SPECIFICATION FOR ELECTRIC-RESISTANCE-WELDED CARBON STEEL FEEDWATER HEATER TUBES

SA-557/SA-557M

(~~Identical with ASTM Specification A557/A557M-90a.~~)

Withdrawn

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1. Scope

1.1 This specification covers minimum-wall-thickness, electric-resistance-welded, carbon steel tubes including those bent, if specified, into the form of U-tubes for application in tubular feedwater heaters.

1.2 The tubing sizes covered shall be ⅛ to 1¼ in. [15.9 to 31.8 mm] outside diameter, inclusive, and wall thicknesses equal to or greater th

1.3 Optional supplementary r
and, when desired, shall be state

1.4 The values stated in either inch-pound units or SI units are to be regarded separately as standard. Within the text, the SI units are shown in brackets. The values stated in each system are not exact equivalents; therefore, each system must be used independently of the other. Combining values from the two systems may result in nonconformance with the specification. The inch-pound units shall apply unless the "M" designation of this specification is specified in the order.

2. Referenced Documents

2.1 *ASTM Standards:*

A 450/A 450M Specification for General Requirements for Carbon, Ferritic Alloy, and Austenitic Alloy Steel Tubes

E 30 Methods for Chemical Analysis of Steel, Cast Iron, Open-Hearth Iron, and Wrought Iron

3. General Requirements

3.1 Material furnished to this specification shall conform to the applicable requirements of the current edition of Specification A 450/A 450M, unless otherwise provided herein.

4. Ordering Information

4.1 Orders for material to this specification should include the following as required to describe the desired material adequately:

4.1.1 Quantity (feet, metres, or number of pieces).

4.1.2 Name of material (electric-resistance-welded steel tubing).

iameter and minimum

dom).

4.1.3 Manufacture (hot rolled or cold drawn; cold-rolled strip may be used as an alternate to hot-rolled strip).

4.1.6 Grade (Section 7) Table 1.

4.1.7 *Optional requirements* — If order specifies bending, a drawing of the U-tubes shall accompany the order. Purchaser must specify if stress-relief anneal of the U-bends is required (Product analysis, Section 8).

4.1.8 Test Report required (see Certification Section of Specification A 450/A 450M).

4.1.9 Specification designation.

4.1.10 Special requirements and any supplementary requirements selected.

5. Manufacture

5.1 *Manufacture* — Tubes shall be made by electric-resistance welding.

5.2 *Heat Treatment:*

5.2.1 Following welding, tubes shall be normalized at a temperature of at least 1600°F [860°C] followed by cooling in air or cooling in the cooling zone of continuous atmosphere controlled furnace.

5.2.2 If cold drawn, tubes shall be heated after the final cold-working operation to a temperature of at least 1200°F [640°C] to ensure ductility satisfactory for rolling into tube sheets and to meet the specified mechanical properties.

5.2.3 If heat treatment of the U-bends is specified, such heat treatment shall consist of heating the stressed portion within a range from 1100 to 1200°F [590 to 640°C].

6. Surface Condition

6.1 Finished tubes shall be free of scale but may have a superficial oxide film on the surfaces. A light-oxide scale on the outside and inside surfaces of U-bend shall be allowed for tubes which have been heat treated for relief of stress.

6.2 Finished tubes shall be coated on both outside and inside diameter with a thin paraffin oil to prevent corrosion in transit. Other types of coatings may be applied as mutually agreed upon and specified in the order.

7. Chemical Composition

7.1 The steel shall confor
as to chemical composition

7.2 For all tubes, the ste

7.3 When a grade is ordered under this specification, supplying an alloy grade that specifically requires the addition of any element other than those listed for the ordered grade in Table 1 is not permitted.

8. Product Analysis

8.1 When requested in the purchase order, a product analysis shall be made by the supplier from one tube or coil of steel per heat.

8.2 If the original test for product analysis fails, retests of two additional lengths of flat-rolled stock or tubes, shall be made. Both retests, for the elements in question shall meet the requirements of this specification; otherwise all remaining material in the heat shall be rejected or, at the option of the producer, each length of flat-rolled stock or tube may be individually tested for acceptance. Lengths of flat-rolled stock or tubes which do not meet the requirements of this specification shall be rejected.

8.3 For referee purposes, Methods E 30 shall be used.

9. Mechanical Requirements

9.1 *Tensile Properties* — The material shall conform to the requirements as to tensile properties prescribed in Table 2.

9.2 *Hardness Requirements* — The tubes shall not exceed the Rockwell Hardness shown in Table 3.

10. Permissible Variations in Dimensions

10.1 Permissible variations from the specified outside diameter shall be in accordance with the applicable portions of Specification A 450/A 450M. The height of flash on the inside of hot-rolled tubes shall be as specified in Specification A 450/A 450M. Cold-drawn tubes shall have no dimensional indication of welding flash. Tolerances for diameter and wall thickness do not apply to the bent portion of U-tubes. At the bent portion of a U-tube, for $R = 2 \times D$, neither the major nor minor diameter of the tube shall deviate from nominal by more than 10%.

10.2 Permissible variations from the specified minimum wall thickness shall not exceed + 18% − 0 for the straight tubing. The wall thickness of the U-tube in the bent section shall be not less than the value determined by:

$$t_f = T(2R)/(2R + D)$$

where:

ending, in. [mm],
be wall thickness, in. [mm],
s, in. [mm], and
diameter, in. [mm].

10.3 Permissible variations from the specified straight length shall be in accordance with Specification A 450/A 450M.

10.4 In the case of U-tubes, the length of the tube legs, as measured from the point of tangency of the bend and the tube leg to the end of the tube leg, shall not be less than specified, but may exceed the specified values by the amount given in Table 4. The difference in lengths of the tube legs shall not be greater than $\frac{1}{8}$ in. [3 mm] unless otherwise specified.

10.5 The end of any tube may depart from the square by not more than the amount given in Table 5.

10.6 The leg spacing measured between the points of tangency of the bend to the legs shall not vary from the value (2*R*-specified tube OD) by more than $\frac{1}{16}$ in. [1.5 mm] where *R* is the centerline bend radius.

10.7 The bent portion of the U-tube shall be substantially uniform in curvature and not exceed $\pm\frac{1}{16}$ in. [±1.5 mm] of the normal centerline radius.

11. Mechanical Tests Required

11.1 *Tension Test* — One tension test shall be made on a specimen for lots of not more than 50 tubes. Tension

tests shall be made on specimens from two tubes for lots of more than 50 tubes (Note 2).

NOTE 1 — For flattening and flange requirements, a lot consists of the 125 tubes.

NOTE 2 — For tension and hardness test requirements, the term *lot* applies to all tubes prior to cutting, of the same nominal diameter and wall thickness which are produced from the same heat of steel. When final heat treatment is in a batch-type furnace, a lot shall include only those tubes of the same size and the same heat which are heat treated in the same furnace charge. When the final heat treatment is in a continuous furnace, a lot shall include all tubes of the same size and heat, heat treated in the same furnace at the same temperature, time at heat and furnace speed.

11.2 *Flattening Test* — One flattening test as specified in Specification A 450/A 450M shall be made on a specimen taken from one tube from each lot (Note 1) or fraction thereof.

11.3 *Flange Test* — One flange test as specified in Specification A 450/A 450M shall be made on a specimen from one tube from each lot (Note 2) or fraction thereof. For Grades B and C, the width of the flange shall not be less than 75% of that specified in Specification A 450/A 450M.

11.4 *Reverse Flattening Test* — test shall be made on a specimen f of finished tubing.

11.5 *Hardness Test* — Brinell or Rockwell hardness tests shall be made on specimens from two tubes from each lot (Note 2). Method of testing and restrictions on wall thickness shall be in accordance with Specification A 450/A 450M.

11.6 *Hydrostatic Test* — Each U-tube shall be subjected to a hydrostatic test, using a noncorrosive fluid, or when agreed upon by the purchaser and manufacturer, they may be tested to 1½ times the specified design pressure.

11.7 Methods of mechanical testing, test specimens, retests and retreatment shall be in accordance with Specification A 450/A 450M.

12. Nondestructive Test (Electric Test)

12.1 Each tube shall be tested after the final heat treatment in accordance with the requirements of the nondestructive electric test in Specification A 450/A 450M.

13. Product Marking

13.1 Marking shall be in accordance with Specification A 450/A 450M. Symbols stamped or rolled into the tube surface are not permissible.

14. Packaging

14.1 option will box, crate, s, or bundle to ensure quiring extra operations the manufacturer must be specified on the order.

14.2 In case of U-tubes, each box shall be palletized and legibly marked with purchase order number, specification number, size, name of manufacturer, and identification of items contained.

FIG. 1 BENT PORTION OF U-TUBE

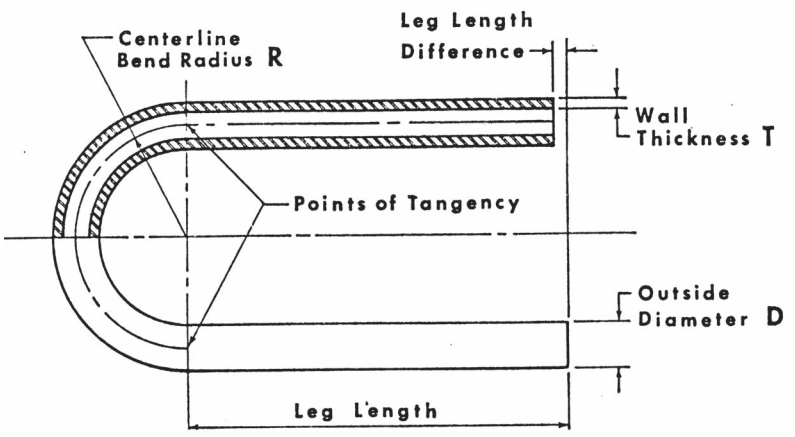

TABLE 1
CHEMICAL REQUIREMENTS

Element	Composition, %		
	Grade A2	Grade B2	Grade C2
Carbon, max	0.18	0.30	0.35
Manganese	0.27–0.63	0.27–0.93	0.27–1.06
Phosphorus, max	0.035	0.035	0.035
Sulfur, max	0.035	0.035	0.035

TABLE 2
TENSILE REQUIREMENTS

	Grade A2	Grade B2	Grade C2
Tensile strength, min, ksi [MPa]	47 [325]	60 [415]	70 [485]
Yield strength, min, ksi [MPa]	26 [180]	37 [255]	40 [275]
Elongation in 2 in. or 50 mm, min, % (longitudinal)	35	30	30

TAB
HARDNESS RE

Grade A	
Grade B	HRB 79
Grade C	HRB 89

TABLE 4
TUBE LEG LENGTH TOLERANCE

Leg Length, ft [m]	Plus Tolerance, in. [mm]
Up to 20 [6], incl	1/8 [3.2]
Over 20 to 30 [6 to 9], incl	5/32 [4.0]
Over 30 to 40 [9 to 12.2], incl	3/16 [4.8]

TABLE 5
SQUARENESS OF ENDS TOLERANCE

Tube OD, in. [mm]	Tolerance in. [mm]
5/8 [15.9]	0.010 [0.25]
Over 5/8 to 1 1/4 [15.9 to 31.7], incl	0.016 [0.4]

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SUPPLEMENTARY REQUIREMENTS

The following supplementary requirement or requirements may become a part of the specification when specified in the inquiry or invitation to bid, and purchase order or contract. These requirements shall not be considered unless specified in the order, in which event the necessary tests shall be made by the manufacturer prior to the bending or shipment of the tubing.

S1. Nondestructive Ultrasonic Test-Round Tubing (Commercial Grade)

S1.1 The manufacturer shall test the tubing by an ultrasonic nondestructive test for detection of harmful faults.

S1.1.1 Ultrasonic testing shall be performed using pulse-echo shear-wave techniques to locate longitudinal or circumferential defects, or both.

S1.1.2 Tubes being tested shall be reasonably straight for proper rotation. The outside and inside diameter surfaces of the tubes shall be free of dirt, grit, grease, oil, loose scale, or other materials which tend to attenuate, scatter, or reflect ultrasonic signa

S1.1.3 Tubing shall be insp of an appropriate length past a suitable transducer with r shall be prepared from toward transducer. a randomly selected tube of the same size, grade, and physical condition as the material to be tested.

S1.1.4 Suitable ultrasonic instrumentation shall be used to clearly distinguish the artificial defects (hereafter called "reference notches") described later. Automatic electronic monitoring of the reflected ultrasonic signals shall be provided in such manner that any naturally occurring defects which present an ultrasonic reflection equal to or greater than the reference standard(s) shall trigger audible and visible alarms.

S1.1.5 Instrument calibration as described herein shall be accomplished with the reference standard being rotated and fed past the transducer at the same approximate rate as the tubing to be tested.

S1.1.6 The following factors shall be adjusted so as to achieve optimum instrument distinction between the reference notch(es) and plain portion of tubing when calibrating equipment to the reference standard.

S1.1.6.1 Search unit position shall be such that shear waves are propagated within the tube being tested. If both outside and inside diameter reference notches are used, the optimum angle shall be used which will indicate both notches as close to equal size as possible.

S1.1.6.2 The test frequency to be used shall be chosen to yield the best distinction between reference notches and plain areas of tubing. In general, 2.25 or 5.0 MH will be used.

S1.1.6.3 Instrument sensitivity shall be adjusted to allow reference notch or notches to present a pip or pips on the scope screen at 50 to 70% of instrument saturation level. The automatic defect monitoring system shall be adjusted to monitor, by means of electronic gates, the portion of the screen where the reference notch is presented. The sensitivity of the alarm system shall be adjusted to indicate audibly and visibly when the reference notch is fed past the search unit.

S1.1.6.4 The recording equipment, if agreed upon, shall be adjusted to clearly indicate the reference notch or notches and also whether or not any reflected signals actu-

S1.1.8 The reference standard shall contain machined notches as follows: Notch to be 10% of wall thickness in depth but not less than 0.004 in. [0.10 mm]. Tolerance on depth shall be +0.0000 or −0.001 in. [0.03 mm].

S1.1.8.1 *Notch Locations and Orientation* — Notches shall be located on outside or inside diameter, or both, and shall be oriented to lie in a longitudinal direction for "radial" inspection or circumferentially for "transverse" inspection, or both. The notch or notches shall be located in the reference tube in such a manner that no physical or acoustical interference exists between notches or end of reference tube. These various locations and orientations will be classified as follows:

Type A — Longitudinal outside diameter for radial inspection,

Type B — Longitudinal inside diameter for radial inspection,

Type C — Circumferential outside diameter for transverse inspection, and

Type D — Circumferential inside diameter for transverse inspection.

S1.1.8.2 *Standard Nomenclature* — The size, location, and orientation of the reference notches which become

a part of a particular order covered under this specification shall be specified.

S1.1.9 The basic procedure will be to rotary feed all the tubes on the order past the search unit (transducer) with the feed helix less than the scanning width of the search unit. As the tubes are fed past the transducer, the alarm system shall be observed for indications of defects equal to or greater than the reference standard. Tubes that show such indication shall be rejected.

S1.1.10 Standard procedure will be to test the material in one direction of helical feed only. Testing in both directions may be done if so specified by customer.

S1.1.11 Any tubes that do not show indications above the level determined by the reference standard shall be held in a lot until the reference standard is run and instrument calibration is proved by triggering the alarm system on the reference notch or notches. After calibration is proved to have been correct, this lot of tubes shall be considered tested and accepted as to maximum defect size corresponding to the reference standard used.

S1.1.12 Rejected tubing may be salvaged by polishing or other suitable mean
after the elimination of the ca
that meets the dimensional re
triggering of the ultrasonic
shall be considered as having met the requirements of this supplement.

S2. Nondestructive Ultrasonic Test-Round Tubing (Select Commercial Grade)

S2.1 The manufacturer shall test the tubing using the procedure outlined in Supplementary Requirement S1, except for the notch depth. The notch shall be 5% of wall thickness in depth but not less than 0.004 in. [0.10 mm]. Tolerance on depth shall be +0.000, −0.005 in. [0.01 mm].

S3. Nondestructive Test (Eddy-Current Test)

S3.1 Each tube shall be tested after the finish heat treatment by passing through an electric nondestructive tester capable of detecting defects on the entire cross section of the tube. Suitable instrumentation shall be used to clearly distinguish artificial defects or reference notches. Tubes to be tested shall be reasonably straight and the outside and inside diameter surfaces shall be free of loose scale, metallic particles, or other material which would tend to restrict signals or create electrical noise. The tubing shall be inspected by feeding longitudinally through an inspection coil of a diameter suitable for the diameter of tubing to be inspected. The instrument calibration shall be accomplished with a reference standard prepared from an appropriate length of selected tubing of the same size, grade, and physical condition as the material to be inspected. The standard shall be fed through the coil at the same speed at which the inspection of the tubing is performed.

S3.1.1 The following factors will be selected or adjusted, or both, in accordance with the instrument manufacturer's instructions for the particular instrument involved as required to achieve optimum instrument distinction between the reference defects and plain portion of the tube. These as well as other factors involved shall not be used in such a manner that they detract from the instrument's overall ability to detect injurious defects:

S3.1.1.1 Test frequency.

S3.1.1.2 Direct-current saturation level.

S3.1.1.3 Filter networks.

S3.1.1.4 Phase analysis circuits.

S3.1.1.5 Coil diameter.

ain.

ndard shall contain longitudinal and circumferential notches in the outside diameter and shall be used to establish rejection level for the tubing to be tested. Inside diameter notches, both longitudinal and circumferential, shall also be a part of the reference standard. These notches may be larger than outside diameter notches and are intended for use only to assure instrument phase settings capable of yielding optimum inside diameter surface sensitivity. The outside diameter reference notches shall have a depth equal to 10% of the wall thickness. The tolerance of the notch shall be ±8% or 0.0005 in. [0.01 mm], whichever is the greater. Width of notch shall not exceed twice the depth. The length of the reference notches shall not exceed 0.375 in. [9.5 mm]. All tubing including that which may be reconditioned, provided the dimensional or other properties of the tubing are not adversely affected, and provided the tubing does not show indications above the level determined by the outside diameter references, shall meet this specification. This is contingent upon the instrument calibration being verified by indicating the standard outside diameter reference notches of a given lot. Tubes generating a signal above the calibration standard sensitivity level shall be rejected. Tubes may be reconditioned if not adversely affecting the dimensional or other properties of the tube and so tested as to assure a satisfactory tube within the limits of this specification. All tubing shall be demagnetized after inspection has been completed.

Table II-200-1
Other Acceptable ASTM Editions (Cont'd)

Specification	Latest Adopted [Note (1)]	Description	Other Acceptable Editions [Note (1)]
SA-553/SA-553M	17	Identical	87b through 17
SA-556/SA-556M	90a(1995) ε1	Identical	88 through 90a(1995) ε1
SA-557/SA-557M	~~90a~~	~~Identical~~	~~88 through 90a~~
SA-562/SA-562M	10	Identical	82(1987) through 10
SA-563	07a(2014)	Identical except for deletion of the term “private label distributor” in paras. 14.7 and 14.9 and editorially corrected title.	84 through 07a(2014)
SA-564/SA-564M	04(2009)	Identical	87b through 04(2009)
SA-568/SA-568M	07a	Identical General Requirements for Steel Sheet	02 through 07a
SA-572/SA-572M	18	Identical	01 through 18
SA-574	04 ε1	Identical except that Table 1 on chemical requirements has been deleted and Supplementary Requirement S1 is now mandatory. Paragraphs 6.1 and 6.2 have been revised to refer to Table S1.1 and para. 6.3 has been deleted.	97a through 04 ε1
SA-587	96(2005)	Identical except for deletion of 1.5.	88 through 96(2005)
SA-592/SA-592M	04(2009)	Identical	85 through 04(2009)
SA-609/SA-609M	91(2007)	Identical Ultrasonic Longitudinal Beam — Castings	83 through 91(2007)
SA-612/SA-612M	12(2019)	Identical	87 through 12(2019)
SA-638/SA-638M	00(2004)	Identical except for an editorial correction in 6.2.	87 through 00(2004)
SA-645/SA-645M	10(2016)	Identical	87(1991) through 10(2016)
SA-649/SA-649M	04	Identical	91a through 04
SA-656/SA-656M	13	Identical	00a through 13
SA-660	96(2010)	Identical	88 through 96(2010)
SA-662/SA-662M	17	Identical	86 through 17
SA-666	03	Identical	90 through 03
SA-667/SA-667M	87(2018)	Identical	...
SA-671/SA-671M	19	Identical except for additional requirements that apply as shown in Specification and, for editions prior to 16, certification for designations CF and CJ shall include the appropriate ASTM plate specification grade. For products ordered to Section III, Division 1, Supplementary Requirement S15 is mandatory.	85 through 19
SA-672/SA-672M	19	Identical. For products ordered to Section III, Division 1, Supplementary Requirement S15 is mandatory.	81 through 19
SA-675/SA-675M	03(2009)	Identical except that Supplementary Requirement S7 is mandatory and Grades 65 [450] and 70 [485] have been added to S7. Certification is mandatory.	...
SA-688/SA-688M	15	Identical. In the case of the -96 and -98 ASTM revisions, solution treatment of Grade UNS N08367 is mandatory.	88a through 15

(21)

Table 1A
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/Thickness, in.	P-No.	Group No.
1	Carbon steel	Sheet	SA–1008	CS–A	...	...	...	1	1
2	Carbon steel	Sheet	SA–1008	CS–B	...	...	...	1	1
3	Carbon steel	Bar	SA–675	45	...	...	...	1	1
4	Carbon steel	Wld. pipe	SA–134	A283A	...	...	...	1	1
5	Carbon steel	Plate	SA–283	A	...	...	...	1	1
6	Carbon steel	Plate	SA–285	A	K01700	...	...	1	1
7	Carbon steel	Wld. pipe	SA–672	A45	K01700	...	...	1	1
8	Carbon steel	Sheet	SA–414	A	K01501	...	...	1	1
9	Carbon steel	Wld. tube	SA–178	A	K01200	...	...	1	1
10	Carbon steel	Wld. tube	SA–178	A	K01200	...	...	1	1
11	Carbon steel	Smls. tube	SA–179	...	K01200	...	...	1	1
12	Carbon steel	Smls. tube	SA–192	...	K01201	...	...	1	1
13	Carbon steel	Wld. tube	SA–214	...	K01807	...	...	1	1
14	Carbon steel	Smls. tube	SA–556	A2	K01807	...	...	1	1
~~15~~	~~Carbon steel~~	~~Wld. tube~~	~~SA–557~~	~~A2~~	~~K01807~~	...	...	~~1~~	~~1~~
16	Carbon steel	Wld. pipe	SA–53	E/A	K02504	...	...	1	1
17	Carbon steel	Wld. pipe	SA–53	E/A	K02504	...	...	1	1
18	Carbon steel	Wld. pipe	SA–53	E/A	K02504	...	...	1	1
19	Carbon steel	Wld. pipe	SA–53	F/A	...	...	...	1	1
20	Carbon steel	Smls. pipe	SA–53	S/A	K02504	...	...	1	1
21	Carbon steel	Smls. pipe	SA–53	S/A	K02504	...	...	1	1
22	Carbon steel	Smls. pipe	SA–106	A	K02501	...	...	1	1
23	Carbon steel	Wld. pipe	SA–135	A	...	...	...	1	1
24	Carbon steel	Forged pipe	SA–369	FPA	K02501	...	...	1	1
25	Carbon steel	Wld. pipe	SA–587	...	K11500	...	...	1	1
26	Carbon steel	Wld. pipe	SA–587	...	K11500	...	...	1	1
27	Carbon steel	Bar	SA–675	50	...	...	...	1	1
28	Carbon steel	Bar	SA–675	50	...	...	...	1	1
29	Carbon steel	Wld. pipe	SA–134	A283B	...	...	...	1	1
30	Carbon steel	Plate	SA–283	B	...	...	...	1	1
31	Carbon steel	Plate	SA–285	B	K02200	...	...	1	1
32	Carbon steel	Plate	SA–285	B	K02200	...	...	1	1
33	Carbon steel	Wld. pipe	SA–672	A50	K02200	...	...	1	1
34	Carbon steel	Sheet	SA–414	B	K02201	...	...	1	1
35	Carbon steel	Plate	SA/EN 10028–3	P275NH	...	...	$6 < t \le 10$	1	1
36	Carbon steel	Plate	SA/EN 10028–2	P235GH	...	...	$\le 2\frac{1}{4}$	1	1
37	Carbon steel	Smls. tube	SA/EN 10216–2	P235GH	...	...	$1\frac{5}{8} < t \le 2\frac{1}{2}$	1	1
38	Carbon steel	Plate	SA/EN 10028–3	P275NH	...	...	$4 < t \le 6$	1	1
39	Carbon steel	Smls. tube	SA/EN 10216–2	P235GH	...	...	$\frac{5}{8} < t \le 1\frac{5}{8}$	1	1
40	Carbon steel	Smls. tube	SA/EN 10216–2	P235GH	...	...	$t \le \frac{5}{8}$	1	1
(21) 41	Carbon steel	Sheet, strip	SA–1011	36	SS	Type 1	$t \le 0.23$	...	...
42	Carbon steel	Plate	SA/EN 10028–3	P275NH	...	...	$2\frac{1}{4} < t \le 4$	1	1
(21) 43	Carbon steel	Sheet, strip	SA–1011	40	SS	...	$t \le 0.23$	...	...
(21) 44	Carbon steel	Sheet, strip	SA–1011	45	HSLAS	2	...	...	...
45	Carbon steel	Bar	SA–675	55	...	...	...	1	1

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Table 1A
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	40	20	NP	NP	650	NP	CS-6	...
2	40	20	NP	NP	650	NP	CS-6	...
3	45	22.5	NP	650 (Cl. 3 only)	900	650	CS-6	G10, G22, T10
4	45	24	NP	300 (Cl. 3 only)	NP	NP	CS-1	W12
5	45	24	NP	300 (Cl. 3 only)	650	650	CS-1	...
6	45	24	900	700	900	650	CS-1	G10, T2
7	45	24	NP	700	NP	NP	CS-1	S6, W10, W12
8	45	25	NP	NP	900	650	CS-1	G10, T2
9	47	26	1000	NP	NP	NP	CS-1	G4, G10, S1, T2, W13
10	47	26	1000	NP	1000	650	CS-1	G3, G10, G24, S1, T2, W6
11	47	26	NP	NP	900	650	CS-1	G10, T2
12	47	26	1000	NP	1000	650	CS-1	G10, S1, T2
13	47	26	NP	NP	1000	650	CS-1	G24, T2, W6
14	47	26	NP	NP	1000	650	CS-1	G10, T2
~~15~~	~~47~~	~~26~~	~~NP~~	~~NP~~	~~1000~~	~~650~~	~~CS-1~~	~~G24, T2, W6~~
16	48	30	900	NP	NP	NP	CS-2	G3, G10, S1, T2
17	48	30	900	300 (Cl. 3 only)	NP	NP	CS-2	G10, S1, T2, W12, W13
18	48	30	1000	NP	900	650	CS-2	G24, T2, W6
19	48	30	900	NP	NP	NP	CS-2	G2, G10, S10, T2, W15
20	48	30	900	300 (Cl. 3 only)	NP	NP	CS-2	G10, S1, T2
21	48	30	NP	700 (SPT)	900	650	CS-2	G10, T2
22	48	30	1000	700	1000	650	CS-2	G10, S1, T1
23	48	30	NP	NP	900	650	CS-2	G24, T2, W6
24	48	30	1000	NP	NP	NP	CS-2	G10, S1, T1
25	48	30	NP	300 (Cl. 3 only)	NP	NP	CS-2	...
26	48	30	NP	NP	850	650	CS-2	G24, T2, W6
27	50	25	NP	650 (Cl. 3 only)	NP	NP	CS-1	...
28	50	25	850	700 (SPT)	900	650	CS-1	G10, G15, G22, S1, T2
29	50	27	NP	300 (Cl. 3 only)	NP	NP	CS-1	W12
30	50	27	NP	300 (Cl. 3 only)	650	650	CS-1	...
31	50	27	900	NP	NP	NP	CS-1	G10, S1, T1
32	50	27	NP	700	900	650	CS-1	G10, T1
33	50	27	NP	700	NP	NP	CS-1	S6, T1, W10, W12
34	50	30	NP	NP	900	650	CS-2	G10, T1
35	51	31	NP	NP	400	NP	CS-2	G10
36	52	31	NP	NP	700	NP	CS-2	T11
37	52	31	1000	NP	1000	NP	CS-2	G10, S1, T2, W14
38	52	32.5	NP	NP	400	NP	CS-2	G10
39	52	32.5	1000	NP	1000	NP	CS-2	G10, S1, T2, W14
40	52	34	1000	NP	1000	NP	CS-2	G10, S1, T2, W14
41	53	36	NP	NP	600	600	CS-2	...
42	53.5	34	NP	NP	400	NP	CS-2	G10
43	55	40	NP	NP	600	600	CS-2	...
44	55	45	NP	NP	600	600	CS-3	...
45	55	27.5	850	700 (SPT)	900	650	CS-1	G10, G15, G22, S1, T2

