

ASTM A790 Pipe specification

Standard Specification for Seamless and Welded Ferritic/Austenitic Stainless Steel Pipe

[ASTM A790 UNS S31803 Pipes](#)

[ASTM A790 UNS S32205 Pipes](#)

[ASTM A790 UNS S32750 Pipes](#)

[ASTM A790 UNS S32760 Pipes](#)

Applicable Grades (UNS Designations)

Grade	UNS No.	Nominal Composition (% Cr – Ni – Mo – N)	Common Trade Name
S31803	S31803	22Cr – 5Ni – 3Mo – N	Duplex 2205
S32205	S32205	22Cr – 5Ni – 3Mo – 0.17N	Duplex 2205 (improved)
S32750	S32750	25Cr – 7Ni – 4Mo – N	Super Duplex 2507
S32760	S32760	25Cr – 7Ni – 3.6Mo – Cu – W – N	Zeron 100
S32550	S32550	25Cr – 6Ni – 3Mo – Cu – N	Ferrallium 255

General Requirements

Material furnished under this specification shall conform to the applicable requirements of the current edition of Specification A 999/A 999M unless otherwise provided herein.

Materials and Manufacture

The pipe shall be made by the seamless or an automatic welding process, with no addition of filler metal in the welding operation.

At the manufacturer's option, pipe may be either hot-finished or cold-finished

Chemical Composition

The steel shall conform to the chemical requirements as prescribed in Table

TABLE 2 Chemical Requirements^a

UNS Designation ^b	Type ^c	C	Mn	P	S	Si	Ni	Cr	Mo	N	Cu	Others
S31200		0.030	2.00	0.045	0.030	1.00	5.5–6.5	24.0–26.0	1.20–2.00	0.14–0.20	...	...
S31260		0.030	1.00	0.030	0.030	0.75	5.5–7.5	24.0–26.0	2.5–3.5	0.10–0.30	0.20–0.80 W	0.10–0.50
S31500		0.030	1.20–2.00	0.030	0.030	1.40–2.00	4.2–5.2	18.0–19.0	2.50–3.00	0.05–0.10	...	...
S31803		0.030	2.00	0.030	0.020	1.00	4.5–6.5	21.0–23.0	2.5–3.5	0.08–0.20	...	...
S32003		0.030	2.00	0.030	0.020	1.00	3.0–4.0	19.5–22.5	1.50–2.00	0.14–0.20	...	...
S32101		0.040	4.0–6.0	0.040	0.030	1.00	1.35–1.70	21.0–22.0	0.10–0.80	0.20–0.25	0.10–0.90	...
S32202		0.030	2.00	0.040	0.010	1.00	1.00–2.00	21.5–24.0	0.45	0.18–0.26	...	...
S32205	2205	0.030	2.00	0.030	0.010	1.00	4.5–6.5	22.0–23.0	3.0–3.5	0.14–0.20	...	...
S32304	2304	0.030	2.50	0.040	0.010	1.00	3.0–5.5	21.5–24.5	0.05–0.80	0.05–0.20	0.05–0.80	...
S32506		0.030	1.00	0.040	0.015	0.90	5.5–7.2	24.0–26.0	3.0–3.5	0.08–0.20	...	W
												0.05–0.30
S32820		0.030	1.5	0.035	0.020	0.80	5.5–6.0	24.0–26.0	3.0–5.0	0.20–0.35	0.5–3.00	...
S32550	255	0.04	1.50	0.040	0.030	1.00	4.5–6.5	24.0–27.0	2.9–3.9	0.10–0.25	1.50–2.50	...
S32707		0.020	1.50	0.035	0.010	0.50	5.5–6.5	26.0–29.0	4.0–5.0	0.30–0.60	1.0	Ca
												0.5–2.0
S32750	2507	0.020	1.20	0.035	0.020	0.80	6.0–6.0	24.0–26.0	3.0–5.0	0.24–0.32	0.5	...
S32760		0.02	1.00	0.030	0.010	1.00	6.0–8.0	24.0–26.0	3.0–4.0	0.20–0.30	0.50–1.00 W	0.50–1.00 40 ml/l ^d
												2.10–2.50
S3906		0.030	1.10	0.050	0.030	0.50	7.0–8.2	27.0–27.9	0.80–1.20	0.30–0.40	...	...
S39900	309	0.06	1.00	0.040	0.030	0.75	2.5–5.0	23.0–24.0	1.00–2.00	...	...	...
S39906		0.030	0.80–1.50	0.030	0.030	0.80	5.6–7.5	28.0–30.0	1.50–2.00	0.30–0.40	0.90	...
S39850		0.030	2.00	0.035	0.010	0.60	3.5–5.2	26.0–29.0	1.00–2.50	0.15–0.35	...	...
S33207		0.030	1.50	0.035	0.010	0.80	6.0–8.0	29.0–33.0	3.0–5.0	0.40–0.60	1.0	...
S39274		0.030	1.00	0.030	0.020	0.80	6.0–8.0	24.0–26.0	2.5–3.5	0.24–0.32	0.20–0.80 W	...
												1.50–2.50
S30277		0.025	0.60	0.025	0.002	0.60	6.5–8.0	24.0–26.0	3.0–4.0	0.20–0.33	1.20–2.00 W	0.5–1.2

