



Standard Specification for Stainless Steel Bars and Shapes for Use in Boilers and Other Pressure Vessels

锅炉和其它压力容器用不锈钢棒材和型材

本标准以英文为准，中文翻译仅供参考，如有疑义，请以英文为准。

This standard is issued under the fixed designation A 479/A 479M; 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 re-approval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or re-approval.

此标准是根据A 479/A 479 M 指定出版的；名称后面显示的数字是最初的或最近一次修订的年份。括号中的数字表明的是重新批准的年份。标记在角上的字母表示的是最近修订或正式批准后的修改部分

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

这一标准已被美国国防部机构批准使用

1. Scope*

1. 引用范围

1.1 This specification covers hot- and cold-finished bars of stainless steel, including rounds, squares, and hexagons, and hot-rolled or extruded shapes such as angles, tees, and channels for use in boiler and pressure vessel construction.

1.1 此标准适用于锅炉和压力容器构件用的热和冷加工不锈钢棒材，包括圆形的、方形的和六角形的，以及热轧或挤压型材，如角钢、T形钢和槽钢。

NOTE 1—There are standards covering high nickel, chromium, austenitic corrosion, and heat-resisting alloy materials. These standards are under the jurisdiction of ASTM Subcommittee B02.07 and may be found in *Annual Book of ASTM Standards*, Vol 02.04.

注释1——有一些标准适用于高镍、铬、奥氏体腐蚀和耐热合金材料。这些标准属于ASTM 小组委员会B02.07管辖，并能在ASTM 标准年刊02.04分册中找到。

1.2 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard.

1.2 用SI单位或英寸-磅单位制表示的数值应单独视为标准值。两单位制表示的数值不完全等同；因此，要分开采用。混用这两种单位制会导致与本标准不符合。

1.3 Unless the order specifies the applicable “M” specification designation, the material



shall be furnished to the inch-pound units.

1.3 除非订单上指定“M”制单位，否则供货材料需用英寸-磅单位制。

2. Referenced Documents

2. 引用标准

2.1 ASTM Standards:

2.1 ASTM标准:

A 262 Practices for Detecting Susceptibility to Intergranular Attack in Austenitic Stainless Steels

A 262 探测奥氏体不锈钢晶间侵蚀敏感度

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

A 370 钢制品的机械性能测试的试验方法和定义

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

A 484/A 484M 不锈钢棒材、坯料和锻材的一般要求

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

A 751 钢制品化学分析的试验方法、操作规范和术语

E 112 Test Methods for Determining Average Grain Size

E 112 测定平均晶粒度的试验方法

E 527 Practice for Numbering Metals and Alloys in the Unified Numbering System (UNS)

E 527 金属和合金编号方式 (UNS)

2.2 SAE Document:

2.2 SAE 文件

SAE J 1086 Recommended Practice for Numbering Metals and Alloys

SAE J 1086 金属和合金编号推荐方法

3. General Requirements

3. 一般要求

3.1 The following requirements for orders for material furnished under this specification shall conform to the applicable requirements of the current edition of Specification **A 484/A 484M**.

3.1 根据本标准订货的材料订单中应包括如下要求并应符合当前版本的**A 484/A 484M**标准的可行性要求。

3.1.1 Definitions,

3.1.1 定义

3.1.2 General requirements for delivery,

3.1.2 交货一般要求

3.1.3 Ordering information,

3.1.3 订单信息

3.1.4 Process,



3.1.4 程序	3.1.15 Certification, and
3.1.5 Special tests,	3.1.15 合格证书,
3.1.5 特殊试验	3.1.16 Packaging, marking, and loading.
3.1.6 Heat treatment,	3.1.16 包装, 标记和装箱。
3.1.6 热处理	4. Other Requirements
3.1.7 Dimensions and permissible variations,	4. 其它要求
3.1.7 尺寸和允许偏差	4.1 In addition to the requirements of this specification, all requirements of the current editions of Specification A 484/A 484M shall apply. Failure to comply with the general requirements of Specification A 484/A 484M constitutes nonconformance with this specification.
3.1.8 Workmanship, finish, and appearance,	4.1 除本标准的要求之外, 当前版本的A 484/A 484M标准的所有要求都适用。不符合标准A 484/A 484M的一般要求等同于与本标准不一致。
3.1.8 加工工艺、表面光洁度和外观,	
3.1.9 Number of tests/test methods,	
3.1.9 试验/试验方法的号码	
3.1.10 Specimen preparation,	
3.1.10 试样制备,	
3.1.11 Retreatment,	5. Chemical Composition
3.1.11 重新处理,	5. 化学成分
3.1.12 Inspection,	5.1 Chemical composition shall be reported to the purchaser, or his representative, and shall conform to the requirements specified in Table 1 .
3.1.12 检验,	5.1 化学成分应报告给客户或其代表, 并应符合 表1 指定的要求。
3.1.13 Rejection and rehearing,	5.2 When a product analysis is performed or requested by the purchaser, the tolerance limits as described in Specification A 484/A 484M apply unless Supplementary Requirement S3 is invoked.
3.1.13 拒收和复测	5.2 进行或按买方要求进行成品分析时, 应采用标准A 484/A 484M 所述的极限偏差, 但调用附加要
3.1.14 Material test report,	
3.1.14 材料测试报告	



