

ANSI/AWWA C101—67 (R1977)

W. H. Hargrove
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Reaffirmed without revision 1977

AMERICAN NATIONAL STANDARD
for
THICKNESS DESIGN OF CAST-IRON PIPE

With Tables of Pipe Thicknesses

In Four Parts

- Sec. 1-1—Thickness Tables for Standard Conditions**
- Sec. 1-2—General Procedure for Thickness Determination**
- Sec. 1-3—Design Theory—Determination of Net Thickness,
Earth Load, and Truck Superload**
- Sec. 1-4—Thickness Determination for Pipe on Piers or Piling
Aboveground or Underground**

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Foreword

This foreword is provided for information only and is not a part of ANSI/AWWA C101.

History of Standard

On Sep. 10, 1902, NEWWA adopted a "Standard Specification for Cast-Iron Pipe and Special Castings," covering bell-and-spigot pit-cast pipe and fittings of ten thickness classes. The thickness classes were based on allowable internal pressures varying by increments of 50 ft of head.

On May 12, 1908, AWWA adopted a "Standard Specification for Cast-Iron Pipe and Special Castings," covering bell-and-spigot pit-cast pipe and fittings of eight classes, A through H, with allowable working pressures varying by increments of 100 ft of head from 100 to 800 ft. Dimensions and weights were given for pipe and fittings.

In 1926, ASA Sectional Committee (now ANSI Standards Committee) A21 on Cast-Iron Pipe and Fittings was organized under the sponsorship of AGA, ASTM, AWWA, and NEWWA. The present scope of Committee A21 is:

Standardization of specifications for cast-iron and ductile-iron pressure pipe for gas, water, and other liquids, and fittings for use with such pipe. These specifications to include design, dimensions, materials, coatings, linings, joints, accessories, and methods of inspection and test.

Sectional Committee A21 sponsored many tests of pipe and fittings; these included subsection of pipe to combined earth load and internal pressures (which form the basis of pipe-thickness design), corrosion tests, measurement of hydraulic friction loss in fittings, and tests of bursting strengths of pipe and fittings. After exhaustive study of the test results and other research, the committee in 1939 issued A21.1, "American Standard Practice Manual for the Computation of Strength and Thickness of Cast-Iron Pipe." The manual included nomograms and thickness tables for pit-cast pipe with 11/31 * iron strength. As stated in the preface to that manual, however, the design method was applicable to pipe of any iron strength.

Discussions and interpretations^{1,2} of the method of design of cast-iron pipe were published in 1939 and presented to AWWA and AGA. As a result of these publications and because of the general acceptance of A21.1, a substantial volume of cast-iron pipe was designed by the new method and furnished to manufacturers' standards between 1939 and 1953. A standard (A21.2) for pit-cast pipe with 11/31 iron strength also was issued in 1939. Work on standards for centrifugally cast pipe with 18/40 iron strength was started after the design was completed in 1939, but, owing to the intervention of World War II and other causes, they were not formally issued until 1953.

* The first figure designates the bursting tensile strength in units of 1,000 psi and the second figure designates the ring modulus of rupture in units of 1,000 psi.

In 1957, a revision of A21.1 was issued. In that revision, designated ASA A21.1-1957 (AWWA H1-57) the major change was the addition of a method for computing earth loads on pipe laid under embankments and of nomograms and thickness tables for centrifugally cast pipe with 18/40 iron strength.

In 1958, Sectional Committee A21 was reorganized. Subcommittees were established to study each group of standards in accordance with the review and revision policy of ASA (now ANSI). The scope of Subcommittee 1—Pipe is:

To include the periodic review of all current A21 standards for pipe, the preparation of revisions or new standards when needed, as well as other matters pertaining to pipe standards.

As a result of the work of Subcommittee No. 1 on this assignment, revisions of the cast-iron pipe standards A21.6 (AWWA C106), A21.7, A21.8 (AWWA C108), and A21.9 were issued in 1962 and again in 1970. Revision of A21.1-1957 (AWWA H1-57) was delayed in order for the subcommittee to carry out a new assignment from the sectional committee to develop a design standard and pipe standards for ductile-iron pipe. Subsequently, the subcommittee completed its study and a revision of A21.1 was issued in 1967.

In 1971, Subcommittee No. 1 reviewed the 1967 edition and submitted a recommendation to Committee A21 that the standard be reaffirmed without change. Therefore, this reaffirmed edition is unchanged from the 1967 edition, except for the updating of this foreword. For convenience, the major features listed in the foreword of the 1967 edition are repeated here.

Major Features of 1967 Revision

Although ANSI A21.1-1967 (AWWA H1-67) contained no changes in the basic design method, a number of revisions were incorporated to simplify the design procedure and to reflect changes in technology. Major features of the 1967 revision are discussed.

1. *Format.* This revision is divided into four major sections: Sec. 1-1 gives thickness tables for standard conditions; Sec. 1-2 gives the general procedure for thickness determination; Sec. 1-3 gives design theory and provides methods for determining pipe thicknesses, earth loads, and truck superloads for both standard and special conditions; and Sec. 1-4 gives the design procedure for a special installation condition, pipe on piers aboveground or underground.

2. *Iron strength.* Thickness tables, nomograms, and other data for pit-cast pipe (11/31 iron strength) were deleted, as this type of pipe is seldom furnished today.

Centrifugally cast pipe covered under ANSI Standards A21.6 (AWWA C106), A21.7, A21.8 (AWWA C108), and A21.9 are specified to have an iron strength of not less than 18/40. Advances in production technology have enabled the manufacturers to furnish pipe with greater strength, and pipe with 21/45 iron strength has been available for many years. Thus, for the con-

venience of users, tables and figures in the standard cover pipe with iron strengths of both 18/40 and 21/45.

3. *Laying conditions.* Laying conditions C, D, and E (also called "field conditions" in the 1957 revision) were deleted. Conditions C and D were for pipe laid on blocks, a method sometimes used in the 1920s and 1930s. This method has been recognized as undesirable and is seldom used today. Condition E was for pipe laid with special bedding but without tamping the backfill. It was felt that this combination would rarely be used today; when special bedding is used, the backfill is almost always tamped, giving laying condition F, which was retained in this revision.

4. *Earth loads.* Formulas and procedures were added (Sec. 1-3) for determining earth loads for standard and special conditions. Earth loads shown in Table 1-8 are the same as those given in the 1957 revision, except that loads for 20 and 24 ft of cover were added.

5. *Allowance for truck superloads.* Formulas and procedures were added (Sec. 1-3) for determining truck superloads for standard and special conditions. These procedures may be used to compute truck superloads for unpaved roads, flexible pavement, or rigid pavement; one truck or two passing trucks; and any wheel load and impact factor, including AASHTO truck loadings. Truck superloads for standard conditions are shown in Table 1-8 and are the same as given in the 1957 revision, except that loads for 20 and 24 ft of cover were added.

6. *Allowance for surge pressure.* The allowances for surge pressure (water hammer), shown in Table 1-10, are unchanged from those given in the 1957 revision.

7. *Allowance for corrosion.* A standard allowance for soil corrosion of 0.08 in., based on judgment and experience of early engineers, was used in the 1939 manual and continued in the 1957 revision. The allowance of 0.08 in. was also retained in this edition. It is very conservative for many soils, and has proved to be adequate in most. In areas suspected or known to be highly corrosive, however, the designer should take special precautions. Where unusually corrosive soil conditions are anticipated, a soil survey is recommended.

8. *Pipe on piers.* A new section (Sec. 1-4) was added to provide procedures for computing thicknesses of pipe installed on piers or piling, a condition sometimes encountered in laying pipe in unstable soil, across streams or swamps, either aboveground or underground, and in installing pipe on bridges and other aboveground structures.

Standard Thicknesses of Pit-Cast Pipe

As stated in the foregoing, thickness tables for pit-cast pipe were deleted in the 1967 edition. During the review of this standard in 1971, it was determined that some standards and codes refer to the table of standard thickness classes for pit-cast pipe shown as Table 10 in the 1957 edition of A21.1. For reference, the contents of that table are reproduced on the next page:

*Standard Thickness Classes for Pit-Cast Pipe**

Pipe Size in.	Pipe-Wall Thickness (in.) for Standard Thickness Class No.:													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
3	0.37	0.40	0.43	0.46	0.50	0.54	0.58	0.63	0.68	0.73	0.79	0.85	0.92	0.99
4	0.40	0.43	0.46	0.50	0.54	0.58	0.63	0.68	0.73	0.79	0.85	0.92	0.99	1.07
6	0.43	0.46	0.50	0.54	0.58	0.63	0.68	0.73	0.79	0.85	0.92	0.99	1.07	1.16
8	0.46	0.50	0.54	0.58	0.63	0.68	0.73	0.79	0.85	0.92	0.99	1.07	1.16	1.25
10	0.50	0.54	0.58	0.63	0.68	0.73	0.79	0.85	0.92	0.99	1.07	1.16	1.25	1.35
12	0.54	0.58	0.63	0.68	0.73	0.79	0.85	0.92	0.99	1.07	1.16	1.25	1.35	1.46
14	0.54	0.58	0.63	0.68	0.73	0.79	0.85	0.92	0.99	1.07	1.16	1.25	1.35	1.46
16	0.58	0.63	0.68	0.73	0.79	0.85	0.92	0.99	1.07	1.16	1.25	1.35	1.46	1.58
18	0.63	0.68	0.73	0.79	0.85	0.92	0.99	1.07	1.16	1.25	1.35	1.46	1.58	1.71
20	0.66	0.71	0.77	0.83	0.90	0.97	1.05	1.13	1.22	1.32	1.43	1.54	1.66	1.79
24	0.74	0.80	0.86	0.93	1.00	1.08	1.17	1.26	1.36	1.47	1.59	1.72	1.86	2.01
30	0.87	0.94	1.02	1.10	1.19	1.29	1.39	1.50	1.62	1.75	1.89	2.04	2.20	2.38
36	0.97	1.05	1.13	1.22	1.32	1.43	1.54	1.66	1.79	1.93	2.08	2.25	2.43	2.62
42	1.07	1.16	1.25	1.35	1.46	1.58	1.71	1.85	2.00	2.16	2.33	2.52	2.72	2.94
48	1.18	1.27	1.37	1.48	1.60	1.73	1.87	2.02	2.18	2.35	2.54	2.74	2.96	3.20
54	1.30	1.40	1.51	1.63	1.76	1.90	2.05	2.21	2.39	2.58	2.79	3.01	3.25	3.51
60	1.39	1.50	1.62	1.75	1.89	2.04	2.20	2.38	2.57	2.78	3.00	3.24	3.50	3.78

* Each class is made 8 per cent heavier than the preceding class, starting with the thinnest, i.e., minimum thickness, as the base class.