Delete Line 15

Table 1A
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	150	200	250	300	400	500	600	650	700	750	800	850	900
1	11.4	11.4	11.4	...	11.4	11.4	10.9	10.2	9.99	...	...	...	...	...
2	11.4	11.4	11.4	...	11.4	11.4	10.9	10.2	9.9	...	...	...	...	...
3	12.9	12.9	12.9	...	12.9	12.8	12.2	11.5	11.1	10.7	10.4	*9.2*	*7.9*	*5.9*
4	12.9	...	12.9	...	12.9	...	...	...	...	...	...	...	...	...
5	12.9	12.9	12.9	...	12.9	12.9	12.9	12.3	11.9	...	...	...	...	...
6	12.9	12.9	12.9	...	12.9	12.9	12.9	12.3	11.9	11.5	*10.7*	*9.2*	*7.9*	*5.9*
7	12.9	...	12.9	...	12.9	12.9	12.9	12.3	11.9	11.5	...	...	...	...
8	12.9	12.9	12.9	...	12.9	12.9	12.9	12.8	12.4	11.9	*10.7*	*9.2*	*7.9*	*5.9*
9	13.4	...	13.4	...	13.4	13.4	13.4	13.3	12.8	12.4	*10.7*	*9.2*	*7.9*	*5.9*
10	11.4	11.4	11.4	...	11.4	11.4	11.4	11.3	10.9	10.5	*9.1*	*7.8*	*6.7*	*5.0*
11	13.4	13.4	13.4	...	13.4	13.4	13.4	13.3	12.8	12.4	*10.7*	*9.2*	*7.9*	*5.9*
12	13.4	13.4	13.4	...	13.4	13.4	13.4	13.3	12.8	12.4	*10.7*	*9.2*	*7.9*	*5.9*
13	11.4	11.4	11.4	...	11.4	11.4	11.4	11.3	10.9	10.5	*9.1*	*7.8*	*6.7*	*5.0*
14	13.4	13.4	13.4	...	13.4	13.4	13.4	13.3	12.8	12.4	*10.7*	*9.2*	*7.9*	*5.9*
~~15~~	~~11.4~~	~~11.4~~	~~11.4~~	~~...~~	~~11.4~~	~~11.4~~	~~11.4~~	~~11.3~~	~~10.9~~	~~10.5~~	~~*9.1*~~	~~*7.8*~~	~~*6.7*~~	~~*5.0*~~
16	11.7	...	11.7	...	11.7	11.7	11.7	11.7	11.7	10.6	*9.1*	*7.7*	*6.1*	*4.3*
17	13.7	...	13.7	...	13.7	13.7	13.7	13.7	13.7	12.5	*10.7*	*9.0*	*7.1*	*5.0*
18	11.7	...	...	...	11.7	11.7	11.7	11.7	11.7	10.6	*9.1*	*7.9*	*6.7*	*5.5*
19	8.2	...	...	...	8.2	8.2	8.2	8.2	8.2	7.5	*6.4*	...	...	...
20	13.7	...	...	...	13.7	13.7	13.7	13.7	13.7	12.5	*10.7*	*9.0*	*7.1*	*5.0*
21	13.7	13.7	13.7	...	13.7	13.7	13.7	13.7	13.7	12.5	*10.7*	*9.3*	*7.9*	*6.5*
22	13.7	13.7	13.7	...	13.7	13.7	13.7	13.7	13.7	*12.5*	*10.7*	*9.3*	*7.9*	*6.5*
23	11.7	11.7	11.7	...	11.7	11.7	11.7	11.7	11.7	10.6	*9.1*	*7.9*	*6.7*	*5.5*
24	13.7	...	13.7	...	13.7	13.7	13.7	13.7	13.7	*12.5*	*10.7*	*9.0*	*7.1*	*5.0*
25	13.7	...	13.7	...	13.7	...	...	...	...	...	...	...	...	...
26	11.7	11.7	11.7	...	11.7	11.7	11.7	11.7	11.7	10.6	*9.1*	*7.9*	*6.7*	...
27	14.3	...	14.3	...	14.3	14.2	13.6	12.8	12.4	...	...	...	...	...
28	14.3	14.3	14.3	...	14.3	14.2	13.6	12.8	12.4	11.9	*10.7*	*9.3*	*7.9*	*6.5*
29	14.3	...	14.3	...	14.3	...	...	...	...	...	...	...	...	...
30	14.3	14.3	14.3	...	14.3	14.3	14.3	13.8	13.3	...	...	...	...	...
31	14.3	...	14.3	...	14.3	14.3	14.3	13.8	13.3	*12.5*	*11.0*	*9.4*	*7.3*	*5.0*
32	14.3	14.3	14.3	...	14.3	14.3	14.3	13.8	13.3	*12.5*	*11.2*	*9.6*	*8.1*	*5.9*
33	14.3	...	14.3	...	14.3	14.3	14.3	13.8	13.3	*12.5*	...	...	...	...
34	14.3	14.3	14.3	...	14.3	14.3	14.3	14.3	14.3	*12.5*	*11.2*	*9.6*	*8.1*	*5.9*
35	14.5	14.5	14.5	...	14.5	14.5	...	...	...	...	...	...	...	...
36	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9	*14.6*	*12.5*	...	...	...	...
37	14.9	...	14.9	...	14.9	14.9	14.9	14.9	14.9	14.9	*13.0*	*10.8*	*8.7*	*5.9*
38	14.9	14.9	14.9	...	14.9	14.9	...	...	...	...	...	...	...	...
39	14.9	...	14.9	...	14.9	14.9	14.9	14.9	14.9	14.9	*13.0*	*10.8*	*8.7*	*5.9*
40	14.9	...	14.9	...	14.9	14.9	14.9	14.9	14.9	14.9	*13.0*	*10.8*	*8.7*	*5.9*
41	15.1	15.1	15.1	15.1	15.1	15.1	15.1	15.1	...	...	...	...	...	...
42	15.3	15.3	15.3	...	15.3	15.3	...	...	...	...	...	...	...	...
43	15.7	15.7	15.7	15.7	15.7	15.7	15.7	15.7	...	...	...	...	...	...
44	15.7	15.7	15.7	15.7	15.7	15.7	15.7	15.7	...	...	...	...	...	...
45	15.7	15.7	15.7	...	15.7	15.7	14.9	14.1	13.6	13.1	*12.7*	*10.8*	*8.7*	*5.9*

Delete Line 15

Table 1A
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding															
	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	*3.4*	*2.1*	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	*3.4*	*2.1*	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
~~15~~	~~*3.4*~~	~~*2.1*~~	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	...				...	...	...	...	...	...	...	...	...	...	...	
19	...				...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	*4.5*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	*3.0*	*1.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
32	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
42	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
44	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
45	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	

Delete Line 15

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/Thickness, in.	P-No.	Group No.
	1	Carbon steel	Forgings	SA–765	I	K03046	...	...	1	1
	2	Carbon steel	Plate	SA–515	60	K02401	...	...	1	1
	3	Carbon steel	Plate	SA–516	60	K02100	...	...	1	1
	4	Carbon steel	Wld. pipe	SA–671	CB60	K02401	...	...	1	1
	5	Carbon steel	Wld. pipe	SA–671	CC60	K02100	...	...	1	1
	6	Carbon steel	Wld. pipe	SA–671	CE60	K02402	...	...	1	1
	7	Carbon steel	Wld. pipe	SA–672	B60	K02401	...	...	1	1
	8	Carbon steel	Wld. pipe	SA–672	C60	K02100	...	...	1	1
	9	Carbon steel	Wld. pipe	SA–672	E60	K02402	...	...	1	1
	10	Carbon steel	Wld. pipe	SA–134	A283D	K02702	...	...	1	1
	11	Carbon steel	Plate	SA–283	D	K02702	...	...	1	1
	12	Carbon steel	Wld. pipe	SA–53	E/B	K03005	...	...	1	1
	13	Carbon steel	Wld. pipe	SA–53	E/B	K03005	...	...	1	1
	14	Carbon steel	Smls. pipe	SA–53	S/B	K03005	...	...	1	1
	15	Carbon steel	Smls. pipe	SA–53	S/B	K03005	...	...	1	1
	16	Carbon steel	Smls. pipe	SA–106	B	K03006	...	...	1	1
	17	Carbon steel	Wld. pipe	SA–135	B	...	...	...	1	1
	18	Carbon steel	Smls. & wld. fittings	SA–234	WPB	K03006	...	...	1	1
	19	Carbon steel	Smls. & wld. pipe	SA–333	6	K03006	...	...	1	1
	20	Carbon steel	Wld. pipe	SA–333	6	K03006	...	...	1	1
	21	Carbon steel	Smls. & wld. tube	SA–334	6	K03006	...	...	1	1
	22	Carbon steel	Wld. tube	SA–334	6	K03006	...	...	1	1
	23	Carbon steel	Forged pipe	SA–369	FPB	K03006	...	...	1	1
	24	Carbon steel	Forgings	SA–372	A	K03002	...	...	1	1
	25	Carbon steel	Sheet	SA–414	D	K02505	...	...	1	1
	26	Carbon steel	Smls. & wld. fittings	SA–420	WPL6	...	...	...	1	1
	27	Carbon steel	Smls. pipe	SA–524	I	K02104	...	...	1	1
	28	Carbon steel	Bar	SA–696	B	K03200	...	...	1	1
	29	Carbon steel	Forgings	SA–727	...	K02506	...	...	1	1
	30	Carbon steel	Wld. tube	SA–178	C	K03503	...	...	1	1
	31	Carbon steel	Wld. tube	SA–178	C	K03503	...	...	1	1
	32	Carbon steel	Wld. tube	SA–178	C	K03503	...	...	1	1
	33	Carbon steel	Smls. tube	SA–210	A–1	K02707	...	...	1	1
	34	Carbon steel	Smls. tube	SA–556	B2	K02707	...	...	1	1
	~~35~~	~~Carbon steel~~	~~Wld. tube~~	~~SA–557~~	~~B2~~	~~K03007~~	~~...~~	~~...~~	~~1~~	~~1~~
	36	Carbon steel	Plate, bar	SA/CSA–G40.21	38W	...	...	...	1	1
(**21**)	37	Carbon steel	Plate, sheet, bar	SA–572	42	...	...	$t \le 6$	...	...
(**21**)	38	Carbon steel	Sheet, strip	SA–1011	45	HSLAS	1	...	...	...
(**21**)	39	Carbon steel	Sheet, strip	SA–1011	45	SS	...	$t \le 0.23$	...	...
(**21**)	40	Carbon steel	Sheet, strip	SA–1011	50	HSLAS	2	...	...	...
	41	Carbon steel	Plate	SA/AS 1548	PT430N	...	Normalized	≤6	1	1
	42	Carbon steel	Plate	SA/AS 1548	PT430NR	...	Norm. rld.	≤6	1	1
	43	Carbon steel	Plate	SA/EN 10028–2	P295GH	...	...	$6 < t \le 10$	1	1
	44	Carbon steel	Plate	SA/EN 10028–2	P295GH	...	...	$4 < t \le 6$	1	1
	45	Carbon steel	Bar	SA–675	65	...	...	...	1	1

Delete Line 35

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	60	30	NP	NP	1000	650	CS-2	G10, T2
2	60	32	1000	700	1000	650	CS-2	G10, S1, T2
3	60	32	850	700	1000	650	CS-2	G10, S1, T2
4	60	32	NP	700	NP	NP	CS-2	S6, W10, W12
5	60	32	NP	700	NP	NP	CS-2	S6, W10, W12
6	60	32	NP	700	NP	NP	CS-2	S6, W10, W12
7	60	32	NP	700	NP	NP	CS-2	S6, W10, W12
8	60	32	NP	700	NP	NP	CS-2	S6, W10, W12
9	60	32	NP	700	NP	NP	CS-2	S6, W10, W12
10	60	33	NP	300 (Cl. 3 only)	NP	NP	CS-2	W12
11	60	33	NP	300 (Cl. 3 only)	650	650	CS-2	...
12	60	35	900	300 (Cl. 3 only)	NP	NP	CS-2	G10, S1, T1, W12, W13
13	60	35	900	NP	900	650	CS-2	G3, G10, G24, S1, T1, W6
14	60	35	900	300 (Cl. 3 only)	NP	NP	CS-2	G10, S1, T1
15	60	35	NP	700 (SPT)	900	650	CS-2	G10, T1
16	60	35	1000	700	1000	650	CS-2	G10, S1, T1
17	60	35	NP	NP	900	650	CS-2	G24, T1, W6
18	60	35	1000	700	1000	650	CS-2	G10, S1, T1
19	60	35	700	700	1000	650	CS-2	G10, T1, W12, W13, W14
20	60	35	700	NP	NP	NP	CS-2	T1
21	60	35	NP	700	650	650	CS-2	T1, W12, W14
22	60	35	NP	NP	650	650	CS-2	G24, W6
23	60	35	1000	NP	NP	NP	CS-2	G10, S1, T1
24	60	35	NP	NP	650	650	CS-2	...
25	60	35	NP	NP	900	650	CS-2	G10, T1
26	60	35	NP	700	850	650	CS-2	G10, T1, W14
27	60	35	NP	NP	1000	650	CS-2	G10, T1
28	60	35	NP	700	NP	NP	CS-2	T1
29	60	36	NP	700	1000	650	CS-2	G10, G22, T1
30	60	37	1000	NP	NP	NP	CS-2	G4, G10, S1, T2
31	60	37	1000	700	NP	NP	CS-2	G10, S1, T1, W13
32	60	37	1000	NP	1000	650	CS-2	G3, G10, G24, S1, T2, W6
33	60	37	1000	700	1000	650	CS-2	G10, S1, T1
34	60	37	NP	NP	1000	650	CS-2	G10, T1
~~35~~	~~60~~	~~37~~	~~NP~~	~~NP~~	~~1000~~	~~650~~	~~CS-2~~	~~G24, T1, W6~~
36	60	38	NP	NP	650	650	CS-2	...
37	60	42	NP	NP	600	600	CS-2	...
38	60	45	NP	NP	600	600	CS-3	...
39	60	[illegible]	[illegible]	NP	600	600	CS-3	...
40	60	[illegible]	[illegible]	NP	600	600	CS-3	...
41	62.5	...	1000	NP	1000	NP	CS-2	G10, G18, S1, T1
42	62.5	...	1000	NP	1000	NP	CS-2	G10, G18, S1, T1
43	62.5	32	850	NP	1000	NP	CS-2	G10, S1, T2
44	64	34	850	NP	1000	NP	CS-2	G10, S1, T2
45	65	32.5	850	650 (Cl. 3 only)	1000	650	CS-2	G10, G15, G22, S1, T2

Delete Line 35

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	150	200	250	300	400	500	600	650	700	750	800	850	900
1	17.1	17.1	17.1	...	17.1	17.1	16.3	15.3	14.8	14.3	*13.0*	*10.8*	*8.7*	*5.9*
2	17.1	17.1	17.1	...	17.1	17.1	17.1	16.4	15.8	15.3	*13.0*	*10.8*	*8.7*	*5.9*
3	17.1	17.1	17.1	...	17.1	17.1	17.1	16.4	15.8	15.3	*13.0*	*10.8*	*8.7*	*5.9*
4	17.1	...	17.1	...	17.1	17.1	17.1	16.4	15.8	15.3	...	...	...	...
5	17.1	...	17.1	...	17.1	17.1	17.1	16.4	15.8	15.3	...	...	...	...
6	17.1	...	17.1	...	17.1	17.1	17.1	16.4	15.8	15.3	...	...	...	...
7	17.1	...	17.1	...	17.1	17.1	17.1	16.4	15.8	15.3	...	...	...	...
8	17.1	...	17.1	...	17.1	17.1	17.1	16.4	15.8	15.3	...	...	...	...
9	17.1	...	17.1	...	17.1	17.1	17.1	16.4	15.8	15.3	...	...	...	...
10	17.1	...	17.1	...	17.1	...	...	...	...	...	...	...	...	...
11	17.1	17.1	17.1	...	17.1	17.1	17.1	16.9	16.3	...	...	...	...	...
12	17.1	...	17.1	...	17.1	17.1	17.1	17.1	17.1	*15.6*	*13.0*	*10.8*	*8.7*	*5.9*
13	14.6	14.6	14.6	...	14.6	14.6	14.6	14.6	14.6	*13.3*	*11.1*	*9.2*	*7.4*	*5.0*
14	17.1	...	17.1	...	17.1	17.1	17.1	17.1	17.1	*15.6*	*13.0*	*10.8*	*8.7*	*5.9*
15	17.1	17.1	17.1	...	17.1	17.1	17.1	17.1	17.1	*15.6*	*13.0*	*10.8*	*8.7*	*5.9*
16	17.1	17.1	17.1	...	17.1	17.1	17.1	17.1	17.1	*15.6*	*13.0*	*10.8*	*8.7*	*5.9*
17	14.6	14.6	14.6	...	14.6	14.6	14.6	14.6	14.6	*13.3*	*11.1*	*9.2*	*7.4*	*5.0*
18	17.1	17.1	17.1	...	17.1	17.1	17.1	17.1	17.1	*15.6*	*13.0*	*10.8*	*8.7*	*5.9*
19	17.1	17.1	17.1	...	17.1	17.1	17.1	17.1	17.1	*15.6*	*13.0*	*10.8*	*8.7*	*5.9*
20	14.6	14.6	14.6	...	14.6	14.6	14.6	14.6	14.6	*13.3*	...	...	...	...
21	17.1	...	17.1	...	17.1	17.1	17.1	17.1	17.1	*15.6*	...	...	...	...
22	14.6	14.6	14.6	...	14.6	14.6	14.6	14.6	14.6	...	...	...	...	...
23	17.1	...	17.1	...	17.1	17.1	17.1	17.1	17.1	*15.6*	*13.0*	*10.8*	*8.7*	*5.9*
24	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	...	...	...	...	...
25	17.1	17.1	17.1	...	17.1	17.1	17.1	17.1	17.1	*15.6*	*13.0*	*10.8*	*8.7*	*5.9*
26	17.1	17.1	17.1	...	17.1	17.1	17.1	17.1	17.1	*15.6*	*13.0*	*10.8*	*8.7*	...
27	17.1	17.1	17.1	...	17.1	17.1	17.1	17.1	17.1	*15.6*	*13.0*	*10.8*	*8.7*	*5.9*
28	17.1	...	17.1	...	17.1	17.1	17.1	17.1	17.1	*15.6*	...	...	...	...
29	17.1	17.1	17.1	...	17.1	17.1	17.1	17.1	17.1	*15.6*	*13.0*	*10.8*	*8.7*	*5.9*
30	17.1	...	17.1	...	17.1	17.1	17.1	17.1	17.1	15.6	*13.0*	*10.8*	*8.7*	*5.0*
31	17.1	...	17.1	...	17.1	17.1	17.1	17.1	17.1	*15.6*	*13.0*	*10.8*	*8.7*	*5.9*
32	14.6	...	14.6	...	14.6	14.6	14.6	14.6	14.6	13.3	*11.1*	*9.2*	*7.4*	*5.0*
33	17.1	17.1	17.1	...	17.1	17.1	17.1	17.1	17.1	*15.6*	*13.0*	*10.8*	*8.7*	*5.9*
34	17.1	17.1	17.1	...	17.1	17.1	17.1	17.1	17.1	*15.6*	*13.0*	*10.8*	*8.7*	*5.9*
~~35~~	~~14.6~~	~~14.6~~	~~14.6~~	~~...~~	~~14.6~~	~~14.6~~	~~14.6~~	~~14.6~~	~~14.6~~	~~*13.3*~~	~~*11.1*~~	~~*9.2*~~	~~*7.4*~~	~~*5.0*~~
36	17.1	...	17.1	...	17.1	17.1	17.1	17.1	17.1	...	...	...	...	...
37	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	...	...	...	...	...	...
38	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	...	...	...	...	...	...
39	17.1	17.1	17.1				17.1	17.1	...	...	...	...	...	...
40	17.1	17.1	17.1				17.1	17.1	...	...	...	...	...	...
41	17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.9	*16.9*	*13.9*	*11.4*	*8.7*	*5.9*
42	17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.9	*16.9*	*13.9*	*11.4*	*8.7*	*5.9*
43	17.9	17.9	17.9	17.9	17.9	17.9	17.4	16.4	15.8	15.3	*13.9*	*11.4*	*8.7*	*5.9*
44	18.3	18.3	18.3	18.3	18.3	18.3	18.3	17.4	16.8	16.2	*13.9*	*11.4*	*8.7*	*5.9*
45	18.6	18.6	18.6	18.6	18.6	18.5	17.7	16.6	16.1	15.5	*13.9*	*11.4*	*8.7*	*5.0*

Delete Line 35

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding															
	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
1	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	*3.4*	*2.1*	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
32	*3.4*	*2.1*	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
~~35~~	~~*3.4*~~	~~*2.1*~~	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
39	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
40	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
41	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	

Delete Line 35

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/Thickness, in.	P-No.	Group No.
1	Carbon steel	Wld. pipe	SA–671	CB70	K03101	...	...	1	2
2	Carbon steel	Wld. pipe	SA–671	CC70	K02700	...	...	1	2
3	Carbon steel	Wld. pipe	SA–672	B70	K03101	...	...	1	2
4	Carbon steel	Wld. pipe	SA–672	C70	K02700	...	...	1	2
5	Carbon steel	Plate	SA/JIS G3118	SGV480	...	...	...	1	2
6	Carbon steel	Smls. pipe	SA–106	C	K03501	...	...	1	2
7	Carbon steel	Wld. tube	SA–178	D	...	...	...	1	2
8	Carbon steel	Wld. tube	SA–178	D	...	...	...	1	2
9	Carbon steel	Wld. tube	SA–178	D	...	...	...	1	2
10	Carbon steel	Smls. tube	SA–210	C	K03501	...	...	1	2
11	Carbon steel	Castings	SA–216	WCC	J02503	...	...	1	2
12	Carbon steel	Smls. & wld. fittings	SA–234	WPC	K03501	...	...	1	2
13	Carbon steel	Castings	SA–352	LCC	J02505	...	...	1	2
14	Carbon steel	Castings	SA–487	16	...	A	...	1	2
15	Carbon steel	Plate	SA–537	...	K12437	3	$4 < t \le 6$	1	3
16	Carbon steel	Smls. tube	SA–556	C2	K03006	...	...	1	2
~~17~~	~~Carbon steel~~	~~Wld. tube~~	~~SA–557~~	~~C2~~	~~K03505~~	...	...	~~1~~	~~2~~
18	Carbon steel	Cast pipe	SA–660	WCC	J02505	...	...	1	2
19	Carbon steel	Bar	SA–696	C	K03200	...	...	1	2
20	Carbon steel	Sheet	SA–414	F	K03102	...	...	1	2
21	Carbo		SA–662	C	K02007	...	...	1	2
22	Carbon steel	Plate	SA–537	...	K12437	2	$4 < t \le 6$	1	3
23	Carbon steel	Plate	SA–738	C	K02008	...	$4 < t \le 6$	1	3
24	Carbon steel	Plate	SA–537	...	K12437	1	$\le 2\frac{1}{2}$	1	2
25	Carbon steel	Wld. pipe	SA–671	CD70	K12437	...	$\le 2\frac{1}{2}$	1	2
26	Carbon steel	Wld. pipe	SA–672	D70	K12437	...	$\le 2\frac{1}{2}$	1	2
27	Carbon steel	Wld. pipe	SA–691	CMSH–70	K12437	...	$\le 2\frac{1}{2}$	1	2
28	Carbon steel	Plate	SA–841	A	...	1	≤ 4	1	2
(**21**) 29	Carbon steel	Plate, sheet, bar	SA–572	55	...	...	$t \le 2$	...	...
(**21**) 30	Carbon steel	Round bar	SA–572	55	...	...	$t \le 3\frac{1}{2}$	...	...
(**21**) 31	Carbon steel	Sheet, strip	SA–1011	55	HSLAS	1	...	...	...
(**21**) 32	Carbon steel	Sheet, strip	SA–1011	60	HSLAS	2	...	...	...
33	Carbon steel	Forgings	SA/EN 10222–2	P305GH	...	NT	$1.4 < t \le 6.3$	1	2
34	Carbon steel	Forgings	SA/EN 10222–2	P305GH	...	Normalized	$t \le 1.4$	1	2
35	Carbon steel	Plate	SA/GB 713	Q345R	...	...	$2\frac{1}{4} < t \le 4$	1	2
36	Carbon steel	Plate	SA/EN 10028–2	P355GH	...	...	$2.5 < t \le 4$	1	2
37	Carbon steel	Plate	SA/GB 713	Q345R	...	...	$1.5 < t \le 2\frac{1}{4}$	1	2
38	Carbon steel	Plate	SA/GB 713	Q345R	...	...	$\frac{5}{8} < t \le 1.5$	1	2
39	Carbon steel	Plate	SA–455	...	K03300	...	$\frac{3}{8} < t \le 0.58$	1	2
40	Carbon steel	Forgings	SA/EN 10222–2	P305GH	...	QT	$t \le 2.8$	1	2
41	Carbon steel	Plate	SA/GB 713	Q345R	...	...	$\frac{1}{8} \le t \le \frac{5}{8}$	1	2
42	Carbon steel	Plate	SA/EN 10028–2	P355GH	...	...	≤ 2.5	1	2
43	Carbon steel	Forgings	SA–266	3	K05001	...	...	1	2
44	Carbon steel	Plate	SA–455	...	K03300	...	$\le \frac{3}{8}$	1	2
45	Carbon steel	Plate	SA–299	A	K02803	...	>1	1	2

Delete Line 17

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	70	38	NP	700	NP	NP	CS-2	S5, W10, W12
2	70	38	NP	700	NP	NP	CS-2	S6, W10, W12
3	70	38	NP	700	NP	NP	CS-2	S5, W10, W12
4	70	38	NP	700	NP	NP	CS-2	S6, W10, W12
5	70	38	850	NP	NP	NP	CS-2	G10, S1, T2
6	70	40	1000	700	1000	650	CS-2	G10, S1, T1
7	70	40	1000	NP	NP	NP	CS-2	G10, S1, T1, W13
8	70	40	1000	NP	NP	NP	CS-2	G4, G10, S1, T4
9	70	40	1000	NP	NP	NP	CS-2	G3, G10, S1, T2
10	70	40	1000	NP	1000	650	CS-2	G10, S1, T1
11	70	40	1000	700	1000	650	CS-2	G1, G10, G17, S1, T1
12	70	40	800	700	800	650	CS-2	G10, T1, W14
13	70	40	NP	700	NP	NP	CS-2	G17, T1
14	70	40	NP	700	NP	NP	CS-2	...
15	70	40	NP	NP	700	650	CS-2	G23, W11
16	70	40	NP	NP	800	650	CS-2	G10, T1
~~17~~	~~70~~	~~40~~	~~NP~~	~~NP~~	~~1000~~	~~650~~	~~CS-2~~	~~G24, T2, W6~~
18	70	40	1000	700	NP	NP	CS-2	G1, G10, G17, S1, T1
19	70	40	NP	700	NP	NP	CS-2	T1
20	70	42	NP	NP	900	650	CS-2	G10, T1
21	~~70~~			NP	700	650	CS-3	T1
22	70	46	NP	700	700	650	CS-3	G23, T1, W11
23	70	46	NP	650	650	650	CS-3	G23, W11
24	70	50	NP	700	650	650	CS-3	G23, T1
25	70	50	NP	700	NP	NP	CS-3	S6, T1, W10, W12
26	70	50	NP	700	NP	NP	CS-3	S6, T1, W10, W12
27	70	50	NP	700	NP	NP	CS-3	S6, T1, W10, W12
28	70	50	NP	NP	650	NP	CS-3	...
29	70	55	NP	NP	600	600	CS-3	...
30	70	55	NP	NP	600	600	CS-3	...
31	70	55	NP	NP	600	600	CS-3	...
32	70	60	NP	NP	600	600	CS-3	...
33	71	40.5	1000	NP	1000	NP	CS-2	G10, S1, T2
34	71	44	1000	NP	1000	NP	CS-2	G10, S1, T2
35	71	44	800	NP	800	NP	CS-2	T1
36	71	45.5	850	NP	1000	NP	CS-2	G10, S1, T1
37	71	45.5	800	NP	800	NP	CS-2	T1
38	72.5	47	800	NP	800	NP	CS-2	T1
39	73	37	NP	400 (Cl. 3 only)	650	650	CS-2	...
40	74	41.5	1000	NP	1000	NP	CS-2	G10, S1, T2
41	74	50	800	NP	800	NP	CS-2	T1
42	74	...	850	NP	1000	NP	CS-2	G10, G18, S1, T1
43	75	37.5	1000	700	1000	NP	CS-2	G10, S1, T2, W8, W11
44	75	38	NP	400 (Cl. 3 only)	650	650	CS-2	...
45	75	40	1000	700	1000	650	CS-2	G10, S1, T2