求S3除外。

TABLE 1 Chemical Requirements

表 1 化学成分要求

UNS Designation ^A UNS代号	Type 类型	Composition, % ^B (成分, %)									Other Elements ^C 其它元素
		Carbon 碳	Manganese 锰	Phosphorus 磷	Sulfur 硫	Silicon 硅	Chromium 铬	Nickel 镍	Nitrogen 氮	Molybdenum 钼	
Austenitic Grades (奥氏体牌号钢)											
N08367	...	0.030	2.00	0.040	0.030	1.00	20.0–22.0	23.5–25.5	0.18–0.25	6.0–7.0	Cu (铜) 0.75
S20161	...	0.15	4.0–6.0	0.045	0.030	3.0–4.0	15.0–18.0	4.0–6.0	0.08–0.20	...	...
S20910	XM-19	0.06	4.0–6.0	0.045	0.030	1.00	20.5–23.5	11.5–13.5	0.20–0.40	1.50–3.00	Cb (铯) 0.10–0.30 V 0.10–0.30
S21600	XM-17	0.08	7.5–9.0	0.045	0.030	1.00	17.5–20.5	5.0–7.0	0.25–0.50	2.00–3.00	...
S21603	XM-18	0.03	7.5–9.0	0.045	0.030	1.00	17.5–20.5	5.0–7.0	0.25–0.50	2.00–3.00	...
S21800	...	0.10	7.0–9.0	0.060	0.030	3.5–4.5	16.0–18.0	8.0–9.0	0.08–0.18	...	...
S21904	XM-11	0.04	8.0–10.0	0.045	0.030	1.00	19.0–21.5	5.5–7.5	0.15–0.40	...	...
S24000	XM-29	0.08	11.5–14.5	0.060	0.030	1.00	17.0–19.0	2.3–3.7	0.20–0.40	...	...
S30200	302	0.15	2.00	0.045	0.030	1.00	17.0–19.0	8.0–10.0	0.10	...	...
S30400	304	0.08 ^C	2.00	0.045	0.030	1.00	18.0–20.0	8.0–10.5	...	...	...
S30403	304L	0.030	2.00	0.045	0.030	1.00	18.0–20.0	8.0–12.0	...	...	...
S30409	304H	0.04–0.10	2.00	0.045	0.030	1.00	18.0–20.0	8.0–10.5	...	...	...
S30451	304N	0.08	2.00	0.045	0.030	1.00	18.0–20.0	8.0–12.0	0.10–0.16	...	...
S30453	304LN	0.030	2.00	0.045	0.030	1.00	18.0–20.0	8.0–11.0	0.10–0.16	...	...
S30600	...	0.018	2.00	0.020	0.020	3.7–4.3	17.0–18.5	14.0–15.5	...	0.20	Cu 0.50
S30815	...	0.05–0.10	0.80	0.040	0.030	1.40–2.00	20.0–22.0	10.0–12.0	0.14–0.20	...	Ce (铈) 0.03–0.08
S30908	309S	0.08	2.00	0.045	0.030	1.00	22.0–24.0	12.0–15.0	...	...	...
S30909	309H	0.04–0.10	2.00	0.045	0.030	1.00	22.0–24.0	12.0–15.0	...	...	...
S30940	309Cb	0.08	2.00	0.045	0.030	1.00	22.0–24.0	12.0–16.0	...	...	Cb 10×C-1.10
S30880	ER308 ^D	0.08	1.00–2.50	0.030	0.030	0.25–0.60	19.5–22.0	9.0–11.0	...	...	...
S31008	310S	0.08	2.00	0.045	0.030	1.00	24.0–26.0	19.0–22.0	...	...	...
S31009	310H	0.04–0.10	2.00	0.045	0.030	1.00	24.0–26.0	19.0–22.0	...	...	...
S31040	310Cb	0.08	2.00	0.045	0.030	1.00	24.0–26.0	19.0–22.0	...	...	Cb 10×C-1.10
S31254	...	0.020	1.00	0.030	0.010	0.80	19.5–20.5	17.5–18.5	0.18–0.22	6.0–6.5	Cu 0.50–1.00
S31600	316	0.08 ^C	2.00	0.045	0.030	1.00	16.0–18.0	10.0–14.0	...	2.00–3.00	...
S31603	316L	0.030	2.00	0.045	0.030	1.00	16.0–18.0	10.0–14.0	...	2.00–3.00	...
S31609	316H	0.04–0.10	2.00	0.045	0.030	1.00	16.0–18.0	10.0–14.0	...	2.00–3.00	...
S31635	316Ti	0.08	2.00	0.045	0.030	1.00	16.0–18.0	10.0–14.0	0.10	2.00–3.00	Ti (铈) 5×(C+N)-0.70 ^F
S31640	316Cb	0.08	2.00	0.045	0.030	1.00	16.0–18.0	10.0–14.0	0.10	2.00–3.00	Cb 103C-1.10
S31651	316N	0.08	2.00	0.045	0.030	1.00	16.0–18.0	10.0–14.0	0.10–0.16	2.00–3.00	...
S31653	316LN	0.030	2.00	0.045	0.030	1.00	16.0–18.0	10.0–14.0	0.10–0.16	2.00–3.00	...
S31700	317	0.08	2.00	0.045	0.030	1.00	18.0–20.0	11.0–15.0	...	3.0–4.0	...
S31725	...	0.030	2.00	0.045	0.030	1.00	18.0–20.0	13.5–17.5	0.20	4.0–5.0	...
S31726	...	0.030	2.00	0.045	0.030	1.00	17.0–20.0	14.5–17.5	0.10–0.20	4.0–5.0	...
S31727	...	0.030	1.00	0.030	0.030	1.00	17.5–19.0	14.5–16.5	0.15–0.21	3.8–4.5	Cu 2.8–4.0
S32050	...	0.030	1.50	0.035	0.020	1.00	22.0–24.0	20.0–23.0	0.21–0.32	6.0–6.8	Cu 0.40
S32053	...	0.030	1.00	0.030	0.010	1.00	22.0–24.0	24.0–26.0	0.17–0.22	5.0–6.0	...
S32100	321	0.08 ^E	2.00	0.045	0.030	1.00	17.0–19.0	9.0–12.0	...	...	Ti 5×(C+N)-0.70 ^F
S32109	321H	0.04–0.10	2.00	0.045	0.030	1.00	17.0–19.0	9.0–12.0	...	...	Ti 4×(C+N)-0.70 ^F
S32615	...	0.07	2.00	0.045	0.030	4.8–6.0	16.5–19.5	19.0–22.0	...	0.30–1.50	Cu 1.50–2.50
S32654	...	0.020	2.0–4.0	0.030	0.005	0.50	24.0–25.0	21.0–23.0	7.0–8.0	0.45–0.55	Cu 0.30–0.60
S33228	...	0.04–0.08	1.00	0.020	0.015	0.30	26.0–28.0	31.0–33.0	...	...	Cb 0.60–1.00 Ce 0.05–0.10 Al (铝) 0.025