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American National Standard for
Thickness Design of Cast-Iron Pipe

Sec. 1-1—Thickness Tables for Standard Conditions

Sec. 1-1.1—General

Tables 1-1, 1-2, and 1-3, as applicable, permit the direct determination of the required thickness of cast-iron pipe limited to the following conditions:

a. Vertical-sided trench of width at top of pipe not greater than the nominal pipe diameter plus 2 ft

b. Unit weight of soil 120 lb/cu ft

c. $K\mu = 0.1924$, $K\mu' = 0.130$ (see Sec. 1-3.2 for definition)

d. Truck superload based on two passing trucks with adjacent wheels 3 ft apart, 9,000 lb wheel load, unpaved road or flexible pavement, 1.50 impact factor

e. Surge allowances as shown in Table 1-10

f. Iron strengths of 18/40 and 21/45 *

g. The three most common laying conditions:

A—Pipe laid on flat-bottom trench, backfill not tamped

B—Pipe laid on flat-bottom trench, backfill tamped

* The first figure designates the bursting tensile strength (S) in units of 1,000 psi and the second figure designates the ring modulus of rupture (R) in units of 1,000 psi.

F—Pipe bedded in gravel or sand, backfill tamped

h. Allowances for casting tolerance as shown in Table 1-6

i. A corrosion allowance of 0.08 in.

Sec. 1-1.2—Trench Load and Internal Pressure

The required thickness of cast-iron pressure pipe is determined from a consideration of trench load and internal pressure in combination. Trench load is considered to consist of the earth load on the pipe plus any superload resulting from traffic over the trench. Internal pressure is considered to consist of the design working pressure plus an additional allowance for surge pressure. Two different combinations of trench load and internal pressure are considered in the design:

Case 1. Trench load (earth load but no truck superload) in combination with internal pressure (working pressure plus surge pressure) and with 2.5 factor of safety applied to both trench load and internal pressure

Case 2. Trench load (earth load plus truck superload) in combination with internal pressure (working pressure but no surge pressure) and with

a 2.5 factor of safety applied to both trench load and internal pressure.

Sec. 1-1.3—Traffic Superload and Surge Pressure

In designing water pipe it is customary to assume that neither traffic superload nor surge pressure will occur in important magnitude simultaneously. Thus, calculations for the required thickness of water pipe are made for both conditions independently, and the greater of the two thicknesses thus determined is chosen as the net thickness.

In designing gas pipe the procedure is the same, except that surge pressure is not a factor and only Case 2 is considered.

Sec. 1-1.4—Corrosion Allowance and Casting Tolerance

To the net thickness determined as explained above, a corrosion allowance and a casting tolerance are added to obtain the calculated thickness shown in Tables 1-1, 1-2, and 1-3. The standard thickness class and/or the nominal thickness for this class shown in Tables 1-1, 1-2, and 1-3 are used for specifying and ordering pipe.

For other than standard conditions the formulas, tables, and diagrams in Sec. 1-2 may be used. The design theory on which Tables 1-1, 1-2, and 1-3 are based is presented in Sec. 1-3. Procedures for determining the net thickness of pipe on piers or piling above- or belowground are presented in Sec. 1-4.

TABLE 1-1
Schedule of Barrel Thickness for Water Pipe of 18/40 Iron Strength

Laying Condition	Depth of Cover ft	Thickness Specifications	Internal Pressure— <i>psi</i>						
			50	100	150	200	250	300	350
			Barrel Thicknesses— <i>in.</i>						
Three-Inch Water Pipe									
A	2½	Calculated Thickness Use {Thickness Class Thickness	.21* 22 .32	.21* 22 .32	.22* 22 .32	.22* 22 .32	.22* 22 .32	.22* 22 .32	.23* 22 .32
	3½	Calculated Thickness Use {Thickness Class Thickness	.21* 22 .32	.21* 22 .32	.22* 22 .32	.22* 22 .32	.22* 22 .32	.22* 22 .32	.23* 22 .32
	5	Calculated Thickness Use {Thickness Class Thickness	.21* 22 .32	.21* 22 .32	.22* 22 .32	.22* 22 .32	.23 22 .32	.23 22 .32	.24 22 .32
	8	Calculated Thickness Use {Thickness Class Thickness	.22* 22 .32	.23* 22 .32	.23* 22 .32	.24 22 .32	.24 22 .32	.24 22 .32	.25 22 .32
	12	Calculated Thickness Use {Thickness Class Thickness	.24* 22 .32	.25* 22 .32	.25* 22 .32	.26 22 .32	.26 22 .32	.27 22 .32	.28 22 .32
	16	Calculated Thickness Use {Thickness Class Thickness	.27 22 .32	.27 22 .32	.28 22 .32	.28 22 .32	.28 22 .32	.29 22 .32	.29 22 .32
B	2½	Calculated Thickness Use {Thickness Class Thickness	.21* 22 .32	.21* 22 .32	.22* 22 .32	.22* 22 .32	.22* 22 .32	.22* 22 .32	.23* 22 .32
	3½	Calculated Thickness Use {Thickness Class Thickness	.21* 22 .32	.21* 22 .32	.22* 22 .32	.22* 22 .32	.22* 22 .32	.22* 22 .32	.23* 22 .32
	5	Calculated Thickness Use {Thickness Class Thickness	.21* 22 .32	.21* 22 .32	.22* 22 .32	.22* 22 .32	.23 22 .32	.23 22 .32	.24 22 .32
	8	Calculated Thickness Use {Thickness Class Thickness	.22* 22 .32	.22* 22 .32	.23* 22 .32	.23* 22 .32	.24 22 .32	.24 22 .32	.24 22 .32
	12	Calculated Thickness Use {Thickness Class Thickness	.24* 22 .32	.24* 22 .32	.25 22 .32	.25 22 .32	.26 22 .32	.26 22 .32	.27 22 .32
	16	Calculated Thickness Use {Thickness Class Thickness	.26 22 .32	.26 22 .32	.27 22 .32	.27 22 .32	.28 22 .32	.28 22 .32	.29 22 .32
F	2½	Calculated Thickness Use {Thickness Class Thickness	.21* 22 .32	.21* 22 .32	.21* 22 .32	.21* 22 .32	.22* 22 .32	.22* 22 .32	.23 22 .32
	3½	Calculated Thickness Use {Thickness Class Thickness	.21* 22 .32	.21* 22 .32	.21* 22 .32	.21* 22 .32	.22* 22 .32	.22* 22 .32	.23 22 .32
	5	Calculated Thickness Use {Thickness Class Thickness	.21* 22 .32	.21* 22 .32	.21* 22 .32	.22* 22 .32	.22* 22 .32	.22* 22 .32	.23 22 .32
	8	Calculated Thickness Use {Thickness Class Thickness	.21 22 .32	.21 22 .32	.22 22 .32	.22 22 .32	.23 22 .32	.23 22 .32	.24 22 .32
	12	Calculated Thickness Use {Thickness Class Thickness	.23 22 .32	.23 22 .32	.23 22 .32	.24 22 .32	.24 22 .32	.24 22 .32	.25 22 .32
	16	Calculated Thickness Use {Thickness Class Thickness	.24 22 .32	.24 22 .32	.25 22 .32	.25 22 .32	.26 22 .32	.26 22 .32	.27 22 .32

* Asterisk following total calculated thickness indicates that truck superload (Case 2) is the controlling factor. When total calculated thickness is not followed by asterisk, surge pressure (Case 1) is the controlling factor. See Sec. 1-2.1.

TABLE 1-1 (Continued)
Schedule of Barrel Thickness for Water Pipe of 18/40 Iron Strength