Delete Line 17

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	150	200	250	300	400	500	600	650	700	750	800	850	900
1	20.0	...	20.0	...	20.0	20.0	20.0	19.4	18.8	18.1	...	...	...	...
2	20.0	...	20.0	...	20.0	20.0	20.0	19.4	18.8	18.1	...	...	...	...
3	20.0	...	20.0	...	20.0	20.0	20.0	19.4	18.8	18.1	...	...	...	...
4	20.0	...	20.0	...	20.0	20.0	20.0	19.4	18.8	18.1	...	...	...	...
5	20.0	20.0	20.0	...	20.0	20.0	20.0	19.4	18.8	18.1	*14.8*	*12.0*	*9.3*	...
6	20.0	...	20.0	...	20.0	20.0	20.0	20.0	19.8	*18.3*	*14.8*	*12.0*	*9.3*	*6.7*
7	20.0	...	20.0	...	20.0	20.0	20.0	20.0	19.8	*18.3*	*14.8*	*12.0*	*9.3*	*6.7*
8	20.0	...	20.0	...	20.0	20.0	20.0	20.0	19.8	18.3	14.8	12.0	9.3	*5.7*
9	17.0	...	17.0	...	17.0	17.0	17.0	17.0	16.8	15.5	*12.6*	*10.2*	*7.9*	*5.7*
10	20.0	...	20.0	...	20.0	20.0	20.0	20.0	19.8	*18.3*	*14.8*	*12.0*	*9.3*	*6.7*
11	20.0	20.0	20.0	...	20.0	20.0	20.0	20.0	19.8	*18.3*	*14.8*	*12.0*	*9.3*	*6.7*
12	20.0	...	20.0	...	20.0	20.0	20.0	20.0	19.8	*18.3*	*14.8*	*12.0*	...	...
13	20.0	...	20.0	...	20.0	20.0	20.0	20.0	19.8	*18.3*	...	...	...	...
14	20.0	...	19.9	...	18.8	18.1	17.9	17.9	17.9	17.9	...	...	...	...
15	20.0	20.0	20.0	...	19.7	19.5	18.9	18.0	17.6	17.2	...	...	...	...
16	20.0	20.0	20.0	...	20.0	20.0	20.0	20.0	19.8	*18.3*	*14.8*	*12.0*	...	...
~~17~~	~~17.0~~	~~17.0~~	~~17.0~~	~~...~~	~~17.0~~	~~17.0~~	~~17.0~~	~~17.0~~	~~16.8~~	~~15.5~~	~~*12.6*~~	~~*10.2*~~	~~*7.9*~~	~~*5.7*~~
18	20.0	...	20.0	...	20.0	20.0	20.0	20.0	19.8	*18.3*	*14.8*	*12.0*	*9.3*	*6.7*
19	20.0	...	20.0	...	20.0	20.0	20.0	20.0	19.8	*18.3*	...	...	...	...
20	20.0	20.0	20.0	...	20.0	20.0	20.0	20.0	20.0	*18.3*	*14.8*	*12.0*	*9.3*	*6.7*
21	20.0	...	20.0	...	20.0	20.0	20.0	20.0	20.0	*18.3*	...	...	...	...
22	20.0	...	20.0	...	19.7	19.5	19.5	19.5	19.5	*18.3*	...	...	...	...
23	20.0	...	20.0	...	19.7	19.5	19.5	19.5	19.5	...	...	...	...	...
24	20.0	...	20.0	...	19.7	19.5	19.5	19.5	19.5	*18.3*	...	...	...	...
25	20.0	...	20.0	...	19.7	19.5	19.5	19.5	19.5	*18.3*	...	...	...	...
26	20.0	...	20.0	...	19.7	19.5	19.5	19.5	19.5	*18.3*	...	...	...	...
27	20.0	...	20.0	...	19.7	19.5	19.5	19.5	19.5	*18.3*	...	...	...	...
28	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	...	...	...	...	...
29	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	...	...	...	...	...	...
30	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	...	...	...	...	...	...
31	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	...	...	...	...	...	...
32	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	...	...	...	...	...	...
33	20.3	...	20.3	...	20.3	20.3	20.3	20.3	19.9	19.2	*14.8*	*12.0*	*9.3*	*6.7*
34	20.3	...	20.3	...	20.3	20.3	20.3	20.3	20.3	20.0	*14.8*	*12.0*	*9.3*	*6.7*
35	20.3	...	20.3	...	20.3	20.3	20.3	20.3	20.3	*18.3*	*14.8*	*12.0*	...	...
36	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	*18.3*	*14.8*	*12.0*	*9.3*	*6.7*
37	20.3	...	20.3	...	20.3	20.3	20.3	20.3	20.3	*18.3*	*14.8*	*12.0*	...	...
38	20.7	...	20.7	...	20.7	20.7	20.7	20.7	20.7	*18.3*	*14.8*	*12.0*	...	...
39	20.9	20.9	20.9	...	20.9	20.9	20.1	18.9	18.3	...	...	...	...	...
40	21.1	...	21.1	...	21.1	21.1	21.1	21.0	20.3	19.6	*14.8*	*12.0*	*9.3*	*6.7*
41	21.1	...	21.1	...	21.1	21.1	21.1	21.1	21.1	*18.3*	*14.8*	*12.0*	...	...
42	21.1	21.1	21.1	21.1	21.1	21.1	21.1	21.1	21.1	*18.3*	*14.8*	*12.0*	*9.3*	*6.7*
43	21.4	21.4	21.4	...	21.4	21.4	20.4	19.2	18.5	17.9	*15.7*	*12.6*	*9.3*	*6.7*
44	21.4	21.4	21.4	...	21.4	21.4	20.6	19.4	18.8	...	...	...	...	...
45	21.4	21.4	21.4	...	21.4	21.4	21.4	20.4	19.8	19.1	*15.7*	*12.6*	*9.3*	*6.7*

Delete Line 17

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding															
	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	*3.4*	*2.1*	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	*3.4*	*2.1*	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
~~17~~	~~*3.4*~~	~~*2.1*~~	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
31	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
32	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
33	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	*4.0*	*2.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	

Delete Line 17

(21)

Table U
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper	Size/Thickness, in.	Min. Tensile Strength, ksi
	Ferrous Materials							
1	Carbon steel	Sheet	SA–1008	CS–A	...	...	...	40
2	Carbon steel	Sheet	SA–1008	CS–B	...	...	...	40
3	Carbon steel	Bar	SA–675	45	...	...	...	45
4	Carbon steel	Wld. pipe	SA–134	A283A	...	...	...	45
5	Carbon steel	Plate	SA–283	A	...	...	...	45
6	Carbon steel	Plate	SA–285	A	K01700	...	...	45
7	Carbon steel	Wld. pipe	SA–672	A45	K01700	...	...	45
8	Carbon steel	Sheet	SA–414	A	K01501	...	...	45
9	Carbon steel	Wld. tube	SA–178	A	K01200	...	...	47
10	Carbon steel	Smls. tube	SA–179	...	K01200	...	...	47
11	Carbon steel	Smls. tube	SA–192	...	K01201	...	...	47
12	Carbon steel	Wld. tube	SA–214	...	K01807	...	...	47
13	Carbon steel	Smls. tube	SA–556	A2	K01807	...	...	47
~~14~~	~~Carbon steel~~	~~Wld. tube~~	~~SA–557~~	~~A2~~	~~K01807~~	~~...~~	~~...~~	~~47~~
15	Carbon steel	Wld. pipe	SA–53	E/A	K02504	...	...	48
16	Carbon steel	Smls. pipe	SA–53	S/A	K02504	...	...	48
17	Carbon		SA–106	A	K02501	...	...	48
18	Carbon		SA–135	A	...	...	...	48
19	Carbon steel	Forged pipe	SA–369	FPA	K02501	...	...	48
20	Carbon steel	Wld. pipe	SA–587	...	K11500	...	...	48
21	Carbon steel	Bar	SA–675	50	...	...	...	50
22	Carbon steel	Wld. pipe	SA–134	A283B	...	...	...	50
23	Carbon steel	Plate	SA–283	B	...	...	...	50
24	Carbon steel	Plate	SA–285	B	K02200	...	...	50
25	Carbon steel	Wld. pipe	SA–672	A50	K02200	...	...	50
26	Carbon steel	Sheet	SA–414	B	K02201	...	...	50
27	Carbon steel	Plate	SA/EN 10028–3	P275NH	...	...	$6 < t \le 10$	51
28	Carbon steel	Plate	SA/EN 10028–2	P235GH	...	...	$\le 2^1/_4$	52
29	Carbon steel	Plate	SA/EN 10028–3	P275NH	...	...	$4 < t \le 6$	52
30	Carbon steel	Smls. tube	SA/EN 10216–2	P235GH	...	...	$t \le 2^1/_2$	52
(21) 31	Carbon steel	Sheet, strip	SA–1011	36	SS	Type 1	$t \le 0.23$	53
32	Carbon steel	Plate	SA/EN 10028–3	P275NH	...	...	$2^1/_4 < t \le 4$	53.5
33	Carbon steel	Bar	SA–675	55	...	...	...	55
34	Carbon steel	Wld. pipe	SA–134	A283C	K02401	...	...	55
35	Carbon steel	Plate	SA–283	C	K02401	...	...	55
36	Carbon steel	Plate	SA–285	C	K02801	...	...	55
37	Carbon steel	Smls. & wld. pipe	SA–333	1	K03008	...	...	55
38	Carbon steel	Smls. & wld. tube	SA–334	1	K03008	...	...	55
39	Carbon steel	Plate	SA–516	55	K01800	...	...	55
40	Carbon steel	Smls. pipe	SA–524	II	K02104	...	...	55
41	Carbon steel	Wld. pipe	SA–671	CA55	K02801	...	...	55
42	Carbon steel	Wld. pipe	SA–671	CE55	K02202	...	...	55
43	Carbon steel	Wld. pipe	SA–672	A55	K02801	...	...	55
44	Carbon steel	Wld. pipe	SA–672	B55	K02001	...	...	55
45	Carbon steel	Wld. pipe	SA–672	C55	K01800	...	...	55

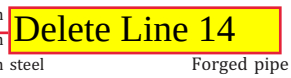

Table U
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	200	300	400	500	600	650	700	750	800	850	900	950	1000
													Ferrous Materials	
1	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	39.5	36.8	33.5	29.9	26.2	23.1
2	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	39.5	36.8	33.5	29.9	26.2	23.1
3	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	44.4	41.3	37.7	33.6	29.5	25.9
4	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	44.4	41.3	37.7	33.6	29.5	25.9
5	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	44.4	41.3	37.7	33.6	29.5	25.9
6	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	44.4	41.3	37.7	33.6	29.5	25.9
7	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	44.4	41.3	37.7	33.6	29.5	25.9
8	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	44.4	41.3	37.7	33.6	29.5	25.9
9	47.0	47.0	47.0	47.0	47.0	47.0	47.0	47.0	46.4	43.2	39.3	35.1	30.8	27.1
10	47.0	47.0	47.0	47.0	47.0	47.0	47.0	47.0	46.4	43.2	39.3	35.1	30.8	27.1
11	47.0	47.0	47.0	47.0	47.0	47.0	47.0	47.0	46.4	43.2	39.3	35.1	30.8	27.1
12	47.0	47.0	47.0	47.0	47.0	47.0	47.0	47.0	46.4	43.2	39.3	35.1	30.8	27.1
13	47.0	47.0	47.0	47.0	47.0	47.0	47.0	47.0	46.4	43.2	39.3	35.1	30.8	27.1
~~14~~	~~47.0~~	~~47.0~~	~~47.0~~	~~47.0~~	~~47.0~~	~~47.0~~	~~47.0~~	~~47.0~~	~~46.4~~	~~43.2~~	~~39.3~~	~~35.1~~	~~30.8~~	~~27.1~~
15	48.0	48.0	48.0	48.0	48.0	48.0	48.0	48.0	47.4	44.1	40.2	35.8	31.5	27.7
16	48.0	48.0	48.0	48.0	48.0	48.0	48.0	48.0	47.4	44.1	40.2	35.8	31.5	27.7
17	48.0				48.0	48.0	48.0	48.0	47.4	44.1	40.2	35.8	31.5	27.7
18	48.0				48.0	48.0	48.0	48.0	47.4	44.1	40.2	35.8	31.5	27.7
19	48.0	48.0	48.0	48.0	48.0	48.0	48.0	48.0	47.4	44.1	40.2	35.8	31.5	27.7
20	48.0	48.0	48.0	48.0	48.0	48.0	48.0	48.0	47.4	44.1	40.2	35.8	31.5	27.7
21	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	49.4	45.9	41.8	37.3	32.8	28.8
22	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	49.4	45.9	41.8	37.3	32.8	28.8
23	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	49.4	45.9	41.8	37.3	32.8	28.8
24	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	49.4	45.9	41.8	37.3	32.8	28.8
25	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	49.4	45.9	41.8	37.3	32.8	28.8
26	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	49.4	45.9	41.8	37.3	32.8	28.8
27	51.0	51.0	51.0	51.0	51.0	51.0	51.0	51.0	50.3	46.8	42.6	38.0	33.3	29.1
28	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	51.4	47.8	43.5	38.8	34.1	30.0
29	52.0	52.0	52.0	52.0	52.0	52.0	52.0	52.0	51.7	48.1	43.9	39.1	34.3	29.9
30	52.2	52.2	52.2	52.2	52.2	52.2	52.2	52.2	51.6	48.0	43.7	39.0	34.3	30.1
31	53.0	53.0	53.0	53.0	53.0	52.9	...	...	...	...	...	...	...	...
32	53.5	53.5	53.5	53.5	53.5	53.5	53.5	53.5	53.1	49.5	45.1	40.2	35.2	30.8
33	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	54.3	50.5	46.0	41.1	36.1	31.7
34	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	54.3	50.5	46.0	41.1	36.1	31.7
35	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	54.3	50.5	46.0	41.1	36.1	31.7
36	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	54.3	50.5	46.0	41.1	36.1	31.7
37	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	54.3	50.5	46.0	41.1	36.1	31.7
38	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	54.3	50.5	46.0	41.1	36.1	31.7
39	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	54.3	50.5	46.0	41.1	36.1	31.7
40	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	54.3	50.5	46.0	41.1	36.1	31.7
41	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	54.3	50.5	46.0	41.1	36.1	31.7
42	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	54.3	50.5	46.0	41.1	36.1	31.7
43	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	54.3	50.5	46.0	41.1	36.1	31.7
44	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	54.3	50.5	46.0	41.1	36.1	31.7
45	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	54.3	50.5	46.0	41.1	36.1	31.7

Delete Line 14

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper	Size/Thickness, in.	Min. Tensile Strength, ksi
		Ferrous Materials (Cont'd)							
	1	Carbon steel	Smls. pipe	SA–524	I	K02104	...	...	60
	2	Carbon steel	Bar	SA–696	B	K03200	...	...	60
	3	Carbon steel	Forgings	SA–727	...	K02506	...	...	60
	4	Carbon steel	Wld. tube	SA–178	C	K03503	...	...	60
	5	Carbon steel	Smls. tube	SA–210	A–1	K02707	...	...	60
	6	Carbon steel	Smls. tube	SA–556	B2	K02707	...	...	60
	~~7~~	~~Carbon steel~~	~~Wld. tube~~	~~SA–557~~	~~B2~~	~~K03007~~	~~...~~	~~...~~	~~60~~
	8	Carbon steel	Plate, bar	SA/CSA–G40.21	38W	...	...	...	60
(**21**)	9	Carbon steel	Plate, sheet, bar	SA–572	42	...	...	$t \le 6$	60
(**21**)	10	Carbon steel	Sheet, strip	SA–1011	45	HSLAS	1	...	60
(**21**)	11	Carbon steel		SA–1011	45	SS	...	$t \le 0.23$	60
(**21**)	12	Carbon steel	Sheet, strip	SA–1011	50	HSLAS	2	...	60
	13	Carbon steel	Plate	SA/AS 1548	PT430	...	...	≤6	62.5
	14	Carbon steel	Plate	SA/EN 10028–2	P295GH	...	...	$6 < t \le 10$	62.5
	15	Carbon steel	Plate	SA/EN 10028–2	P295GH	...	...	$4 < t \le 6$	64
	16	Carbon steel	Bar	SA–675	65	...	...	...	65
	17	Carbon steel	Castings	SA–352	LCB	J03003	...	...	65
	18	Carbon steel	Plate	SA–515	65	K02800	...	...	65
	19	Carbon steel	Plate	SA–516	65	K02403	...	...	65
	20	Carbon steel	Wld. pipe	SA–671	CB65	K02800	...	...	65
	21	Carbon steel	Wld. pipe	SA–671	CC65	K02403	...	...	65
	22	Carbon steel	Wld. pipe	SA–672	B65	K02800	...	...	65
	23	Carbon steel	Wld. pipe	SA–672	C65	K02403	...	...	65
	24	Carbon steel	Sheet	SA–414	E	K02704	...	...	65
	25	Carbon steel	Plate	SA–662	B	K02203	...	...	65
	26	Carbon steel	Plate	SA–537	...	K12437	1	$2\frac{1}{2} < t \le 4$	65
	27	Carbon steel	Wld. pipe	SA–691	CMSH–70	K12437	...	$2\frac{1}{2} < t \le 4$	65
	28	Carbon steel	Plate, bar	SA/CSA–G40.21	44W	...	...	$t \le 8$	65
	29	Carbon steel	Plate, bar	SA/CSA–G40.21	50W	...	...	$t \le 6$	65
(**21**)	30	Carbon steel	Plate, sheet, bar	SA–572	50	...	...	$t \le 4$	65
(**21**)	31	Carbon steel	Round bar	SA–572	50	...	...	$t \le 11$	65
(**21**)	32	Carbon steel	Sheet, strip	SA–1011	50	SS	...	$t \le 0.23$	65
(**21**)	33	Carbon steel	Sheet, strip	SA–1011	50	HSLAS	1	...	65
(**21**)	34	Carbon steel	Sheet, strip	SA–1011	55	HSLAS	2	...	65
	35	Carbon steel	Plate	SA/AS 1548	PT460	...	...	≤6	66.5
	36	Carbon steel	Plate	SA/EN 10028–2	P295GH	...	...	≤4	66.5
	37	Carbon steel	Forgings	SA/EN 10222–2	P280GH	...	N, NT, or QT	$t \le 6.3$	66.5
	38	Carbon steel	Plate	SA/EN 10028–2	P355GH	...	...	$6 < t \le 10$	68
(**21**)	39	Carbon steel	Plate	SA/GB 713	Q345R	...	...	$6 < t \le 10$	68
	40	Carbon steel	Plate	SA/EN 10025–2	S355J2+N	...	...	$0.12 < t \le 3.15$	68
	41	Carbon steel	Plate	SA/EN 10028–2	P355GH	...	...	$4 < t \le 6$	69.5
	42	Carbon steel	Plate	SA/GB 713	Q345R	...	...	$4 < t \le 6$	69.5
	43	Carbon steel	Plate	SA–455	...	K03300	...	$0.58 < t \le \frac{3}{4}$	70
	44	Carbon steel	Bar	SA–675	70	...	...	...	70
	45	Carbon steel	Forgings	SA–105	...	K03504	...	...	70

Delete Line 7

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	200	300	400	500	600	650	700	750	800	850	900	950	1000
														Ferrous Materials (Cont'd)
1	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	59.3	55.1	50.2	44.8	39.4	34.6
2	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	59.3	55.1	50.2	44.8	39.4	34.6
3	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	59.3	55.1	50.2	44.8	39.4	34.6
4	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	59.3	55.1	50.2	44.8	39.4	34.6
5	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	59.3	55.1	50.2	44.8	39.4	34.6
6	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	59.3	55.1	50.2	44.8	39.4	34.6
~~7~~	~~60.0~~	~~60.0~~	~~60.0~~	~~60.0~~	~~60.0~~	~~60.0~~	~~60.0~~	~~60.0~~	~~59.3~~	~~55.1~~	~~50.2~~	~~44.8~~	~~39.4~~	~~34.6~~
8	60.0	58.0	58.0	58.0	58.0	58.0	58.0	58.0	57.3	53.3	48.5	43.3	38.0	33.4
9	60.0	60.0	60.0	60.0	60.0	60.0	...	...	...	...	...	...	...	...
10	60.0	60.0	60.0	60.0	60.0	60.0	...	...	...	...	...	...	...	...
11	~~60.0~~	Delete Line 7			60.0	60.0	...	...	...	...	...	...	...	...
12	60.0	~~60.0~~	~~60.0~~	~~60.0~~	60.0	60.0	...	...	...	...	...	...	...	...
13	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	61.7	57.4	52.3	46.7	41.0	36.0
14	62.5	62.5	62.5	62.5	62.5	62.5	62.5	62.5	61.7	57.4	52.3	46.7	41.0	36.0
15	64.0	64.0	64.0	64.0	64.0	64.0	64.0	64.0	63.2	58.8	53.5	47.5	42.0	36.9
16	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	64.2	59.7	54.4	48.5	42.6	37.5
17	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	64.2	59.7	54.4	48.5	42.6	37.5
18	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	64.2	59.7	54.4	48.5	42.6	37.5
19	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	64.2	59.7	54.4	48.5	42.6	37.5
20	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	64.2	59.7	54.4	48.5	42.6	37.5
21	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	64.2	59.7	54.4	48.5	42.6	37.5
22	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	64.2	59.7	54.4	48.5	42.6	37.5
23	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	64.2	59.7	54.4	48.5	42.6	37.5
24	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	64.2	59.7	54.4	48.5	42.6	37.5
25	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	64.2	59.7	54.4	48.5	42.6	37.5
26	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	64.2	59.7	54.4	48.5	42.6	37.5
27	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	64.2	59.7	54.4	48.5	42.6	37.5
28	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	64.2	59.8	54.5	48.6	42.7	37.4
29	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	64.2	59.8	54.5	48.6	42.7	37.4
30	65.0	65.0	65.0	65.0	65.0	65.0	...	...	...	...	...	...	...	...
31	65.0	65.0	65.0	65.0	65.0	65.0	...	...	...	...	...	...	...	...
32	65.0	65.0	65.0	65.0	65.0	65.0	...	...	...	...	...	...	...	...
33	65.0	65.0	65.0	65.0	65.0	65.0	...	...	...	...	...	...	...	...
34	65.0	65.0	65.0	65.0	65.0	65.0	...	...	...	...	...	...	...	...
35	66.5	66.5	66.5	66.5	66.5	66.5	66.5	66.5	65.7	61.1	55.6	49.6	43.6	38.3
36	66.5	66.5	66.5	66.5	66.5	66.5	66.5	66.5	65.7	61.1	55.6	49.6	43.6	38.3
37	66.7	66.7	66.7	66.7	66.7	66.7	66.7	66.7	65.7	61.2	55.8	49.8	43.6	38.1
38	68.0	68.0	68.0	68.0	68.0	68.0	68.0	68.0	65.5	62.2	57.5	51.7	45.0	37.7
39	68.2	68.2	68.2	68.2	68.2	68.2	68.2	68.2	67.3	62.5	56.9	50.7	44.5	39.4
40	68.2	...	...	...	...	...	...	...	...	...	...	...	...	...
41	69.5	69.5	69.5	69.5	69.5	69.5	69.5	69.5	66.9	63.5	58.8	52.8	45.9	38.5
42	69.6	69.6	69.6	69.6	69.6	69.6	69.6	69.6	68.7	63.9	58.1	51.7	45.5	40.2
43	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	69.1	64.3	58.6	52.3	45.9	40.4
44	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	69.1	64.3	58.6	52.3	45.9	40.4
45	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	69.1	64.3	58.6	52.3	45.9	40.4

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper	Size/Thickness, in.	Min. Tensile Strength, ksi
	Ferrous Materials (Cont'd)							
1	Carbon steel	Forgings	SA–181	...	K03502	70	...	70
2	Carbon steel	Castings	SA–216	WCB	J03002	...	...	70
3	Carbon steel	Forgings	SA–266	2	K03506	...	...	70
4	Carbon steel	Forgings	SA–266	4	K03017	...	...	70
5	Carbon steel	Forgings	SA–350	LF2	K03011	...	...	70
6	Carbon steel	Forgings	SA–508	1	K13502	...	...	70
7	Carbon steel	Forgings	SA–508	1A	K13502	...	...	70
8	Carbon steel	Forgings	SA–541	1	K03506	...	...	70
9	Carbon steel	Forgings	SA–541	1A	K03020	...	...	70
10	Carbon steel	Cast pipe	SA–660	WCB	J03003	...	...	70
11	Carbon steel	Forgings	SA–765	II	K03047	...	...	70
12	Carbon steel	Plate	SA–515	70	K03101	...	...	70
13	Carbon steel	Plate	SA–516	70	K02700	...	...	70
14	Carbon steel	Wld. pipe	SA–671	CB70	K03101	...	...	70
15	Carbon steel	Wld. pipe	SA–671	CC70	K02700	...	...	70
16	Carbon steel	Wld. pipe	SA–672	B70	K03101	...	...	70
17	Carbon steel	Wld. pipe	SA–672	C70	K02700	...	...	70
18	Carbon steel	Smls. pipe	SA–106	C	K03501	...	...	70
19	Carbon steel	Wld. tube	SA–178	D	...	...	...	70
20	Carbon steel	Smls. tube	SA–210	C	K03501	...	...	70
21	Carbon steel	Castings	SA–216	WCC	J02503	...	...	70
22	Carbon steel	Smls. & wld. ftgs.	SA–234	WPC	K03501	...	...	70
23	Carbon steel	Castings	SA–352	LCC	J02505	...	...	70
24	Carbon steel	Castings	SA–487	16	...	A	...	70
25	Carbon steel	Plate	SA–537	...	K12437	3	$4 < t \le 6$	70
26	Carbon steel	Smls. tube	SA–556	C2	K03006	...	...	70
~~27~~	~~Carbon steel~~	~~Tube~~	~~SA–557~~	~~C2~~	~~K03505~~	~~...~~	~~...~~	~~70~~
28	Carbon steel	Cast pipe	SA–660	WCC	J02505	...	...	70
29	Carbon steel	Bar	SA–696	C	K03200	...	...	70
30	Carbon steel	Sheet	SA–414	F	K03102	...	...	70
31	Carbon	Delete Line 27	SA–662	C	K02007	...	...	70
32	Carbon steel	Plate	SA–537	...	K12437	2	$4 < t \le 6$	70
33	Carbon steel	Plate	SA–738	C	K02008	...	$4 < t \le 6$	70
34	Carbon steel	Plate	SA–537	...	K12437	1	$\le 2\frac{1}{2}$	70
35	Carbon steel	Wld. pipe	SA–671	CD70	K12437	...	$\le 2\frac{1}{2}$	70
36	Carbon steel	Wld. pipe	SA–672	D70	K12437	...	$\le 2\frac{1}{2}$	70
37	Carbon steel	Wld. pipe	SA–691	CMSH–70	K12437	...	$\le 2\frac{1}{2}$	70
38	Carbon steel	Plate	SA–841	A	...	1	≤4	70
(**21**) 39	Carbon steel	Plate, sheet, bar	SA–572	55	...	...	$t \le 2$	70
(**21**) 40	Carbon steel	Round bar	SA–572	55	...	...	$t \le 3\frac{1}{2}$	70
(**21**) 41	Carbon steel	Sheet, strip	SA–1011	55	HSLAS	1	...	70
(**21**) 42	Carbon steel	Sheet, strip	SA–1011	60	HSLAS	2	...	70
43	Carbon steel	Forgings	SA/EN 10222–2	P305GH	...	N or NT	$t \le 6.3$	71
44	Carbon steel	Plate	SA/EN 10028–2	P355GH	...	...	$2.5 < t \le 4$	71
45	Carbon steel	Plate	SA/GB 713	Q345R	...	...	$1.5 < t \le 4$	71