表1续

UNS Designation ^A UNS代号	Type 类型	Composition, % ^B (成分, %)									
		Carbon 碳	Manganese 锰	Phosphorus 磷	Sulfur 硫	Silicon 硅	Chromium 铬	Nickel 镍	Nitrogen 氮	Molybdenum 钼	Other Elements ^C 其它元素
S34565	...	0.030	5.0–7.0	0.030	0.010	1.00	23.0–25.0	16.0–18.0	0.40–0.60	4.0–5.0	Cb 0.10
S34700	347	0.08 ^E	2.00	0.045	0.030	1.00	17.0–19.0	9.0–12.0	...	...	Cb 10×C–1.10
S34709	347H	0.04–0.10	2.00	0.045	0.030	1.00	17.0–19.0	9.0–12.0	...	...	Cb 8×C–1.10
S34800	348	0.08 ^E	2.00	0.045	0.030	1.00	17.0–19.0	9.0–12.0	...	...	(Cb+Ta) 10×C–1.10; Ta (钽) 0.10; Co 0.20
S34809	348H	0.04–0.10	2.00	0.045	0.030	1.00	17.0–19.0	9.0–12.0	...	...	(Cb + Ta) 8×C–1.10; Co 0.20; Ta 0.10
S35315	...	0.04–0.08	2.00	0.040	0.030	1.20–2.00	24.0–26.0	34.0–36.0	0.12–0.18	...	Ce 0.03–0.08
S38815	...	0.030	2.00	0.040	0.020	5.50–6.50	13.0–15.0	15.0–17.0	...	0.75–1.50	Al 0.30; Cu 0.75–1.50
Austenitic-Ferritic Grades (奥氏体-铁素体牌号钢)											
S31803	...	0.030	2.00	0.030	0.020	1.00	21.0–23.0	4.5–6.5	0.08–0.20	2.5–3.5	...
S32101	...	0.040	4.0–6.0	0.040	0.030	1.00	21.0–22.0	1.35–1.70	0.20–0.25	0.10–0.80	Cu 0.10–0.80
S32202	...	0.030	2.00	0.040	0.010	1.00	21.5–24.0	1.00–2.80	0.18–0.26	0.45	...
S32205	...	0.030	2.00	0.030	0.020	1.00	22.0–23.0	4.5–6.5	0.14–0.20	3.0–3.5	...
S32506	...	0.030	1.00	0.040	0.015	0.90	24.0–26.0	5.5–7.2	0.08–0.20	3.0–3.5	W (钨) 0.05–0.30
S32550	...	0.04	1.50	0.040	0.030	1.00	24.0–27.0	4.5–6.5	0.10–0.25	2.9–3.9	Cu 1.50–2.50
S32750	...	0.030	1.20	0.035	0.020	0.80	24.0–26.0	6.0–8.0	0.24–0.32	3.0–5.0	Cu 0.50
S32760	...	0.030	1.00	0.030	0.010	1.00	24.0–26.0	6.0–8.0	0.20–0.30	3.0–4.0	Cu 0.50–1.00; W 0.50–1.00
S32906	...	0.030	0.80–1.50	0.030	0.030	0.50	28.0–30.0	5.8–7.5	0.30–0.40	1.50–2.60	Cu 0.80
S32950	...	0.03	2.00	0.035	0.010	0.60	26.0–29.0	3.5–5.2	0.15–0.35	1.00–2.50	...
S39277	...	0.025	0.80	0.025	0.002	0.80	24.0–26.0	6.5–8.0	0.23–0.33	3.0–4.0	Cu 1.20–2.00 W 0.80–1.20
Ferritic Grades (铁素体牌号钢)											
S40500	405	0.08	1.00	0.040	0.030	1.00	11.5–14.5	0.50	...	...	Al 0.10–0.30
S43000	430	0.12	1.00	0.040	0.030	1.00	16.0–18.0	...	...	...	...
S43035	439	0.07	1.00	0.040	0.030	1.00	17.0–19.0	0.50	0.04	...	Ti 0.20 + 4 × (C+N) –1.10; Al 0.15
S44400	444	0.025	1.00	0.040	0.030	1.00	17.5–19.5	1.00	0.035	1.75–2.50	(Ti+Cb) 0.20 + 4 × (C+N)–0.80
S44627	XM-27	0.010 ^H	0.40	0.020	0.020	0.40	25.0–27.5	0.50	0.015H	0.75–1.50	Cu 0.20; Cb 0.05–0.20; (Ni+Cu) 0.50
S44700	...	0.010	0.30	0.025	0.020	0.20	28.0–30.0	0.15	0.020	3.5–4.2	(C+N) 0.025; Cu 0.15
S44800	...	0.010	0.30	0.025	0.020	0.20	28.0–30.0	2.00–2.50	0.020	3.5–4.2	(C+N) 0.025; Cu 0.15
Martensitic Grades (马氏体牌号钢)											
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	...	...	...	...
S41040	XM-30	0.18	1.00	0.040	0.030	1.00	11.5–13.5	...	...	...	Cb 0.05–0.30
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	0.06–0.12	1.50–2.00	Cu 0.30
S41500	/	0.05	0.50–1.00	0.030	0.030	0.60	11.5–14.0	3.5–5.5	...	0.50–1.00	...
S43100	431	0.20	1.00	0.040	0.030	1.00	15.0–17.0	1.25–2.50	...	...	...