Laying Condi- tion	Depth of Cover <i>ft</i>	Thickness Specifications	Internal Pressure— <i>psi</i>							
			50	100	150	200	250	300	350	
			Barrel Thicknesses— <i>in.</i>							
Four-Inch Water Pipe										
A	2½	Calculated Thickness Use { Thickness Class Thickness	.23* 22 .35	.23* 22 .35	.24* 22 .35	.24* 22 .35	.24* 22 .35	.25* 22 .35	.27 22 .35	
	3½	Calculated Thickness Use { Thickness Class Thickness	.23* 22 .35	.23* 22 .35	.23* 22 .35	.24 22 .35	.24 22 .35	.25 22 .35	.27 22 .35	
	5	Calculated Thickness Use { Thickness Class Thickness	.23* 22 .35	.24* 22 .35	.24* 22 .35	.25 22 .35	.26 22 .35	.27 22 .35	.28 22 .35	
	8	Calculated Thickness Use { Thickness Class Thickness	.25* 22 .35	.26 22 .35	.27 22 .35	.28 22 .35	.28 22 .35	.29 22 .35	.30 22 .35	
	12	Calculated Thickness Use { Thickness Class Thickness	.29 22 .35	.29 22 .35	.30 22 .35	.30 22 .35	.31 22 .35	.31 22 .35	.32 22 .35	
	16	Calculated Thickness Use { Thickness Class Thickness	.31 22 .35	.31 22 .35	.32 22 .35	.32 22 .35	.33 22 .35	.33 22 .35	.34 22 .35	
	B	2½	Calculated Thickness Use { Thickness Class Thickness	.23* 22 .35	.23* 22 .35	.23* 22 .35	.23* 22 .35	.24* 22 .35	.25 22 .35	.27 22 .35
		3½	Calculated Thickness Use { Thickness Class Thickness	.23* 22 .35	.23* 22 .35	.23* 22 .35	.24 22 .35	.25 22 .35	.26 22 .35	.27 22 .35
		5	Calculated Thickness Use { Thickness Class Thickness	.23 22 .35	.24 22 .35	.24 22 .35	.25 22 .35	.26 22 .35	.27 22 .35	.28 22 .35
		8	Calculated Thickness Use { Thickness Class Thickness	.25 22 .35	.26 22 .35	.27 22 .35	.27 22 .35	.28 22 .35	.29 22 .35	.29 22 .35
		12	Calculated Thickness Use { Thickness Class Thickness	.28 22 .35	.28 22 .35	.29 22 .35	.30 22 .35	.30 22 .35	.31 22 .35	.32 22 .35
		16	Calculated Thickness Use { Thickness Class Thickness	.30 22 .35	.31 22 .35	.31 22 .35	.32 22 .35	.32 22 .35	.33 22 .35	.33 22 .35
F		2½	Calculated Thickness Use { Thickness Class Thickness	.23* 22 .35	.23* 22 .35	.23* 22 .35	.24* 22 .35	.24 22 .35	.25 22 .35	.26 22 .35
		3½	Calculated Thickness Use { Thickness Class Thickness	.23* 22 .35	.23* 22 .35	.23 22 .35	.24 22 .35	.24 22 .35	.25 22 .35	.26 22 .35
		5	Calculated Thickness Use { Thickness Class Thickness	.23 22 .35	.23 22 .35	.23 22 .35	.24 22 .35	.24 22 .35	.25 22 .35	.26 22 .35
		8	Calculated Thickness Use { Thickness Class Thickness	.24 22 .35	.24 22 .35	.25 22 .35	.25 22 .35	.25 22 .35	.26 22 .35	.27 22 .35
		12	Calculated Thickness Use { Thickness Class Thickness	.25 22 .35	.26 22 .35	.27 22 .35	.28 22 .35	.28 22 .35	.29 22 .35	.30 22 .35
		16	Calculated Thickness Use { Thickness Class Thickness	.28 22 .35	.28 22 .35	.29 22 .35	.29 22 .35	.30 22 .35	.30 22 .35	.31 22 .35

* Asterisk following total calculated thickness indicates that truck superload (Case 2) is the controlling factor. When total calculated thickness is not followed by asterisk, surge pressure (Case 1) is the controlling factor. See Sec. 1-2.1.

TABLE 1-1 (Continued)
Schedule of Barrel Thickness for Water Pipe of 18/40 Iron Strength

Laying Condi- tion	Depth of Cover ft	Thickness Specifications	Internal Pressure— <i>psi</i>						
			50	100	150	200	250	300	350
			Barrel Thicknesses— <i>in.</i>						
Six-Inch Water Pipe									
A	2½	Calculated Thickness Use {Thickness Class Thickness	.29* 22 .38	.29* 22 .38	.30* 22 .38	.31* 22 .38	.32* 22 .38	.33* 22 .38	.34 22 .38
	3½	Calculated Thickness Use {Thickness Class Thickness	.28* 22 .38	.28* 22 .38	.29* 22 .38	.30* 22 .38	.31* 22 .38	.32* 22 .38	.34 22 .38
	5	Calculated Thickness Use {Thickness Class Thickness	.29* 22 .38	.29* 22 .38	.30* 22 .38	.31* 22 .38	.33 22 .38	.34 22 .38	.35 22 .38
	8	Calculated Thickness Use {Thickness Class Thickness	.32 22 .38	.33 22 .38	.34 22 .38	.35 22 .38	.36 22 .38	.37 22 .38	.38 22 .38
	12	Calculated Thickness Use {Thickness Class Thickness	.36 22 .38	.37 22 .38	.38 22 .38	.38 22 .38	.39 22 .38	.40 23 .41	.41 23 .41
	16	Calculated Thickness Use {Thickness Class Thickness	.39 22 .38	.40 23 .41	.41 23 .41	.42 23 .41	.42 23 .41	.43 24 .44	.44 24 .44
B	2½	Calculated Thickness Use {Thickness Class Thickness	.28* 22 .38	.28* 22 .38	.29* 22 .38	.30* 22 .38	.31* 22 .38	.32* 22 .38	.33* 22 .38
	3½	Calculated Thickness Use {Thickness Class Thickness	.27* 22 .38	.28* 22 .38	.28* 22 .38	.29* 22 .38	.30* 22 .38	.32 22 .38	.34 22 .38
	5	Calculated Thickness Use {Thickness Class Thickness	.28* 22 .38	.29 22 .38	.30 22 .38	.31 22 .38	.32 22 .38	.33 22 .38	.34 22 .38
	8	Calculated Thickness Use {Thickness Class Thickness	.31 22 .38	.32 22 .38	.33 22 .38	.34 22 .38	.35 22 .38	.36 22 .38	.37 22 .38
	12	Calculated Thickness Use {Thickness Class Thickness	.35 22 .38	.35 22 .38	.36 22 .38	.37 22 .38	.38 22 .38	.39 22 .38	.40 23 .41
	16	Calculated Thickness Use {Thickness Class Thickness	.38 22 .38	.38 22 .38	.39 22 .38	.40 23 .41	.41 23 .41	.42 23 .41	.43 24 .44
F	2½	Calculated Thickness Use {Thickness Class Thickness	.26* 22 .38	.27* 22 .38	.28 22 .38	.29 22 .38	.30 22 .38	.32 22 .38	.34 22 .38
	3½	Calculated Thickness Use {Thickness Class Thickness	.27 22 .38	.27 22 .38	.28 22 .38	.29 22 .38	.30 22 .38	.32 22 .38	.34 22 .38
	5	Calculated Thickness Use {Thickness Class Thickness	.28 22 .38	.28 22 .38	.29 22 .38	.29 22 .38	.30 22 .38	.32 22 .38	.35 22 .38
	8	Calculated Thickness Use {Thickness Class Thickness	.29 22 .38	.30 22 .38	.31 22 .38	.32 22 .38	.33 22 .38	.34 22 .38	.35 22 .38
	12	Calculated Thickness Use {Thickness Class Thickness	.32 22 .38	.33 22 .38	.34 22 .38	.35 22 .38	.36 22 .38	.37 22 .38	.38 22 .38
	16	Calculated Thickness Use {Thickness Class Thickness	.35 22 .38	.35 22 .38	.36 22 .38	.37 22 .38	.38 22 .38	.39 22 .38	.40 23 .41

* Asterisk following total calculated thickness indicates that truck superload (Case 2) is the controlling factor. When total calculated thickness is not followed by asterisk, surge pressure (Case 1) is the controlling factor. See Sec. 1-2.1.

TABLE 1-1 (Continued)
Schedule of Barrel Thickness for Water Pipe of 18/40 Iron Strength

Laying Condition	Depth of Cover ft	Thickness Specifications	Internal Pressure—psi						
			50	100	150	200	250	300	350
			Barrel Thicknesses—in.						
Eight-Inch Water Pipe									
A	2½	Calculated Thickness Use {Thickness Class Thickness	.34* 22 .41	.35* 22 .41	.36* 22 .41	.37* 22 .41	.38* 22 .41	.39* 22 .41	.40* 22 .41
	3½	Calculated Thickness Use {Thickness Class Thickness	.33* 22 .41	.34* 22 .41	.34* 22 .41	.35* 22 .41	.36* 22 .41	.39 22 .41	.41 22 .41
	5	Calculated Thickness Use {Thickness Class Thickness	.34* 22 .41	.35* 22 .41	.36* 22 .41	.37* 22 .41	.39 22 .41	.41 22 .41	.43 23 .44
	8	Calculated Thickness Use {Thickness Class Thickness	.38 22 .41	.39 22 .41	.40 22 .41	.41 22 .41	.43 23 .44	.44 23 .44	.46 24 .48
	12	Calculated Thickness Use {Thickness Class Thickness	.43 23 .44	.44 23 .44	.45 23 .44	.46 24 .48	.47 24 .48	.49 24 .48	.50 25 .52
	16	Calculated Thickness Use {Thickness Class Thickness	.46 24 .48	.47 24 .48	.48 24 .48	.49 24 .48	.51 25 .52	.52 25 .52	.53 25 .52
B	2½	Calculated Thickness Use {Thickness Class Thickness	.32* 22 .41	.33* 22 .41	.34* 22 .41	.35* 22 .41	.36* 22 .41	.38* 22 .41	.39* 22 .41
	3½	Calculated Thickness Use {Thickness Class Thickness	.32* 22 .41	.33* 22 .41	.33* 22 .41	.34* 22 .41	.36* 22 .41	.38 22 .41	.40 22 .41
	5	Calculated Thickness Use {Thickness Class Thickness	.33* 22 .41	.34* 22 .41	.35 22 .41	.36 22 .41	.38 22 .41	.40 22 .41	.42 22 .41
	8	Calculated Thickness Use {Thickness Class Thickness	.36 22 .41	.37 22 .41	.38 22 .41	.40 22 .41	.41 22 .41	.43 23 .44	.45 23 .44
	12	Calculated Thickness Use {Thickness Class Thickness	.41 22 .41	.42 22 .41	.43 23 .44	.44 23 .44	.46 24 .48	.47 24 .48	.48 24 .48
	16	Calculated Thickness Use {Thickness Class Thickness	.44 23 .44	.45 23 .44	.46 24 .48	.47 24 .48	.48 24 .48	.50 25 .52	.51 25 .52
F	2½	Calculated Thickness Use {Thickness Class Thickness	.30* 22 .41	.31* 22 .41	.32* 22 .41	.33* 22 .41	.35 22 .41	.37 22 .41	.39 22 .41
	3½	Calculated Thickness Use {Thickness Class Thickness	.29* 22 .41	.30* 22 .41	.31 22 .41	.33 22 .41	.35 22 .41	.37 22 .41	.39 22 .41
	5	Calculated Thickness Use {Thickness Class Thickness	.30* 22 .41	.31* 22 .41	.32 22 .41	.34 22 .41	.36 22 .41	.38 22 .41	.40 22 .41
	8	Calculated Thickness Use {Thickness Class Thickness	.34 22 .41	.35 22 .41	.36 22 .41	.37 22 .41	.39 22 .41	.41 22 .41	.43 23 .44
	12	Calculated Thickness Use {Thickness Class Thickness	.38 22 .41	.39 22 .41	.40 22 .41	.41 22 .41	.43 23 .44	.44 23 .44	.46 24 .48
	16	Calculated Thickness Use {Thickness Class Thickness	.40 22 .41	.41 22 .41	.42 22 .41	.43 23 .44	.45 23 .44	.46 24 .48	.48 24 .48

* Asterisk following total calculated thickness indicates that truck superload (Case 2) is the controlling factor. When total calculated thickness is not followed by asterisk, surge pressure (Case 1) is the controlling factor. See Sec. 1-2.1.