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding													
	100	200	300	400	500	600	650	700	750	800	850	900	950	1000
												Ferrous Materials (Cont'd)		
1	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	69.1	64.3	58.6	52.3	45.9	40.4
2	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	69.1	64.3	58.6	52.3	45.9	40.4
3	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	69.1	64.3	58.6	52.3	45.9	40.4
4	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	69.1	64.3	58.6	52.3	45.9	40.4
5	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	69.1	64.3	58.6	52.3	45.9	40.4
6	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	69.1	64.3	58.6	52.3	45.9	40.4
7	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	69.1	64.3	58.6	52.3	45.9	40.4
8	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	69.1	64.3	58.6	52.3	45.9	40.4
9	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	69.1	64.3	58.6	52.3	45.9	40.4
10	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	69.1	64.3	58.6	52.3	45.9	40.4
11	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	69.1	64.3	58.6	52.3	45.9	40.4
12	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	69.1	64.3	58.6	52.3	45.9	40.4
13	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	69.1	64.3	58.6	52.3	45.9	40.4
14	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	69.1	64.3	58.6	52.3	45.9	40.4
15	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	69.1	64.3	58.6	52.3	45.9	40.4
16	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	69.1	64.3	58.6	52.3	45.9	40.4
17	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	69.1	64.3	58.6	52.3	45.9	40.4
18	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	69.1	64.3	58.6	52.3	45.9	40.4
19	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	69.1	64.3	58.6	52.3	45.9	40.4
20	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	69.1	64.3	58.6	52.3	45.9	40.4
21	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	69.1	64.3	58.6	52.3	45.9	40.4
22	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	69.1	64.3	58.6	52.3	45.9	40.4
23	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	69.1	64.3	58.6	52.3	45.9	40.4
24	70.0	69.5	65.7	63.3	62.6	62.6	62.6	62.6	62.3	59.2	...	...	...	...
25	70.0	70.0	69.1	68.4	68.4	68.4	68.4	68.4	67.7	65.4	...	...	...	...
26	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	69.1	64.3	58.6	52.3	45.9	40.4
~~27~~	~~70.0~~	~~70.0~~	~~70.0~~	~~70.0~~	~~70.0~~	~~70.0~~	~~70.0~~	~~70.0~~	~~69.1~~	~~64.3~~	~~58.6~~	~~52.3~~	~~45.9~~	~~40.4~~
28	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	69.1	64.3	58.6	52.3	45.9	40.4
29	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	69.1	64.3	58.6	52.3	45.9	40.4
30	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	69.1	64.3	58.6	52.3	45.9	40.4
31	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	69.1	64.3	58.6	52.3	45.9	40.4
32	70.0	70.0	69.1	68.4	68.4	68.4	68.4	68.4	67.7	65.4	...	...	...	...
33	70.0	70.0	69.1	68.4	68.4	68.4	68.4	68.4	67.7	65.4	...	...	...	...
34	70.0	70.0	69.1	68.4	68.4	68.4	68.4	68.4	67.7	65.4	...	...	...	...
35	70.0	70.0	69.1	68.4	68.4	68.4	68.4	68.4	67.7	65.4	...	...	...	...
36	70.0	70.0	69.1	68.4	68.4	68.4	68.4	68.4	67.7	65.4	...	...	...	...
37	70.0	70.0	69.1	68.4	68.4	68.4	68.4	68.4	67.7	65.4	...	...	...	...
38	70.0	70.0	70.0	70.0	70.0	69.9	68.4	...	...	...	...	...	...	...
39	70.0	70.0	70.0	70.0	70.0	70.0	...	...	...	...	...	...	...	...
40	70.0	70.0	70.0	70.0	70.0	70.0	...	...	...	...	...	...	...	...
41	70.0	70.0	70.0	70.0	70.0	70.0	...	...	...	...	...	...	...	...
42	70.0	70.0	70.0	70.0	70.0	70.0	...	...	...	...	...	...	...	...
43	71.1	71.1	71.1	71.1	71.1	71.1	71.1	71.1	70.0	65.2	59.4	53.0	46.5	40.6
44	71.0	71.0	71.0	71.0	71.0	71.0	71.0	71.0	68.3	64.8	60.0	53.9	46.9	39.3
45	71.1	71.1	71.1	71.1	71.1	71.1	71.1	71.1	70.1	65.2	59.3	52.8	46.4	41.0

Delete Line 27

(21)

Table Y-1
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
	Ferrous Materials					
1	Carbon steel	Sheet	SA–1008	CS–A	...	...
2	Carbon steel	Sheet	SA–1008	CS–B	...	...
3	Carbon steel	Bar	SA–675	45	...	...
4	Carbon steel	Wld. pipe	SA–134	A283A	...	...
5	Carbon steel	Plate	SA–283	A	...	...
6	Carbon steel	Plate	SA–285	A	K01700	...
7	Carbon steel	Wld. pipe	SA–672	A45	K01700	...
8	Carbon steel	Sheet	SA–414	A	K01501	...
9	Carbon steel	Wld. tube	SA–178	A	K01200	...
10	Carbon steel	Smls. tube	SA–179	...	K01200	...
11	Carbon steel	Smls. tube	SA–192	...	K01201	...
12	Carbon steel	Wld. tube	SA–214	...	K01807	...
13	Carbon steel	Smls. tube	SA–556	A2	K01807	...
~~14~~	~~Carbon steel~~	~~Wld. tube~~	~~SA–557~~	~~A2~~	~~K01807~~	...
15	Carbon steel	Wld. pipe	SA–53	E/A	K02504	...
16	Carbon steel	Smls. pipe	SA–53	S/A	K02504	...
17	Carbon steel	Smls. pipe	SA–106	A	K02501	...
18	Carbon steel	Wld. pipe	SA–135	A	...	...
19	Carbon steel	Forged pipe	SA–369	FPA	K02501	...
20	Carbon steel	Wld. pipe	SA–587	...	K11500	...
21	Carbon steel	Bar	SA–675	50	...	...
22	Carbon steel	Wld. pipe	SA–134	A283B	...	...
23	Carbon steel	Plate	SA–283	B	...	...
24	Carbon steel	Plate	SA–285	B	K02200	...
25	Carbon steel	Wld. pipe	SA–672	A50	K02200	...
26	Carbon steel	Sheet	SA–414	B	K02201	...
27	Carbon steel	Plate	SA/EN 10028–3	P275NH	...	...
28	Carbon steel	Plate	SA/EN 10028–2	P235GH	...	...
29	Carbon steel	Smls. tube	SA/EN 10216–2	P235GH	...	...
30	Carbon steel	Plate	SA/EN 10028–3	P275NH	...	...
31	Carbon steel	Smls. tube	SA/EN 10216–2	P235GH	...	...
32	Carbon steel	Smls. tube	SA/EN 10216–2	P235GH	...	...
(21) 33	Carbon steel	Sheet, strip	SA–1011	36	SS	Type 1
34	Carbon steel	Plate	SA/EN 10028–3	P275NH	...	...
35	Carbon steel	Bar	SA–675	55	...	...
36	Carbon steel	Wld. pipe	SA–134	A283C	K02401	...
37	Carbon steel	Plate	SA–283	C	K02401	...
38	Carbon steel	Plate	SA–285	C	K02801	...
39	Carbon steel	Smls. & wld. pipe	SA–333	1	K03008	...
40	Carbon steel	Smls. & wld. tube	SA–334	1	K03008	...
41	Carbon steel	Plate	SA–516	55	K01800	...
42	Carbon steel	Smls. pipe	SA–524	II	K02104	...
43	Carbon steel	Wld. pipe	SA–671	CA55	K02801	...
44	Carbon steel	Wld. pipe	SA–671	CE55	K02202	...
45	Carbon steel	Wld. pipe	SA–672	A55	K02801	...

Delete Line 14

Table Y-1
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Size/Thickness, in.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Notes
				Ferrous Materials
1	...	40	20	...
2	...	40	20	...
3	...	45	22.5	...
4	...	45	24	...
5	...	45	24	...
6	...	45	24	...
7	...	45	24	...
8	...	45	25	...
9	...	47	26	...
10	...	47	26	...
11	...	47	26	...
12	...	47	26	...
13	...	47	26	...
~~14~~	~~...~~	~~47~~	~~26~~	...
15	...	48	30	...
16	...	48	30	...
17	...	48	30	...
18	...	48	30	...
19	...	48	30	...
20	...	48	30	...
21	...	50	25	...
22	...	50	27	...
23	...	50	27	...
24	...	50	27	...
25	...	50	27	...
26	...	50	30	...
27	$6 < t \le 10$	51	31	...
28	$\le 2\frac{1}{4}$	52	31	...
29	$1\frac{5}{8} < t \le 2\frac{1}{2}$	52	31	...
30	$4 < t \le 6$	52	32.5	...
31	$\frac{5}{8} < t \le 1\frac{5}{8}$	52	32.5	...
32	$t \le \frac{5}{8}$	52	34	...
33	$t \le 0.23$	53	36	...
34	$2\frac{1}{4} < t \le 4$	53.5	34	...
35	...	55	27.5	...
36	...	55	30	...
37	...	55	30	...
38	...	55	30	...
39	...	55	30	...
40	...	55	30	...
41	...	55	30	...
42	...	55	30	...
43	...	55	30	...
44	...	55	30	...
45	...	55	30	...

Delete Line 14

Table Y-1
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding								
	100	150	200	250	300	350	400	450	500
	Ferrous Materials								
1	20.0	18.8	18.3	18.0	17.7	...	17.1	...	16.3
2	20.0	18.8	18.3	18.0	17.7	...	17.1	...	16.3
3	22.5	21.1	20.6	20.2	19.9	...	19.2	...	18.3
4	24.0	22.6	22.0	21.6	21.2	...	20.5	...	19.6
5	24.0	22.6	22.0	21.6	21.2	...	20.5	...	19.6
6	24.0	22.6	22.0	21.6	21.2	...	20.5	...	19.6
7	24.0	22.6	22.0	21.6	21.2	...	20.5	...	19.6
8	25.0	23.5	22.9	22.5	22.1	...	21.4	...	20.4
9	26.0	24.4	23.8	23.4	23.0	...	22.2	...	21.2
10	26.0	24.4	23.8	23.4	23.0	...	22.2	...	21.2
11	26.0	24.4	23.8	23.4	23.0	...	22.2	...	21.2
12	26.0	24.4	23.8	23.4	23.0	...	22.2	...	21.2
13	26.0	24.4	23.8	23.4	23.0	...	22.2	...	21.2
~~14~~	~~26.0~~	~~24.4~~	~~23.8~~	~~23.4~~	~~23.0~~	~~...~~	~~22.2~~	~~...~~	~~21.2~~
15	30.0	28.2	27.5	27.0	26.5	...	25.6	...	24.4
16	30.0	28.2	27.5	27.0	26.5	...	25.6	...	24.4
17	30.0	28.2	27.5	27.0	26.5	...	25.6	...	24.4
18	30.0	28.2	27.5	27.0	26.5	...	25.6	...	24.4
19	30.0	28.2	27.5	27.0	26.5	...	25.6	...	24.4
20	30.0	28.2	27.5	27.0	26.5	...	25.6	...	24.4
21	25.0	23.5	22.9	22.5	22.1	...	21.4	...	20.4
22	27.0	25.4	24.7	24.3	23.9	...	23.1	...	22.0
23	27.0	25.4	24.7	24.3	23.9	...	23.1	...	22.0
24	27.0	25.4	24.7	24.3	23.9	...	23.1	...	22.0
25	27.0	25.4	24.7	24.3	23.9	...	23.1	...	22.0
26	30.0	28.2	27.5	27.0	26.5	...	25.6	...	24.4
27	31.0	29.3	28.6	...	27.6	...	26.6	...	25.4
28	31.0	...	28.4	...	27.4	...	26.5	...	25.3
29	31.2	29.3	28.6	28.0	27.6	27.1	26.6	26.1	25.4
30	32.5	30.7	29.9	...	28.9	...	27.9	...	26.6
31	32.6	30.7	29.9	29.3	28.9	28.4	27.9	27.3	26.6
32	34.1	32.0	31.2	30.6	30.2	29.7	29.1	28.5	27.8
33	36.0	33.8	33.1	32.4	31.6	31.2	30.8	30.2	29.3
34	34.0	32.0	31.1	...	30.1	...	29.1	...	...
35	27.5	25.8	25.2	24.7	24.3	...	23.5	...	22.4
36	30.0	28.2	27.5	27.0	26.5	...	25.6	...	24.4
37	30.0	28.2	27.5	27.0	26.5	...	25.6	...	24.4
38	30.0	28.2	27.5	27.0	26.5	...	25.6	...	24.4
39	30.0	28.2	27.5	27.0	26.5	...	25.6	...	24.4
40	30.0	28.2	27.5	27.0	26.5	...	25.6	...	24.4
41	30.0	28.2	27.5	27.0	26.5	...	25.6	...	24.4
42	30.0	28.2	27.5	27.0	26.5	...	25.6	...	24.4
43	30.0	28.2	27.5	27.0	26.5	...	25.6	...	24.4
44	30.0	28.2	27.5	27.0	26.5	...	25.6	...	24.4
45	30.0	28.2	27.5	27.0	26.5	...	25.6	...	24.4

Delete Line 14

Table Y-1
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding									
	550	600	650	700	750	800	850	900	950	1000
										Ferrous Materials
1	...	15.3	14.8	14.3	13.8	13.4	13.0	12.6	12.3	11.9
2	...	15.3	14.8	14.3	13.8	13.4	13.0	12.6	12.3	11.9
3	...	17.2	16.7	16.1	15.6	15.1	14.6	14.2	13.8	13.4
4	...	18.4	17.8	17.2	16.6	16.1	15.6	15.2	14.7	14.3
5	...	18.4	17.8	17.2	16.6	16.1	15.6	15.2	14.7	14.3
6	...	18.4	17.8	17.2	16.6	16.1	15.6	15.2	14.7	14.3
7	...	18.4	17.8	17.2	16.6	16.1	15.6	15.2	14.7	14.3
8	...	19.2	18.5	17.9	17.3	16.8	16.3	15.8	15.4	14.9
9	...	19.9	19.3	18.6	18.0	17.4	16.9	16.4	16.0	15.5
10	...	19.9	19.3	18.6	18.0	17.4	16.9	16.4	16.0	15.5
11	...	19.9	19.3	18.6	18.0	17.4	16.9	16.4	16.0	15.5
12	...	19.9	19.3	18.6	18.0	17.4	16.9	16.4	16.0	15.5
13	...	19.9	19.3	18.6	18.0	17.4	16.9	16.4	16.0	15.5
~~14~~	~~...~~	~~19.9~~	~~19.3~~	~~18.6~~	~~18.0~~	~~17.4~~	~~16.9~~	~~16.4~~	~~16.0~~	~~15.5~~
15	...	23.0	22.2	21.5	20.8	20.1	19.5	19.0	18.4	17.8
16	...	23.0	22.2	21.5	20.8	20.1	19.5	19.0	18.4	17.8
17	...	[illegible]	[illegible]	21.5	20.8	20.1	19.5	19.0	18.4	17.8
18	...	[illegible]	[illegible]	21.5	20.8	20.1	19.5	19.0	18.4	17.8
19	...	23.0	22.2	21.5	20.8	20.1	19.5	19.0	18.4	17.8
20	...	23.0	22.2	21.5	20.8	20.1	19.5	19.0	18.4	17.8
21	...	19.2	18.5	17.9	17.3	16.8	16.3	15.8	15.4	14.9
22	...	20.7	20.0	19.3	18.7	18.1	17.6	17.1	16.6	16.0
23	...	20.7	20.0	19.3	18.7	18.1	17.6	17.1	16.6	16.0
24	...	20.7	20.0	19.3	18.7	18.1	17.6	17.1	16.6	16.0
25	...	20.7	20.0	19.3	18.7	18.1	17.6	17.1	16.6	16.0
26	...	23.0	22.2	21.5	20.8	20.1	19.5	19.0	18.4	17.8
27	...	23.9	23.1	22.3	21.6	20.9	20.3	19.7	19.2	18.5
28	...	23.8	...	22.2	21.5	20.8	20.2	19.6	19.0	18.4
29	24.7	23.9	23.1	22.3	21.6	20.9	20.3	19.7	19.2	18.5
30	...	25.0	24.2	23.4	22.6	21.9	21.2	20.6	20.0	19.4
31	25.8	25.0	24.2	23.4	22.6	21.9	21.2	20.6	20.0	19.4
32	27.0	26.1	25.3	24.4	23.6	22.8	22.2	21.5	20.9	20.3
33	28.3	27.7	...	...	...	...	...	...	...	...
34	...	...	...	...	...	...	...	...	...	...
35	...	21.1	20.4	19.7	19.0	18.4	17.9	17.4	16.9	16.3
36	...	23.0	22.2	21.5	20.8	20.1	19.5	19.0	18.4	17.8
37	...	23.0	22.2	21.5	20.8	20.1	19.5	19.0	18.4	17.8
38	...	23.0	22.2	21.5	20.8	20.1	19.5	19.0	18.4	17.8
39	...	23.0	22.2	21.5	20.8	20.1	19.5	19.0	18.4	17.8
40	...	23.0	22.2	21.5	20.8	20.1	19.5	19.0	18.4	17.8
41	...	23.0	22.2	21.5	20.8	20.1	19.5	19.0	18.4	17.8
42	...	23.0	22.2	21.5	20.8	20.1	19.5	19.0	18.4	17.8
43	...	23.0	22.2	21.5	20.8	20.1	19.5	19.0	18.4	17.8
44	...	23.0	22.2	21.5	20.8	20.1	19.5	19.0	18.4	17.8
45	...	23.0	22.2	21.5	20.8	20.1	19.5	19.0	18.4	17.8

Delete Line 14

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
	Ferrous Materials (Cont'd)					
1	Carbon steel	Plate	SA–283	D	K02702	...
2	Carbon steel	Wld. pipe	SA–53	E/B	K03005	...
3	Carbon steel	Smls. pipe	SA–53	S/B	K03005	...
4	Carbon steel	Smls. pipe	SA–106	B	K03006	...
5	Carbon steel	Wld. pipe	SA–135	B	...	...
6	Carbon steel	Smls. & wld. fittings	SA–234	WPB	K03006	...
7	Carbon steel	Smls. & wld. pipe	SA–333	6	K03006	...
8	Carbon steel	Smls. & wld. tube	SA–334	6	K03006	...
9	Carbon steel	Forged pipe	SA–369	FPB	K03006	...
10	Carbon steel	Forgings	SA–372	A	K03002	...
11	Carbon steel	Sheet	SA–414	D	K02505	...
12	Carbon steel	Smls. & wld. fittings	SA–420	WPL6	...	...
13	Carbon steel	Smls. pipe	SA–524	I	K02104	...
14	Carbon steel	Bar	SA–696	B	K03200	...
15	Carbon steel	Bolting	SA–307	A	...	...
16	Carbon steel	Bolting	SA–307	B	...	...
17	Carbon steel	Forgings	SA–727	...	K02506	...
18	Carbon steel	Wld. tube	SA–178	C	K03503	...
19	Carbon steel	Smls. tube	SA–210	A–1	K02707	...
20	Carbon steel	Smls. tube	SA–556	B2	K02707	...
~~21~~	~~Carbon steel~~	~~Wld. tube~~	~~SA–557~~	~~B2~~	~~K03007~~	~~...~~
22	Carbon steel	Plate, bar	SA/CSA–G40.21	38W	...	...
(**21**) 23	Carbon steel	Plate, sheet, bar	SA–572	42	...	...
(**21**) 24	Carbon steel	Sheet, strip	SA–1011	45	HSLAS	1
(**21**) 25	Carbon steel	Sheet, strip	SA–1011	45	SS	...
(**21**) 26	Carbon steel	Sheet, strip	SA–1011	50	HSLAS	2
27	Carbon steel	Plate	SA/EN 10028–2	P295GH	...	...
28	Carbon steel	Plate	SA/AS 1548	PT430	...	...
29	Carbon steel	Plate	SA/AS 1548	PT430	...	...
30	Carbon steel	Plate	SA/AS 1548	PT430	...	...
31	Carbon steel	Plate	SA/AS 1548	PT430	...	...
32	Carbon steel	Plate	SA/EN 10028–2	P295GH	...	...
33	Carbon steel	Bar	SA–675	65	...	...
34	Carbon steel	Castings	SA–352	LCB	J03003	...
35	Carbon steel	Plate	SA–515	65	K02800	...
36	Carbon steel	Plate	SA–516	65	K02403	...
37	Carbon steel	Wld. pipe	SA–671	CB65	K02800	...
38	Carbon steel	Wld. pipe	SA–671	CC65	K02403	...
39	Carbon steel	Wld. pipe	SA–672	B65	K02800	...
40	Carbon steel	Wld. pipe	SA–672	C65	K02403	...
41	Carbon steel	Sheet	SA–414	E	K02704	...
42	Carbon steel	Plate	SA–662	B	K02203	...
43	Carbon steel	Plate, bar	SA/CSA–G40.21	44W	...	...
44	Carbon steel	Plate, bar	SA/CSA–G40.21	44W	...	...
45	Carbon steel	Plate	SA–537	...	K12437	1

Delete Line 21

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Size/Thickness, in.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Notes
				Ferrous Materials (Cont'd)
1	...	60	33	...
2	...	60	35	...
3	...	60	35	...
4	...	60	35	...
5	...	60	35	...
6	...	60	35	...
7	...	60	35	...
8	...	60	35	...
9	...	60	35	...
10	...	60	35	...
11	...	60	35	...
12	...	60	35	...
13	...	60	35	...
14	...	60	35	...
15	$^1/_4 \le t \le 4$	60	36	...
16	...	60	36	...
17	...	60	36	...
18	...	60	37	...
19	...	60	37	...
20	...	60	37	...
~~21~~	~~...~~	~~60~~	~~37~~	~~...~~
22	...	60	38	...
23	$t \le 6$	60	42	...
24	...	60	45	...
25	$t \le 0.2$	60	45	...
26	...	60	50	...
27	$6 < t \le 10$	62.5	32	...
28	$3^1/_4 < t \le 6$	62.5	36.5	...
29	$1^1/_2 < t \le 3^1/_4$	62.5	39	...
30	$^5/_8 < t \le 1^1/_2$	62.5	40.5	...
31	$\le^5/_8$	62.5	43.5	...
32	$4 < t \le 6$	64	34	...
33	...	65	32.5	...
34	...	65	35	...
35	...	65	35	...
36	...	65	35	...
37	...	65	35	...
38	...	65	35	...
39	...	65	35	...
40	...	65	35	...
41	...	65	38	...
42	...	65	40	...
43	$2^1/_2 < t \le 8$	65	40	...
44	$t \le 2^1/_2$	65	44	...
45	$2^1/_2 < t \le 4$	65	45	...

Delete Line 21

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding								
	100	150	200	250	300	350	400	450	500
	Ferrous Materials (Cont'd)								
1	33.0	31.0	30.2	29.7	29.2	...	28.2	...	26.9
2	35.0	32.9	32.1	31.5	31.0	...	29.9	...	28.5
3	35.0	32.9	32.1	31.5	31.0	...	29.9	...	28.5
4	35.0	32.9	32.1	31.5	31.0	...	29.9	...	28.5
5	35.0	32.9	32.1	31.5	31.0	...	29.9	...	28.5
6	35.0	32.9	32.1	31.5	31.0	...	29.9	...	28.5
7	35.0	32.9	32.1	31.5	31.0	...	29.9	...	28.5
8	35.0	32.9	32.1	31.5	31.0	...	29.9	...	28.5
9	35.0	32.9	32.1	31.5	31.0	...	29.9	...	28.5
10	35.0	32.9	32.1	31.5	31.0	...	29.9	...	28.5
11	35.0	32.9	32.1	31.5	31.0	...	29.9	...	28.5
12	35.0	32.9	32.1	31.5	31.0	...	29.9	...	28.5
13	35.0	32.9	32.1	31.5	31.0	...	29.9	...	28.5
14	35.0	32.9	32.1	31.5	31.0	...	29.9	...	28.5
15	36.0	33.8	33.0	32.4	31.8	...	30.8	...	29.3
16	36.0	33.8	33.0	32.4	31.8	...	30.8	...	29.3
17	36.0	33.8	33.0	32.4	31.8	...	30.8	...	29.3
18	37.0	34.8	33.9	33.3	32.7	...	31.6	...	30.2
19	37.0	34.8	33.9	33.3	32.7	...	31.6	...	30.2
20	37.0	34.8	33.9	33.3	32.7	...	31.6	...	30.2
~~21~~	~~37.0~~	~~34.8~~	~~33.9~~	~~33.3~~	~~32.7~~	~~...~~	~~31.6~~	~~...~~	~~30.2~~
22	38.0	35.7	34.8	34.2	33.6	...	32.5	...	31.0
23	42.0	39.5	38.5	37.8	37.2	36.4	35.9	35.2	34.2
24	45.0	42.3	41.3	40.5	39.9	39.0	38.5	37.8	36.7
25	45.0	[illegible]	[illegible]	40.5	39.9	39.0	38.5	37.8	36.7
26	50.0	46.3	44.2	42.2	40.5	39.1	37.6	36.5	35.4
27	32.0	30.1	29.3	28.8	28.3	...	27.3	...	26.1
28	36.5	...	33.4	...	32.3	...	31.2	...	29.7
29	39.0	...	35.7	...	34.5	...	33.3	...	31.8
30	40.5	...	37.1	...	35.8	...	34.6	...	33.0
31	43.5	...	39.9	...	38.5	...	37.2	...	35.4
32	34.0	32.0	31.1	30.6	30.1	...	29.1	...	27.7
33	32.5	30.5	29.8	29.2	28.8	...	27.8	...	26.5
34	35.0	32.9	32.1	31.5	31.0	...	29.9	...	28.5
35	35.0	32.9	32.1	31.5	31.0	...	29.9	...	28.5
36	35.0	32.9	32.1	31.5	31.0	...	29.9	...	28.5
37	35.0	32.9	32.1	31.5	31.0	...	29.9	...	28.5
38	35.0	32.9	32.1	31.5	31.0	...	29.9	...	28.5
39	35.0	32.9	32.1	31.5	31.0	...	29.9	...	28.5
40	35.0	32.9	32.1	31.5	31.0	...	29.9	...	28.5
41	38.0	35.7	34.8	34.2	33.6	...	32.5	...	31.0
42	40.0	37.6	36.6	36.0	35.4	...	34.2	...	32.6
43	40.0	37.8	36.8	36.1	35.4	34.8	34.1	...	32.5
44	44.0	41.6	40.5	39.7	39.0	38.2	37.5	...	35.8
45	45.0	42.3	41.2	40.5	39.8	...	38.4	...	36.7

Delete Line 21

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding									
	550	600	650	700	750	800	850	900	950	1000
										Ferrous Materials (Cont'd)
1	...	25.3	24.5	23.6	22.8	22.1	21.5	20.9	20.3	19.6
2	...	26.8	25.9	25.1	24.2	23.5	22.8	22.1	21.5	20.8
3	...	26.8	25.9	25.1	24.2	23.5	22.8	22.1	21.5	20.8
4	...	26.8	25.9	25.1	24.2	23.5	22.8	22.1	21.5	20.8
5	...	26.8	25.9	25.1	24.2	23.5	22.8	22.1	21.5	20.8
6	...	26.8	25.9	25.1	24.2	23.5	22.8	22.1	21.5	20.8
7	...	26.8	25.9	25.1	24.2	23.5	22.8	22.1	21.5	20.8
8	...	26.8	25.9	25.1	24.2	23.5	22.8	22.1	21.5	20.8
9	...	26.8	25.9	25.1	24.2	23.5	22.8	22.1	21.5	20.8
10	...	26.8	25.9	25.1	24.2	23.5	22.8	22.1	21.5	20.8
11	...	26.8	25.9	25.1	24.2	23.5	22.8	22.1	21.5	20.8
12	...	26.8	25.9	25.1	24.2	23.5	22.8	22.1	21.5	20.8
13	...	26.8	25.9	25.1	24.2	23.5	22.8	22.1	21.5	20.8
14	...	26.8	25.9	25.1	24.2	23.5	22.8	22.1	21.5	20.8
15	...	27.6	26.7	25.8	...	...	...	...	...	...
16	...	27.6	26.7	25.8	...	...	...	...	...	...
17	...	27.6	26.7	25.8	24.9	24.1	23.4	22.8	22.1	21.4
18	...	28.4	27.4	26.5	25.6	24.8	24.1	23.4	22.7	22.0
19	...	28.4	27.4	26.5	25.6	24.8	24.1	23.4	22.7	22.0
20	...	28.4	27.4	26.5	25.6	24.8	24.1	23.4	22.7	22.0
~~21~~	~~...~~	~~28.4~~	~~27.4~~	~~26.5~~	~~25.6~~	~~24.8~~	~~24.1~~	~~23.4~~	~~22.7~~	~~22.0~~
22	...	29.1	28.2	27.2	26.3	25.5	24.7	24.0	23.3	21.4
23	33.0	32.2	...	...	...	...	...	...	...	...
24	35.4	34.5	...	...	...	...	...	...	...	...
25	35.4	Delete Line 21		...	...	...	...	...	...	...
26	34.6	33.7	...	...	...	...	...	...	...	...
27	...	24.5	23.7	22.9	22.2	21.5	20.8	20.2	19.7	19.0
28	...	28.0	27.1	26.1	25.3	24.5	23.7	23.1	22.4	21.7
29	...	29.9	28.9	27.9	27.0	26.1	25.4	24.7	24.0	23.2
30	...	31.0	30.0	29.0	28.0	27.1	26.3	25.6	24.9	24.1
31	...	33.3	32.2	31.1	30.1	29.2	28.3	27.5	26.7	25.9
32	...	26.1	25.2	24.3	23.5	22.8	22.1	21.5	20.9	20.2
33	...	24.9	24.1	23.3	22.5	21.8	21.1	20.5	20.0	19.3
34	...	26.8	25.9	25.1	24.2	23.5	22.8	22.1	21.5	20.8
35	...	26.8	25.9	25.1	24.2	23.5	22.8	22.1	21.5	20.8
36	...	26.8	25.9	25.1	24.2	23.5	22.8	22.1	21.5	20.8
37	...	26.8	25.9	25.1	24.2	23.5	22.8	22.1	21.5	20.8
38	...	26.8	25.9	25.1	24.2	23.5	22.8	22.1	21.5	20.8
39	...	26.8	25.9	25.1	24.2	23.5	22.8	22.1	21.5	20.8
40	...	26.8	25.9	25.1	24.2	23.5	22.8	22.1	21.5	20.8
41	...	29.1	28.2	27.2	26.3	25.5	24.7	24.0	23.3	22.6
42	...	30.7	29.6	28.6	27.7	26.8	26.0	25.3	24.6	23.8
43	31.6	30.7	29.7	28.7	27.7	26.8	26.0	25.2	24.5	23.8
44	34.8	33.7	32.7	31.6	30.5	29.5	28.6	27.7	26.9	26.2
45	...	34.5	33.4	32.2	31.2	30.2	29.3	28.4	27.6	26.7