^A New designations established in accordance with Practice E 527 and SAE J 1086 published jointly by ASTM and



SAE. See ASTM DS-56C, available from ASTM Headquarters.

A—新代号建立符合ASTM 和SAE 共同制定的 E 527 和 SAE J 1086。参见ASTM 总部发布的 ASTM DS-56C,

^B Maximum unless otherwise indicated.

B—除非另有规定，否则都是最大的

^C Except as required for specific alloy type, molybdenum, titanium, nickel, cobalt, tantalum, nitrogen, and copper need not be reported but shall not be present in other than residual amounts, the intent being to prohibit substitution of one alloy type for another due to absence of control of the above named elements in certain alloys.

C— 除特定合金钢号油要求外，钼、钛、镍、钴、钽、氮和铜不需要写入报告但不能超过残余量，目的是防止由于在某些合金中的主要元素没有加以控制而造成一种合金代替另一种。

^D American Welding Society designation.

D— 美国焊接协会代号

^E See Supplementary Requirement S1.

E—见补充要求S1

^F Nitrogen content is to be reported for this grade.

F—此牌号需报告氮含量

^G $\% \text{Cr} + 3.3 \times \% \text{Mo} + 16 \times \% \text{N} \geq 40$.

G— $\% \text{Cr} + 3.3 \times \% \text{Mo} + 16 \times \% \text{N} \geq 40$.

^H Product analysis tolerance over the maximum limit for carbon and nitrogen to be 0.002 %.

H—成品分析偏差允许碳和氮超过最大极限值0.002%.

^I Wrought version of CA6NM.

I—锻制型CA6NM

5.3 Methods and practices relating to chemical analysis required by this specification shall be

in accordance with Test Methods, Practices, and Terminology A 751.



5.3 有关本标准的化学分析的方法和操作应和**A 751** 测试方法、操作规范和术语一致。

6. Grain Size for Austenitic Grades

6. 奥氏体钢的晶粒度

6.1 All austenitic grades shall be tested for average grain size by Test Methods **E 112**.

6.1 所有奥氏体钢应按**E 112**测试方法测试平均晶粒度。

6.2 The H grades shall conform to an average grain size as follows:

6.2 H类牌号平均晶粒度应符合如下要求:

6.2.1 ASTM No. 6 or coarser for Types 304H, 309H, 310H, and 316H,

6.2.1 304H, 309H, 310H和316H——ASTM标准的6级或更粗,

6.2.2 ASTM No. 7 or coarser for Types 321H, 347H, and 348H.

6.2.2 321H, 347H和348H——ASTM标准的7级或更粗。

6.3 For S32615, the grain size as determined in accordance with Test Methods **E 112**, comparison method, Plate 11, shall be No. 3 or finer.

6.3 对牌号S32615, 根据试验方法**E 112** 的比较方法, 图片11所测定的晶粒度应为3级或更细。

6.4 Supplementary Requirement S1 shall be invoked when non-H grade austenitic stainless steels are ordered for ASME Code applications for service above 1000°F [540°C].

6.4 非H类牌号的奥氏体不锈钢为ASME规范在1000°F [540°C]温度以上使用的材料而下订单时应调用附加要求S1.

7. Mechanical Properties Requirements

7. 机械性能要求

7.1 The material shall conform to the mechanical property requirements specified in **Table 2** for the grade ordered. At least one room-temperature test shall be performed by the manufacturer on a sample from at least one bar or shape from each lot of material.

7.1 订单要求牌号的材料应符合**表2**所指定的机械性能要求。生产商对每批材料至少从一根棒材或型材取一试样至少进行一次室温试验。

7.2 The yield strength shall be determined by the offset (0.2 %) method as prescribed in Test Methods and Definitions **A 370**.

7.2 屈服强度应根据《试验方法和定义**A 370**》所述的0.2%残余变形法进行测定。

7.3 Martensitic material supplied in the annealed condition shall be capable of meeting the hardened and tempered mechanical properties when heat treated.