TABLE 1-1 (Continued)
Schedule of Barrel Thickness for Water Pipe of 18/40 Iron Strength

Laying Condi- tion	Depth of Cover ft	Thickness Specifications	Internal Pressure—psi						
			50	100	150	200	250	300	350
			Barrel Thicknesses—in.						
Ten-Inch Water Pipe									
A	2½	Calculated Thickness Use { Thickness Class Thickness	.40* 22 .44	.41* 22 .44	.42* 22 .44	.43* 22 .44	.45* 22 .44	.46* 23 .48	.48* 23 .48
	3½	Calculated Thickness Use { Thickness Class Thickness	.39* 22 .44	.40* 22 .44	.41* 22 .44	.42* 22 .44	.44* 22 .44	.46 23 .48	.49 23 .48
	5	Calculated Thickness Use { Thickness Class Thickness	.40* 22 .44	.41* 22 .44	.42* 22 .44	.44 22 .44	.46 23 .48	.48 23 .48	.51 24 .52
	8	Calculated Thickness Use { Thickness Class Thickness	.44 22 .44	.46 23 .48	.47 23 .48	.49 23 .48	.51 24 .52	.53 24 .52	.55 25 .56
	12	Calculated Thickness Use { Thickness Class Thickness	.51 24 .52	.52 24 .52	.53 24 .52	.55 25 .56	.56 25 .56	.58 26 .60	.60 26 .60
	16	Calculated Thickness Use { Thickness Class Thickness	.53 24 .52	.54 25 .56	.56 25 .56	.57 25 .56	.59 26 .60	.60 26 .60	.62 26 .60
B	2½	Calculated Thickness Use { Thickness Class Thickness	.38* 22 .44	.39* 22 .44	.40* 22 .44	.41* 22 .44	.43* 22 .44	.45* 22 .44	.47* 23 .48
	3½	Calculated Thickness Use { Thickness Class Thickness	.37* 22 .44	.38* 22 .44	.39* 22 .44	.40* 22 .44	.42* 22 .44	.44 22 .44	.48 23 .48
	5	Calculated Thickness Use { Thickness Class Thickness	.38* 22 .44	.39* 22 .44	.40* 22 .44	.42 22 .44	.45 22 .44	.47 23 .48	.50 24 .52
	8	Calculated Thickness Use { Thickness Class Thickness	.41* 22 .44	.44 22 .44	.45 22 .44	.47 23 .48	.49 23 .48	.51 24 .52	.53 24 .52
	12	Calculated Thickness Use { Thickness Class Thickness	.48 23 .48	.49 23 .48	.51 24 .52	.52 24 .52	.54 25 .56	.56 25 .56	.58 26 .60
	16	Calculated Thickness Use { Thickness Class Thickness	.50 24 .52	.52 24 .52	.53 24 .52	.54 25 .56	.56 25 .56	.58 26 .60	.60 26 .60
F	2½	Calculated Thickness Use { Thickness Class Thickness	.35* 22 .44	.36* 22 .44	.37* 22 .44	.38* 22 .44	.41 22 .44	.44 22 .44	.47 23 .48
	3½	Calculated Thickness Use { Thickness Class Thickness	.34* 22 .44	.35* 22 .44	.36* 22 .44	.38 22 .44	.41 22 .44	.44 22 .44	.47 23 .48
	5	Calculated Thickness Use { Thickness Class Thickness	.35* 22 .44	.36* 22 .44	.38 22 .44	.40 22 .44	.42 22 .44	.46 23 .46	.48 23 .46
	8	Calculated Thickness Use { Thickness Class Thickness	.39 22 .44	.41 22 .44	.42 22 .44	.44 22 .44	.46 23 .48	.48 23 .48	.51 24 .52
	12	Calculated Thickness Use { Thickness Class Thickness	.44 22 .44	.45 22 .44	.46 23 .48	.48 23 .48	.50 24 .52	.52 24 .52	.54 25 .56
	16	Calculated Thickness Use { Thickness Class Thickness	.46 23 .48	.47 23 .48	.49 23 .48	.51 24 .52	.52 24 .52	.54 25 .56	.56 25 .56

* Asterisk following total calculated thickness indicates that truck superload (Case 2) is the controlling factor. When total calculated thickness is not followed by asterisk, surge pressure (Case 1) is the controlling factor. Sec. 1-2.1.

TABLE 1-1 (Continued)
Schedule of Barrel Thickness for Water Pipe of 18/40 Iron Strength

Laying Condition	Depth of Cover <i>ft</i>	Thickness Specifications	Internal Pressure— <i>psi</i>						
			50	100	150	200	250	300	350
			Barrel Thicknesses—in.						
Twelve-Inch Water Pipe									
A	2½	Calculated Thickness Use { Thickness Class Thickness	.45* 22 .48	.46* 22 .48	.47* 22 .48	.49* 22 .48	.51* 23 .52	.53* 23 .52	.55* 24 .56
	3½	Calculated Thickness Use { Thickness Class Thickness	.43* 22 .48	.45* 22 .48	.46* 22 .48	.48* 22 .48	.50* 23 .52	.51 23 .52	.55 24 .56
	5	Calculated Thickness Use { Thickness Class Thickness	.45* 22 .48	.46* 22 .48	.47* 22 .48	.49 22 .48	.52 23 .52	.54 24 .56	.57 24 .56
	8	Calculated Thickness Use { Thickness Class Thickness	.50 23 .52	.52 23 .52	.53 23 .52	.55 24 .56	.57 24 .56	.60 25 .60	.62 25 .60
	12	Calculated Thickness Use { Thickness Class Thickness	.56 24 .56	.57 24 .56	.59 25 .60	.60 25 .60	.62 25 .60	.64 26 .65	.67 26 .65
	16	Calculated Thickness Use { Thickness Class Thickness	.59 25 .60	.60 25 .60	.61 25 .60	.63 26 .65	.65 26 .65	.67 26 .65	.69 27 .70
B	2½	Calculated Thickness Use { Thickness Class Thickness	.42* 22 .48	.44* 22 .48	.45* 22 .48	.46* 22 .48	.48* 22 .48	.50* 23 .52	.53* 23 .52
	3½	Calculated Thickness Use { Thickness Class Thickness	.41* 22 .48	.42* 22 .48	.44* 22 .48	.45* 22 .48	.47* 22 .48	.51 23 .52	.55 24 .56
	5	Calculated Thickness Use { Thickness Class Thickness	.42* 22 .48	.43* 22 .48	.45* 22 .48	.47 22 .48	.50 23 .52	.53 23 .52	.56 24 .56
	8	Calculated Thickness Use { Thickness Class Thickness	.48 22 .48	.49 22 .48	.51 23 .52	.53 23 .52	.55 24 .56	.57 24 .56	.60 25 .60
	12	Calculated Thickness Use { Thickness Class Thickness	.53 23 .52	.54 24 .56	.56 24 .56	.57 24 .56	.59 25 .60	.61 25 .60	.64 26 .65
	16	Calculated Thickness Use { Thickness Class Thickness	.55 24 .56	.57 24 .56	.58 25 .60	.60 25 .60	.62 25 .60	.64 26 .65	.66 26 .65
F	2½	Calculated Thickness Use { Thickness Class Thickness	.39* 22 .48	.40* 22 .48	.41* 22 .48	.43* 22 .48	.45* 22 .48	.49 22 .48	.53 23 .52
	3½	Calculated Thickness Use { Thickness Class Thickness	.38* 22 .48	.39* 22 .48	.40* 22 .48	.42* 22 .48	.45 22 .48	.50 23 .52	.53 23 .52
	5	Calculated Thickness Use { Thickness Class Thickness	.39* 22 .48	.40* 22 .48	.41* 22 .48	.43* 22 .48	.46 22 .48	.50 23 .52	.54 24 .56
	8	Calculated Thickness Use { Thickness Class Thickness	.44 22 .48	.45 22 .48	.47 22 .48	.49 22 .48	.52 23 .52	.55 24 .56	.58 25 .60
	12	Calculated Thickness Use { Thickness Class Thickness	.48 22 .48	.49 22 .48	.51 23 .52	.53 23 .52	.55 24 .56	.58 25 .60	.61 25 .60
	16	Calculated Thickness Use { Thickness Class Thickness	.50 23 .52	.52 23 .52	.53 23 .52	.55 24 .56	.57 24 .56	.59 25 .60	.62 25 .60

* Asterisk following total calculated thickness indicates that truck superload (Case 2) is the controlling factor. When total calculated thickness is not followed by asterisk, surge pressure (Case 1) is the controlling factor.
Sec. 1-2.1.