^aMaximum, unless a range or minimum is indicated. Where ellipses (. . .) appear in this table, there is no minimum and analysis for the element need not be determined or reported.

^bNew designation established in accordance with Practice E 527 and SAE J 1096

^cCommon name, not a trademark, widely used; not associated with any one producer; 309 is an AISI number

^d% Cr + 3.3 = % Mo + 1.6 = % N

Tensile and Hardness Properties

The material shall conform to the tensile and hardness properties prescribed in Table 3

TABLE 3 Tensile and Hardness Requirements

UNS Designation	Type ^A	Tensile Strength, min, ksi [MPa]	Yield Strength, min, ksi [MPa]	Elongation in 2 in. or 50 mm, min, %	Hardness, max	
					HBW	HRC
S31200		100 [690]	65 [450]	25	280	...
S31260		100 [690]	65 [450]	25	...	...
S31500		92 [630]	64 [440]	30	290	30
S31803		90 [620]	65 [450]	25	290	30
S32003		90 [620]	65 [450]	25	290	30
S32101						
t ≤ 0.187 in. [5.00 mm]		101 [700]	77 [530]	30	290	...
t > 0.187 in. [5.00 mm]		94 [650]	65 [450]	30	290	...
S32202		94 [650]	65 [450]	30	290	30
S32205	2205	95 [655]	65 [450]	25	290	30
S32304	2304	87 [600]	58 [400]	25	290	30
S32506		90 [620]	65 [450]	18	302	32
S32520		112 [770]	80 [550]	25	310	...
S32550	255	110 [760]	80 [550]	15	297	31
S32707		133 [920]	101 [700]	25	318	34
S32750	2507	116 [800]	80 [550]	15	300	32
S32760 ^B		109 [750]	80 [550]	25	300	...
S32808		116 [800]	80 [550]	15	310	32
S32900	329	90 [620]	70 [485]	20	271	28
S32906						
Wall below 0.40 in. [10 mm]		116 [800]	94 [650]	25	300	32
Wall 0.40 in. [10 mm] and above		109 [750]	80 [550]	25	300	32
S32950		100 [690]	70 [480]	20	290	30
S33207						
Wall below 0.157 in. (4 mm)		138 [950]	112 [770]	15	336	36
Wall 0.157 in. (4 mm) and above		123 [850]	101 [700]	15	336	36
S39274		116 [800]	80 [550]	15	310	32
S39277		120 [825]	90 [620]	25	290	30

^ACommon name, not a trademark, widely used, not associated with any one producer. 329 is an AISI number.

^BPrior to A 790/A 790M – 04, the tensile strength value for UNS 32760 was 109–130 ksi [750–895 MPa].

Lengths

Pipe lengths shall be in accordance with the following regular practice: 11.1.1 Unless otherwise agreed upon, all sizes from NPS 1/8 to and including NPS 8 are available in a length up to 24 ft (see Note 3) with the permissible range of 15 to 24 ft (see Note 3).

Short lengths are acceptable and the number and minimum length shall be agreed upon between the manufacturer and the purchaser.

If definite cut lengths are desired, the lengths required shall be specified in the order.

No pipe shall be less than the specified length and no more than 1/4 in. [6 mm] over it.

11.1.3 No jointers are permitted unless otherwise specified.

Hydrostatic or Nondestructive Electric Test

Each pipe shall be subjected to the nondestructive electric test or the hydrostatic test. The type of test to be used shall be at the option of the manufacturer, unless otherwise specified in the purchase order.