7.3 以退火状态提供的马氏体材料应能达到热处理后的硬度及回火状态后的机械性能。

7.4 Hardness measurements, when required, shall be made at a location midway between the surface and the center of the cross section.

7.4 如果要求硬度测量, 则应在横截面的表面和中心之间的中间部位上进行测定。

7.5 Martensitic grades shall be capable of meeting the hardness requirements after heat



treating as specified in Table 3.

TABLE 2 Mechanical Property Requirements
表2 机械性能要求

UNS Designation UNS 代号	Type 钢号	Condition 状态	Tensile Strength, min, ksi [MPa] 抗 拉强度, 最 小, 千磅/英寸 ² [兆帕]	Yield Strength ^A , min, ksi [MPa] 屈服强度, 最 小, 千磅/英寸 ² [兆帕]	Elongation in 2 in. [50 mm] or 4D, min, % (2英 寸[50mm]或 4D) 延伸率	Reduction of Area, min, % ^{B,C} , 断面收缩 率, 最 小, %	Brinell Hardne ss, max 布氏硬 度, 最 大
Austenitic Grades (奥氏体牌号钢)							
N08367	...	annealed 退火	95 [655]	45 [310]	30	...	241
S20161	...	annealed 退火	125 [860]	50 [345]	40	40	311
S20910	XM-19 Up to 2 in. [50.8 mm], incl ≤2英寸[50.8mm] Over 2 to 3 in. [50.8 to 76.2 mm], incl >2-3英寸 (50.8~76.2mm) Over 3 to 8 in. [76.2 to 203.2 mm], incl >3-8英寸 (76.2~203.2mm) Up to 1 1/2 in. [38.1 mm], incl ≤ 1 1/2英寸 [38.1 mm] Over 1 1/2 to 2 1/4 in. [38.1 to 57.2 mm], incl > 1 1/2~2 1/4英寸 [38.1~57.2mm]	annealed 退火	100 [690]	55 [380]	35	55	293
		hot-rolled 热轧	135 [930]	105 [725]	20	50	...
		hot-rolled 热轧	115 [795]	75 [515]	25	50	...
		hot-rolled 热轧	100 [690]	60 [415]	30	50	...
		strain-hardened 应变-硬化	145 [1000]	125 [860]	12	40	...
		strain-hardened 应变-硬化	120 [825]	105 [725]	15	45	...
S21600, S21603	XM-17, XM-18	annealed 退火	90 [620]	50 [345]	40	50	212
S21800	...	annealed 退火	95 [655]	50 [345]	35	55	241
S21904	XM-11	annealed 退火	90 [620]	50 [345]	45	60	...
S24000	XM-29	annealed 退火	100 [690]	55 [380]	30	50	...
S30200, S30400, S30409, S30453, S30880, S30908, S30909, S30940, S31008, S31009, S31040, S31600, S31609, S31635, S31640, S31653, S31700, S32100, S32109, S34700, S34709, S34800, S34809, S30403, S31603	302, 304, 304H, 304LN, ER308 ^D , 309S, 309H, 309Cb, 310S, 310H, 310Cb, 316, 316H, 316Ti, 316Cb, 316LN, 317, 321, 321H, 347, 347H, 348, 348H	annealed 退火	75 [515] ^E	30 [205]	30	40	...
S30403, S31603 S30451, S31651 S30600 S30815 S31254 S31725 S31726 S31727 S32050	316, 316L, 304, 304L 2 in. and under ≤2英寸 Over 2 to 2 1/2 in. [50.8 to 63.5 mm], incl. >2-2 1/2英寸[50.8~63.5 mm] Over 2 1/2 to 3 in. [63.5 to 76.2 mm], incl >2 1/2-3英寸[63.5~76.2 mm]	strain-hardened level 1 应变-硬化, 1 级	85 [585]	65 [450] ^F	30	60	...
		strain-hardened level 2 应变-硬化, 2 级	95 [655]	75 [515]	25	40	...
		strain-hardened level 2 应变-硬化, 2 级	90 [620]	65 [450]	30	40	...
		strain-hardened level 2 应变-硬化, 2 级	80 [550]	55 [380]	30	40	...
		annealed 退火	70 [485]	25 [170]	30	40	...
S30403, S31603	304L, 316L	annealed 退火	80 [550]	35 [240]	30	40	...
S30600	...	annealed 退火	78 [540]	35 [240]	40	...	...
S30815	...	annealed 退火	87 [600]	45 [310]	40	50	...
S31254	...	annealed 退火	95 [655]	44 [305]	35	50	...
S31725	...	annealed 退火	75 [515]	30 [205]	40	...	...
S31726	...	annealed 退火	80 [550]	35 [240]	40	...	...
S31727	...	annealed 退火	80 [550]	36 [245]	35	...	217
S32050	...	annealed 退火	98 [675]	48 [330]	40	...	...