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
	Ferrous Materials (Cont'd)					
1	Carbon steel	Wld. pipe	SA–672	C70	K02700	...
2	Carbon steel	Smls. pipe	SA–106	C	K03501	...
3	Carbon steel	Wld. tube	SA–178	D	...	...
4	Carbon steel	Smls. tube	SA–210	C	K03501	...
5	Carbon steel	Castings	SA–216	WCC	J02503	...
6	Carbon steel	Smls. & wld. fittings	SA–234	WPC	K03501	...
7	Carbon steel	Castings	SA–352	LCC	J02505	...
8	Carbon steel	Castings	SA–487	16	...	A
9	Carbon steel	Plate	SA–537	...	K12437	3
10	Carbon steel	Smls. tube	SA–556	C2	K03006	...
~~11~~	~~Carbon steel~~	~~Tube~~	~~SA–557~~	~~C2~~	~~K03505~~	~~...~~
12	Carbon steel	Cast pipe	SA–660	WCC	J02505	...
13	Carbon steel	Bar	SA–696	C	K03200	...
14	Carbon steel	Sheet	SA–414	F	K03102	...
15	Carbon steel	Plate	SA–662	C	K02007	...
16	Carbon steel	Plate	SA–537	...	K12437	2
17	Carbon steel	Plate	SA–738	C	K02008	...
18	Carbon steel	Plate	SA–537	...	K12437	1
19	Carbon steel	Wld. pipe	SA–671	CD70	K12437	...
20	Carbon steel	Wld. pipe	SA–672	D70	K12437	...
21	Carbon steel	Wld. pipe	SA–691	CMSH–70	K12437	...
22	Carbon steel	Plate	SA–841	A	...	1
(**21**) 23	Carbon steel	Plate, sheet, bar	SA–572	55	...	...
(**21**) 24	Carbon steel	Round bar	SA–572	55	...	...
(**21**) 25	Carbon steel	Sheet, strip	SA–1011	55	HSLAS	1
(**21**) 26	Carbon steel	Sheet, strip	SA–1011	60	HSLAS	2
27	Carbon steel	Forgings	SA/EN 10222–2	P305GH	...	NT
28	Carbon steel	Forgings	SA/EN 10222–2	P305GH	...	Normalized
29	Carbon steel	Plate	SA/GB 713	Q345R	...	...
30	Carbon steel	Plate	SA/EN 10028–2	P355GH	...	...
31	Carbon steel	Plate	SA/GB 713	Q345R	...	...
32	Carbon steel	Plate	SA/GB 713	Q345R	...	...
33	Carbon steel	Plate	SA–455	...	K03300	...
34	Carbon steel	Forgings	SA/EN 10222–2	P305GH	...	QT
35	Carbon steel	Plate	SA/EN 10028–2	P355GH	...	...
36	Carbon steel	Plate	SA/EN 10028–2	P355GH	...	...
37	Carbon steel	Plate	SA/GB 713	Q345R	...	...
38	Carbon steel	Plate	SA/EN 10025–2	S355J2+N	...	...
39	Carbon steel	Plate	SA/EN 10028–2	P355GH	...	...
40	Carbon steel	Forgings	SA–266	3	K05001	...
41	Carbon steel	Plate	SA–455	...	K03300	...
42	Carbon steel	Plate	SA–299	A	K02803	...
43	Carbon steel	Wld. pipe	SA–671	CK75	K02803	...
44	Carbon steel	Wld. pipe	SA–672	N75	K02803	...
45	Carbon steel	Wld. pipe	SA–691	CMS–75	K02803	...

Delete Line 11

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Size/Thickness, in.	Min. Tensile Strength, ksi	Min. Yield Strength, ksi	Notes
				Ferrous Materials (Cont'd)
1	...	70	38	...
2	...	70	40	...
3	...	70	40	...
4	...	70	40	...
5	...	70	40	...
6	...	70	40	...
7	...	70	40	...
8	...	70	40	...
9	$4 < t \le 6$	70	40	...
10	...	70	40	...
~~11~~	~~...~~	~~70~~	~~40~~	~~...~~
12	...	70	40	...
13	...	70	40	...
14	...	70	42	...
15	...	70	43	...
16	$4 < t \le 6$	70	46	...
17	$4 < t \le 6$	70	46	...
18	$\le 2^1/_2$	70	50	...
19	$\le 2^1/_2$	70	50	...
20	$\le 2^1/_2$	70	50	...
21	$\le 2^1/_2$	70	50	...
22	≤ 4	70	50	...
23	$t \le 2$	70	55	...
24	$t \le 3^1/_2$	70	55	...
25	...	70	55	...
26	...	70	60	...
27	$1.4 < t \le 6.3$	71	40.5	...
28	$t \le 1.4$	71	44	...
29	$2^1/_4 < t \le 4$	71	44	...
30	$2.5 < t \le 4$	71	45.5	...
31	$1.5 < t \le 2^1/_4$	71	45.5	...
32	$^5/_8 < t \le 1.5$	72.5	47	...
33	$^3/_8 < t \le ^5/_8$	73	37	...
34	$t \le 2.8$	74	41.5	...
35	$1.5 < t \le 2.5$	74	48.5	...
36	$^5/_8 < t \le 1.5$	74	50	...
37	$^1/_8 \le t \le ^5/_8$	74	50	...
38	$t < 0.12$	74	51.5	...
39	$\le ^5/_8$	74	51.5	...
40	...	75	37.5	...
41	$\le ^3/_8$	75	38	...
42	>1	75	40	...
43	>1	75	40	...
44	>1	75	40	...
45	>1	75	40	...

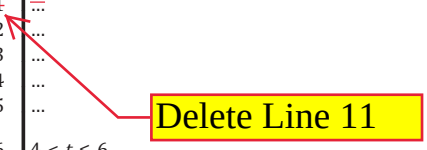

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding								
	100	150	200	250	300	350	400	450	500
	Ferrous Materials (Cont'd)								
1	38.0	35.7	34.8	34.2	33.6	...	32.5	...	31.0
2	40.0	37.6	36.6	36.0	35.4	...	34.2	...	32.6
3	40.0	37.6	36.6	36.0	35.4	...	34.2	...	32.6
4	40.0	37.6	36.6	36.0	35.4	...	34.2	...	32.6
5	40.0	37.6	36.6	36.0	35.4	...	34.2	...	32.6
6	40.0	37.6	36.6	36.0	35.4	...	34.2	...	32.6
7	40.0	37.6	36.6	36.0	35.4	...	34.2	...	32.6
8	40.0	37.2	35.7	34.4	33.4	...	31.8	...	30.5
9	40.0	37.1	35.3	33.8	32.4	...	30.0	...	28.3
10	40.0	37.6	36.6	36.0	35.4	...	34.2	...	32.6
~~11~~	~~40.0~~	~~37.6~~	~~36.6~~	~~36.0~~	~~35.4~~	~~...~~	~~34.2~~	~~...~~	~~32.6~~
12	40.0	37.6	36.6	36.0	35.4	...	34.2	...	32.6
13	40.0	37.6	36.6	36.0	35.4	...	34.2	...	32.6
14	42.0	39.5	38.5	37.8	37.2	...	35.9	...	34.2
15	43.0	40.6	39.6	38.7	38.0	...	36.7	...	35.0
16	46.0	42.6	40.6	38.8	37.2	...	34.6	...	32.5
17	46.0	42.6	40.6	38.8	37.2	...	34.6	...	32.5
18	50.0	46.3	44.2	42.2	40.5	...	37.6	...	35.4
19	50.0	46.3	44.2	42.2	40.5	...	37.6	...	35.4
20	50.0	46.3	44.2	42.2	40.5	...	37.6	...	35.4
21	50.0	46.3	44.2	42.2	40.5	...	37.6	...	35.4
22	50.0	...	46.1	...	43.8	...	42.3	...	41.3
23	55.0	51.0	48.6	46.4	44.5	42.8	41.3	40.2	38.9
24	55.0	51.0	48.6	46.4	44.5	42.8	41.3	40.2	38.9
25	55.0	51.0	48.6	46.4	44.5	42.8	41.3	40.2	38.9
26	60.0	55.8	53.0	50.7	48.6	46.6	45.1	43.9	42.4
27	40.6	38.0	37.0	36.3	35.7	35.1	34.4	...	32.9
28	44.2	41.4	40.3	39.5	38.9	38.2	37.5	...	35.8
29	44.2	41.5	40.6	39.8	39.2	38.6	37.8	37.0	36.1
30	45.7	...	41.7	...	40.4	...	39.1	...	37.3
31	45.7	42.9	41.9	41.1	40.5	39.8	39.1	38.2	37.3
32	47.1	44.3	43.2	42.4	41.8	41.1	40.3	39.4	38.5
33	37.0	34.8	33.9	33.3	32.7	...	31.6	...	30.2
34	41.3	38.7	37.7	36.9	36.3	35.7	35.1	...	33.4
35	48.6	...	44.4	...	43.0	...	41.6	...	39.6
36	50.0	...	45.7	...	44.3	...	42.8	...	40.8
37	50.0	47.0	45.9	45.0	44.3	43.6	42.8	41.9	40.8
38	51.5	...	...	...	...	...	...	...	...
39	51.5	...	47.0	...	45.6	...	44.1	...	42.0
40	37.5	35.2	34.4	33.7	33.2	...	32.0	...	30.6
41	38.0	35.7	34.8	34.2	33.6	...	32.5	...	31.0
42	40.0	37.6	36.6	36.0	35.4	...	34.2	...	32.6
43	40.0	37.6	36.6	36.0	35.4	...	34.2	...	32.6
44	40.0	37.6	36.6	36.0	35.4	...	34.2	...	32.6
45	40.0	37.6	36.6	36.0	35.4	...	34.2	...	32.6

Delete Line 11

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, ksi (Multiply by 1000 to Obtain psi), for Metal Temperature, °F, Not Exceeding									
	550	600	650	700	750	800	850	900	950	1000
										Ferrous Materials (Cont'd)
1	...	29.1	28.2	27.2	26.3	25.5	24.7	24.0	23.3	22.6
2	...	30.7	29.6	28.6	27.7	26.8	26.0	25.3	24.6	23.8
3	...	30.7	29.6	28.6	27.7	26.8	26.0	25.3	24.6	23.8
4	...	30.7	29.6	28.6	27.7	26.8	26.0	25.3	24.6	23.8
5	...	30.7	29.6	28.6	27.7	26.8	26.0	25.3	24.6	23.8
6	...	30.7	29.6	28.6	27.7	26.8	26.0	25.3	24.6	23.8
7	...	30.7	29.6	28.6	27.7	26.8	26.0	25.3	24.6	23.8
8	...	29.3	28.7	28.0	27.1	26.2	...	...	...	...
9	...	27.0	26.4	25.8	25.2	24.4	...	...	...	...
10	...	30.7	29.6	28.6	27.7	26.8	26.0	25.3	24.6	23.8
~~11~~	~~...~~	~~30.7~~	~~29.6~~	~~28.6~~	~~27.7~~	~~26.8~~	~~26.0~~	~~25.3~~	~~24.6~~	~~23.8~~
12	...	30.7	29.6	28.6	27.7	26.8	26.0	25.3	24.6	23.8
13	...	30.7	29.6	28.6	27.7	26.8	26.0	25.3	24.6	23.8
14	...	32.2	31.1	30.1	29.1	28.2	27.3	26.5	25.8	25.0
15	...	32.2	31.1	30.8	29.8	28.8	28.0	27.2	26.4	25.6
16	...	31.0	30.3	29.7	28.9	28.1	...	...	...	...
17	...	31.0	30.3	29.7	28.9	28.1	...	...	...	...
18	...	33.7	33.0	32.3	31.5	30.5	...	...	...	...
19	...	33.7	33.0	32.3	31.5	30.5	...	...	...	...
20	...	33.7	33.0	32.3	31.5	30.5	...	...	...	...
21	...	33.7	33.0	32.3	31.5	30.5	...	...	...	...
22	...	40.1	39.3	38.1	36.7	34.9	...	...	...	...
23	37.8	37.1	...	...	...	...	...	...	...	...
24	37.8	37.1	...	...	...	...	...	...	...	...
25	37.8	37.1	...	...	...	...	...	...	...	...
26	41.2	40.5	...	...	...	...	...	...	...	...
27	31.9	30.9	29.9	28.9	27.9	27.0	26.2	25.4	24.8	24.1
28	34.8	33.7	32.6	31.4	30.4	29.4	28.5	27.7	27.0	26.2
29	35.0	33.9	32.8	31.7	30.6	29.7	28.8	27.9	27.1	26.2
30	...	35.0	33.8	32.7	31.6	30.6	29.7	28.9	28.1	27.2
31	36.2	35.1	33.9	32.7	31.6	30.6	29.7	28.8	28.0	27.1
32	37.3	36.2	35.0	33.8	32.6	31.6	30.6	29.8	28.9	28.0
33	...	28.4	27.4	26.5	25.6	24.8	24.1	23.4	22.7	22.0
34	32.5	31.5	30.4	29.4	28.4	27.5	26.6	25.9	25.2	24.5
35	...	37.2	36.0	34.7	33.6	32.5	31.6	30.7	29.9	28.9
36	...	38.3	37.0	35.8	34.6	33.5	32.5	31.6	30.8	29.8
37	39.6	38.4	37.1	35.9	34.7	33.5	32.5	31.6	30.7	29.7
38	...	...	...	...	...	...	...	...	...	...
39	...	39.4	38.1	36.8	35.6	34.5	33.5	32.5	31.6	30.6
40	...	28.7	27.8	26.9	26.0	25.1	24.4	23.7	23.0	22.3
41	...	29.1	28.2	27.2	26.3	25.5	24.7	24.0	23.3	22.6
42	...	30.7	29.6	28.6	27.7	26.8	26.0	25.3	24.6	23.8
43	...	30.7	29.6	28.6	27.7	26.8	26.0	25.3	24.6	23.8
44	...	30.7	29.6	28.6	27.7	26.8	26.0	25.3	24.6	23.8
45	...	30.7	29.6	28.6	27.7	26.8	26.0	25.3	24.6	23.8

Delete Line 11

(21)

Table 1A
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/ Thickness, mm	P-No.	Group No.
1	Carbon steel	Sheet	SA–1008	CS–A	...	...	...	1	1
2	Carbon steel	Sheet	SA–1008	CS–B	...	...	...	1	1
3	Carbon steel	Bar	SA–675	45	...	...	...	1	1
4	Carbon steel	Wld. pipe	SA–134	A283A	...	...	...	1	1
5	Carbon steel	Plate	SA–283	A	...	...	...	1	1
6	Carbon steel	Plate	SA–285	A	K01700	...	...	1	1
7	Carbon steel	Wld. pipe	SA–672	A45	K01700	...	...	1	1
8	Carbon steel	Sheet	SA–414	A	K01501	...	...	1	1
9	Carbon steel	Wld. tube	SA–178	A	K01200	...	...	1	1
10	Carbon steel	Wld. tube	SA–178	A	K01200	...	...	1	1
11	Carbon steel	Smls. tube	SA–179	...	K01200	...	...	1	1
12	Carbon steel	Smls. tube	SA–192	...	K01201	...	...	1	1
13	Carbon steel	Wld. tube	SA–214	...	K01807	...	...	1	1
14	Carbon steel	Smls. tube	SA–556	A2	K01807	...	...	1	1
~~15~~	~~Carbon steel~~	~~Wld. tube~~	~~SA–557~~	~~A2~~	~~K01807~~	~~...~~	~~...~~	~~1~~	~~1~~
16	Carbon steel	Wld. pipe	SA–53	E/A	K02504	...	...	1	1
17	Carbon steel	Wld. pipe	SA–53	E/A	K02504	...	...	1	1
18	Carbon steel	Wld. pipe	SA–53	E/A	K02504	...	...	1	1
19	Carbon steel	Wld. pipe	SA–53	F/A	...	...	...	1	1
20	Carbon steel	Smls. pipe	SA–53	S/A	K02504	...	...	1	1
21	Carbon steel	Smls. pipe	SA–53	S/A	K02504	...	...	1	1
22	Carbon steel	Smls. pipe	SA–106	A	K02501	...	...	1	1
23	Carbon steel	Wld. pipe	SA–135	A	...	...	...	1	1
24	Carbon steel	Forged pipe	SA–369	FPA	K02501	...	...	1	1
25	Carbon steel	Wld. pipe	SA–587	...	K11500	...	...	1	1
26	Carbon steel	Wld. pipe	SA–587	...	K11500	...	...	1	1
27	Carbon steel	Bar	SA–675	50	...	...	...	1	1
28	Carbon steel	Bar	SA–675	50	...	...	...	1	1
29	Carbon steel	Wld. pipe	SA–134	A283B	...	...	...	1	1
30	Carbon steel	Plate	SA–283	B	...	...	...	1	1
31	Carbon steel	Plate	SA–285	B	K02200	...	...	1	1
32	Carbon steel	Plate	SA–285	B	K02200	...	...	1	1
33	Carbon steel	Wld. pipe	SA–672	A50	K02200	...	...	1	1
34	Carbon steel	Sheet	SA–414	B	K02201	...	...	1	1
35	Carbon steel	Plate	SA/EN 10028–3	P275NH	...	...	150 < *t* ≤ 250	1	1
36	Carbon steel	Plate	SA/EN 10028–2	P235GH	...	...	≤60	1	1
37	Carbon steel	Smls. tube	SA/EN 10216–2	P235GH	...	...	40 < *t* ≤ 60	1	1
38	Carbon steel	Plate	SA/EN 10028–3	P275NH	...	...	100 < *t* ≤ 150	1	1
39	Carbon steel	Smls. tube	SA/EN 10216–2	P235GH	...	...	16 < *t* ≤ 40	1	1
40	Carbon steel	Smls. tube	SA/EN 10216–2	P235GH	...	...	*t* ≤ 16	1	1
(21) 41	Carbon steel	Sheet, strip	SA–1011	36	SS	Type 1	*t* ≤ 6	...	...
42	Carbon steel	Plate	SA/EN 10028–3	P275NH	...	...	60 < *t* ≤ 100	1	1
(21) 43	Carbon steel	Sheet, strip	SA–1011	40	SS	...	*t* ≤ 6	...	...
(21) 44	Carbon steel	Sheet, strip	SA–1011	45	HSLAS	2	...	...	...
45	Carbon steel	Bar	SA–675	55	...	...	...	1	1

Delete Line 15

Table 1A
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Min. Tensile Strength, MPa	Min. Yield Strength, MPa	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	275	140	NP	NP	343	NP	CS–6	...
2	275	140	NP	NP	343	NP	CS–6	...
3	310	155	NP	343 (Cl. 3 only)	482	343	CS–6	G10, G22, T10
4	310	165	NP	149 (Cl. 3 only)	NP	NP	CS–1	W12
5	310	165	NP	149 (Cl. 3 only)	343	343	CS–1	...
6	310	165	482	371	482	343	CS–1	G10, T2
7	310	165	NP	371	NP	NP	CS–1	S6, W10, W12
8	310	170	NP	NP	482	343	CS–1	G10, T2
9	325	180	538	NP	NP	NP	CS–1	G4, G10, S1, T2, W13
10	325	180	538	NP	538	343	CS–1	G3, G10, G24, S1, T2, W6
11	325	180	NP	NP	482	343	CS–1	G10, T2
12	325	180	538	NP	538	343	CS–1	G10, S1, T2
13	325	180	NP	NP	538	343	CS–1	G24, T2, W6
14	325	180	NP	NP	538	343	CS–1	G10, T2
~~15~~	~~325~~	~~180~~	~~NP~~	~~NP~~	~~538~~	~~343~~	~~CS–1~~	~~G24, T2, W6~~
16	330	205	482	NP	NP	NP	CS–2	G3, G10, S1, T2
17	330	205	482	149 (Cl. 3 only)	NP	NP	CS–2	G10, S1, T2, W12, W13
18	330	205	538	NP	482	343	CS–2	G24, T2, W6
19	330	205	538	NP	NP	NP	CS–2	G2, G10, S10, T2, W15
20	330	205	482	149 (Cl. 3 only)	NP	NP	CS–2	G10, S1, T2
21	330	205	NP	371 (SPT)	482	343	CS–2	G10, T2
22	330	205	538	371	538	343	CS–2	G10, S1, T1
23	330	205	NP	NP	482	343	CS–2	G24, T2, W6
24	330	205	538	NP	NP	NP	CS–2	G10, S1, T1
25	330	205	NP	149 (Cl. 3 only)	NP	NP	CS–2	...
26	330	205	NP	NP	454	343	CS–2	G24, T2, W6
27	345	170	NP	343 (Cl. 3 only)	NP	NP	CS–1	...
28	345	170	454	371 (SPT)	482	343	CS–1	G10, G15, G22, S1, T2
29	345	185	NP	149 (Cl. 3 only)	NP	NP	CS–1	W12
30	345	185	NP	149 (Cl. 3 only)	343	343	CS–1	...
31	345	185	482	NP	NP	NP	CS–1	G10, S1, T1
32	345	185	NP	371	482	343	CS–1	G10, T1
33	345	185	NP	371	NP	NP	CS–1	S6, T1, W10, W12
34	345	205	NP	NP	482	343	CS–2	G10, T1
35	350	215	NP	NP	204	NP	CS–2	G10
36	360	215	NP	NP	371	NP	CS–2	T11
37	360	215	538	NP	538	NP	CS–2	G10, S1, T2, W14
38	360	225	NP	NP	204	NP	CS–2	G10
39	360	225	538	NP	538	NP	CS–2	G10, S1, T2, W14
40	360	235	538	NP	538	NP	CS–2	G10, S1, T2, W14
41	365	250	NP	NP	316	316	CS–2	...
42	370	235	NP	NP	204	NP	CS–2	G10
43	380	275	NP	NP	316	316	CS–2	...
44	380	310	NP	NP	316	316	CS–3	...
45	380	190	454	371 (SPT)	482	343	CS–1	G10, G15, G22, S1, T2

Delete Line 15

Table 1A
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, MPa (Multiply by 1000 to Obtain kPa), for Metal Temperature, °C, Not Exceeding														
	40	65	100	125	150	200	250	300	325	350	375	400	425	450	475
1	78.6	78.6	78.6	78.6	78.6	78.6	76.0	71.6	69.6	67.8	...	...	...	...	...
2	78.6	78.6	78.6	78.6	78.6	78.6	76.0	71.6	69.6	67.8	...	...	...	...	...
3	88.9	88.9	88.9	88.9	88.9	88.4	85.0	80.7	78.4	75.8	73.5	71.5	*64.0*	*56.1*	*44.5*
4	88.9	88.9	88.9	88.9	88.9	...	...	...	...	...	...	...	...	...	...
5	88.9	88.9	88.9	88.9	88.9	88.9	88.9	86.3	83.8	81.4	...	...	...	...	...
6	88.9	88.9	88.9	88.9	88.9	88.9	88.9	86.3	83.8	81.4	78.8	*73.4*	*64.0*	*56.1*	*44.5*
7	88.9	88.9	88.9	88.9	88.9	88.9	88.9	86.3	83.8	81.4	78.8	...	...	...	...
8	88.9	88.9	88.9	88.9	88.9	88.9	88.9	88.5	87.5	84.8	81.2	*73.4*	*64.0*	*56.1*	*44.5*
9	92.4	92.4	92.4	92.4	92.4	92.4	92.4	91.9	90.7	87.8	84.3	*73.3*	*63.9*	*56.2*	*44.5*
10	78.6	78.6	78.6	78.6	78.6	78.6	78.6	78.1	77.1	74.7	71.4	*62.3*	*54.2*	*47.6*	*37.7*
11	92.4	92.4	92.4	92.4	92.4	92.4	92.4	91.9	90.7	87.8	84.3	*73.3*	*63.9*	*56.2*	*44.5*
12	92.4	92.4	92.4	92.4	92.4	92.4	92.4	91.9	90.7	87.8	84.3	*73.3*	*63.9*	*56.2*	*44.5*
13	78.6	78.6	78.6	78.6	78.6	78.6	78.6	78.1	77.1	74.7	71.4	*62.3*	*54.2*	*47.6*	*37.7*
14	92.4	92.4	92.4	92.4	92.4	92.4	92.4	91.9	90.7	87.8	84.3	*73.3*	*63.9*	*56.2*	*44.5*
~~15~~	~~78.6~~	~~78.6~~	~~78.6~~	~~78.6~~	~~78.6~~	~~78.6~~	~~78.6~~	~~78.1~~	~~77.1~~	~~74.7~~	~~71.4~~	~~*62.3*~~	~~*54.2*~~	~~*47.6*~~	~~*37.7*~~
16	80.7	80.7	80.7	80.7	80.7	80.7	80.7	80.7	80.7	79.8	71.6	*62.3*	*53.7*	*43.9*	*32.9*
17	94.5	94.5	94.5	94.5	94.5	94.5	94.5	94.5	94.5	93.5	84.5	*73.3*	*62.8*	*51.2*	*38.3*
18	80.7	Delete Line 15			80.7	80.7	80.7	80.7	80.7	79.8	71.6	*62.4*	*54.9*	*47.5*	*40.1*
19	56.5				56.5	56.5	56.5	56.5	56.5	56.0	50.7	*43.8*	...	...	...
20	94.5	94.5	94.5	94.5	94.5	94.5	94.5	94.5	94.5	93.5	84.5	*73.3*	*62.8*	*51.2*	*38.3*
21	94.5	94.5	94.5	94.5	94.5	94.5	94.5	94.5	94.5	93.6	84.4	*73.3*	*64.7*	*56.0*	*47.6*
22	94.5	94.5	94.5	94.5	94.5	94.5	94.5	94.5	94.5	93.6	*84.4*	*73.3*	*64.7*	*56.0*	*47.6*
23	80.7	80.7	80.7	80.7	80.7	80.7	80.7	80.7	80.7	79.8	71.6	*62.4*	*54.9*	*47.5*	*40.1*
24	94.5	94.5	94.5	94.5	94.5	94.5	94.5	94.5	94.5	93.5	*84.5*	*73.3*	*62.8*	*51.2*	*38.3*
25	94.5	94.5	94.5	94.5	94.5	...	...	...	...	...	...	...	...	...	...
26	80.7	80.7	80.7	80.7	80.7	80.7	80.7	80.7	80.7	79.8	71.6	*62.4*	*54.9*	*47.5*	*40.1*
27	98.6	98.6	98.6	98.6	98.6	98.1	94.7	89.8	87.3	84.9	...	...	...	...	...
28	98.6	98.6	98.6	98.6	98.6	98.1	94.7	89.8	87.3	84.9	81.2	*73.4*	*64.7*	*56.0*	*47.3*
29	98.6	98.6	98.6	98.6	98.6	...	...	...	...	...	...	...	...	...	...
30	98.6	98.6	98.6	98.6	98.6	98.6	98.6	96.6	94.1	90.6	...	...	...	...	...
31	98.6	98.6	98.6	98.6	98.6	98.6	98.6	96.6	94.1	90.7	*85.0*	*75.4*	*65.6*	*52.8*	*38.6*
32	98.6	98.6	98.6	98.6	98.6	98.6	98.6	96.6	94.1	90.6	*85.1*	*76.8*	*66.8*	*57.8*	*44.9*
33	98.6	98.6	98.6	98.6	98.6	98.6	98.6	96.6	94.1	90.6	*85.1*	...	...	...	...
34	98.6	98.6	98.6	98.6	98.6	98.6	98.6	98.6	98.6	96.9	*84.5*	*76.8*	*66.8*	*57.7*	*44.9*
35	100	100	100	100	100	100	...	...	...	...	...	...	...	...	...
36	103	103	103	103	103	103	103	103	103	*96.8*	*85.0*	...	...	...	...
37	103	103	103	103	103	103	103	103	103	103	102	*89.1*	*75.4*	*62.6*	*45.5*
38	103	103	103	103	103	103	...	...	...	...	...	...	...	...	...
39	103	103	103	103	103	103	103	103	103	103	102	*89.1*	*75.4*	*62.6*	*45.5*
40	103	103	103	103	103	103	103	103	103	103	102	*89.1*	*75.4*	*62.6*	*45.5*
41	104	104	104	104	104	104	104	104	104	104	...	...	...	...	...
42	105	105	105	105	105	105	...	...	...	...	...	...	...	...	...
43	108	108	108	108	108	108	108	108	108	108	...	...	...	...	...
44	108	108	108	108	108	108	108	108	108	108	...	...	...	...	...
45	108	108	108	108	108	108	104	98.8	96.1	92.9	89.9	*87.3*	*75.4*	*62.5*	*46.0*

