentary material have been deleted. These are not sufficiently related to safety of operation to warrant regulation. A number of commenters also stated that testing with petroleum or other commodities can be conducted just as safely as with water and should be permitted with very little restriction. However, since the possibility of rupture is greater with an untested line, the Board believes that testing with product should be limited to areas where there is no exposure to the general public. Therefore, the restriction that no persons, other than those conducting the test, be within 1,000 feet of the test section is retained for tests conducted with product.

Section 195.310. Since a particular location is not necessary for test records retained under this section, the requirement that they be kept at the operator's principal place of business has been deleted. In response to a comment pointing out that elevation profiles are not useful in flat country, paragraph (b) has been modified to require a profile only where elevation differences exceed 100 feet.

Section 195.404. Paragraph (b) of this section has been amended to delete the requirement that daily operating records be kept at one central location. This will make this regulation consistent with the other record-keeping requirements of this part and with those in Part 192, the newly established gas pipeline regulations. If in the future it appears that the records are not being maintained at locations that are conducive to surveillance by both the carriers and representatives of the Administrator, the question will be reconsidered and requirements for location of records may be established.

Section 195.406. Due to the substantive changes in the proposed rules discussed above, this section has also been modified. Proposed paragraph (b), except for the last sentence, has been combined with paragraph (a) to establish one regulation for determining maximum operating pressure. The maximum operating pressure, except for surge or other variations from normal operations, will be limited by any one of four separate criteria. These criteria were contained in other sections of the proposed rules and are combined in this one section for simpler application. The design pressure criteria are based on the definition of maximum operating pressure proposed

in the notice. Eighty percent of test pressure, as specified in subparagraphs (3) and (4), is the equivalent of a test requirement of 125 percent of maximum operating pressure. The requirement in paragraph (b) for limiting surge pressure on existing pipelines is basically unchanged except that for greater clarity the limit is expressed as 110 percent of maximum operating pressure determined under paragraph (a).

Section 195.414. The determination of "maximum operating pressure" under § 195.406 makes inappropriate the use of that term in § 195.414(b). Therefore, the word "maximum" is deleted in order to more clearly express the limit that is being imposed.

Since the amendments to §§ 195.8, 195.116, and 195.404 remove certain requirements and clarify others without imposing an additional burden on any person, I find that notice and public procedure with respect to these amendments are unnecessary and that good cause exists for making the amendments to §§ 195.8, 195.116, and 195.404 effective immediately.

In consideration of the foregoing, Part 195 of Title 49 of the Code of Federal Regulations is amended as set forth below, effective January 8, 1971, except that the amendments to §§ 195.8, 195.116, and 195.404 are effective immediately.

(Secs. 831-835, Title 18, United States Code; secs. 6(e)(4), (f)(3)(A), Department of Transportation Act (49 U.S.C. 1655(e)(4), (f)(3)(A)); § 1.4(d)(6), Regulations of the Office of the Secretary of Transportation)

Issued in Washington, D.C., on November 2, 1970.

CARL V. LYON,
Acting Administrator,
Federal Railroad Administration.

1. Section 195.3 is amended as follows: By revising paragraph (b) (3) and (4), adding new paragraphs (b) (5) and (c) (1) (iii), (iv), and (v), revising paragraph (c) (4), and adding new paragraph (c) (5), all to read as follows:

§ 195.3 Matter incorporated by reference.

* * * * *

(b) * * *
(3) Manufacturers Standardization Society of the Valve and Fittings Industry (MSS), 1815 North Fort Myer Drive, Arlington, Va. 22209.

(4) American National Standards Institute (ANSI), 1430 Broadway, New York, N.Y. 10018. (Formerly the United States of America Standards Institute (USASI). All current standards issued by USASI and ASA have been redesignated as American National Standards and continue in effect.)

(5) American Society for Testing and Materials (ASTM), 1916 Race Street, Philadelphia, Pa. 19103.