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UNS Designation UNS 代号	Type 钢号	Condition 状态	Tensile Strength, min, ksi [MPa] 抗 拉强度, 最 小, 千磅/英寸 ² [兆帕]	Yield Strength,min, ksi [MPa] 屈服强度, 最 小, 千磅/英寸 ² [兆帕]	Elongation in 2 in. [50 mm] or 4D, min, % (2英 寸[50mm]或 4D) 延伸率	Reduction of Area, min, % ^{B,C} , 断面收缩 率, 最 小, %	Brinell Hardne ss, max 布氏硬 度, 最 大
S32053	...	annealed 退火	93 [640]	43 [295]	40	...	217
S32615	...	annealed 退火	80 [550]	32 [220]	25	40	...
S32654	...	annealed 退火	109 [750]	62 [430]	40	40	250
S33228	...	annealed 退火	73 [500]	27 [185]	30	...	...
S34565	...	annealed 退火	115 [795]	60 [415]	35	40	230
S35315	...	annealed 退火	94 [650]	39 [270]	40	...	...
S38815	...	annealed 退火	78 [540]	37 [255]	30	...	...
Austenitic-Ferritic Grades							
S31803	...	annealed 退火	90 [620]	65 [450]	25	...	290
S32101	...	annealed 退火	94 [650]	65 [450]	30	...	290
S32202	...	annealed 退火	94 [650]	65 [450]	30	...	290
S32205	...	annealed 退火	95 [655]	65 [450]	25	...	290
S32506	...	annealed 退火	90 [620]	65 [450]	18	...	302
S32550	...	annealed 退火	110 [760]	80 [550]	15	...	297
S32750	2 in. and under over 2 in. 英寸	≤2 annealed 退火	116 [800] ^G	80 [550] ^G	15	...	310
		annealed 退火	110 [760]	75 [515]	15	...	310
S32760	...	annealed 退火	109 [750]	80 [550]	25	...	300
S32906	...	annealed 退火	109 [750]	80 [550]	25	...	310
S32950	...	annealed 退火	100 [690]	70 [485]	15	...	297
S39277	...	annealed 退火	118 [820]	85 [585]	25	50	293
Ferritic Grades							
S40500	405	annealed 退火	60 [415]	25 [170]	20	45	207
S43000, S43035	430, 439	annealed 退火	70 [485]	40 [275]	20 ^H	45 ^H	192
S44627	XM-27	annealed 退火	65 [450]	40 [275]		45 ^H	217
S44401	...	annealed 退火	60 [415]	45 [310]	20 ^I	45 ^I	217
S44700	...	annealed 退火	70 [485]	55 [380]	20	40	...
S44800	...	annealed 退火	70 [485]	55 [380]	20	40	...
Martensitic Grades							
S40300, S41000	403, 410	annealed 退火	70 [485]	40 [275]	20 ^I	45 ^I	223
		1	70 [485]	40 [275]	20 ^I	45 ^I	223
		2	110 [760]	85 [585]	15	45	269
		3	130 [895]	100 [690]	12	35	331
S41400	414	tempered 回火	115 [795]	90 [620]	15	45	321
S41425	...	tempered 回火	120 [825]	95 [655]	15	45	321
S41500	...	normalized and tempered 正火加回火	115 [795]	90 [620]	15	45	293
S43100	431 ^J	annealed 退火	...	...	...	...	277
		tempered 回火	115 [795]	90 [620]	15	45	321
S41040	XM-30	annealed 退火	70 [485]	40 [275]	13 ^H	45 ^H	235
		quenched and tempered 淬火加回火	125 [860]	100 [690]	13	45	302

A See Section 7.

A—见第7节

B Reduction of area does not apply on flat bars 3/16 in. [4.80 mm] and under in thickness, as this determination is not generally made in this product size.

B—断面收缩率不适用于对厚度≤3/16[4.80 mm]的扁钢，一般不对这种规格的产品规定此项定义。



C The material shall be capable of meeting the required reduction of area where listed, but actual measurement and reporting of the reduction of area are not required unless specified in the purchase order.

C—钢材应能达到所列要求的断面收缩率，但实际测量和断面收缩率报告是不作要求，除非订单上有要求。

D American Welding Society designation.

D—美国焊接协会代号

E Tensile strength 70 ksi [485 MPa] min permitted for extruded shapes.

E—对于挤压型材允许抗拉强度为70 ksi [485 MPa].

F For bars greater than 2 in. [51 mm], a cross section, 60 ksi [415 MPa] min, shall be permitted.

F—对于横截面大于2英寸[51 mm]的棒材，允许最小最低为60 ksi [415 MPa].

G For sections over 2 in. [50 mm] in thickness, the minimum tensile strength shall be 106 ksi [730 MPa]; the minimum yield strength shall be 75 ksi [515 MPa].

G—对于厚度超过2英寸[50mm]的截面，最小抗拉强度应为106 ksi [730 MPa]；最小屈服强度为75 ksi [515 MPa].

H Elongation in 2 in. or 50 mm of 12 % min and reduction of area of 35 % min permitted for cold-finished bars.

H 对于冷加工棒材，允许最小延伸率（2英寸[50mm]标距）为12%和最小断面收缩率为35%.

I Elongation in 2 in. of 12 % min and reduction of area of 35 % min permitted for cold-drawn or cold-rolled bars.

I 对于冷拔或冷轧棒材，允许最小延伸率（2英寸标距）为12%和最小断面收缩率为35%.

J Annealed bars shall be capable of meeting the tempered condition requirements when heat treated.

J 经退火的棒材应能达到热处理要求的回火状态.



7.5 马氏体的牌号应能达到表3所示的热处理后的硬度要求。

TABLE 3 Response To Heat Treatment			
表 3 热处理感受性			
Type ^A 钢号	Heat Treatment Temperature ^B °F (°C), min 热处理温度°F (°C),最小	Quenchant 淬火	Hardness HRC, min 硬度, HRC, 最小
403	1750 [955]	Air 空气	35
410	1750 [955]	Air 空气	35
414	1750 [955]	Oil 油	42

8. Corrosion Testing

8. 腐蚀试验

8.1 Austenitic stainless steels solution annealed by the alternative method shall be tested and pass the intergranular corrosion test requirements described in S2.