TABLE 1-1 (Continued)
Schedule of Barrel Thickness for Water Pipe of 18/40 Iron Strength

Laying Condi- tion	Depth of Cover ft	Thickness Specifications	Internal Pressure— <i>psi</i>						
			50	100	150	200	250	300	350
			Barrel Thicknesses— <i>in.</i>						
Fourteen-Inch Water Pipe									
A	2½	Calculated Thickness Use {Thickness Class Thickness	.51* 22 .51	.52* 22 .51	.54* 23 .55	.55* 23 .55	.58* 24 .59	.60* 24 .59	.62* 25 .64
	3½	Calculated Thickness Use {Thickness Class Thickness	.50* 22 .51	.51* 22 .51	.53* 23 .55	.54* 23 .55	.57* 24 .59	.60 24 .59	.64 25 .64
	5	Calculated Thickness Use {Thickness Class Thickness	.51* 22 .51	.53* 23 .55	.54* 23 .55	.56* 23 .55	.59 24 .59	.62 25 .64	.66 25 .64
	8	Calculated Thickness Use {Thickness Class Thickness	.58 24 .59	.60 24 .59	.62 25 .64	.64 25 .64	.66 25 .64	.69 26 .69	.72 27 .75
	12	Calculated Thickness Use {Thickness Class Thickness	.63 25 .64	.65 25 .64	.67 26 .69	.69 26 .69	.71 26 .69	.74 27 .75	.76 27 .75
	16	Calculated Thickness Use {Thickness Class Thickness	.67 26 .69	.68 26 .69	.70 26 .69	.72 27 .75	.74 27 .75	.76 27 .75	.79 28 .81
B	2½	Calculated Thickness Use {Thickness Class Thickness	.47* 21 .48	.49* 21 .48	.51* 22 .51	.52* 22 .51	.54* 23 .55	.57* 24 .59	.62 25 .64
	3½	Calculated Thickness Use {Thickness Class Thickness	.46* 21 .48	.47* 21 .48	.49* 22 .51	.51* 22 .51	.54 23 .55	.57 24 .59	.63 25 .64
	5	Calculated Thickness Use {Thickness Class Thickness	.48* 21 .48	.49* 22 .51	.52 22 .51	.54 23 .55	.57 24 .59	.61 24 .59	.65 25 .64
	8	Calculated Thickness Use {Thickness Class Thickness	.54 23 .55	.56 23 .55	.58 24 .59	.61 24 .59	.63 25 .64	.66 25 .64	.69 26 .69
	12	Calculated Thickness Use {Thickness Class Thickness	.59 24 .59	.61 24 .59	.63 25 .64	.65 25 .64	.68 26 .69	.70 26 .69	.73 27 .75
	16	Calculated Thickness Use {Thickness Class Thickness	.62 25 .64	.64 25 .64	.66 25 .64	.68 26 .69	.70 26 .69	.73 27 .75	.75 27 .75
F	2½	Calculated Thickness Use {Thickness Class Thickness	.44* 21 .48	.45* 21 .48	.47* 21 .48	.49* 21 .48	.52 22 .51	.57 24 .59	.61 24 .59
	3½	Calculated Thickness Use {Thickness Class Thickness	.44* 21 .48	.45* 21 .48	.47 21 .48	.50 22 .51	.53 23 .55	.57 24 .59	.62 25 .64
	5	Calculated Thickness Use {Thickness Class Thickness	.45 21 .48	.47 21 .48	.49 21 .48	.52 22 .51	.55 23 .55	.59 24 .59	.64 25 .64
	8	Calculated Thickness Use {Thickness Class Thickness	.50 22 .51	.52 22 .51	.54 23 .55	.57 24 .59	.60 24 .59	.64 25 .64	.66 25 .64
	12	Calculated Thickness Use {Thickness Class Thickness	.54 23 .55	.56 23 .55	.58 24 .59	.61 24 .59	.63 25 .64	.66 25 .64	.69 26 .69
	16	Calculated Thickness Use {Thickness Class Thickness	.57 24 .59	.58 24 .59	.60 24 .59	.63 25 .64	.65 25 .64	.68 26 .69	.71 26 .69

* Asterisk following total calculated thickness indicates that truck superload (Case 2) is the controlling factor. When total calculated thickness is not followed by asterisk, surge pressure (Case 1) is the controlling factor. See Sec. 1-2.1.

TABLE 1-1 (Continued)
Schedule of Barrel Thickness for Water Pipe of 18/40 Iron Strength

Laying Condition	Depth of Cover <i>ft</i>	Thickness Specifications	Internal Pressure— <i>psi</i>						
			50	100	150	200	250	300	350
			Barrel Thicknesses—in.						
Sixteen-Inch Water Pipe									
A	2½	Calculated Thickness Use {Thickness Class Thickness	.54* 22 .54	.56* 23 .58	.58* 23 .58	.60* 23 .58	.62* 24 .63	.65* 24 .63	.68* 25 .68
	3½	Calculated Thickness Use {Thickness Class Thickness	.54* 22 .54	.55* 22 .54	.57* 23 .58	.59* 23 .58	.61 24 .63	.65 24 .63	.70 25 .68
	5	Calculated Thickness Use {Thickness Class Thickness	.56* 23 .58	.57* 23 .58	.59* 23 .58	.61* 24 .63	.64 24 .63	.68 25 .68	.72 26 .73
	8	Calculated Thickness Use {Thickness Class Thickness	.62 24 .63	.64 24 .63	.66 25 .68	.69 25 .68	.72 26 .73	.75 26 .73	.78 27 .79
	12	Calculated Thickness Use {Thickness Class Thickness	.68 25 .68	.70 25 .68	.72 26 .73	.74 26 .73	.77 27 .79	.80 27 .79	.83 28 .85
	16	Calculated Thickness Use {Thickness Class Thickness	.72 26 .73	.74 26 .73	.76 27 .79	.78 27 .79	.81 27 .79	.83 28 .85	.86 28 .85
B	2½	Calculated Thickness Use {Thickness Class Thickness	.50* 21 .50	.52* 22 .54	.54* 22 .54	.56* 23 .58	.56* 23 .58	.62* 24 .63	.65* 25 .68
	3½	Calculated Thickness Use {Thickness Class Thickness	.50* 21 .50	.52* 22 .54	.53* 22 .54	.56* 23 .58	.59 23 .58	.63 24 .63	.68 25 .68
	5	Calculated Thickness Use {Thickness Class Thickness	.52* 22 .54	.53* 22 .54	.55* 22 .54	.58 23 .58	.62 24 .63	.66 25 .68	.70 25 .68
	8	Calculated Thickness Use {Thickness Class Thickness	.58 23 .58	.60 23 .58	.62 24 .63	.65 24 .63	.68 25 .68	.71 26 .73	.75 26 .73
	12	Calculated Thickness Use {Thickness Class Thickness	.63 24 .63	.65 24 .63	.68 25 .68	.70 25 .68	.73 26 .73	.76 27 .79	.79 27 .79
	16	Calculated Thickness Use {Thickness Class Thickness	.67 25 .68	.69 25 .68	.71 26 .73	.73 26 .73	.76 27 .79	.79 27 .79	.82 28 .85
F	2½	Calculated Thickness Use {Thickness Class Thickness	.47* 21 .50	.48* 21 .50	.50* 21 .50	.52* 22 .54	.56 23 .58	.61 24 .63	.67 25 .68
	3½	Calculated Thickness Use {Thickness Class Thickness	.46* 21 .50	.47* 21 .50	.50 21 .50	.53 22 .54	.57 23 .58	.62 24 .63	.67 25 .68
	5	Calculated Thickness Use {Thickness Class Thickness	.48* 21 .50	.50 21 .50	.52 22 .54	.56 23 .58	.59 23 .58	.64 24 .63	.68 25 .68
	8	Calculated Thickness Use {Thickness Class Thickness	.53 22 .54	.55 22 .54	.58 23 .58	.61 24 .63	.64 24 .63	.68 25 .68	.72 26 .73
	12	Calculated Thickness Use {Thickness Class Thickness	.57 23 .58	.59 23 .58	.62 24 .63	.65 24 .63	.68 25 .68	.71 26 .73	.75 26 .73
	16	Calculated Thickness Use {Thickness Class Thickness	.61 24 .63	.63 24 .63	.65 24 .63	.68 25 .68	.71 26 .73	.74 26 .73	.77 27 .79

* Asterisk following total calculated thickness indicates that truck superload (Case 2) is the controlling factor. When total calculated thickness is not followed by asterisk, surge pressure (Case 1) is the controlling factor. See Sec. 1-2.1.

TABLE 1-1 (Continued)
Schedule of Barrel Thickness for Water Pipe of 18/40 Iron Strength

