



Standard Specification for Stainless Steel Forgings¹

This standard is issued under the fixed designation A 473; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reappraisal. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reappraisal.

This standard has been approved for use by agencies of the Department of Defense.

1. Scope

1.1 This specification covers austenitic, austenitic-ferritic, ferritic, and martensitic stainless steel forgings for general use, and for low- or high-temperature service.

1.2 The values stated in inch-pound units are to be regarded as the standard.

2. Referenced Documents

2.1 ASTM Standards:

A 314 Specification for Stainless Steel Billets and Bars for Forging²

A 370 Test Methods and Definitions for Mechanical Testing of Steel Products³

A 484/A 484M Specification for General Requirements for Stainless Steel Bars, Billets, and Forgings²

A 751 Test Methods, Practices, and Terminology for Chemical Analysis of Steel Products³

E 527 Practice for Numbering Metals and Alloys (UNS)⁴

3. Ordering Information

3.1 It is the responsibility of the purchaser to specify all requirements that are necessary for material ordered under this specification. Such requirements may include, but are not limited to, the following:

3.1.1 Quantity (weight or number of pieces),

3.1.2 Dimensions, including prints or sketches,

3.1.3 Name of material (stainless steel forgings),

3.1.4 Type or UNS designation (Table 1),

3.1.5 Condition (Table 2), and

3.1.6 ASTM designation and date of issue.

3.1.7 Test for magnetic permeability if specified by customer purchase order when ordering Types 207 and 205.

3.1.8 Special requirements.

3.2 If possible the intended end use of the item should be given on the purchase order especially when the item is ordered for a specific end use or uses.

¹ This specification is under the jurisdiction of ASTM Committee A-1 on Steel, Stainless Steel, and Related Alloys and is the direct responsibility of Subcommittee A01.17 on Flat Stainless Steel Products.

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² Annual Book of ASTM Standards, Vol 01.05.

³ Annual Book of ASTM Standards, Vol 01.03.

⁴ Annual Book of ASTM Standards, Vol 01.01.

NOTE 1—A typical ordering description is as follows: 5 stainless steel forgings, Type 410, Designation A, ASTM Specification A 473 dated _____. End use: pump blocks for oil well equipment.

4. General Requirements

4.1 In addition to the requirements of this specification, all requirements of the current edition of Specification A 484/A 484M shall apply. Failure to comply with the general requirements of Specification A 484/A 484M constitutes non-conformance with this specification.

5. Manufacture

5.1 Material for forgings shall consist of ingots or blooms, billets, slabs, or bars, either forged or rolled from an ingot, and cut to the required length by a suitable process. This material, except for ingots, may be specified to Specification A 314.

5.2 The material shall be forged by hammering, pressing, rolling, extruding, or upsetting. It shall be brought as nearly as possible to the finished shape and size by hot-working; and shall be processed, if practicable, so as to cause metal-flow during the hot-working operation in the direction most favorable for resisting the stresses encountered in service as may be indicated to the manufacturer by the purchaser.

5.3 When specified on the order, a sample forging may be sectioned and etched to show flow lines and the condition as regards internal imperfections. When so specified, the question of acceptable and unacceptable metal-flow shall be subject to agreement between the manufacturer and the purchaser prior to order entry.

5.4 When specified on the order, the manufacturer shall submit for approval of the purchaser a sketch showing the shape of the rough forging before machining, or before heat treating for mechanical properties.

5.5 The grain size shall be as fine as practicable and precautions shall be taken to minimize grain growth.

6. Heat Treatment

6.1 Except for S31254, the austenitic steels shall receive a solution heat treatment, consisting of heating the material to a minimum temperature of 1900°F (1040°C), followed by cooling rapidly in air or water.

6.2 S31254 shall receive a solution heat treatment, consisting of heating the material to a minimum temperature of 2100°F (1150°C) followed by cooling rapidly in air or water.