Table 1A
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, MPa (Multiply by 1000 to Obtain kPa), for Metal Temperature, °C, Not Exceeding																	
	500	525	550	575	600	625	650	675	700	725	750	775	800	825	850	875	900	
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	*31.7*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	*31.7*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	*31.7*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	*31.9*	*21.8*	*12.7*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	*27.1*	*18.5*	*10.6*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	*31.9*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	*31.9*	*21.8*	*12.7*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	*27.1*	*18.5*	*10.6*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	*31.9*	*21.8*	*12.7*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
~~15~~	~~*27.1*~~	~~*18.5*~~	~~*10.6*~~	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	*21.7*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	*25.3*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	*32.6*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	*25.3*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	*36.2*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	*36.2*	*23.5*	*11.2*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	*32.6*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	*25.3*	*14.9*	*5.88*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	*38.6*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	*24.3*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
32	*30.9*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	*30.9*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	*31.6*	*21.9*	*12.7*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	*31.6*	*21.9*	*12.7*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	*31.6*	*21.9*	*12.7*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
42	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
44	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
45	*28.2*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	

Delete Line 15

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/ Thickness, mm	P-No.	Group No.
	1	Carbon steel	Forgings	SA–765	I	K03046	...	...	1	1
	2	Carbon steel	Plate	SA–515	60	K02401	...	...	1	1
	3	Carbon steel	Plate	SA–516	60	K02100	...	...	1	1
	4	Carbon steel	Wld. pipe	SA–671	CB60	K02401	...	...	1	1
	5	Carbon steel	Wld. pipe	SA–671	CC60	K02100	...	...	1	1
	6	Carbon steel	Wld. pipe	SA–671	CE60	K02402	...	...	1	1
	7	Carbon steel	Wld. pipe	SA–672	B60	K02401	...	...	1	1
	8	Carbon steel	Wld. pipe	SA–672	C60	K02100	...	...	1	1
	9	Carbon steel	Wld. pipe	SA–672	E60	K02402	...	...	1	1
	10	Carbon steel	Wld. pipe	SA–134	A283D	K02702	...	...	1	1
	11	Carbon steel	Plate	SA–283	D	K02702	...	...	1	1
	12	Carbon steel	Wld. pipe	SA–53	E/B	K03005	...	...	1	1
	13	Carbon steel	Wld. pipe	SA–53	E/B	K03005	...	...	1	1
	14	Carbon steel	Smls. pipe	SA–53	S/B	K03005	...	...	1	1
	15	Carbon steel	Smls. pipe	SA–53	S/B	K03005	...	...	1	1
	16	Carbon steel	Smls. pipe	SA–106	B	K03006	...	...	1	1
	17	Carbon steel	Wld. pipe	SA–135	B	...	...	...	1	1
	18	Carbon steel	Smls. & wld. fittings	SA–234	WPB	K03006	...	...	1	1
	19	Carbon steel	Smls. & wld. pipe	SA–333	6	K03006	...	...	1	1
	20	Carbon steel	Wld. pipe	SA–333	6	K03006	...	...	1	1
	21	Carbon steel	Smls. & wld. tube	SA–334	6	K03006	...	...	1	1
	22	Carbon steel	Wld. tube	SA–334	6	K03006	...	...	1	1
	23	Carbon steel	Forged pipe	SA–369	FPB	K03006	...	...	1	1
	24	Carbon steel	Forgings	SA–372	A	K03002	...	...	1	1
	25	Carbon steel	Sheet	SA–414	D	K02505	...	...	1	1
	26	Carbon steel	Smls. & wld. fittings	SA–420	WPL6	...	...	...	1	1
	27	Carbon steel	Smls. pipe	SA–524	I	K02104	...	...	1	1
	28	Carbon steel	Bar	SA–696	B	K03200	...	...	1	1
	29	Carbon steel	Forgings	SA–727	...	K02506	...	...	1	1
	30	Carbon steel	Wld. tube	SA–178	C	K03503	...	...	1	1
	31	Carbon steel	Wld. tube	SA–178	C	K03503	...	...	1	1
	32	Carbon steel	Wld. tube	SA–178	C	K03503	...	...	1	1
	33	Carbon steel	Smls. tube	SA–210	A–1	K02707	...	...	1	1
	34	Carbon steel	Smls. tube	SA–556	B2	K02707	...	...	1	1
	~~35~~	~~Carbon steel~~	~~Wld. tube~~	~~SA–557~~	~~B2~~	~~K03007~~	...	...	~~1~~	~~1~~
	36	Carbon steel	Plate, bar	SA/CSA–G40.21	38W	...	...	...	1	1
(**21**)	37	Carbon steel	Plate, sheet, bar	SA–572	42	...	...	$t \le 150$	...	...
(**21**)	38	Carbon	ip	SA–1011	45	HSLAS	1	...	...	...
(**21**)	39	Carbon	ip	SA–1011	45	SS	...	$t \le 6$	...	...
(**21**)	40	Carbon steel	Sheet, strip	SA–1011	50	HSLAS	2	...	...	...
	41	Carbon steel	Plate	SA/AS 1548	PT430N	...	Normalized	≤150	1	1
	42	Carbon steel	Plate	SA/AS 1548	PT430NR	...	Norm. rld.	≤150	1	1
	43	Carbon steel	Plate	SA/EN 10028–2	P295GH	...	...	$150 < t \le 250$	1	1
	44	Carbon steel	Plate	SA/EN 10028–2	P295GH	...	...	$100 < t \le 150$	1	1
	45	Carbon steel	Bar	SA–675	65	...	...	...	1	1

Delete Line 35

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Min. Tensile Strength, MPa	Min. Yield Strength, MPa	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	415	205	NP	NP	538	343	CS-2	G10, T2
2	415	220	538	371	538	343	CS-2	G10, S1, T2
3	415	220	454	371	538	343	CS-2	G10, S1, T2
4	415	220	NP	371	NP	NP	CS-2	S6, W10, W12
5	415	220	NP	371	NP	NP	CS-2	S6, W10, W12
6	415	220	NP	371	NP	NP	CS-2	S6, W10, W12
7	415	220	NP	371	NP	NP	CS-2	S6, W10, W12
8	415	220	NP	371	NP	NP	CS-2	S6, W10, W12
9	415	220	NP	371	NP	NP	CS-2	S6, W10, W12
10	415	230	NP	149 (Cl. 3 only)	NP	NP	CS-2	W12
11	415	230	NP	149 (Cl. 3 only)	343	343	CS-2	...
12	415	240	482	149 (Cl. 3 only)	NP	NP	CS-2	G10, S1, T1, W12, W13
13	415	240	482	NP	482	343	CS-2	G3, G10, G24, S1, T1, W6
14	415	240	482	149 (Cl. 3 only)	NP	NP	CS-2	G10, S1, T1
15	415	240	NP	371 (SPT)	482	343	CS-2	G10, T1
16	415	240	538	371	538	343	CS-2	G10, S1, T1
17	415	240	NP	NP	482	343	CS-2	G24, T1, W6
18	415	240	538	371	538	343	CS-2	G10, S1, T1
19	415	240	371	371	538	343	CS-2	G10, T1, W12, W13, W14
20	415	240	371	NP	NP	NP	CS-2	T1
21	415	240	NP	371	343	343	CS-2	T1, W12, W14
22	415	240	NP	NP	343	343	CS-2	G24, W6
23	415	240	538	NP	NP	NP	CS-2	G10, S1, T1
24	415	240	NP	NP	343	343	CS-2	...
25	415	240	NP	NP	482	343	CS-2	G10, T1
26	415	240	NP	371	454	343	CS-2	G10, T1, W14
27	415	240	NP	NP	538	343	CS-2	G10, T1
28	415	240	NP	371	NP	NP	CS-2	T1
29	415	250	NP	371	538	343	CS-2	G10, G22, T1
30	415	255	538	NP	NP	NP	CS-2	G4, G10, S1, T2
31	415	255	538	371	NP	NP	CS-2	G10, S1, T1, W13
32	415	255	538	NP	538	343	CS-2	G3, G10, G24, S1, T2, W6
33	415	255	538	371	538	343	CS-2	G10, S1, T1
34	415	255	NP	NP	538	343	CS-2	G10, T1
~~35~~	~~415~~	~~255~~	~~NP~~	~~NP~~	~~538~~	~~343~~	~~CS-2~~	~~G24, T1, W6~~
36	415	260	NP	NP	343	343	CS-2	...
37	415	290	NP	NP	316	316	CS-3	...
38	410	[illegible]	[illegible]	NP	316	316	CS-3	...
39	410	[illegible]	[illegible]	NP	316	316	CS-3	...
40	410	340	NP	NP	316	316	CS-3	...
41	430	...	538	NP	538	NP	CS-2	G10, G18, S1, T1
42	430	...	538	NP	538	NP	CS-2	G10, G18, S1, T1
43	430	220	454	NP	538	NP	CS-2	G10, S1, T2
44	440	235	454	NP	538	NP	CS-2	G10, S1, T2
45	450	225	454	343 (Cl. 3 only)	538	343	CS-2	G10, G15, G22, S1, T2

Delete Line 35

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, MPa (Multiply by 1000 to Obtain kPa), for Metal Temperature, °C, Not Exceeding														
	40	65	100	125	150	200	250	300	325	350	375	400	425	450	475
1	118	118	118	118	118	118	114	107	104	101	97.8	*89.1*	*75.4*	*62.6*	*45.5*
2	118	118	118	118	118	118	118	115	112	108	104	*88.9*	*75.3*	*62.7*	*45.5*
3	118	118	118	118	118	118	118	115	112	108	104	*88.9*	*75.3*	*62.7*	*45.5*
4	118	118	118	118	118	118	118	115	112	108	104	...	...	...	...
5	118	118	118	118	118	118	118	115	112	108	104	...	...	...	...
6	118	118	118	118	118	118	118	115	112	108	104	...	...	...	...
7	118	118	118	118	118	118	118	115	112	108	104	...	...	...	...
8	118	118	118	118	118	118	118	115	112	108	104	...	...	...	...
9	118	118	118	118	118	118	118	115	112	108	104	...	...	...	...
10	118	118	118	118	118	...	...	...	...	...	...	...	...	...	...
11	118	118	118	118	118	118	118	118	115	111	...	...	...	...	...
12	118	118	118	118	118	118	118	118	118	117	*105*	*88.9*	*75.3*	*62.7*	*45.5*
13	101	101	101	101	101	101	101	101	101	99.7	*89.7*	*75.9*	*64.1*	*53.3*	*38.6*
14	118	118	118	118	118	118	118	118	118	117	*105*	*88.9*	*75.3*	*62.7*	*45.5*
15	118	118	118	118	118	118	118	118	118	117	*105*	*88.9*	*75.3*	*62.7*	*45.5*
16	118	118	118	118	118	118	118	118	118	117	*105*	*88.9*	*75.3*	*62.7*	*45.5*
17	101	101	101	101	101	101	101	101	101	99.7	*89.7*	*75.9*	*64.1*	*53.3*	*38.6*
18	118	118	118	118	118	118	118	118	118	117	*105*	*88.9*	*75.3*	*62.7*	*45.5*
19	118	118	118	118	118	118	118	118	118	117	*105*	*88.9*	*75.3*	*62.7*	*45.5*
20	101	101	101	101	101	101	101	101	101	99.7	*89.7*	...	...	...	...
21	118	118	118	118	118	118	118	118	118	117	*105*	...	...	...	...
22	101	101	101	101	101	101	101	101	101	101	...	...	...	...	...
23	118	118	118	118	118	118	118	118	118	117	*105*	*88.9*	*75.3*	*62.7*	*45.5*
24	118	118	118	118	118	118	118	118	118	118	...	...	...	...	...
25	118	118	118	118	118	118	118	118	118	117	*105*	*88.9*	*75.3*	*62.7*	*45.5*
26	118	118	118	118	118	118	118	118	118	117	*105*	*88.9*	*75.3*	*62.7*	*45.5*
27	118	118	118	118	118	118	118	118	118	117	*105*	*88.9*	*75.3*	*62.7*	*45.5*
28	118	118	118	118	118	118	118	118	118	117	*105*	...	...	...	...
29	118	118	118	118	118	118	118	118	118	117	*105*	*88.9*	*75.3*	*62.7*	*45.5*
30	118	118	118	118	118	118	118	118	118	117	105	*88.9*	*75.2*	*63.2*	*40.5*
31	118	118	118	118	118	118	118	118	118	117	*105*	*88.9*	*75.3*	*62.7*	*45.5*
32	101	101	101	101	101	101	101	101	101	99.7	89.7	*75.9*	*64.1*	*53.3*	*38.6*
33	118	118	118	118	118	118	118	118	118	117	*105*	*88.9*	*75.3*	*62.7*	*45.5*
34	118	118	118	118	118	118	118	118	118	117	*105*	*88.9*	*75.3*	*62.7*	*45.5*
~~35~~	~~101~~	~~101~~	~~101~~	~~101~~	~~101~~	~~101~~	~~101~~	~~101~~	~~101~~	~~99.7~~	~~*89.7*~~	~~*75.9*~~	~~*64.1*~~	~~*53.3*~~	~~*38.6*~~
36	118	118	118	118	118	118	118	118	118	118	...	...	...	...	...
37	118	118	118	118	118	118	118	118	118	118	...	...	...	...	...
38	118	Delete Line 35			118	118	118	118	118	118	...	...	...	...	...
39	118				118	118	118	118	118	118	...	...	...	...	...
40	118	118	118	118	118	118	118	118	118	118	...	...	...	...	...
41	123	123	123	123	123	123	123	123	123	123	*114*	*95.0*	*79.6*	*63.2*	*45.3*
42	123	123	123	123	123	123	123	123	123	123	*114*	*95.0*	*79.6*	*63.2*	*45.3*
43	123	123	123	123	123	123	121	114	111	108	105	*96.2*	*79.1*	*62.1*	*46.0*
44	126	126	126	126	126	126	126	122	119	115	112	*96.2*	*79.1*	*62.1*	*46.0*
45	128	128	128	128	128	128	123	117	113	110	106	*95.2*	*79.6*	*63.8*	*39.2*

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, MPa (Multiply by 1000 to Obtain kPa), for Metal Temperature, °C, Not Exceeding																	
	500	525	550	575	600	625	650	675	700	725	750	775	800	825	850	875	900	
1	*31.6*	*21.9*	*12.7*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	*31.6*	*21.9*	*12.7*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	*31.6*	*21.9*	*12.7*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	*31.6*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	*26.8*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	*31.6*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	*31.6*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	*31.6*	*21.9*	*12.7*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	*26.8*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	*31.6*	*21.9*	*12.7*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	*31.6*	*21.9*	*12.7*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	*31.6*	*21.9*	*12.7*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	*31.6*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	*31.6*	*21.9*	*12.7*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	*31.6*	*21.9*	*12.7*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
30	*26.2*	*18.8*	*10.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
31	*31.6*	*21.9*	*12.7*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
32	*26.8*	*18.6*	*10.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
33	*31.6*	*21.9*	*12.7*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	*31.6*	*21.9*	*12.7*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
~~35~~	~~*26.8*~~	~~*18.6*~~	~~*10.5*~~	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
39	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
40	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
41	*31.7*	*21.9*	*12.7*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	*31.7*	*21.9*	*12.7*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	*32.1*	*21.2*	*14.4*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	*32.1*	*21.2*	*14.4*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	*30.1*	*22.4*	*12.5*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	

Delete Line 35

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./ UNS No.	Class/ Condition/ Temper	Size/ Thickness, mm	P-No.	Group No.
1	Carbon steel	Wld. pipe	SA–671	CB70	K03101	...	...	1	2
2	Carbon steel	Wld. pipe	SA–671	CC70	K02700	...	...	1	2
3	Carbon steel	Wld. pipe	SA–672	B70	K03101	...	...	1	2
4	Carbon steel	Wld. pipe	SA–672	C70	K02700	...	...	1	2
5	Carbon steel	Plate	SA/JIS G3118	SGV480	...	...	...	1	2
6	Carbon steel	Smls. pipe	SA–106	C	K03501	...	...	1	2
7	Carbon steel	Wld. tube	SA–178	D	...	...	...	1	2
8	Carbon steel	Wld. tube	SA–178	D	...	...	...	1	2
9	Carbon steel	Wld. tube	SA–178	D	...	...	...	1	2
10	Carbon steel	Smls. tube	SA–210	C	K03501	...	...	1	2
11	Carbon steel	Castings	SA–216	WCC	J02503	...	...	1	2
12	Carbon steel	Smls. & wld. fittings	SA–234	WPC	K03501	...	...	1	2
13	Carbon steel	Castings	SA–352	LCC	J02505	...	...	1	2
14	Carbon steel	Castings	SA–487	16	...	A	...	1	2
15	Carbon steel	Plate	SA–537	...	K12437	3	100 < t ≤ 150	1	3
16	Carbon steel	Smls. tube	SA–556	C2	K03006	...	...	1	2
~~17~~	~~Carbon steel~~	~~Wld. tube~~	~~SA–557~~	~~C2~~	~~K03505~~	...	...	~~1~~	~~2~~
18	Carbon steel	Cast pipe	SA–660	WCC	J02505	...	...	1	2
19	Carbon steel	Bar	SA–696	C	K03200	...	...	1	2
20	Carbon steel	Sheet	SA–414	F	K03102	...	...	1	2
21	Carbon		SA–662	C	K02007	...	...	1	2
22	Carbon steel	Plate	SA–537	...	K12437	2	100 < t ≤ 150	1	3
23	Carbon steel	Plate	SA–738	C	K02008	...	100 < t ≤ 150	1	3
24	Carbon steel	Plate	SA–537	...	K12437	1	≤65	1	2
25	Carbon steel	Wld. pipe	SA–671	CD70	K12437	...	≤65	1	2
26	Carbon steel	Wld. pipe	SA–672	D70	K12437	...	≤65	1	2
27	Carbon steel	Wld. pipe	SA–691	CMSH–70	K12437	...	≤65	1	2
28	Carbon steel	Plate	SA–841	A	...	1	≤100	1	2
(**21**) 29	Carbon steel	Plate, sheet, bar	SA–572	55	...	...	t ≤ 50	...	...
(**21**) 30	Carbon steel	Round bar	SA–572	55	...	...	t ≤ 90	...	...
(**21**) 31	Carbon steel	Sheet, strip	SA–1011	55	HSLAS	1	...	...	...
(**21**) 32	Carbon steel	Sheet, strip	SA–1011	60	HSLAS	2	...	...	...
33	Carbon steel	Forgings	SA/EN 10222–2	P305GH	...	NT	35 < t ≤ 160	1	2
34	Carbon steel	Forgings	SA/EN 10222–2	P305GH	...	Normalized	t ≤ 35	1	2
35	Carbon steel	Plate	SA/GB 713	Q345R	...	...	60 < t ≤ 100	1	2
36	Carbon steel	Plate	SA/EN 10028–2	P355GH	...	...	60 < t ≤ 100	1	2
37	Carbon steel	Plate	SA/GB 713	Q345R	...	...	36 < t ≤ 60	1	2
38	Carbon steel	Plate	SA/GB 713	Q345R	...	...	16 < t ≤ 36	1	2
39	Carbon steel	Plate	SA–455	...	K03300	...	9.5 < t ≤ 15	1	2
40	Carbon steel	Forgings	SA/EN 10222–2	P305GH	...	QT	t ≤ 70	1	2
41	Carbon steel	Plate	SA/GB 713	Q345R	...	...	3 ≤ t ≤ 16	1	2
42	Carbon steel	Plate	SA/EN 10028–2	P355GH	...	...	≤60	1	2
43	Carbon steel	Forgings	SA–266	3	K05001	...	...	1	2
44	Carbon steel	Plate	SA–455	...	K03300	...	≤9.5	1	2
45	Carbon steel	Plate	SA–299	A	K02803	...	>25	1	2

Delete Line 17

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Min. Tensile Strength, MPa	Min. Yield Strength, MPa	Applicability and Max. Temperature Limits (NP = Not Permitted) (SPT = Supports Only) I	III	VIII-1	XII	External Pressure Chart No.	Notes
1	485	260	NP	371	NP	NP	CS–2	S5, W10, W12
2	485	260	NP	371	NP	NP	CS–2	S6, W10, W12
3	485	260	NP	371	NP	NP	CS–2	S5, W10, W12
4	485	260	NP	371	NP	NP	CS–2	S6, W10, W12
5	485	260	454	NP	NP	NP	CS–2	G10, S1, T2
6	485	275	538	371	538	343	CS–2	G10, S1, T1
7	485	275	538	NP	NP	NP	CS–2	G10, S1, T1, W13
8	485	275	538	NP	NP	NP	CS–2	G4, G10, S1, T4
9	485	275	538	NP	NP	NP	CS–2	G3, G10, S1, T2
10	485	275	538	NP	538	343	CS–2	G10, S1, T1
11	485	275	538	371	538	343	CS–2	G1, G10, G17, S1, T1
12	485	275	427	371	427	343	CS–2	G10, T1, W14
13	485	275	NP	371	NP	NP	CS–2	G17, T1
14	485	275	NP	371	NP	NP	CS–2	...
15	485	275	NP	NP	371	343	CS–2	G23, W11
16	485	275	NP	NP	427	343	CS–2	G10, T1
~~17~~	~~485~~	~~275~~	~~NP~~	~~NP~~	~~538~~	~~343~~	~~CS–2~~	~~G24, T2, W6~~
18	485	275	538	371	NP	NP	CS–2	G1, G10, G17, S1, T1
19	485	275	NP	371	NP	NP	CS–2	T1
20	485	290	NP	NP	482	343	CS–2	G10, T1
21	485	[illegible]	[illegible]	NP	371	343	CS–3	T1
22	485	315	NP	371	371	343	CS–3	G23, T1, W11
23	485	315	NP	343	343	343	CS–3	G23, W11
24	485	345	NP	371	343	343	CS–3	G23, T1
25	485	345	NP	371	NP	NP	CS–3	S6, T1, W10, W12
26	485	345	NP	371	NP	NP	CS–3	S6, T1, W10, W12
27	485	345	NP	371	NP	NP	CS–3	S6, T1, W10, W12
28	485	345	NP	NP	343	NP	CS–3	...
29	485	380	NP	NP	316	316	CS–3	...
30	485	380	NP	NP	316	316	CS–3	...
31	480	380	NP	NP	316	316	CS–3	...
32	480	410	NP	NP	316	316	CS–3	...
33	490	280	538	NP	538	NP	CS–2	G10, S1, T2
34	490	305	538	NP	538	NP	CS–2	G10, S1, T1
35	490	305	427	NP	427	NP	CS–2	T1
36	490	315	454	NP	538	NP	CS–2	G10, S1, T1
37	490	315	427	NP	427	NP	CS–2	T1
38	500	325	427	NP	427	NP	CS–2	T1
39	505	255	NP	204 (Cl. 3 only)	343	343	CS–2	...
40	510	285	538	NP	538	NP	CS–2	G10, S1, T2
41	510	345	427	NP	427	NP	CS–2	T1
42	510	...	454	NP	538	NP	CS–2	G10, G18, S1, T1
43	515	260	538	371	538	NP	CS–2	G10, S1, T2, W8, W11
44	515	260	NP	204 (Cl. 3 only)	343	343	CS–2	...
45	515	275	538	371	538	343	CS–2	G10, S1, T2

Delete Line 17

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, MPa (Multiply by 1000 to Obtain kPa), for Metal Temperature, °C, Not Exceeding														
	40	65	100	125	150	200	250	300	325	350	375	400	425	450	475
1	138	138	138	138	138	138	138	136	132	128	123	...	...	...	...
2	138	138	138	138	138	138	138	136	132	128	123	...	...	...	...
3	138	138	138	138	138	138	138	136	132	128	123	...	...	...	...
4	138	138	138	138	138	138	138	136	132	128	123	...	...	...	...
5	138	138	138	138	138	138	138	136	132	128	123	*101*	*83.8*	*67.1*	*51.0*
6	138	138	138	138	138	138	138	138	138	135	*123*	*101*	*83.8*	*67.0*	*51.0*
7	138	138	138	138	138	138	138	138	138	135	*123*	*101*	*83.8*	*67.0*	*51.0*
8	138	138	138	138	138	138	138	138	138	135	123	101	83.7	67.6	45.5
9	117	117	117	117	117	117	117	117	117	115	104	*86.1*	*71.3*	*56.9*	*43.4*
10	138	138	138	138	138	138	138	138	138	135	*123*	*101*	*83.8*	*67.0*	*51.0*
11	138	138	138	138	138	138	138	138	138	135	*123*	*101*	*83.8*	*67.0*	*51.0*
12	138	138	138	138	138	138	138	138	138	135	*123*	*101*	*83.8*	*67.0*	...
13	138	138	138	138	138	138	138	138	138	135	*123*	...	...	...	...
14	138	138	137	133	129	125	123	123	123	123	123	...	...	...	...
15	138	138	138	137	136	135	131	126	123	121	118	...	...	...	...
16	138	138	138	138	138	138	138	138	138	135	*123*	*101*	*83.8*	*67.0*	...
~~17~~	~~117~~	~~117~~	~~117~~	~~117~~	~~117~~	~~117~~	~~117~~	~~117~~	~~117~~	~~115~~	~~104~~	~~*86.1*~~	~~*71.3*~~	~~*56.9*~~	~~*43.4*~~
18	138	138	138	138	138	138	138	138	138	135	*123*	*101*	*83.8*	*67.0*	*51.0*
19	138	138	138	138	138	138	138	138	138	135	*123*	...	...	...	...
20	138	138	138	138	138	138	138	138	138	137	*123*	*101*	*83.8*	*67.1*	*50.8*
21	138	138	138	138	138	138	138	138	138	137	*123*	...	...	...	...
22	138	138	138	137	136	134	134	134	134	133	*125*	...	...	...	...
23	138	138	138	137	136	134	134	134	134	133	...	...	...	...	...
24	138	138	138	137	136	134	134	134	134	133	*125*	...	...	...	...
25	138	138	138	137	136	134	134	134	134	133	*125*	...	...	...	...
26	138	138	138	137	136	134	134	134	134	133	*125*	...	...	...	...
27	138	138	138	137	136	134	134	134	134	133	*125*	...	...	...	...
28	138	138	138	138	138	138	138	138	138	138	...	...	...	...	...
29	138	138	138	138	138	138	138	138	138	138	...	...	...	...	...
30	138	138	138	138	138	138	138	138	138	138	...	...	...	...	...
31	138	138	138	138	138	138	138	138	138	138	...	...	...	...	...
32	138	138	138	138	138	138	138	138	138	138	...	...	...	...	...
33	140	140	140	140	140	140	140	140	140	136	132	*101*	*83.9*	*67.0*	*51.1*
34	140	140	140	140	140	140	140	140	140	140	*136*	*101*	*83.9*	*67.0*	*51.1*
35	140	140	140	140	140	140	140	140	140	140	*123*	*101*	*83.8*	*67.1*	...
36	140	140	140	140	140	140	140	140	140	140	*123*	*101*	*83.8*	*67.1*	*51.0*
37	140	140	140	140	140	140	140	140	140	140	*123*	*101*	*83.8*	*67.1*	...
38	143	143	143	143	143	143	143	143	143	143	*123*	*101*	*83.8*	*67.1*	...
39	144	144	144	144	144	144	140	133	129	125	...	...	...	...	...
40	146	146	146	146	146	146	146	146	143	139	134	*101*	*83.9*	*67.0*	*51.1*
41	146	146	146	146	146	146	146	146	146	146	*123*	*101*	*83.8*	*67.1*	...
42	146	146	146	146	146	146	146	146	146	146	*123*	*101*	*83.8*	*67.1*	*51.0*
43	148	148	148	148	148	148	142	135	131	127	122	*107*	*88.3*	*67.5*	*50.9*
44	148	148	148	148	148	148	143	136	132	129	...	...	...	...	...
45	148	148	148	148	148	148	148	143	139	135	130	*107*	*88.1*	*67.5*	*50.8*