The hydrostatic test shall be in accordance with Specification A 999/A 999M, except that the value for S to be used in the calculation of the hydrostatic test pressure shall be equal to 50 % of the specified minimum yield strength of the pipe. 14.3 Nondestructive Electric Test: Nondestructive electric tests shall be in accordance with Practices E 213 or E 309.

Product Marking

In addition to the marking prescribed in Specification A 999/A 999M, the marking shall include the manufacturer's private identifying mark and whether the pipe is seamless or welded. If specified in the purchase order, the marking for pipe larger than NPS 4 shall include the weight.

Dimensions of Welded and Seamless Stainless Steel Pipe

Note: 1—The decimal thickness listed for the respective pipe sizes represents their nominal or average wall dimensions.

NPS Designator	Outside Diameter		Nominal Wall Thickness							
	in.	mm	Schedule 5S ^a		Schedule 10S ^a		Schedule 40S		Schedule 80S	
			in.	mm	in.	mm	in.	mm	in.	mm
1/8	0.405	10.29	...	...	0.049 ^b	1.24	0.068	1.73	0.095	2.41
1/4	0.540	13.72	...	...	0.065 ^b	1.65	0.088	2.24	0.119	3.02
3/8	0.675	17.15	...	...	0.065 ^b	1.65	0.091	2.31	0.126	3.20
1/2	0.840	21.34	0.065 ^b	1.65	0.083 ^b	2.11	0.109	2.77	0.147	3.73
3/4	1.050	26.67	0.065 ^b	1.65	0.083 ^b	2.11	0.113	2.87	0.154	3.91
1.0	1.315	33.40	0.065 ^b	1.65	0.109 ^b	2.77	0.133	3.38	0.179	4.55
1 1/4	1.660	42.15	0.065 ^b	1.65	0.109 ^b	2.77	0.140	3.55	0.191	4.85
1 1/2	1.900	48.26	0.065 ^b	1.65	0.109 ^b	2.77	0.145	3.68	0.200	5.06
2	2.375	60.33	0.065 ^b	1.65	0.109 ^b	2.77	0.154	3.91	0.216	5.54
2 1/2	2.875	73.03	0.085	2.11	0.120 ^b	3.05	0.203	5.16	0.276	7.01
3	3.500	88.90	0.083	2.11	0.120 ^b	3.05	0.216	5.49	0.300	7.62
3 1/2	4.000	101.60	0.083	2.11	0.120 ^b	3.05	0.226	5.74	0.318	8.06
4	4.500	114.30	0.083	2.11	0.120 ^b	3.05	0.237	6.02	0.337	8.56
5	5.563	141.30	0.109 ^b	2.77	0.134 ^b	3.40	0.258	6.55	0.375	9.52
6	6.625	168.28	0.109 ^b	2.77	0.134 ^b	3.40	0.280	7.11	0.432	10.97
8	8.625	219.08	0.109 ^b	2.77	0.148 ^b	3.76	0.322	8.18	0.500	12.70
10	10.750	273.05	0.134 ^b	3.40	0.186 ^b	4.19	0.365	9.27	0.500 ^b	12.70 ^b
12	12.750	323.85	0.156 ^b	3.96	0.180 ^b	4.57	0.375 ^b	9.52 ^b	0.500 ^b	12.70 ^b
14	14.000	355.60	0.156 ^b	3.96	0.188	4.78	...	...	...	...
16	16.000	406.40	0.185 ^b	4.19	0.188	4.78	...	...	...	...
18	18.000	457.20	0.185 ^b	4.19	0.188	4.78	...	...	...	...
20	20.000	508.00	0.188 ^b	4.76	0.216 ^b	5.54	...	...	...	...
22	22.000	558.80	0.188 ^b	4.76	0.216 ^b	5.54	...	...	...	...
24	24.000	609.60	0.215 ^b	5.54	0.250	6.35	...	...	...	...
30	30.000	762.00	0.250	6.35	0.312	7.92	...	...	...	...

^a Schedules 5S and 10S wall thicknesses do not permit threading in accordance with the American National Standard for Pipe Threads (ANSI B1.20.1).

^b These do not conform to the American National Standard for Welded and Seamless Wrought Steel Pipe (ANSI B36.10-1978).