6.3 When specified, Types 347, 348, and 321 shall receive a

TABLE 1 Chemical Requirements^A

UNS Designation ^B	Type Number	Carbon, %	Manganese, %	Phosphorus, %	Sulfur, %	Silicon, %	Chromium, %	Nickel, %	Molybdenum, %	Nitrogen, %	Other Elements, %
Austenitic Grades											
S20100	201	0.15	5.5–7.5	0.060	0.030	1.00	16.0–18.0	3.5–5.5	...	0.25	
S20200	202	0.15	7.5–10.0	0.060	0.030	1.00	17.0–19.0	4.0–6.0	...	0.25	
S20500	205	0.12–0.25	14.0–15.5	0.060	0.030	1.00	16.5–18.0	1.00–1.75	...	0.32–0.40	
S21900	XM-10	0.08	8.0–10.0	0.060	0.030	1.00	19.0–21.5	5.5–7.5	...	0.15–0.40	
S21904	XM-11	0.04	8.0–10.0	0.060	0.030	1.00	19.0–21.5	5.5–7.5	...	0.15–0.40	
S28200	...	0.15	17.0–19.0	0.045	0.030	1.00	17.0–19.0	...	0.75–1.25	0.40–0.60	Cu 0.75–1.25
S30200	302	0.15	2.00	0.045	0.030	1.00	17.0–19.0	8.0–10.0	...	0.10	
S30215	302B	0.15	2.00	0.045	0.030	2.00–3.00	17.0–19.0	8.0–10.0	...	...
S30300	303	0.15	2.00	0.20	0.15 min	1.00	17.0–19.0	8.0–10.0	0.60 ^C	...	
S30323	303 Se	0.15	2.00	0.20	0.06	1.00	17.0–19.0	8.0–10.0	...	...	Se 0.15 min
S30400	304	0.08	2.00	0.045	0.030	1.00	18.0–20.0	8.0–10.5	...	0.10	
S30403	304L	0.030	2.00	0.045	0.030	1.00	18.0–20.0	8.0–12.0	...	0.10	
S30500	305	0.12	2.00	0.045	0.030	1.00	17.0–19.0	10.5–13.0	...	...
S30800	308	0.08	2.00	0.045	0.030	1.00	19.0–21.0	10.0–12.0	...	...
S30815	...	0.10	0.80	0.040	0.030	1.40–2.00	20.0–22.0	10.0–12.0	...	0.14–0.20	Ce 0.03–0.08
S30900	309	0.20	2.00	0.045	0.030	1.00	22.0–24.0	12.0–15.0	...	...
S30908	309S	0.08	2.00	0.045	0.030	1.00	22.0–24.0	12.0–15.0	...	...
S31000	310	0.25	2.00	0.045	0.030	1.50	24.0–26.0	19.0–22.0	...	...
S31008	310S	0.08	2.00	0.045	0.030	1.50	24.0–26.0	19.0–22.0	...	...
S31254	...	0.020	1.00	0.030	0.010	0.80	19.5–20.5	17.5–18.5	6.0–6.5	0.18–0.22	Cu 0.50–1.00
S31400	314	0.25	2.00	0.045	0.030	1.50–3.00	23.0–26.0	19.0–22.0	...	...
S31600	316	0.08	2.00	0.045	0.030	1.00	16.0–18.0	10.0–14.0	2.00–3.00	0.10	
S31603	316L	0.030	2.00	0.045	0.030	1.00	16.0–18.0	10.0–14.0	2.00–3.00	0.10	
S31700	317	0.08	2.00	0.045	0.030	1.00	18.0–20.0	11.0–15.0	3.0–4.0	0.10	
S32100	321	0.08	2.00	0.045	0.030	1.00	17.0–19.0	9.0–12.0	...	...	Ti 5×C min
S34700	347	0.08	2.00	0.045	0.030	1.00	17.0–19.0	9.0–13.0	...	...	Cb+Ta 10×C, min
S34800	348	0.08	2.00	0.045	0.030	1.00	17.0–19.0	9.0–13.0	...	...	Cb+Ta 10×C, min Ta 0.10 Co 0.20