(c) * * *

(1) * * *

(iii) API Specification 5L is titled "API Specification for Line Pipe."

(iv) API Specification 5LS is titled "API Specification for Spiral-Weld Line Pipe."

(v) API Specification 5LX is titled "API Specification for High-Test Line Pipe."

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(4) American National Standards Institute:

(i) ANSI B16.9 is titled "Wrought Steel Butt-Welding Fittings."

(ii) ANSI B31.4 is titled "Liquid Petroleum Transportation Piping Systems."

(5) American Society for Testing and Materials:

(i) ASTM Specification A53 is titled "Standard Specification for Welded and Seamless Steel Pipe."

(ii) ASTM Specification A106 is titled "Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service."

(iii) ASTM Specification A134 is titled "Standard Specification for Electric-Fusion (ARC)-Welded Steel Plate Pipe, Sizes 16 in. and Over."

(iv) ASTM Specification A135 is titled "Standard Specification for Electric-Resistance-Welded Steel Pipe."

(v) ASTM Specification A139 is titled "Standard Specification for Electric-Fusion (ARC)-Welded Steel Pipe, Sizes 4 in. and Over."

(vi) ASTM Specification A155 is titled "Standard Specification for Electric-Fusion-Welded Steel Pipe for High-Temperature Service."

(vii) ASTM Specification A211 is titled "Standard Specification for Spiral-Welded Steel or Iron Pipe."

(viii) ASTM Specification A333 is titled "Standard Specification for Seamless and Welded Steel Pipe for Low Temperature Service."

(ix) ASTM Specification A381 is titled "Standard Specification for Metal-Welded Steel Pipe for High-Pressure Transmission Service."

2. The first sentence of § 195.8 is amended to read as follows:

§ 195.8 Transportation of commodities in pipelines constructed with other than steel pipe.

No carrier may transport any commodity through a pipe that is constructed after October 1, 1970, of material other than steel unless the carrier has notified the Administrator in writing at least 90 days before the transportation is to begin. * * *

3. A new § 195.106 is added after § 195.104 to read as follows:

§ 195.106 Internal design pressure.

(a) Internal design pressure for the pipe in a pipeline is determined in accordance with the following formula:

$$P = \frac{2St \times E \times F}{D}$$

P=Internal design pressure in pounds per square inch gauge.

S=Yield strength in pounds per square inch determined in accordance with paragraph (b) of this section.

t=Nominal wall thickness of the pipe in inches. If this is unknown, it is determined in accordance with paragraph (c) of this section.

D=Nominal outside diameter of the pipe in inches.

E=Seam joint factor determined in accordance with paragraph (e) of this section.

F=A design factor of 0.72, except that a design factor of 0.54 is used for pipe that has been cold worked to meet the specified minimum yield strength and is subsequently heated, other than by welding, to 600° F. or more.

(b) The yield strength to be used in determining internal design pressure under paragraph (a) of this section is the specified minimum yield strength. If the specified minimum yield strength is not known, the yield strength is determined by performing all of the tensile tests of either API Standard 5L, 5LS, or 5LX on randomly selected test specimens with the following number of tests:

| Pipe size | Number of tests |
|--|--------------------------------|
| Less than 6 inches in outside diameter. | One test for each 200 lengths. |
| 6 inches through 12¾ inches in outside diameter. | One test for each 100 lengths. |
| Larger than 12¾ inches in outside diameter. | One test for each 50 lengths. |

If the average yield-tensile ratio exceeds 0.85, the yield strength of the pipe is taken as 24,000 p.s.i. If the average yield-tensile ratio is 0.85 or less, the yield strength of the pipe is taken as the lower of the following:

(1) Eighty percent of the average yield strength determined by the tensile tests.

(2) The lowest yield strength determined by the tensile tests.