8.1 可选择的方法进行固溶退火的奥氏体不锈钢应试验并通过S2所述的晶粒腐蚀试验要求。

9. Certification

9. 合格证书

9.1 The material manufacturer's certificate of compliance certifying that the material was manufactured and tested in accordance with this specification, together with a report of the results required by this specification and the purchase order, shall be furnished at the time of shipment. The certification shall be positively relatable to the lot of material represented.

9.1 材料生产商的材料合格证明的证书应与本标准的生产和测试一致，以及本标准和订单要求进行的结果报告应在出货时一起提供。合格证书应与相关的材料批次绝对符合。

10. Product Marking

10. 产品标记

10.1 In addition to the marking requirements of Specification A 484/A 484M, materials that have been heat treated or have been strain hardened shall be identified by placement of the following symbols after the grade designation:

10.1 除标准A 484/A 484M 的标记要求外，已进过热处理或应变硬化的材料应在牌号名称后放置如下符号作为标记：

10.1.1 Austenitic Grades:

10.1.1 奥氏体钢：

10.1.1.1 All grades in the annealed condition—A,

10.1.1.1 所有退火状态的牌号——A

10.1.1.2 Strain hardened Type 316, Level 1—S1,

10.1.1.2 牌号316的应变硬化，1级——S1

10.1.1.3 Strain hardened Type 316, Level 2—S2,



10.1.1.3 牌号316的应变硬化，2级——S2

10.1.4 马氏体牌号钢：

10.1.1.4 Hot-rolled Type XM-19—H,

10.1.4.1 All grades in the annealed condition—A.

10.1.1.4 牌号XM-19的热轧——H

10.1.4.1 所有退火状态的牌号——A

10.1.1.5 Strain hardened Type XM-19—S,

10.1.4.2 Types 403 and 410—COND 1, COND 2, or COND 3 as appropriate for the tempering temperature employed.

10.1.1.5 牌号XM-19的应变硬化——H

10.1.4.2 牌号403和410——COND 1, COND 2, 或 COND 3，按适用于所用回火温度而定。

10.1.1.6 Material meeting Supplementary Requirement S1—ELT (unnecessary for H grades).

10.1.1.6 材料达到附加要求S1——ELT(对于H类牌号是多余的)

10.1.4.3 Type 414, S41500, and Type XM-30 tempered materials—T.

10.1.1.7 In addition to all other marking requirements of this specification, when S1 is invoked, all grades in the direct quenched condition shall be marked “D”.

10.1.4.3 牌号414，S41500和XM-30回火材料——T

10.1.1.7 除本标准所有其它标记要求外，若调用S1，所有直接淬火状态的牌号应标记“D”。

11. Keywords

11. 关键字

10.1.2 *Austenitic-Ferritic Grades*—All grades in the annealed condition—A.

11.1 austenitic stainless steel; austenitic-ferritic duplex stainless steel; ferritic stainless steel; martensitic stainless steel; pressure-containing parts; pressure vessel service; stainless steel bars; stainless steel shapes; temperature service applications—high

10.1.2 奥氏体-铁素体牌号钢——所有退火状态的牌号——A

10.1.3 *Ferritic Grades*—All grades in the annealed condition—A.

11.1 奥氏体不锈钢；奥氏体-铁素体双相不锈钢；铁素体不锈钢；马氏体不锈钢；压力容器部件；压力容器设施；不锈钢棒材；不锈钢型材；适用于高温下使用

10.1.3 铁素体牌号——所有退火状态的牌号——A

10.1.4 *Martensitic Grades*:

SUPPLEMENTARY REQUIREMENTS

补充要求



The following may be made requirements when the purchaser specifies them to be applicable.

当需方规定使用时，可制定如下要求：

S1. Materials for High-Temperature Service

S1. 高温下使用的材料

S1.1 Unless an H grade has been ordered, this supplementary requirement shall be specified for ASME Code applications for service above 1000°F [540°C].

S1.1 除非已订购H类牌号，此补充要求是为ASME规范在1000°F [540°C]温度以上使用的材料而定。

S1.2 The user is permitted to use an austenitic stainless steel as the corresponding H grade when the material meets all requirements of the H grade including chemistry, annealing temperature, and grain size (see Section 6).

S1.2 当材料达到H类牌号钢的所有要求，包括化学成分、退火状态和晶粒度（见第6节），允许使用奥氏体不锈钢对应的H类牌号。

S1.3 The user is permitted to use an L grade austenitic stainless steel for service above 1000°F [540°C], subject to the applicable allowable stress table of the ASME Code, when the material meets all requirements of this specification and the grain size is ASTM No. 7 or coarser as determined in accordance with Test Methods E 112. The grain size shall be reported on a Certified Test Report.

S1.3 允许在1000°F [540°C]温度以上使用L类牌号钢，使之适用于ASME规范的允许应力表，当材料达到本标准的所有要求并与ASTM E 112所规定的晶粒度等级为7级或更粗。晶粒度需在合格测试报

告中体现。

S2. Corrosion Tests

S2. 腐蚀试验

S2.1 Intergranular corrosion tests shall be performed by the manufacturer on sensitized specimens of Types 304L, 316L, 321, 347, and 348, and for the other austenitic grades, on specimens representative of the as-shipped condition. All austenitic stainless steels shall be capable of passing intergranular corrosion tests in the as-shipped condition. Tests shall be performed in accordance with Practice E of Practices A 262.