Austenitic-Ferritic Grades											
S32550 ^D	...	0.04	1.50	0.040	0.030	1.00	24.0–27.0	4.5–6.5	2.9–3.9	0.10–0.25	Cu 1.50–2.50
S32760 ^D	...	0.030	1.00	0.030	0.010	1.00	24.0–26.0	6.0–8.0	3.0–4.0	0.20–0.30	Cu 0.50–1.00 W 0.50–1.00
S32950	...	0.03	2.00	0.035	0.010	0.60	26.0–29.0	3.5–5.2	1.00–2.50	0.15–0.35	
Ferritic Grades											
S40500	405	0.08	1.00	0.040	0.030	1.00	11.5–14.5	0.60	...	...	A1 0.10–0.30
S42900	429	0.12	1.00	0.040	0.030	1.00	14.0–16.0	0.75	...	...
S43000	430	0.12	1.00	0.040	0.030	1.00	16.0–18.0	0.75	...	...
S43020	430F	0.12	1.25	0.06	0.15 min	1.00	16.0–18.0	0.75	0.60 ^C	...	
S43023	430F Se	0.12	1.25	0.06	0.06	1.00	16.0–18.0	0.75	...	...	Se 0.15 min
S44600	446	0.20	1.50	0.040	0.030	1.00	23.0–27.0	0.75	...	0.25	
Martensitic Grades											
S40300	403	0.15	1.00	0.040	0.030	0.50	11.5–13.0	...	...	...
S41000	410	0.15	1.00	0.040	0.030	1.00	11.5–13.5	0.75	...	...
S41008	410S	0.08	1.00	0.040	0.030	1.00	11.5–13.5	0.75	...	...
S41400	414	0.15	1.00	0.040	0.030	1.00	11.5–13.5	1.25–2.50	...	...
S41425	...	0.05	0.50–1.00	0.020	0.005	0.50	12.0–15.0	4.0–7.0	1.50–2.00	0.06–0.12	Cu 0.30
S41500	^E	0.05	0.5–1.0	0.030	0.030	0.60	11.5–14.0	3.5–5.5	0.40–0.80	...	
S41600	416	0.15	1.25	0.06	0.15 min	1.00	12.0–14.0	...	0.60 ^C	...	
S41623	416 Se	0.15	1.25	0.06	0.06	1.00	12.0–14.0	...	...	...	Se 0.15 min
S42000	420	Over 0.15	1.00	0.040	0.030	1.00	12.0–14.0	...	...	...
S43100	431	0.20	1.00	0.040	0.030	1.00	15.0–17.0	1.25–2.50	...	...
S44002	440A	0.60–0.75	1.00	0.040	0.030	1.00	16.0–18.0	...	0.75	...	
S44003	440B	0.75–0.95	1.00	0.040	0.030	1.00	16.0–18.0	...	0.75	...	
S44004	440C	0.95–1.20	1.00	0.040	0.030	1.00	16.0–18.0	...	0.75	...	
S50100	501	Over 0.10	1.00	0.040	0.030	1.00	4.0–6.0	...	0.40–0.65	...	
...	501A	0.15	0.30–0.60	0.030	0.030	0.50–1.00	6.0–8.0	...	0.45–0.65	...	
...	501B	0.15	0.30–0.60	0.030	0.030	0.50–1.00	8.0–10.0	...	0.90–1.10	...	
S50200	502	0.10	1.00	0.040	0.030	1.00	4.0–6.0	...	0.40–0.65	...	

^A Maximum, unless range or minimum is indicated.

^B New designation established in accordance with Practice E 527 and SAE J 1086.

^C At manufacturer's option; reported only when intentionally added.

^D % Cr + 3.3 × % Mo + 16 × % N ≥ 40.

^E Wrought version of CA6NM.