(c) If the nominal wall thickness to be used in determining internal design pressure under paragraph (a) of this section is not known, it is determined by measuring the thickness of each piece of pipe at quarter points on one end. However, if the pipe is of uniform grade, size, and thickness, only 10 individual lengths or 5 percent of all lengths, whichever is greater, need be measured. The thickness of the lengths that are not measured must be verified by applying a gage set to the minimum thickness found by the measurement. The nominal wall thickness to be used is the next wall thickness found in commercial specifications that is below the average of all the measurements taken. However, the nominal wall thickness may not be more than 1.14 times the smallest measurement taken on pipe that is less than 20 inches in outside diameter, nor more than 1.11 times the smallest measurement taken on pipe that is 20 inches or more in outside diameter.

(d) The minimum wall thickness of the pipe may not be less than 87.5 percent of the value used for nominal wall thickness in determining the internal design pressure under paragraph (a) of this section. In addition, the anticipated external loads and external pressures that are concurrent with internal pressure must be considered in accordance with §§ 195.108 and 195.110 and, after determining the internal design pressure, the nominal wall thickness must be increased as necessary to compensate for these concurrent loads and pressures.

(e) The seam joint factor used in paragraph (a) of this section is determined in accordance with the following table:

| Specification | Pipe class | Seam joint factor |
|---------------|-----------------------------|-------------------|
| ASTM A 53 | Seamless | 1.00 |
| | Electric resistance welded | 1.00 |
| | Furnace lap welded | 0.80 |
| | Furnace butt welded | 0.60 |
| ASTM A 106 | Seamless | 1.00 |
| ASTM A 134 | Electric fusion arc welded | 0.80 |
| ASTM A 135 | Electric resistance welded | 1.00 |
| ASTM A 139 | Electric fusion welded | 0.80 |
| ASTM A 155 | Electric fusion arc welded | 1.00 |
| ASTM A 211 | Spiral welded pipe | 0.80 |
| ASTM A 333 | Seamless | 1.00 |
| | Welded | 1.00 |
| ASTM A 381 | Double submerged arc welded | 1.00 |
| | Seamless | 1.00 |
| API 5L | Electric resistance welded | 1.00 |
| | Electric flash welded | 1.00 |
| | Submerged arc welded | 1.00 |
| | Furnace lap welded | 0.80 |
| | Furnace butt welded | 0.60 |
| API 5LX | Seamless | 1.00 |
| | Electric resistance welded | 1.00 |
| | Electric flash welded | 1.00 |
| API 5LS | Submerged arc welded | 1.00 |
| | Electric resistance welded | 1.00 |
| | Submerged arc welded | 1.00 |

The seam joint factor for pipe which is not covered by this paragraph must be approved by the Administrator.

4. Section 195.114(a) is amended to read as follows:

§ 195.114 Used pipe.

(a) The pipe must be of a known specification and the seam joint factor must be determined in accordance with § 195.106(d). If the specified minimum yield strength or the wall thickness is not known, it is determined in accordance with § 195.106 (b) or (c) as appropriate.

5. Section 195.116 (d) and (e) are revised to read as follows:

§ 195.116 Valves.

(d) Each gate, ball, plug, or check valve must be both hydrostatically shell tested and hydrostatically seat tested without leakage to at least the requirements set forth in section 5 of API Standard 6D, 1968 edition.

(e) Each valve other than a check valve must be equipped with a means for clearly indicating the position of the valve (open, closed, etc.).

6. A new Subpart E is added after § 195.264 to read as follows:

Subpart E—Hydrostatic Testing

| Sec. | |
|---------|------------------------|
| 195.300 | Scope. |
| 195.302 | General requirements. |
| 195.304 | Testing of components. |
| 195.306 | Test medium. |
| 195.308 | Testing of tie-ins. |
| 195.310 | Records. |

AUTHORITY: The provisions of this Subpart E issued under secs. 831-835, Title 18, United States Code; secs. 6 (e) (4), (f) (3) (A), Department of Transportation Act (49 U.S.C. 1655 (e) (4), (f) (3) (A)); § 1.4(d) (6), Regulations of the Office of the Secretary of Transportation.