Laying Condi- tion	Depth of Cover <i>ft</i>	Thickness Specifications	Internal Pressure— <i>psi</i>						
			50	100	150	200	250	300	350
			Barrel Thicknesses— <i>in.</i>						
Eighteen-Inch Water Pipe									
A	2½	Calculated Thickness Use {Thickness Class Thickness	.58* 22 .58	.60* 22 .58	.62* 23 .63	.65* 23 .63	.67* 24 .68	.70* 24 .68	.74* 25 .73
	3½	Calculated Thickness Use {Thickness Class Thickness	.58* 22 .58	.56* 22 .58	.62* 23 .63	.64* 23 .63	.67* 24 .68	.70 24 .68	.76 26 .79
	5	Calculated Thickness Use {Thickness Class Thickness	.60* 22 .58	.62* 23 .63	.64* 23 .63	.67 24 .68	.70 24 .68	.75 25 .73	.79 26 .79
	8	Calculated Thickness Use {Thickness Class Thickness	.67 24 .68	.69 24 .68	.72 25 .73	.74 25 .73	.77 26 .79	.81 26 .79	.85 27 .85
	12	Calculated Thickness Use {Thickness Class Thickness	.73 25 .73	.75 25 .73	.78 26 .79	.80 26 .79	.83 27 .85	.86 27 .85	.90 28 .92
	16	Calculated Thickness Use {Thickness Class Thickness	.77 26 .79	.80 26 .79	.82 27 .85	.85 27 .85	.88 27 .85	.91 28 .92	.95 28 .92
B	2½	Calculated Thickness Use {Thickness Class Thickness	.54* 21 .54	.56* 22 .58	.58* 22 .58	.60* 22 .58	.63* 23 .63	.67 24 .68	.73 25 .73
	3½	Calculated Thickness Use {Thickness Class Thickness	.53* 21 .54	.55* 21 .54	.57* 22 .58	.60 22 .58	.64 23 .63	.69 24 .68	.75 25 .73
	5	Calculated Thickness Use {Thickness Class Thickness	.55* 21 .54	.58* 22 .58	.60 22 .58	.63 23 .63	.67 24 .68	.72 25 .73	.77 26 .79
	8	Calculated Thickness Use {Thickness Class Thickness	.62 23 .63	.64 23 .63	.67 24 .68	.70 24 .68	.74 25 .73	.77 26 .79	.82 27 .85
	12	Calculated Thickness Use {Thickness Class Thickness	.68 24 .68	.70 24 .68	.73 25 .73	.75 25 .73	.78 26 .79	.82 27 .85	.86 27 .85
	16	Calculated Thickness Use {Thickness Class Thickness	.72 25 .73	.74 25 .73	.76 26 .79	.79 26 .79	.82 27 .85	.85 27 .85	.89 28 .92
F	2½	Calculated Thickness Use {Thickness Class Thickness	.50* 21 .54	.51* 21 .54	.53* 21 .54	.56* 22 .58	.61 23 .63	.67 24 .68	.73 25 .73
	3½	Calculated Thickness Use {Thickness Class Thickness	.49* 21 .54	.51 21 .54	.53 21 .54	.57 22 .58	.62 23 .63	.67 24 .68	.73 25 .73
	5	Calculated Thickness Use {Thickness Class Thickness	.51* 21 .54	.53 21 .54	.57 22 .58	.60 22 .58	.65 23 .63	.70 24 .68	.75 25 .73
	8	Calculated Thickness Use {Thickness Class Thickness	.57 22 .58	.59 22 .58	.62 23 .63	.65 23 .63	.69 24 .68	.74 25 .73	.78 26 .79
	12	Calculated Thickness Use {Thickness Class Thickness	.61 23 .63	.64 23 .63	.67 24 .68	.70 24 .68	.73 25 .73	.77 26 .79	.81 26 .79
	16	Calculated Thickness Use {Thickness Class Thickness	.65 23 .63	.67 24 .68	.69 24 .68	.72 25 .73	.76 26 .79	.80 26 .79	.84 27 .85

* Asterisk following total calculated thickness indicates that truck superload (Case 2) is the controlling factor. When total calculated thickness is not followed by asterisk, surge pressure (Case 1) is the controlling factor. See Sec. 1-2.1.

TABLE 1-1 (Continued)
Schedule of Barrel Thickness for Water Pipe of 18/40 Iron Strength

Laying Condi- tion	Depth of Cover ft	Thickness Specifications	Internal Pressure— <i>psi</i>						
			50	100	150	200	250	300	350
			Barrel Thicknesses—in.						
Twenty-Inch Water Pipe									
A	2½	Calculated Thickness Use {Thickness Class Thickness	.62* 22 .62	.65* 23 .67	.67* 23 .67	.70* 24 .72	.73* 24 .72	.76* 25 .78	.80* 25 .78
	3½	Calculated Thickness Use {Thickness Class Thickness	.62* 22 .62	.64* 22 .62	.66* 23 .67	.69* 23 .67	.72* 24 .72	.76* 25 .78	.80 26 .84
	5	Calculated Thickness Use {Thickness Class Thickness	.65* 23 .67	.67* 23 .67	.69* 23 .67	.72* 24 .72	.75* 25 .78	.80 25 .78	.85 26 .84
	8	Calculated Thickness Use {Thickness Class Thickness	.71 24 .72	.73 24 .72	.76 25 .78	.79 25 .78	.83 26 .84	.87 26 .84	.91 27 .91
	12	Calculated Thickness Use {Thickness Class Thickness	.78 25 .78	.80 25 .78	.83 26 .84	.86 26 .84	.89 27 .91	.93 27 .91	.97 28 .98
	16	Calculated Thickness Use {Thickness Class Thickness	.83 26 .84	.86 26 .84	.88 27 .91	.91 27 .91	.94 27 .91	.97 28 .98	1.01 28 .98
B	2½	Calculated Thickness Use {Thickness Class Thickness	.57* 21 .57	.59* 21 .57	.62* 22 .62	.65* 23 .67	.68* 23 .67	.72 24 .72	.78 25 .78
	3½	Calculated Thickness Use {Thickness Class Thickness	.57* 21 .57	.58* 21 .57	.62* 22 .62	.64* 22 .62	.68 23 .67	.74 24 .72	.80 25 .78
	5	Calculated Thickness Use {Thickness Class Thickness	.59* 21 .57	.61* 22 .62	.64* 22 .62	.67 23 .67	.72 24 .72	.77 25 .78	.82 26 .84
	8	Calculated Thickness Use {Thickness Class Thickness	.65 23 .67	.68 23 .67	.71 24 .72	.74 24 .72	.78 25 .78	.82 26 .84	.87 26 .84
	12	Calculated Thickness Use {Thickness Class Thickness	.71 24 .72	.74 24 .72	.77 25 .78	.80 25 .78	.84 26 .84	.87 26 .84	.92 27 .91
	16	Calculated Thickness Use {Thickness Class Thickness	.76 25 .78	.78 25 .78	.81 26 .84	.84 26 .84	.87 26 .84	.91 27 .91	.95 28 .98
F	2½	Calculated Thickness Use {Thickness Class Thickness	.51* 21 .57	.53* 21 .57	.57* 21 .57	.60* 22 .62	.64 22 .62	.70 24 .72	.77 25 .78
	3½	Calculated Thickness Use {Thickness Class Thickness	.52 21 .57	.54 21 .57	.57 21 .57	.61 22 .62	.66 23 .67	.72 24 .72	.78 25 .78
	5	Calculated Thickness Use {Thickness Class Thickness	.53 21 .57	.56 21 .57	.60 22 .62	.64 22 .62	.69 23 .67	.74 24 .72	.80 25 .78
	8	Calculated Thickness Use {Thickness Class Thickness	.60 22 .62	.62 22 .62	.65 23 .67	.69 23 .67	.73 24 .72	.78 25 .78	.83 26 .84
	12	Calculated Thickness Use {Thickness Class Thickness	.65 23 .67	.68 23 .67	.71 24 .72	.74 24 .72	.78 25 .78	.82 26 .84	.87 26 .84
	16	Calculated Thickness Use {Thickness Class Thickness	.69 23 .67	.71 24 .72	.74 24 .72	.77 25 .78	.81 26 .84	.85 26 .84	.90 27 .91

* Asterisk following total calculated thickness indicates that truck superload (Case 2) is the controlling factor. When total calculated thickness is not followed by asterisk, surge pressure (Case 1) is the controlling factor. See Sec. 1-2.1.

TABLE 1-1 (Continued)
Schedule of Barrel Thickness for Water Pipe of 18/40 Iron Strength

Laying Condi- tion	Depth of Cover <i>ft</i>	Thickness Specifications	Internal Pressure— <i>psi</i>						
			50	100	150	200	250	300	350
			Barrel Thicknesses— <i>in.</i>						
Twenty-four-Inch Water Pipe									
A	2½	Calculated Thickness Use {Thickness Class Thickness	.69* 22 .68	.72* 23 .73	.75* 23 .73	.78* 24 .79	.82* 25 .85	.86* 25 .85	.91* 26 .92
	3½	Calculated Thickness Use {Thickness Class Thickness	.69* 22 .68	.71* 23 .73	.74* 23 .73	.78* 24 .79	.81* 24 .79	.86 25 .85	.93 26 .92
	5	Calculated Thickness Use {Thickness Class Thickness	.72* 23 .73	.75* 23 .73	.78* 24 .79	.81* 24 .79	.85* 25 .85	.91 26 .92	.96 27 .99
	8	Calculated Thickness Use {Thickness Class Thickness	.80 24 .79	.82 25 .85	.86 25 .85	.90 26 .92	.94 26 .92	.99 27 .99	1.04 28 1.07
	12	Calculated Thickness Use {Thickness Class Thickness	.88 25 .85	.91 26 .92	.94 26 .92	.98 27 .99	1.02 27 .99	1.06 28 1.07	1.10 28 1.07
	16	Calculated Thickness Use {Thickness Class Thickness	.94 26 .92	.97 27 .99	1.00 27 .99	1.03 28 1.07	1.07 28 1.07	1.11 28 1.07	1.15 29 1.16
B	2½	Calculated Thickness Use {Thickness Class Thickness	.63* 21 .63	.65* 21 .63	.68* 22 .68	.72* 23 .73	.76* 24 .79	.82 25 .85	.90 26 .92
	3½	Calculated Thickness Use {Thickness Class Thickness	.62* 21 .63	.65* 21 .63	.68* 22 .68	.71* 23 .73	.77 24 .79	.84 25 .85	.91 26 .92
	5	Calculated Thickness Use {Thickness Class Thickness	.65* 21 .63	.67* 22 .68	.71* 23 .73	.76 24 .79	.81 24 .79	.88 25 .85	.94 26 .92
	8	Calculated Thickness Use {Thickness Class Thickness	.72 23 .73	.75 23 .73	.79 24 .79	.83 25 .85	.88 25 .85	.94 26 .92	.99 27 .99
	12	Calculated Thickness Use {Thickness Class Thickness	.79 24 .79	.82 25 .85	.86 25 .85	.90 26 .92	.94 26 .92	.99 27 .99	1.04 28 1.07
	16	Calculated Thickness Use {Thickness Class Thickness	.85 25 .85	.88 25 .85	.91 26 .92	.95 26 .92	.99 27 .99	1.03 28 1.07	1.08 28 1.07
C	2½	Calculated Thickness Use {Thickness Class Thickness	.56* 21 .63	.58* 21 .63	.63* 21 .63	.67* 22 .68	.73 23 .73	.81 24 .79	.89 26 .92
	3½	Calculated Thickness Use {Thickness Class Thickness	.56* 21 .63	.59 21 .63	.63 21 .63	.69 22 .68	.75 23 .73	.82 25 .85	.90 26 .92
	5	Calculated Thickness Use {Thickness Class Thickness	.59 21 .63	.63 21 .63	.67 22 .68	.72 23 .73	.78 24 .79	.84 25 .85	.92 26 .92
	8	Calculated Thickness Use {Thickness Class Thickness	.66 22 .68	.69 22 .68	.73 23 .73	.77 24 .79	.83 25 .85	.89 26 .92	.95 26 .92
	12	Calculated Thickness Use {Thickness Class Thickness	.72 23 .73	.75 23 .73	.79 24 .79	.83 25 .85	.88 25 .85	.93 26 .92	.99 27 .99
	16	Calculated Thickness Use {Thickness Class Thickness	.77 24 .79	.80 24 .79	.83 25 .85	.87 25 .85	.91 26 .92	.96 27 .99	1.02 27 .99

* Asterisk following total calculated thickness indicates that truck superload (Case 2) is the controlling factor. When total calculated thickness is not followed by asterisk, surge pressure (Case 1) is the controlling factor. See Sec. 1-2.1.