Delete Line 17

Table 1A (Cont'd)
Section I; Section III, Division 1, Classes 2 and 3;* Section VIII, Division 1; and Section XII
Maximum Allowable Stress Values, *S*, for Ferrous Materials
(*See Maximum Temperature Limits for Restrictions on Class)

Line No.	Maximum Allowable Stress, MPa (Multiply by 1000 to Obtain kPa), for Metal Temperature, °C, Not Exceeding																	
	500	525	550	575	600	625	650	675	700	725	750	775	800	825	850	875	900	
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
6	*33.6*	*21.3*	*12.9*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	*33.6*	*21.3*	*12.9*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	*27.9*	*18.3*	*10.6*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	*28.6*	*18.1*	*10.7*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	*33.6*	*21.3*	*12.9*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	*33.6*	*21.3*	*12.9*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
~~17~~	~~*28.6*~~	~~*18.1*~~	~~*10.7*~~	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
18	*33.6*	*21.3*	*12.9*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
19	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	*34.7*					...	...	...	...	...	...	...	...	...	...	...	...	
21	...					...	...	...	...	...	...	...	...	...	...	...	...	
22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
31	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
32	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	(**21**)
33	*33.6*	*21.3*	*12.9*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
34	*33.6*	*21.3*	*12.9*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
35	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
36	*33.6*	*21.3*	*12.9*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
37	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
39	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
40	*33.6*	*21.3*	*12.9*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
41	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
42	*33.6*	*21.3*	*12.9*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
43	*33.7*	*21.3*	*12.9*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
44	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
45	*33.7*	*21.3*	*12.9*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	

Delete Line 17

(21)

Table U
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper	Size/ Thickness, mm	Min. Tensile Strength, MPa
	Ferrous Materials							
1	Carbon steel	Sheet	SA–1008	CS–A	...	...	...	275
2	Carbon steel	Sheet	SA–1008	CS–B	...	...	...	275
3	Carbon steel	Bar	SA–675	45	...	...	...	310
4	Carbon steel	Wld. pipe	SA–134	A283A	...	...	...	310
5	Carbon steel	Plate	SA–283	A	...	...	...	310
6	Carbon steel	Plate	SA–285	A	K01700	...	...	310
7	Carbon steel	Wld. pipe	SA–672	A45	K01700	...	...	310
8	Carbon steel	Sheet	SA–414	A	K01501	...	...	310
9	Carbon steel	Wld. tube	SA–178	A	K01200	...	...	325
10	Carbon steel	Smls. tube	SA–179	...	K01200	...	...	325
11	Carbon steel	Smls. tube	SA–192	...	K01201	...	...	325
12	Carbon steel	Wld. tube	SA–214	...	K01807	...	...	325
13	Carbon steel	Smls. tube	SA–556	A2	K01807	...	...	325
~~14~~	~~Carbon steel~~	~~Wld. tube~~	~~SA–557~~	~~A2~~	~~K01807~~	~~...~~	~~...~~	~~325~~
15	Carbon steel	Wld. pipe	SA–53	E/A	K02504	...	...	330
16	Carbon steel	Smls. pipe	SA–53	S/A	K02504	...	...	330
17	Carbon steel		SA–106	A	K02501	...	...	330
18	Carbon steel		SA–135	A	...	...	...	330
19	Carbon steel	Forged pipe	SA–369	FPA	K02501	...	...	330
20	Carbon steel	Wld. pipe	SA–587	...	K11500	...	...	330
21	Carbon steel	Bar	SA–675	50	...	...	...	345
22	Carbon steel	Wld. pipe	SA–134	A283B	...	...	...	345
23	Carbon steel	Plate	SA–283	B	...	...	...	345
24	Carbon steel	Plate	SA–285	B	K02200	...	...	345
25	Carbon steel	Wld. pipe	SA–672	A50	K02200	...	...	345
26	Carbon steel	Sheet	SA–414	B	K02201	...	...	345
27	Carbon steel	Plate	SA/EN 10028–3	P275NH	...	...	150 < t ≤ 250	350
28	Carbon steel	Plate	SA/EN 10028–2	P235GH	...	...	≤60	360
29	Carbon steel	Plate	SA/EN 10028–3	P275NH	...	...	100 < t ≤ 150	360
30	Carbon steel	Smls. tube	SA/EN 10216–2	P235GH	...	...	t ≤ 60	360
(21) 31	Carbon steel	Sheet, strip	SA–1011	36	SS	Type 1	t ≤ 6	365
32	Carbon steel	Plate	SA/EN 10028–3	P275NH	...	...	60 < t ≤ 100	370
33	Carbon steel	Bar	SA–675	55	...	...	...	380
34	Carbon steel	Wld. pipe	SA–134	A283C	K02401	...	...	380
35	Carbon steel	Plate	SA–283	C	K02401	...	...	380
36	Carbon steel	Plate	SA–285	C	K02801	...	...	380
37	Carbon steel	Smls. & wld. pipe	SA–333	1	K03008	...	...	380
38	Carbon steel	Smls. & wld. tube	SA–334	1	K03008	...	...	380
39	Carbon steel	Plate	SA–516	55	K01800	...	...	380
40	Carbon steel	Smls. pipe	SA–524	II	K02104	...	...	380
41	Carbon steel	Wld. pipe	SA–671	CA55	K02801	...	...	380
42	Carbon steel	Wld. pipe	SA–671	CE55	K02202	...	...	380
43	Carbon steel	Wld. pipe	SA–672	A55	K02801	...	...	380
44	Carbon steel	Wld. pipe	SA–672	B55	K02001	...	...	380
45	Carbon steel	Wld. pipe	SA–672	C55	K01800	...	...	380

Delete Line 14

Table U
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, MPa (Multiply by 1000 to Obtain kPa), for Metal Temperature, °C, Not Exceeding														
	40	100	150	200	250	300	325	350	375	400	425	450	475	500	525
															Ferrous Materials
1	276	276	276	276	276	276	276	276	276	272	255	235	213	189	169
2	276	276	276	276	276	276	276	276	276	272	255	235	213	189	169
3	310	310	310	310	310	310	310	310	310	306	286	264	239	213	190
4	310	310	310	310	310	310	310	310	310	306	286	264	239	213	190
5	310	310	310	310	310	310	310	310	310	306	286	264	239	213	190
6	310	310	310	310	310	310	310	310	310	306	286	264	239	213	190
7	310	310	310	310	310	310	310	310	310	306	286	264	239	213	190
8	310	310	310	310	310	310	310	310	310	306	286	264	239	213	190
9	324	324	324	324	324	324	324	324	324	319	299	275	250	223	198
10	324	324	324	324	324	324	324	324	324	319	299	275	250	223	198
11	324	324	324	324	324	324	324	324	324	319	299	275	250	223	198
12	324	324	324	324	324	324	324	324	324	319	299	275	250	223	198
13	324	324	324	324	324	324	324	324	324	319	299	275	250	223	198
~~14~~	~~324~~	~~324~~	~~324~~	~~324~~	~~324~~	~~324~~	~~324~~	~~324~~	~~324~~	~~319~~	~~299~~	~~275~~	~~250~~	~~223~~	~~198~~
15	331	331	331	331	331	331	331	331	331	326	306	282	255	227	203
16	331	331	331	331	331	331	331	331	331	326	306	282	255	227	203
17	331	331	331	331	331	331	331	331	331	326	306	282	255	227	203
18	331	331	331	331	331	331	331	331	331	326	306	282	255	227	203
19	331	331	331	331	331	331	331	331	331	326	306	282	255	227	203
20	331	331	331	331	331	331	331	331	331	326	306	282	255	227	203
21	345	345	345	345	345	345	345	345	345	340	318	293	265	237	211
22	345	345	345	345	345	345	345	345	345	340	318	293	265	237	211
23	345	345	345	345	345	345	345	345	345	340	318	293	265	237	211
24	345	345	345	345	345	345	345	345	345	340	318	293	265	237	211
25	345	345	345	345	345	345	345	345	345	340	318	293	265	237	211
26	345	345	345	345	345	345	345	345	345	340	318	293	265	237	211
27	350	350	350	350	350	350	350	350	350	345	323	298	270	241	214
28	360	360	360	360	360	360	360	360	360	355	332	306	277	248	220
29	360	360	360	360	360	360	360	360	360	355	332	306	277	248	220
30	360	360	360	360	360	360	360	360	360	355	332	306	277	248	220
31	366	366	364	362	362	362	362	362	...	...	...	...	...	...	...
32	369	369	369	369	369	369	369	369	369	365	343	316	286	255	225
33	379	379	379	379	379	379	379	379	379	374	350	322	292	261	232
34	379	379	379	379	379	379	379	379	379	374	350	322	292	261	232
35	379	379	379	379	379	379	379	379	379	374	350	322	292	261	232
36	379	379	379	379	379	379	379	379	379	374	350	322	292	261	232
37	379	379	379	379	379	379	379	379	379	374	350	322	292	261	232
38	379	379	379	379	379	379	379	379	379	374	350	322	292	261	232
39	379	379	379	379	379	379	379	379	379	374	350	322	292	261	232
40	379	379	379	379	379	379	379	379	379	374	350	322	292	261	232
41	379	379	379	379	379	379	379	379	379	374	350	322	292	261	232
42	379	379	379	379	379	379	379	379	379	374	350	322	292	261	232
43	379	379	379	379	379	379	379	379	379	374	350	322	292	261	232
44	379	379	379	379	379	379	379	379	379	374	350	322	292	261	232
45	379	379	379	379	379	379	379	379	379	374	350	322	292	261	232

Delete Line 14

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

	Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper	Size/ Thickness, mm	Min. Tensile Strength, MPa
		Ferrous Materials (Cont'd)							
	1	Carbon steel	Smls. pipe	SA–524	I	K02104	...	...	415
	2	Carbon steel	Bar	SA–696	B	K03200	...	...	415
	3	Carbon steel	Forgings	SA–727	...	K02506	...	...	415
	4	Carbon steel	Wld. tube	SA–178	C	K03503	...	...	415
	5	Carbon steel	Smls. tube	SA–210	A–1	K02707	...	...	415
	6	Carbon steel	Smls. tube	SA–556	B2	K02707	...	...	415
	~~7~~	~~Carbon steel~~	~~Wld. tube~~	~~SA–557~~	~~B2~~	~~K03007~~	~~...~~	~~...~~	~~415~~
	8	Carbon steel	Plate, bar	SA/CSA–G40.21	38W	...	...	...	415
(21)	9	Carbon steel	Plate, sheet, bar	SA–572	42	...	...	$t \le 150$	415
(21)	10	Carbon steel	Sheet, strip	SA–1011	45	HSLAS	1	...	410
(21)	11	Carbon steel	Sheet, strip	SA–1011	45	SS	...	$t \le 6$	410
(21)	12	Carbon steel	Sheet, strip	SA–1011	50	HSLAS	2	...	410
	13	Carbon steel	Plate	SA/AS 1548	PT430	...	...	≤150	430
	14	Carbon steel	Plate	SA/EN 10028–2	P295GH	...	...	$150 < t \le 250$	430
	15	Carbon steel	Plate	SA/EN 10028–2	P295GH	...	...	$100 < t \le 150$	440
	16	Carbon steel	Bar	SA–675	65	...	...	...	450
	17	Carbon steel	Castings	SA–352	LCB	J03003	...	...	450
	18	Carbon steel	Plate	SA–515	65	K02800	...	...	450
	19	Carbon steel	Plate	SA–516	65	K02403	...	...	450
	20	Carbon steel	Wld. pipe	SA–671	CB65	K02800	...	...	450
	21	Carbon steel	Wld. pipe	SA–671	CC65	K02403	...	...	450
	22	Carbon steel	Wld. pipe	SA–672	B65	K02800	...	...	450
	23	Carbon steel	Wld. pipe	SA–672	C65	K02403	...	...	450
	24	Carbon steel	Sheet	SA–414	E	K02704	...	...	450
	25	Carbon steel	Plate	SA–662	B	K02203	...	...	450
	26	Carbon steel	Plate	SA–537	...	K12437	1	$65 < t \le 100$	450
	27	Carbon steel	Wld. pipe	SA–691	CMSH–70	K12437	...	$65 < t \le 100$	450
	28	Carbon steel	Plate, bar	SA/CSA–G40.21	44W	...	...	$t \le 200$	450
	29	Carbon steel	Plate, bar	SA/CSA–G40.21	50W	...	...	$t \le 150$	450
(21)	30	Carbon steel	Plate, sheet, bar	SA–572	50	...	...	$t \le 100$	450
(21)	31	Carbon steel	Round bar	SA–572	50	...	...	$t \le 275$	450
(21)	32	Carbon steel	Sheet, strip	SA–1011	50	SS	...	$t \le 6$	450
(21)	33	Carbon steel	Sheet, strip	SA–1011	50	HSLAS	1	...	450
(21)	34	Carbon steel	Sheet, strip	SA–1011	55	HSLAS	2	...	450
	35	Carbon steel	Plate	SA/AS 1548	PT460	...	...	≤150	460
	36	Carbon steel	Plate	SA/EN 10028–2	P295GH	...	...	≤100	460
	37	Carbon steel	Forgings	SA/EN 10222–2	P280GH	...	N, NT, or QT	$t \le 160$	460
	38	Carbon steel	Plate	SA/EN 10028–2	P355GH	...	...	$150 < t \le 250$	470
(21)	39	Carbon steel	Plate	SA/GB 713	Q345R	...	...	$150 < t \le 250$	470
	40	Carbon steel	Plate	SA/EN 10025–2	S355J2+N	...	...	$3 \le t \le 80$	470
	41	Carbon steel	Plate	SA/EN 10028–2	P355GH	...	...	$100 < t \le 150$	480
	42	Carbon steel	Plate	SA/GB 713	Q345R	...	...	$100 < t \le 150$	480
	43	Carbon steel	Plate	SA–455	...	K03300	...	$15 < t \le 20$	485
	44	Carbon steel	Bar	SA–675	70	...	...	...	485
	45	Carbon steel	Forgings	SA–105	...	K03504	...	...	485

Delete Line 7

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, MPa (Multiply by 1000 to Obtain kPa), for Metal Temperature, °C, Not Exceeding														
	40	100	150	200	250	300	325	350	375	400	425	450	475	500	525
															Ferrous Materials (Cont'd)
1	414	414	414	414	414	414	414	414	414	408	382	352	319	285	253
2	414	414	414	414	414	414	414	414	414	408	382	352	319	285	253
3	414	414	414	414	414	414	414	414	414	408	382	352	319	285	253
4	414	414	414	414	414	414	414	414	414	408	382	352	319	285	253
5	414	414	414	414	414	414	414	414	414	408	382	352	319	285	253
6	414	414	414	414	414	414	414	414	414	408	382	352	319	285	253
~~7~~	~~414~~	~~414~~	~~414~~	~~414~~	~~414~~	~~414~~	~~414~~	~~414~~	~~414~~	~~408~~	~~382~~	~~352~~	~~319~~	~~285~~	~~253~~
8	414	400	400	400	400	400	400	400	399	395	370	340	308	275	245
9	414	414	414	414	414	414	414	414	...	...	...	...	...	...	...
10	414	414	414	414	414	414	414	414	...	...	...	...	...	...	...
11	414	414	414	414	414	414	414	414	...	...	...	...	...	...	...
12	414	414	414	414	414	414	414	414	...	...	...	...	...	...	...
13	431	431	431	431	431	431	431	431	431	425	398	366	332	296	264
14	430	430	430	430	430	430	430	430	430	424	397	366	331	296	263
15	441	441	441	441	441	441	441	441	441	435	408	375	338	303	270
16	448	448	448	448	448	448	448	448	448	442	414	381	345	308	274
17	448	448	448	448	448	448	448	448	448	442	414	381	345	308	274
18	448	448	448	448	448	448	448	448	448	442	414	381	345	308	274
19	448	448	448	448	448	448	448	448	448	442	414	381	345	308	274
20	448	448	448	448	448	448	448	448	448	442	414	381	345	308	274
21	448	448	448	448	448	448	448	448	448	442	414	381	345	308	274
22	448	448	448	448	448	448	448	448	448	442	414	381	345	308	274
23	448	448	448	448	448	448	448	448	448	442	414	381	345	308	274
24	448	448	448	448	448	448	448	448	448	442	414	381	345	308	274
25	448	448	448	448	448	448	448	448	448	442	414	381	345	308	274
26	448	448	448	448	448	448	448	448	448	442	414	381	345	308	274
27	448	448	448	448	448	448	448	448	448	442	414	381	345	308	274
28	448	448	448	448	448	448	448	448	448	441	414	382	346	309	274
29	448	448	448	448	448	448	448	448	448	441	414	382	346	309	274
30	452	448	448	448	448	448	448	448	...	...	...	...	...	...	...
31	452	448	448	448	448	448	448	448	...	...	...	...	...	...	...
32	452	448	448	448	448	448	448	448	...	...	...	...	...	...	...
33	452	448	448	448	448	448	448	448	...	...	...	...	...	...	...
34	452	448	448	448	448	448	448	448	...	...	...	...	...	...	...
35	458	458	458	458	458	458	458	458	458	452	424	389	353	315	281
36	458	458	458	458	458	458	458	458	458	452	424	389	353	315	281
37	460	460	460	460	460	460	460	460	460	452	424	391	354	316	279
38	470	470	470	470	470	470	470	470	470	451	430	402	368	327	283
39	470	470	470	470	470	470	470	470	470	463	433	399	361	322	286
40	470	...	...	...	...	...	...	...	...	...	...	...	...	...	...
41	480	480	480	480	480	480	480	480	480	461	439	411	376	334	289
42	480	480	480	480	480	480	480	480	480	473	443	407	368	329	293
43	483	483	483	483	483	483	483	483	483	476	446	411	372	332	296
44	483	483	483	483	483	483	483	483	483	476	446	411	372	332	296
45	483	483	483	483	483	483	483	483	483	476	446	411	372	332	296

Delete Line 7

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper	Size/ Thickness, mm	Min. Tensile Strength, MPa
	Ferrous Materials (Cont'd)							
1	Carbon steel	Forgings	SA–181	...	K03502	70	...	485
2	Carbon steel	Castings	SA–216	WCB	J03002	...	...	485
3	Carbon steel	Forgings	SA–266	2	K03506	...	...	485
4	Carbon steel	Forgings	SA–266	4	K03017	...	...	485
5	Carbon steel	Forgings	SA–350	LF2	K03011	...	...	485
6	Carbon steel	Forgings	SA–508	1	K13502	...	...	485
7	Carbon steel	Forgings	SA–508	1A	K13502	...	...	485
8	Carbon steel	Forgings	SA–541	1	K03506	...	...	485
9	Carbon steel	Forgings	SA–541	1A	K03020	...	...	485
10	Carbon steel	Cast pipe	SA–660	WCB	J03003	...	...	485
11	Carbon steel	Forgings	SA–765	II	K03047	...	...	485
12	Carbon steel	Plate	SA–515	70	K03101	...	...	485
13	Carbon steel	Plate	SA–516	70	K02700	...	...	485
14	Carbon steel	Wld. pipe	SA–671	CB70	K03101	...	...	485
15	Carbon steel	Wld. pipe	SA–671	CC70	K02700	...	...	485
16	Carbon steel	Wld. pipe	SA–672	B70	K03101	...	...	485
17	Carbon steel	Wld. pipe	SA–672	C70	K02700	...	...	485
18	Carbon steel	Smls. pipe	SA–106	C	K03501	...	...	485
19	Carbon steel	Wld. tube	SA–178	D	...	...	...	485
20	Carbon steel	Smls. tube	SA–210	C	K03501	...	...	485
21	Carbon steel	Castings	SA–216	WCC	J02503	...	...	485
22	Carbon steel	Smls. & wld. fittings	SA–234	WPC	K03501	...	...	485
23	Carbon steel	Castings	SA–352	LCC	J02505	...	...	485
24	Carbon steel	Castings	SA–487	16	...	A	...	485
25	Carbon steel	Plate	SA–537	...	K12437	3	100 < t ≤ 150	485
26	Carbon steel	Smls. tube	SA–556	C2	K03006	...	...	485
~~27~~	~~Carbon steel~~	~~Tube~~	~~SA–557~~	~~C2~~	~~K03505~~	~~...~~	~~...~~	~~485~~
28	Carbon steel	Cast pipe	SA–660	WCC	J02505	...	...	485
29	Carbon steel	Bar	SA–696	C	K03200	...	...	485
30	Carbon steel	Sheet	SA–414	F	K03102	...	...	485
31	Carbon steel	Plate	SA–662	C	K02007	...	...	485
32	Carbon steel	Plate	SA–537	...	K12437	2	100 < t ≤ 150	485
33	Carbon steel	Plate	SA–738	C	K02008	...	100 < t ≤ 150	485
34	Carbon steel	Plate	SA–537	...	K12437	1	≤65	485
35	Carbon steel	Wld. pipe	SA–671	CD70	K12437	...	≤65	485
36	Carbon steel	Wld. pipe	SA–672	D70	K12437	...	≤65	485
37	Carbon steel	Wld. pipe	SA–691	CMSH–70	K12437	...	≤65	485
38	Carbon steel	Plate	SA–841	A	...	1	≤65	485
(**21**) 39	Carbon steel	Plate, sheet, bar	SA–572	55	...	...	t ≤ 50	485
(**21**) 40	Carbon steel	Round bar	SA–572	55	...	...	t ≤ 90	485
(**21**) 41	Carbon steel	Sheet, strip	SA–1011	55	HSLAS	1	...	480
(**21**) 42	Carbon steel	Sheet, strip	SA–1011	60	HSLAS	2	...	480
43	Carbon steel	Forgings	SA/EN 10222–2	P305GH	...	N or NT	t ≤ 160	490
44	Carbon steel	Plate	SA/EN 10028–2	P355GH	...	...	60 < t ≤ 100	490
45	Carbon steel	Plate	SA/GB 713	Q345R	...	...	36 < t ≤ 100	490

Delete Line 27

Table U (Cont'd)
Tensile Strength Values, S_u, for Ferrous and Nonferrous Materials

Line No.	Tensile Strength, MPa (Multiply by 1000 to Obtain kPa), for Metal Temperature, °C, Not Exceeding														
	40	100	150	200	250	300	325	350	375	400	425	450	475	500	525
													Ferrous Materials (Cont'd)		
1	483	483	483	483	483	483	483	483	483	476	446	411	372	332	296
2	483	483	483	483	483	483	483	483	483	476	446	411	372	332	296
3	483	483	483	483	483	483	483	483	483	476	446	411	372	332	296
4	483	483	483	483	483	483	483	483	483	476	446	411	372	332	296
5	483	483	483	483	483	483	483	483	483	476	446	411	372	332	296
6	483	483	483	483	483	483	483	483	483	476	446	411	372	332	296
7	483	483	483	483	483	483	483	483	483	476	446	411	372	332	296
8	483	483	483	483	483	483	483	483	483	476	446	411	372	332	296
9	483	483	483	483	483	483	483	483	483	476	446	411	372	332	296
10	483	483	483	483	483	483	483	483	483	476	446	411	372	332	296
11	483	483	483	483	483	483	483	483	483	476	446	411	372	332	296
12	483	483	483	483	483	483	483	483	483	476	446	411	372	332	296
13	483	483	483	483	483	483	483	483	483	476	446	411	372	332	296
14	483	483	483	483	483	483	483	483	483	476	446	411	372	332	296
15	483	483	483	483	483	483	483	483	483	476	446	411	372	332	296
16	483	483	483	483	483	483	483	483	483	476	446	411	372	332	296
17	483	483	483	483	483	483	483	483	483	476	446	411	372	332	296
18	483	483	483	483	483	483	483	483	483	476	446	411	372	332	296
19	483	483	483	483	483	483	483	483	483	476	446	411	372	332	296
20	483	483	483	483	483	483	483	483	483	476	446	411	372	332	296
21	483	483	483	483	483	483	483	483	483	476	446	411	372	332	296
22	483	483	483	483	483	483	483	483	483	476	446	411	372	332	296
23	483	483	483	483	483	483	483	483	483	476	446	411	372	332	296
24	483	477	452	437	432	432	432	432	431	429	410	390	...	...	...
25	483	482	476	472	472	472	472	472	471	466	452	437	...	...	...
26	483	483	483	483	483	483	483	483	483	476	446	411	372	332	296
~~27~~	~~483~~	~~483~~	~~483~~	~~483~~	~~483~~	~~483~~	~~483~~	~~483~~	~~483~~	~~476~~	~~446~~	~~411~~	~~372~~	~~332~~	~~296~~
28	483	483	483	483	483	483	483	483	483	476	446	411	372	332	296
29	483	483	483	483	483	483	483	483	483	476	446	411	372	332	296
30	483	483	483	483	483	483	483	483	483	476	446	411	372	332	296
31	483	483	483	483	483	483	483	483	483	476	446	411	372	332	296
32	483	482	476	472	472	472	472	472	471	466	452	437	...	...	...
33	483	482	476	472	472	472	472	472	471	466	452	437	...	...	...
34	483	482	476	472	472	472	472	472	471	466	452	437	...	...	...
35	483	482	476	472	472	472	472	472	471	466	452	437	...	...	...
36	483	482	476	472	472	472	472	472	471	466	452	437	...	...	...
37	483	482	476	472	472	472	472	472	471	466	452	437	...	...	...
38	483	483	483	483	483	483	480	468	448	421	...	...	...	...	...
39	487	483	483	483	483	483	483	483	...	...	...	...	...	...	...
40	487	483	483	483	483	483	483	483	...	...	...	...	...	...	...
41	482	483	483	483	483	483	483	483	...	...	...	...	...	...	...
42	482	483	483	483	483	483	483	483	...	...	...	...	...	...	...
43	490	490	490	490	490	490	490	490	490	482	452	416	377	336	298
44	490	490	490	490	490	490	490	490	490	470	449	419	383	341	295
45	490	490	490	490	490	490	490	490	490	482	452	416	376	336	299

Delete Line 27

(21)

Table Y-1
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
	Ferrous Materials					
1	Carbon steel	Sheet	SA–1008	CS–A	...	...
2	Carbon steel	Sheet	SA–1008	CS–B	...	...
3	Carbon steel	Bar	SA–675	45	...	...
4	Carbon steel	Wld. pipe	SA–134	A283A	...	...
5	Carbon steel	Plate	SA–283	A	...	...
6	Carbon steel	Plate	SA–285	A	K01700	...
7	Carbon steel	Wld. pipe	SA–672	A45	K01700	...
8	Carbon steel	Sheet	SA–414	A	K01501	...
9	Carbon steel	Wld. tube	SA–178	A	K01200	...
10	Carbon steel	Smls. tube	SA–179	...	K01200	...
11	Carbon steel	Smls. tube	SA–192	...	K01201	...
12	Carbon steel	Wld. tube	SA–214	...	K01807	...
13	Carbon steel	Smls. tube	SA–556	A2	K01807	...
~~14~~	~~Carbon steel~~	~~Wld. tube~~	~~SA–557~~	~~A2~~	~~K01807~~	...
15	Carbon steel	Wld. pipe	SA–53	E/A	K02504	...
16	Carbon steel	Smls. pipe	SA–53	S/A	K02504	...
17	Carbon steel		SA–106	A	K02501	...
18	Carbon steel		SA–135	A	...	...
19	Carbon steel	Forged pipe	SA–369	FPA	K02501	...
20	Carbon steel	Wld. pipe	SA–587	...	K11500	...
21	Carbon steel	Bar	SA–675	50	...	...
22	Carbon steel	Wld. pipe	SA–134	A283B	...	...
23	Carbon steel	Plate	SA–283	B	...	...
24	Carbon steel	Plate	SA–285	B	K02200	...
25	Carbon steel	Wld. pipe	SA–672	A50	K02200	...
26	Carbon steel	Sheet	SA–414	B	K02201	...
27	Carbon steel	Plate	SA/EN 10028–3	P275NH	...	...
28	Carbon steel	Plate	SA/EN 10028–2	P235GH	...	...
29	Carbon steel	Smls. tube	SA/EN 10216–2	P235GH	...	...
30	Carbon steel	Plate	SA/EN 10028–3	P275NH	...	...
31	Carbon steel	Smls. tube	SA/EN 10216–2	P235GH	...	...
32	Carbon steel	Smls. tube	SA/EN 10216–2	P235GH	...	...
(21) 33	Carbon steel	Sheet, strip	SA–1011	36	SS	Type 1
34	Carbon steel	Plate	SA/EN 10028–3	P275NH	...	...
35	Carbon steel	Bar	SA–675	55	...	...
36	Carbon steel	Wld. pipe	SA–134	A283C	K02401	...
37	Carbon steel	Plate	SA–283	C	K02401	...
38	Carbon steel	Plate	SA–285	C	K02801	...
39	Carbon steel	Smls. & wld. pipe	SA–333	1	K03008	...
40	Carbon steel	Smls. & wld. tube	SA–334	1	K03008	...
41	Carbon steel	Plate	SA–516	55	K01800	...
42	Carbon steel	Smls. pipe	SA–524	II	K02104	...
43	Carbon steel	Wld. pipe	SA–671	CA55	K02801	...
44	Carbon steel	Wld. pipe	SA–671	CE55	K02202	...
45	Carbon steel	Wld. pipe	SA–672	A55	K02801	...