Subpart E—Hydrostatic Testing

§ 195.300 Scope.

This subpart prescribes minimum requirements for hydrostatic testing of newly constructed steel pipeline systems and for hydrostatic testing of existing steel pipeline systems that are relocated, replaced, or otherwise changed. However, this subpart does not apply to the movement of pipe covered by § 195.424.

§ 195.302 General requirements.

(a) Each new pipeline system, each pipeline system in which pipe has been relocated or replaced, or that part of a pipeline system that has been relocated or replaced, must be hydrostatically tested in accordance with this subpart without leakage.

(b) The test pressure for each hydrostatic test conducted under this section must be maintained for at least 24 hours throughout the part of the system that is being tested.

§ 195.304 Testing of components.

(a) Each hydrostatic test under § 195.302 must test all pipe and attached fittings, including components, unless otherwise permitted by paragraph (b) of this section.

(b) A component that is the only item being replaced or added to the pipeline system need not be hydrostatically tested under paragraph (a) of this section if the manufacturer certifies that either—

(1) The component was hydrostatically tested at the factory; or

(2) The component was manufactured under a quality control system that ensures each component is at least equal in strength to a prototype that was hydrostatically tested at the factory.

§ 195.306 Test medium.

(a) Except as provided in paragraph (b) of this section, water must be used as the test medium.

(b) Liquid petroleum that does not vaporize rapidly may be used as the test medium if—

(1) The entire pipeline section under test is outside of cities and other populated areas; and

(2) There are no persons, other than those conducting the test, within 1,000 feet of the test section.

§ 195.308 Testing of tie-ins.

Pipe associated with tie-ins must be hydrostatically tested, either with the section to be tied in or separately.

§ 195.310 Records.

(a) A record must be made of each hydrostatic test and that record must be retained as long as the facility tested is in use.

(b) The record required by paragraph (a) of this section must include the recording gauge charts, dead weight tester

data, and the reasons for any failure during a test. Where elevation differences in the section under test exceed 100 feet, a profile of the pipeline that shows the elevation and test sites over the entire length of the test section must be included. Each recording gauge chart must also contain—

(1) The carrier's name, the name of the person responsible for making the test, and the name of the test company used, if any;

(2) The date and time of the test;

(3) The minimum test pressure;

(4) The test medium;

(5) A description of the facility tested; and

(6) An explanation of any pressure discontinuities that appear on any chart.

6. Section 195.404(b) is amended to read as follows:

§ 195.404 Maps and records.

(b) Each carrier shall maintain daily operating records that indicate the discharge pressures at each pump station and any unusual operations of a facility. The carrier shall retain these records for at least 3 years.

7. The following new section is added after § 195.404:

§ 195.406 Maximum operating pressure.

(a) Except for surge pressures and other variations from normal operations, no carrier may operate a pipeline at a pressure that exceeds any of the following:

(1) The internal design pressure of the pipe determined in accordance with § 195.106.

(2) The design pressure of any other component of the pipeline.

(3) Eighty percent of the test pressure for any part of the pipeline which has been hydrostatically tested under Subpart E of this part.

(4) Eighty percent of the factory test pressure or of the prototype test pressure for any individually installed component which is excepted from testing under § 195.304.

(b) No carrier may permit the pressure in a pipeline during surges or other variations from normal operations to exceed 110 percent of the operating pressure limit established under paragraph (a) of this section. Each carrier must provide adequate controls and protective equipment to control the pressure within this limit.

§ 195.414 [Amended]

8. The second sentence of § 195.414(b) is amended by deleting the word "maximum" therefrom.

[F.R. Doc. 70-15049; Filed, Nov. 6, 1970; 8:48 a.m.]