TABLE 1-1 (Continued)
Schedule of Barrel Thickness for Water Pipe of 18/40 Iron Strength

Laying Condi- tion	Depth of Cover <i>ft</i>	Thickness Specifications	Internal Pressure— <i>psi</i>						
			50	100	150	200	250	300	350
			Barrel Thicknesses— <i>in.</i>						
Thirty-Inch Water Pipe									
A	2½	Calculated Thickness Use { Thickness Class Thickness	.83* 23 .85	.86* 23 .85	.90* 24 .92	.94* 24 .92	.98* 25 .99	1.04* 26 1.07	1.10 26 1.07
	3½	Calculated Thickness Use { Thickness Class Thickness	.82* 23 .85	.85* 23 .85	.89* 24 .92	.93* 24 .92	.98* 25 .99	1.04 26 1.07	1.12 27 1.16
	5	Calculated Thickness Use { Thickness Class Thickness	.86* 23 .85	.90* 24 .92	.93* 24 .92	.97* 25 .99	1.03 26 1.07	1.10 26 1.07	1.18 27 1.16
	8	Calculated Thickness Use { Thickness Class Thickness	.94* 24 .92	.98 25 .99	1.02 25 .99	1.07 26 1.07	1.12 27 1.16	1.19 27 1.16	1.25 28 1.25
	12	Calculated Thickness Use { Thickness Class Thickness	1.05 26 1.07	1.08 26 1.07	1.12 27 1.16	1.17 27 1.16	1.22 28 1.25	1.28 28 1.25	1.33 29 1.35
	16	Calculated Thickness Use { Thickness Class Thickness	1.13 27 1.16	1.17 27 1.16	1.20 27 1.16	1.25 28 1.25	1.29 28 1.25	1.35 29 1.35	1.40 29 1.35
B	2½	Calculated Thickness Use { Thickness Class Thickness	.74* 21 .73	.77* 22 .79	.81* 22 .79	.85* 23 .85	.90* 24 .92	.99 25 .99	1.09 26 1.07
	3½	Calculated Thickness Use { Thickness Class Thickness	.73* 21 .73	.76* 22 .79	.80* 22 .79	.85* 23 .85	.92 24 .92	1.01 25 .99	1.10 26 1.07
	5	Calculated Thickness Use { Thickness Class Thickness	.77* 22 .79	.80* 22 .79	.84* 23 .85	.90 24 .92	.97 25 .99	1.05 26 1.07	1.13 27 1.16
	8	Calculated Thickness Use { Thickness Class Thickness	.84 23 .85	.88 23 .85	.93 24 .92	.98 25 .99	1.05 26 1.07	1.11 26 1.07	1.18 27 1.16
	12	Calculated Thickness Use { Thickness Class Thickness	.93 24 .92	.97 25 .99	1.01 25 .99	1.06 26 1.07	1.12 27 1.16	1.18 27 1.16	1.25 28 1.25
	16	Calculated Thickness Use { Thickness Class Thickness	1.00 25 .99	1.04 26 1.07	1.08 26 1.07	1.13 27 1.16	1.18 27 1.16	1.24 28 1.25	1.30 29 1.35
F	2½	Calculated Thickness Use { Thickness Class Thickness	.66* 21 .73	.70* 21 .73	.74* 21 .73	.79* 22 .79	.88 23 .85	.98 25 .99	1.08 26 1.07
	3½	Calculated Thickness Use { Thickness Class Thickness	.66* 21 .73	.70* 21 .73	.74* 21 .73	.80 22 .79	.90 24 .92	1.00 25 .99	1.10 26 1.07
	5	Calculated Thickness Use { Thickness Class Thickness	.70* 21 .73	.73* 21 .73	.79 22 .79	.86 23 .85	.93 24 .92	1.01 25 .99	1.11 26 1.07
	8	Calculated Thickness Use { Thickness Class Thickness	.77 22 .79	.81 22 .79	.86 23 .85	.93 24 .92	1.00 25 .99	1.07 26 1.07	1.15 27 1.16
	12	Calculated Thickness Use { Thickness Class Thickness	.85 23 .85	.89 24 .92	.94 24 .92	.99 25 .99	1.05 26 1.07	1.12 27 1.16	1.20 27 1.16
	16	Ca culated Thickness Use { Thickness Class Thickness	.91 24 .92	.95 24 .92	.99 25 .99	1.04 26 1.07	1.10 26 1.07	1.16 27 1.16	1.23 28 1.25

* Asterisk following total calculated thickness indicates that truck superload (Case 2) is the controlling factor. When total calculated thickness is not followed by asterisk, surge pressure (Case 1) is the controlling factor. See Sec. 1-2.1.

TABLE 1-1 (Continued)
Schedule of Barrel Thickness for Water Pipe of 18/40 Iron Strength

Laying Condition	Depth of Cover <i>ft</i>	Thickness Specifications	Internal Pressure— <i>psi</i>						
			50	100	150	200	250	300	350
			Barrel Thicknesses— <i>in.</i>						
Thirty-six-Inch Water Pipe									
A	2½	Calculated Thickness Use {Thickness Class Thickness	.94* 23 .94	.98* 24 1.02	1.02* 24 1.02	1.07* 25 1.10	1.13* 25 1.10	1.19* 26 1.19	1.27 27 1.29
	3½	Calculated Thickness Use {Thickness Class Thickness	.93* 23 .94	.97* 23 .94	1.02* 24 1.02	1.07* 25 1.10	1.12* 25 1.10	1.19 26 1.19	1.31 27 1.29
	5	Calculated Thickness Use {Thickness Class Thickness	.98* 24 1.02	1.02* 24 1.02	1.07* 25 1.10	1.12* 25 1.10	1.17* 26 1.19	1.26 27 1.29	1.35 28 1.39
	8	Calculated Thickness Use {Thickness Class Thickness	1.07* 25 1.10	1.11* 25 1.10	1.16 26 1.19	1.22 26 1.19	1.28 27 1.29	1.36 28 1.39	1.44 28 1.39
	12	Calculated Thickness Use {Thickness Class Thickness	1.19 26 1.19	1.24 27 1.29	1.28 27 1.29	1.34 28 1.39	1.40 28 1.39	1.47 29 1.50	1.54 29 1.50
	1	Calculated Thickness Use {Thickness Class Thickness	1.29 27 1.29	1.33 27 1.29	1.38 28 1.39	1.43 28 1.39	1.49 29 1.50	1.55 29 1.50	1.62 30 1.62
B	2½	Calculated Thickness Use {Thickness Class Thickness	.82* 21 .81	.86* 22 .87	.91* 23 .94	.97* 23 .94	1.03* 24 1.02	1.14 25 1.10	1.26 27 1.29
	3½	Calculated Thickness Use {Thickness Class Thickness	.81* 21 .81	.85* 22 .87	.90* 22 .87	.96* 23 .94	1.04 24 1.02	1.15 26 1.19	1.28 27 1.29
	5	Calculated Thickness Use {Thickness Class Thickness	.86* 22 .87	.90* 22 .87	.94* 23 .94	1.01 24 1.02	1.10 25 1.10	1.20 26 1.19	1.30 27 1.29
	8	Calculated Thickness Use {Thickness Class Thickness	.94 23 .94	.99 24 1.02	1.05 24 1.02	1.11 25 1.10	1.18 26 1.19	1.27 27 1.29	1.36 28 1.39
	12	Calculated Thickness Use {Thickness Class Thickness	1.05 24 1.02	1.09 25 1.10	1.14 25 1.10	1.20 26 1.19	1.27 27 1.29	1.34 28 1.39	1.43 28 1.39
	16	Calculated Thickness Use {Thickness Class Thickness	1.12 25 1.10	1.17 26 1.19	1.22 26 1.19	1.27 27 1.29	1.34 28 1.39	1.40 28 1.39	1.48 29 1.50
F	2½	Calculated Thickness Use {Thickness Class Thickness	.73* 21 .81	.79* 21 .81	.84* 22 .87	.89 22 .87	1.01 24 1.02	1.13 25 1.10	1.25 27 1.29
	3½	Calculated Thickness Use {Thickness Class Thickness	.73* 21 .81	.78* 21 .81	.83* 21 .81	.92 23 .94	1.03 24 1.02	1.14 25 1.10	1.26 27 1.29
	5	Calculated Thickness Use {Thickness Class Thickness	.78* 21 .81	.82* 21 .81	.89 22 .87	.97 23 .94	1.07 25 1.10	1.17 26 1.19	1.28 27 1.29
	8	Calculated Thickness Use {Thickness Class Thickness	.86 22 .87	.91 23 .94	.97 23 .94	1.04 24 1.02	1.13 25 1.10	1.22 26 1.19	1.33 27 1.29
	12	Calculated Thickness Use {Thickness Class Thickness	.95 23 .94	1.00 24 1.02	1.06 25 1.10	1.12 25 1.10	1.20 26 1.19	1.28 27 1.29	1.37 28 1.39
	16	Calculated Thickness Use {Thickness Class Thickness	1.02 24 1.02	1.07 25 1.10	1.12 25 1.10	1.18 26 1.19	1.25 27 1.29	1.33 27 1.29	1.42 28 1.39

* Asterisk following total calculated thickness indicates that truck superload (Case 2) is the controlling factor.
 When total calculated thickness is not followed by asterisk, surge pressure (Case 1) is the controlling factor.
 Sec. 1-2.1.