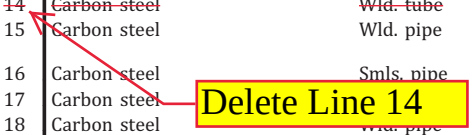

Table Y-1
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Size/Thickness, mm	Min. Tensile Strength, MPa	Min. Yield Strength, MPa	Notes
				Ferrous Materials
1	...	275	140	...
2	...	275	140	...
3	...	310	155	...
4	...	310	165	...
5	...	310	165	...
6	...	310	165	...
7	...	310	165	...
8	...	310	170	...
9	...	325	180	...
10	...	325	180	...
11	...	325	180	...
12	...	325	180	...
13	...	325	180	...
~~14~~	~~...~~	~~325~~	~~180~~	...
15	...	330	205	...
16	...	330	205	...
17	...	330	205	...
18	...	330	205	...
19	...	330	205	...
20	...	330	205	...
21	...	345	170	...
22	...	345	185	...
23	...	345	185	...
24	...	345	185	...
25	...	345	185	...
26	...	345	205	...
27	$150 < t \le 250$	350	215	...
28	≤60	360	215	...
29	$40 < t \le 60$	360	215	...
30	$100 < t \le 150$	360	225	...
31	$16 < t \le 40$	360	225	...
32	$t \le 16$	360	235	...
33	$t \le 6$	365	250	...
34	$60 < t \le 100$	370	235	...
35	...	380	190	...
36	...	380	205	...
37	...	380	205	...
38	...	380	205	...
39	...	380	205	...
40	...	380	205	...
41	...	380	205	...
42	...	380	205	...
43	...	380	205	...
44	...	380	205	...
45	...	380	205	...

Delete Line 14

Table Y-1
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, MPa (Multiply by 1000 to Obtain kPa), for Metal Temperature, °C, Not Exceeding									
	40	65	100	125	150	175	200	225	250	275
	Ferrous Materials									
1	138	130	126	124	122	120	118	116	114	111
2	138	130	126	124	122	120	118	116	114	111
3	155	146	141	139	137	135	133	130	127	124
4	165	156	151	149	146	144	142	139	136	133
5	165	156	151	149	146	144	142	139	136	133
6	165	156	151	149	146	144	142	139	136	133
7	165	156	151	149	146	144	142	139	136	133
8	172	162	157	155	152	150	148	145	142	139
9	179	168	163	161	158	156	154	151	148	144
10	179	168	163	161	158	156	154	151	148	144
11	179	168	163	161	158	156	154	151	148	144
12	179	168	163	161	158	156	154	151	148	144
13	179	168	163	161	158	156	154	151	148	144
~~14~~	~~179~~	~~168~~	~~163~~	~~161~~	~~158~~	~~156~~	~~154~~	~~151~~	~~148~~	~~144~~
15	207	195	189	186	183	180	177	174	170	166
16	207	195	189	186	183	180	177	174	170	166
17	207	195	189	186	183	180	177	174	170	166
18	207	195	189	186	183	180	177	174	170	166
19	207	195	189	186	183	180	177	174	170	166
20	207	195	189	186	183	180	177	174	170	166
21	172	162	157	155	152	150	148	145	142	139
22	186	175	170	167	165	162	160	157	153	149
23	186	175	170	167	165	162	160	157	153	149
24	186	175	170	167	165	162	160	157	153	149
25	186	175	170	167	165	162	160	157	153	149
26	207	195	189	186	183	180	177	174	170	166
27	215	202	196	193	190	187	184	181	177	172
28	215	202	196	193	190	187	184	181	177	173
29	215	202	196	193	190	187	184	181	177	173
30	225	212	205	202	199	196	193	189	185	181
31	225	212	205	202	199	196	193	189	185	181
32	235	221	214	211	208	205	201	198	193	189
33	248	233	227	223	219	216	213	209	204	199
34	234	221	213	210	207	204	201	198	193	188
35	190	178	173	170	167	165	163	159	156	152
36	207	195	189	186	183	180	177	174	170	166
37	207	195	189	186	183	180	177	174	170	166
38	207	195	189	186	183	180	177	174	170	166
39	207	195	189	186	183	180	177	174	170	166
40	207	195	189	186	183	180	177	174	170	166
41	207	195	189	186	183	180	177	174	170	166
42	207	195	189	186	183	180	177	174	170	166
43	207	195	189	186	183	180	177	174	170	166
44	207	195	189	186	183	180	177	174	170	166
45	207	195	189	186	183	180	177	174	170	166

Delete Line 14

Table Y-1
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, MPa (Multiply by 1000 to Obtain kPa), for Metal Temperature, °C, Not Exceeding									
	300	325	350	375	400	425	450	475	500	525
										Ferrous Materials
1	107	104	101	98.1	95.0	92.5	90.1	87.5	85.6	83.4
2	107	104	101	98.1	95.0	92.5	90.1	87.5	85.6	83.4
3	121	117	114	110	107	104	101	98.6	96.2	93.7
4	129	125	122	118	114	111	108	106	103	99.8
5	129	125	122	118	114	111	108	106	103	99.8
6	129	125	122	118	114	111	108	106	103	99.8
7	129	125	122	118	114	111	108	106	103	99.8
8	135	131	127	123	119	116	113	110	107	104
9	140	136	132	128	124	120	117	114	111	109
10	140	136	132	128	124	120	117	114	111	109
11	140	136	132	128	124	120	117	114	111	109
12	140	136	132	128	124	120	117	114	111	109
13	140	136	132	128	124	120	117	114	111	109
~~14~~	~~140~~	~~136~~	~~132~~	~~128~~	~~124~~	~~120~~	~~117~~	~~114~~	~~111~~	~~109~~
15	161	157	152	148	143	139	135	132	128	125
16	161	157	152	148	143	139	135	132	128	125
17	161	157	152	148	143	139	135	132	128	125
18	161	157	152	148	143	139	135	132	128	125
19	161	157	152	148	143	139	135	132	128	125
20	161	157	152	148	143	139	135	132	128	125
21	135	131	127	123	119	116	113	110	107	104
22	145	141	137	132	129	125	122	119	116	112
23	145	141	137	132	129	125	122	119	116	112
24	145	141	137	132	129	125	122	119	116	112
25	145	141	137	132	129	125	122	119	116	112
26	161	157	152	148	143	139	135	132	128	125
27	168	163	158	153	149	144	141	137	133	130
28	168	163	158	153	149	144	141	137	133	130
29	168	163	158	153	149	144	141	137	133	130
30	176	171	165	160	156	151	147	143	140	136
31	176	171	165	160	156	151	147	143	140	136
32	183	178	173	167	162	158	154	150	146	142
33	194	188	183	...	...	...	...	...	...	...
34	183	178	173	168	163	158	154	150	146	142
35	148	144	139	135	131	127	124	121	118	114
36	161	157	152	148	143	139	135	132	128	125
37	161	157	152	148	143	139	135	132	128	125
38	161	157	152	148	143	139	135	132	128	125
39	161	157	152	148	143	139	135	132	128	125
40	161	157	152	148	143	139	135	132	128	125
41	161	157	152	148	143	139	135	132	128	125
42	161	157	152	148	143	139	135	132	128	125
43	161	157	152	148	143	139	135	132	128	125
44	161	157	152	148	143	139	135	132	128	125
45	161	157	152	148	143	139	135	132	128	125

Delete Line 14

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
	Ferrous Materials (Cont'd)					
1	Carbon steel	Plate	SA–283	D	K02702	...
2	Carbon steel	Wld. pipe	SA–53	E/B	K03005	...
3	Carbon steel	Smls. pipe	SA–53	S/B	K03005	...
4	Carbon steel	Smls. pipe	SA–106	B	K03006	...
5	Carbon steel	Wld. pipe	SA–135	B	...	...
6	Carbon steel	Smls. & wld. fittings	SA–234	WPB	K03006	...
7	Carbon steel	Smls. & wld. pipe	SA–333	6	K03006	...
8	Carbon steel	Smls. & wld. tube	SA–334	6	K03006	...
9	Carbon steel	Forged pipe	SA–369	FPB	K03006	...
10	Carbon steel	Forgings	SA–372	A	K03002	...
11	Carbon steel	Sheet	SA–414	D	K02505	...
12	Carbon steel	Smls. & wld. fittings	SA–420	WPL6	...	...
13	Carbon steel	Smls. pipe	SA–524	I	K02104	...
14	Carbon steel	Bar	SA–696	B	K03200	...
15	Carbon steel	Bolting	SA–307	A	...	...
16	Carbon steel	Bolting	SA–307	B	...	...
17	Carbon steel	Forgings	SA–727	...	K02506	...
18	Carbon steel	Wld. tube	SA–178	C	K03503	...
19	Carbon steel	Smls. tube	SA–210	A–1	K02707	...
20	Carbon steel	Smls. tube	SA–556	B2	K02707	...
~~21~~	~~Carbon steel~~	~~Wld. tube~~	~~SA–557~~	~~B2~~	~~K03007~~	...
22	Carbon steel	Plate, bar	SA/CSA–G40.21	38W	...	...
23	Carbon steel	Plate	SA/EN 10028–2	P295GH	...	...
24	Carbon steel	Plate	SA/AS 1548	PT430	...	...
25	Carbon steel	Plate	SA/AS 1548	PT430	...	...
26	Carbon steel	Plate	SA/AS 1548	PT430	...	...
27	Carbon steel	Plate	SA/AS 1548	PT430	...	...
28	Carbon steel	Plate	SA/EN 10028–2	P295GH	...	...
29	Carbon steel	Bar	SA–675	65	...	...
30	Carbon steel	Castings	SA–352	LCB	J03003	...
31	Carbon steel	Plate	SA–515	65	K02800	...
32	Carbon steel	Plate	SA–516	65	K02403	...
33	Carbon steel	Wld. pipe	SA–671	CB65	K02800	...
34	Carbon steel	Wld. pipe	SA–671	CC65	K02403	...
35	Carbon steel	Wld. pipe	SA–672	B65	K02800	...
36	Carbon steel	Wld. pipe	SA–672	C65	K02403	...
37	Carbon steel	Sheet	SA–414	E	K02704	...
38	Carbon steel	Plate	SA–662	B	K02203	...
39	Carbon steel	Plate, bar	SA/CSA–G40.21	44W	...	...
40	Carbon steel	Plate, bar	SA/CSA–G40.21	44W	...	...
41	Carbon steel	Plate	SA–537	...	K12437	1
42	Carbon steel	Wld. pipe	SA–691	CMSH–70	K12437	...
43	Carbon steel	Plate, bar	SA/CSA–G40.21	50W	...	...
44	Carbon steel	Plate, bar	SA/CSA–G40.21	50W	...	...
(**21**) 45	Carbon steel	Plate, sheet, bar	SA–572	50	...	...

Delete Line 21

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Size/Thickness, mm	Min. Tensile Strength, MPa	Min. Yield Strength, MPa	Notes
				Ferrous Materials (Cont'd)
1	...	415	230	...
2	...	415	240	...
3	...	415	240	...
4	...	415	240	...
5	...	415	240	...
6	...	415	240	...
7	...	415	240	...
8	...	415	240	...
9	...	415	240	...
10	...	415	240	...
11	...	415	240	...
12	...	415	240	...
13	...	415	240	...
14	...	415	240	...
15	$6 \le t \le 100$	415	250	...
16	...	415	250	...
17	...	415	250	...
18	...	415	255	...
19	...	415	255	...
20	...	415	255	...
~~21~~	~~...~~	~~415~~	~~255~~	...
22	...	415	260	...
23	$150 < t \le 250$	430	220	...
24	$80 < t \le 150$	430	250	...
25	$40 < t \le 80$	430	270	...
26	$16 < t \le 40$	430	280	...
27	≤16	430	300	...
28	$100 < t \le 150$	440	235	...
29	...	450	225	...
30	...	450	240	...
31	...	450	240	...
32	...	450	240	...
33	...	450	240	...
34	...	450	240	...
35	...	450	240	...
36	...	450	240	...
37	...	450	260	...
38	...	450	275	...
39	$64 < t \le 200$	450	275	...
40	$t \le 64$	450	305	...
41	$65 < t \le 100$	450	310	...
42	$65 < t \le 100$	450	310	...
43	$64 < t \le 150$	450	315	...
44	$t \le 64$	450	345	...
45	$t \le 100$	450	345	...

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, MPa (Multiply by 1000 to Obtain kPa), for Metal Temperature, °C, Not Exceeding									
	40	65	100	125	150	175	200	225	250	275
	Ferrous Materials (Cont'd)									
1	228	214	207	204	201	198	195	191	187	183
2	241	227	220	217	214	210	207	203	198	194
3	241	227	220	217	214	210	207	203	198	194
4	241	227	220	217	214	210	207	203	198	194
5	241	227	220	217	214	210	207	203	198	194
6	241	227	220	217	214	210	207	203	198	194
7	241	227	220	217	214	210	207	203	198	194
8	241	227	220	217	214	210	207	203	198	194
9	241	227	220	217	214	210	207	203	198	194
10	241	227	220	217	214	210	207	203	198	194
11	241	227	220	217	214	210	207	203	198	194
12	241	227	220	217	214	210	207	203	198	194
13	241	227	220	217	214	210	207	203	198	194
14	241	227	220	217	214	210	207	203	198	194
15	248	233	227	223	219	216	213	209	204	199
16	248	233	227	223	219	216	213	209	204	199
17	248	233	227	223	219	216	213	209	204	199
18	255	240	233	229	225	222	219	215	210	205
19	255	240	233	229	225	222	219	215	210	205
20	255	240	233	229	225	222	219	215	210	205
~~21~~	~~255~~	~~240~~	~~233~~	~~229~~	~~225~~	~~222~~	~~219~~	~~215~~	~~210~~	~~205~~
22	262	246	239	235	232	228	225	221	216	210
23	220	220	201	197	195	192	189	185	181	177
24	252	240	229	225	223	220	216	212	207	202
25	269	2		40	238	234	230	226	221	216
26	279	266	254	250	247	243	239	235	230	224
27	300	286	273	268	265	262	257	252	247	240
28	234	221	214	211	207	204	201	197	193	188
29	224	210	205	201	198	196	192	189	184	180
30	241	227	220	217	214	210	207	203	198	194
31	241	227	220	217	214	210	207	203	198	194
32	241	227	220	217	214	210	207	203	198	194
33	241	227	220	217	214	210	207	203	198	194
34	241	227	220	217	214	210	207	203	198	194
35	241	227	220	217	214	210	207	203	198	194
36	241	227	220	217	214	210	207	203	198	194
37	262	246	239	235	232	228	225	221	216	210
38	276	259	251	248	244	240	237	232	227	221
39	276	261	253	248	244	240	236	231	226	221
40	303	287	278	273	268	264	259	254	249	243
41	310	292	283	279	274	270	266	261	255	249
42	310	292	283	279	274	270	266	261	255	249
43	317	300	291	285	281	276	271	266	260	254
44	345	326	316	310	305	300	295	289	283	276
45	345	328	313	306	300	293	287	281	276	271

Delete Line 21

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, MPa (Multiply by 1000 to Obtain kPa), for Metal Temperature, °C, Not Exceeding									
	300	325	350	375	400	425	450	475	500	525
										Ferrous Materials (Cont'd)
1	178	173	167	162	157	153	149	145	142	137
2	188	183	177	172	167	162	158	154	150	146
3	188	183	177	172	167	162	158	154	150	146
4	188	183	177	172	167	162	158	154	150	146
5	188	183	177	172	167	162	158	154	150	146
6	188	183	177	172	167	162	158	154	150	146
7	188	183	177	172	167	162	158	154	150	146
8	188	183	177	172	167	162	158	154	150	146
9	188	183	177	172	167	162	158	154	150	146
10	188	183	177	172	167	162	158	154	150	146
11	188	183	177	172	167	162	158	154	150	146
12	188	183	177	172	167	162	158	154	150	146
13	188	183	177	172	167	162	158	154	150	146
14	188	183	177	172	167	162	158	154	150	146
15	194	188	183	177	171	...	...	...	...	...
16	194	188	183	177	171	...	...	...	...	...
17	194	188	183	177	171	166	162	158	154	150
18	200	193	187	182	176	171	167	163	158	154
19	200	193	187	182	176	171	167	163	158	154
20	200	193	187	182	176	171	167	163	158	154
~~21~~	~~200~~	~~193~~	~~187~~	~~182~~	~~176~~	~~171~~	~~167~~	~~163~~	~~158~~	~~154~~
22	204	199	193	187	181	176	171	167	163	154
23	172	167	162	157	152	148	144	140	137	133
24	196	191	185	179	174	169	164	160	156	152
25	210	204	199	191	186	180	176	172	167	163
26	218	211	205	199	193	187	182	178	173	169
27	234	227	220	213	207	202	196	191	186	181
28	183	178	172	167	162	157	153	149	146	142
29	175	170	165	160	155	151	146	142	139	135
30	188	183	177	172	167	162	158	154	150	146
31	188	183	177	172	167	162	158	154	150	146
32	188	183	177	172	167	162	158	154	150	146
33	188	183	177	172	167	162	158	154	150	146
34	188	183	177	172	167	162	158	154	150	146
35	188	183	177	172	167	162	158	154	150	146
36	188	183	177	172	167	162	158	154	150	146
37	204	199	193	187	181	176	171	167	162	158
38	216	209	202	196	191	185	180	176	171	167
39	215	209	203	197	191	185	180	175	171	166
40	237	230	223	217	210	204	198	193	188	183
41	242	235	228	221	215	209	203	197	192	187
42	242	235	228	221	215	209	203	197	192	187
43	247	241	234	227	220	213	207	201	196	191
44	269	261	254	246	239	232	225	219	213	208
45	266	262	259	...	...	...	...	...	...	...

Delete Line 21

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Nominal Composition	Product Form	Spec. No.	Type/Grade	Alloy Desig./UNS No.	Class/Condition/ Temper
	Ferrous Materials (Cont'd)					
1	Carbon steel	Castings	SA–216	WCC	J02503	...
2	Carbon steel	Smls. & wld. fittings	SA–234	WPC	K03501	...
3	Carbon steel	Castings	SA–352	LCC	J02505	...
4	Carbon steel	Castings	SA–487	16	...	A
5	Carbon steel	Plate	SA–537	...	K12437	3
6	Carbon steel	Smls. tube	SA–556	C2	K03006	...
7	~~Carbon steel~~	~~Tube~~	~~SA–557~~	~~C2~~	~~K03505~~	...
8	Carbon steel	Cast pipe	SA–660	WCC	J02505	...
9	Carbon steel	Bar	SA–696	C	K03200	...
10	Carbon steel		SA–414	F	K03102	...
11	Carbon steel	Plate	SA–662	C	K02007	...
12	Carbon steel	Plate	SA–537	...	K12437	2
13	Carbon steel	Plate	SA–738	C	K02008	...
14	Carbon steel	Plate	SA–537	...	K12437	1
15	Carbon steel	Wld. pipe	SA–671	CD70	K12437	...
16	Carbon steel	Wld. pipe	SA–672	D70	K12437	...
17	Carbon steel	Wld. pipe	SA–691	CMSH–70	K12437	...
18	Carbon steel	Plate	SA–841	A	...	1
(**21**) 19	Carbon steel	Plate, sheet, bar	SA–572	55	...	...
(**21**) 20	Carbon steel	Round bar	SA–572	55	...	...
(**21**) 21	Carbon steel	Sheet, strip	SA–1011	55	HSLAS	1
(**21**) 22	Carbon steel	Sheet, strip	SA–1011	60	HSLAS	2
23	Carbon steel	Forgings	SA/EN 10222–2	P305GH	...	NT
24	Carbon steel	Forgings	SA/EN 10222–2	P305GH	...	Normalized
25	Carbon steel	Plate	SA/GB 713	Q345R	...	...
26	Carbon steel	Plate	SA/EN 10028–2	P355GH	...	...
27	Carbon steel	Plate	SA/GB 713	Q345R	...	...
28	Carbon steel	Plate	SA/GB 713	Q345R	...	...
29	Carbon steel	Plate	SA–455	...	K03300	...
30	Carbon steel	Forgings	SA/EN 10222–2	P305GH	...	QT
31	Carbon steel	Plate	SA/EN 10028–2	P355GH	...	...
32	Carbon steel	Plate	SA/EN 10028–2	P355GH	...	...
33	Carbon steel	Plate	SA/GB 713	Q345R	...	...
34	Carbon steel	Plate	SA/EN 10025–2	S355J2+N	...	...
35	Carbon steel	Plate	SA/EN 10028–2	P355GH	...	...
36	Carbon steel	Forgings	SA–266	3	K05001	...
37	Carbon steel	Plate	SA–455	...	K03300	...
38	Carbon steel	Plate	SA–299	A	K02803	...
39	Carbon steel	Wld. pipe	SA–671	CK75	K02803	...
40	Carbon steel	Wld. pipe	SA–672	N75	K02803	...
41	Carbon steel	Wld. pipe	SA–691	CMS–75	K02803	...
42	Carbon steel	Plate	SA–299	A	K02803	...
43	Carbon steel	Wld. pipe	SA–691	CMS–75	K02803	...
44	Carbon steel	Forgings	SA–372	B	K04001	...
45	Carbon steel	Sheet	SA–414	G	K03103	...

Delete Line 7

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Size/Thickness, mm	Min. Tensile Strength, MPa	Min. Yield Strength, MPa	Notes
				Ferrous Materials (Cont'd)
1	...	485	275	...
2	...	485	275	...
3	...	485	275	...
4	...	485	275	...
5	100 < t ≤ 150	485	275	...
6	...	485	275	...
~~7~~	~~...~~	~~485~~	~~275~~	...
8	...	485	275	...
9	...	485	275	...
10	...	485	290	...
11	...	485	295	...
12	100 < t ≤ 150	485	315	...
13	100 < t ≤ 150	485	315	...
14	≤65	485	345	...
15	≤65	485	345	...
16	≤65	485	345	...
17	≤65	485	345	...
18	≤100	485	345	...
19	t ≤ 50	485	380	...
20	t ≤ 90	485	380	...
21	...	480	380	...
22	...	480	410	...
23	35 < t ≤ 160	490	280	...
24	t ≤ 35	490	305	...
25	60 < t ≤ 100	490	305	...
26	60 < t ≤ 100	490	315	...
27	36 < t ≤ 60	490	315	...
28	16 < t ≤ 36	500	325	...
29	9.5 < t ≤ 15	505	255	...
30	t ≤ 70	510	285	...
31	40 < t ≤ 60	510	335	...
32	16 < t ≤ 40	510	345	...
33	3 ≤ t ≤ 16	510	345	...
34	t < 3	510	355	...
35	≤16	510	355	...
36	...	515	260	...
37	≤9.5	515	260	...
38	>25	515	275	...
39	>25	515	275	...
40	>25	515	275	...
41	>25	515	275	...
42	≤25	515	290	...
43	≤25	515	290	...
44	...	515	310	...
45	...	515	310	...

Delete Line 7

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, MPa (Multiply by 1000 to Obtain kPa), for Metal Temperature, °C, Not Exceeding									
	40	65	100	125	150	175	200	225	250	275
	Ferrous Materials (Cont'd)									
1	276	259	251	248	244	240	237	232	227	221
2	276	259	251	248	244	240	237	232	227	221
3	276	259	251	248	244	240	237	232	227	221
4	276	257	244	236	230	225	220	216	212	208
5	276	256	241	232	223	215	208	202	197	193
6	276	259	251	248	244	240	237	232	227	221
~~7~~	~~276~~	~~259~~	~~251~~	~~248~~	~~244~~	~~240~~	~~237~~	~~232~~	~~227~~	~~221~~
8	276	259	251	248	244	240	237	232	227	221
9	276	259	251	248	244	240	237	232	227	221
10	290	273	264	260	256	253	248	243	238	232
11	296	279	271	266	262	258	254	249	244	238
12	317	294	277	266	256	248	240	233	226	221
13	317	294	277	266	256	248	240	233	226	221
14	345	320	302	289	279	269	261	253	247	241
15	345	320	302	289	279	269	261	253	247	241
16	345	320	302	289	279	269	261	253	247	241
17	345	320	302	289	279	269	261	253	247	241
18	345	328	316	308	301	296	292	289	286	283
19	379	352	331	318	306	296	286	278	271	265
20	379	352	331	318	306	296	286	278	271	265
21	379	352	331	318	306	296	286	278	271	265
22	414	394	379	369	362	355	351	347	343	339
23	280	262	254	250	246	242	238	234	229	223
24	305	285	276	272	268	264	259	255	249	243
25	305	287	278	274	270	266	262	257	251	245
26	315	295	286	282	279	275	270	265	259	253
27	315	296	287	283	279	275	270	265	259	253
28	325	305	297	292	288	284	279	274	268	261
29	255	240	233	229	225	222	219	215	210	205
30	285	267	258	254	250	246	242	238	233	227
31	335	314	305	300	296	292	288	282	276	269
32	345	323	314	309	305	301	296	291	284	277
33	345	324	315	310	306	301	296	291	284	277
34	355	...	...	...	...	...	...	...	...	...
35	355	332	323	318	314	310	305	299	292	285
36	259	243	236	232	229	225	221	217	213	208
37	262	246	239	235	232	228	225	221	216	210
38	276	259	251	248	244	240	237	232	227	221
39	276	259	251	248	244	240	237	232	227	221
40	276	259	251	248	244	240	237	232	227	221
41	276	259	251	248	244	240	237	232	227	221
42	290	273	264	260	256	253	248	243	238	232
43	290	273	264	260	256	253	248	243	238	232
44	310	292	283	279	274	270	266	261	255	249
45	310	292	283	279	274	270	266	261	255	249

Delete Line 7

Table Y-1 (Cont'd)
Yield Strength Values, S_y, for Ferrous and Nonferrous Materials

Line No.	Yield Strength, MPa (Multiply by 1000 to Obtain kPa), for Metal Temperature, °C, Not Exceeding									
	300	325	350	375	400	425	450	475	500	525
										Ferrous Materials (Cont'd)
1	216	209	202	196	191	185	180	176	171	167
2	216	209	202	196	191	185	180	176	171	167
3	216	209	202	196	191	185	180	176	171	167
4	204	201	197	192	187	181	175	...	...	...
5	189	185	181	177	174	169	164	...	...	...
6	216	209	202	196	191	185	180	176	171	167
~~7~~	~~216~~	~~209~~	~~202~~	~~196~~	~~191~~	~~185~~	~~180~~	~~176~~	~~171~~	~~167~~
8	216	209	202	196	191	185	180	176	171	167
9	216	209	202	196	191	185	180	176	171	167
10	226	219	213	207	200	195	189	184	180	175
11	232	225	218	211	205	199	194	189	184	179
12	216	212	208	204	199	194	189	...	...	...
13	216	212	208	204	199	194	189	...	...	...
14	235	231	226	222	217	211	204	...	...	...
15	235	231	226	222	217	211	204	...	...	...
16	235	231	226	222	217	211	204	...	...	...
17	235	231	226	222	217	211	204	...	...	...
18	279	275	269	261	252	...	...	...	...	...
19	259	254	249	...	...	...	...	...	...	...
20	259	254	249	...	...	...	...	...	...	...
21	259	254	249	...	...	...	...	...	...	...
22	335	330	323	...	...	...	...	...	...	...
23	217	211	204	198	192	186	181	177	172	168
24	236	230	223	216	209	203	197	192	188	183
25	238	231	224	217	211	205	199	194	189	184
26	246	239	231	224	217	211	206	201	196	190
27	246	239	232	225	218	212	206	200	195	190
28	254	247	239	232	225	218	212	207	201	196
29	200	193	187	182	176	171	167	163	158	154
30	221	215	208	202	195	190	185	180	175	171
31	261	254	246	238	231	225	219	213	208	203
32	269	261	253	245	238	231	225	220	214	209
33	270	262	254	246	239	232	225	219	214	208
34	...	...	...	...	...	...	...	...	...	...
35	277	269	261	252	245	238	232	226	220	215
36	202	196	190	185	179	173	169	165	160	156
37	204	199	193	187	181	176	171	167	162	158
38	216	209	202	196	191	185	180	176	171	167
39	216	209	202	196	191	185	180	176	171	167
40	216	209	202	196	191	185	180	176	171	167
41	216	209	202	196	191	185	180	176	171	167
42	226	219	213	207	200	195	189	184	180	175
43	226	219	213	207	200	195	189	184	180	175
44	242	235	228	221	215	209	203	197	192	187
45	242	235	228	221	215	209	203	197	192	187

Delete Line 7