TABLE 1-1 (Continued)
Schedule of Barrel Thickness for Water Pipe of 18/40 Iron Strength

Laying Condition	Depth of Cover <i>ft</i>	Thickness Specifications	Internal Pressure— <i>psi</i>						
			50	100	150	200	250	300	350
			Barrel Thicknesses— <i>in.</i>						
Forty-two-Inch Water Pipe									
A	2½	Calculated Thickness Use {Thickness Class Thickness	1.04* 23 1.05	1.08* 23 1.05	1.14* 24 1.13	1.20* 25 1.22	1.27* 26 1.32	1.34* 26 1.32	1.43 27 1.43
	3½	Calculated Thickness Use {Thickness Class Thickness	1.04* 23 1.05	1.08* 23 1.05	1.14* 24 1.13	1.20* 25 1.22	1.27* 26 1.32	1.33 26 1.32	1.46 27 1.43
	5	Calculated Thickness Use {Thickness Class Thickness	1.09* 24 1.13	1.14* 24 1.13	1.19* 25 1.22	1.25* 25 1.22	1.32* 26 1.32	1.43 27 1.43	1.52 28 1.54
	8	Calculated Thickness Use {Thickness Class Thickness	1.19* 25 1.22	1.24* 25 1.22	1.30 26 1.32	1.37 26 1.32	1.45 27 1.43	1.53 28 1.54	1.63 29 1.66
	12	Calculated Thickness Use {Thickness Class Thickness	1.33 26 1.32	1.38 27 1.43	1.44 27 1.43	1.50 28 1.54	1.58 28 1.54	1.65 29 1.66	1.74 30 1.79
	16	Calculated Thickness Use {Thickness Class Thickness	1.46 27 1.43	1.51 28 1.54	1.56 28 1.54	1.62 29 1.66	1.68 29 1.66	1.75 30 1.79	1.83 30 1.79
B	2½	Calculated Thickness Use {Thickness Class Thickness	.89* 21 .90	.94* 22 .97	1.00* 22 .97	1.07* 23 1.05	1.14 24 1.13	1.28 26 1.32	1.42 27 1.43
	3½	Calculated Thickness Use {Thickness Class Thickness	.89* 21 .90	.94* 22 .97	1.00* 22 .97	1.07* 23 1.05	1.17 24 1.13	1.30 26 1.32	1.43 27 1.43
	5	Calculated Thickness Use {Thickness Class Thickness	.94* 22 .97	.98* 22 .97	1.04* 23 1.05	1.13 24 1.13	1.23 25 1.22	1.34 26 1.32	1.47 27 1.43
	8	Calculated Thickness Use {Thickness Class Thickness	1.04 23 1.05	1.09 24 1.13	1.16 24 1.13	1.23 25 1.22	1.32 26 1.32	1.42 27 1.43	1.53 28 1.54
	12	Calculated Thickness Use {Thickness Class Thickness	1.15 24 1.13	1.21 25 1.22	1.27 26 1.32	1.33 26 1.32	1.42 27 1.43	1.51 28 1.54	1.60 29 1.66
	16	Calculated Thickness Use {Thickness Class Thickness	1.25 25 1.22	1.30 26 1.32	1.36 26 1.32	1.43 27 1.43	1.50 28 1.54	1.58 28 1.54	1.67 29 1.66
F	2½	Calculated Thickness Use {Thickness Class Thickness	.80* 21 .90	.86* 21 .90	.92* 21 .90	1.00 22 .97	1.15 24 1.13	1.28 26 1.32	1.42 27 1.43
	3½	Calculated Thickness Use {Thickness Class Thickness	.80* 21 .90	.86* 21 .90	.92* 21 .90	1.04 23 1.05	1.17 24 1.13	1.29 26 1.32	1.43 27 1.43
	5	Calculated Thickness Use {Thickness Class Thickness	.85* 21 .90	.90* 21 .90	.98 22 .97	1.08 23 1.05	1.19 25 1.22	1.32 26 1.32	1.45 27 1.43
	8	Calculated Thickness Use {Thickness Class Thickness	.94 22 .97	1.00 22 .97	1.08 23 1.05	1.16 24 1.13	1.26 25 1.22	1.36 26 1.32	1.49 28 1.54
	12	Calculated Thickness Use {Thickness Class Thickness	1.05 23 1.05	1.10 24 1.13	1.17 24 1.13	1.25 25 1.22	1.34 26 1.32	1.43 27 1.43	1.54 28 1.54
	16	Calculated Thickness Use {Thickness Class Thickness	1.13 24 1.13	1.18 25 1.22	1.24 25 1.22	1.32 26 1.32	1.40 27 1.43	1.49 28 1.54	1.59 28 1.54

* Asterisk following total calculated thickness indicates that truck superload (Case 2) is the controlling factor. When total calculated thickness is not followed by asterisk, surge pressure (Case 1) is the controlling factor. See Sec. 1-2.1.

TABLE 1-1 (Continued)
Schedule of Barrel Thickness for Water Pipe of 18/40 Iron Strength

Laying Condition	Depth of Cover ft	Thickness Specifications	Internal Pressure— <i>psi</i>						
			50	100	150	200	250	300	350
			Barrel Thicknesses— <i>in.</i>						
Forty-eight-Inch Water Pipe									
A	2½	Calculated Thickness Use {Thickness Class Thickness	1.14* 23 1.14	1.19* 24 1.23	1.25* 24 1.23	1.32* 25 1.33	1.40* 26 1.44	1.49* 26 1.44	1.61 27 1.56
	3½	Calculated Thickness Use {Thickness Class Thickness	1.14* 23 1.14	1.20* 24 1.23	1.26* 24 1.23	1.33* 25 1.33	1.40* 26 1.44	1.50 27 1.56	1.66 28 1.68
	5	Calculated Thickness Use {Thickness Class Thickness	1.22* 24 1.23	1.27* 24 1.23	1.32* 25 1.33	1.39* 26 1.44	1.47 26 1.44	1.58 27 1.56	1.71 28 1.68
	8	Calculated Thickness Use {Thickness Class Thickness	1.33* 25 1.33	1.38* 25 1.33	1.44 26 1.44	1.53 27 1.56	1.61 27 1.56	1.71 28 1.68	1.83 29 1.81
	12	Calculated Thickness Use {Thickness Class Thickness	1.49 26 1.44	1.55 27 1.56	1.61 27 1.56	1.69 28 1.68	1.77 29 1.81	1.85 29 1.81	1.96 30 1.95
	16	Calculated Thickness Use {Thickness Class Thickness	1.63 28 1.68	1.68 28 1.68	1.74 28 1.68	1.81 29 1.81	1.89 30 1.95	1.98 30 1.95	2.08
B	2½	Calculated Thickness Use {Thickness Class Thickness	.97* 21 .98	1.03* 22 1.06	1.09* 22 1.06	1.17* 23 1.14	1.28 25 1.33	1.43 26 1.44	1.59 27 1.56
	3½	Calculated Thickness Use {Thickness Class Thickness	.98* 21 .98	1.03* 22 1.06	1.10* 23 1.14	1.17 23 1.14	1.31 25 1.33	1.45 26 1.44	1.61 27 1.56
	5	Calculated Thickness Use {Thickness Class Thickness	1.03* 22 1.06	1.09* 22 1.06	1.15* 23 1.14	1.25 24 1.23	1.37 25 1.33	1.50 27 1.56	1.65 28 1.68
	8	Calculated Thickness Use {Thickness Class Thickness	1.13 23 1.14	1.20 24 1.23	1.28 25 1.33	1.37 25 1.33	1.47 26 1.44	1.58 27 1.56	1.72 28 1.68
	12	Calculated Thickness Use {Thickness Class Thickness	1.28 25 1.33	1.34 25 1.33	1.41 26 1.44	1.49 26 1.44	1.58 27 1.56	1.69 28 1.68	1.80 29 1.81
	16	Calculated Thickness Use {Thickness Class Thickness	1.38 25 1.33	1.43 26 1.44	1.50 27 1.56	1.58 27 1.56	1.67 28 1.68	1.77 29 1.81	1.87 29 1.81
F	2½	Calculated Thickness Use {Thickness Class Thickness	.88* 21 .98	.93* 21 .98	1.00* 21 .98	1.12 23 1.14	1.27 24 1.23	1.43 26 1.44	1.59 27 1.56
	3½	Calculated Thickness Use {Thickness Class Thickness	.88* 21 .98	.94* 21 .98	1.01* 21 .98	1.14 23 1.14	1.29 25 1.33	1.44 26 1.44	1.60 27 1.56
	5	Calculated Thickness Use {Thickness Class Thickness	.93* 21 .98	.99* 21 .98	1.08 22 1.06	1.20 24 1.23	1.33 25 1.33	1.48 26 1.44	1.63 28 1.68
	8	Calculated Thickness Use {Thickness Class Thickness	1.03 22 1.06	1.10 23 1.14	1.19 24 1.23	1.28 25 1.33	1.40 26 1.44	1.52 27 1.56	1.67 28 1.68
	12	Calculated Thickness Use {Thickness Class Thickness	1.15 23 1.14	1.22 24 1.23	1.29 25 1.33	1.39 26 1.44	1.48 26 1.44	1.60 27 1.56	1.73 28 1.68
	16	Calculated Thickness Use {Thickness Class Thickness	1.25 24 1.23	1.31 25 1.33	1.38 25 1.33	1.46 26 1.44	1.56 27 1.56	1.67 28 1.68	1.78 29 1.81

* Asterisk following total calculated thickness indicates that truck superload (Case 2) is the controlling factor. When total calculated thickness is not followed by asterisk, surge pressure (Case 1) is the controlling factor. See Sec. 1-2.1.