S2.1 对于牌号304L, 316L, 321, 347和348钢，生产商应用敏化试样进行晶粒间腐蚀试验，而对其它奥氏体牌号，应用代表出货状态的试样进行试验。所有奥氏体不锈钢都应能在发货状态下通过晶粒间腐蚀试验。试验应按照A 262 标准的操作方法E进行。

S3. Product Analysis

S3. 成品分析

S3.1 An analysis shall be made by the manufacturer on a sample from one bar in each lot as defined in Specification A 484/A 484M. The analysis shall meet the requirements of Table 1. In the event of failure, the lot represented shall be rejected except that, at the option of the manufacturer, each bar in the lot may be tested for acceptance. Product analysis tolerance provisions do not apply.

S3.1 生产商应按A 484/A 484M 标准所述的从每批的一根条钢上取一个试样进行一次分析。分析结果应符合表1的要求。万一不合格，其代表的批次应拒收，除按生产厂的意见，对该批钢材可逐根进行验收试验。成品分析偏差规定不适用。

**S4. Material for High Cycle Fatigue Service****S4. 高频率疲劳使用的材料**

S4.1 The mechanical properties of bars furnished in lengths under 20 ft [6 m] shall be determined by testing one end of each bar. Bars furnished in lengths of 20 ft [6 m] and over shall be tested at each end.

S4.1 对于供货长度<20英尺[6 m]的棒材的机械性能应通过每根棒材的一端进行测试来确定。对供货长度≥20英尺[6 m]的棒材应在其每一端进行试验。

S5. Material for Optimum Resistance to Stress Corrosion Cracking**S5. 具有最佳耐应力腐蚀裂纹的材料**

S5.1 This supplementary requirement is to be referenced when austenitic stainless steels are to be purchased with solution-annealing as the final operation and with no subsequent cold drawing permitted. Straightening is permitted as a final operation to meet the straightness requirements of Specification A 484/A 484M unless specifically prohibited by the purchaser.

S5.1 当订购以固溶退火作为最后工序并且不允许进行冷拔的奥氏体不锈钢, 则应引用此补充要求。允许校正作为最后工序来达到标准A 484/A 484M的笔直性要求, 除非需方指定禁止使用。

APPENDIX**附录****(Non-mandatory Information)****非强制性资料****X1. RATIONALE REGARDING DEFINITION OF SOLUTION ANNEALING****X1. 固溶退火基本原理的相关阐述**

X1.1 It is generally recognized that austenitic stainless steels are solution annealed by heating to a temperature that dissolves (takes into solution) chromium carbides and quenching rapidly so that the chromium carbides will not participate in the grain boundaries, which could cause susceptibility to intergranular corrosion in a critically corrosive environment. Thus, solution annealing also can be accomplished for nonstabilized grades by taking advantage of hot rolling temperatures (which always exceed solution annealing temperature requirements), maintaining hot rolling finishing temperatures well above minimum solution annealing requirements, and immediately quenching integral with hot rolling. Stabilized grades

(with columbium or titanium added) cannot be handled this way, since they would become destabilized due to columbium or titanium carbide solution, without subsequent reheating.

X1.1 普遍认为奥氏体不锈钢的固溶退火是通过加热到能溶解(变成固溶体)铬碳化物的温度并快速淬火, 使之在临界腐蚀环境下可能对晶间腐蚀产生敏化的铬碳化物在晶界上不析出。因此, 固溶退火能通过有利的热轧温度(此温度经常超过固溶退火的温度要求)对不稳定牌号钢来进行, 保持热轧完成温度充分地高于最低固溶退火要求的温度, 并在热轧的同时立即淬火。稳定牌号(加铌或钛)不能用这个方法, 因为这些牌号随后不进行再加热就会由于铌或钛碳化物溶解而变得不稳定。

X1.2 For Boiler Code applications involving temperatures at which optimum resistance to



creep is desired, the larger grain size of material solution annealed by reheating is generally desired. For that reason, a minimum grain size has been required of the H grades (created for optimum elevated temperature properties), and a mandatory grain size test and report has been added for the non-H grades so that the information is available for those desiring to reclassify a non-H grade to H grade.

X1.2 对于锅炉应用中包括的温度要求具有最佳抗蠕变性能，一般要求经过再加热的材料进行固溶退火有最大晶粒度。基于这个原因，H类牌号钢（设立最佳高温特性）要求一个最低的晶粒度，并且对非H类牌号钢增加一个强制性晶粒度试验和报告，从而使那些需要者利用这些信息将非H类牌号重新分类为H类牌号。

X1.3 To satisfy the concerns of inadvertent assignment of fine grained material to

elevated temperature applications, special marking has been added for material that meets the requirements of Supplementary Requirement S1.

X1.3 为避免担心由于疏忽而将细晶粒材料分配给高温用途，对符合补充要求S1的要求的材料增加特殊标记。

X1.4 A mandatory test for susceptibility to intergranular corrosion has been added for material solution annealed by the alternative method so that a history of data can be accumulated, as has been done in the past for material solution annealed by reheating.

X1.4 通过可选择方法进行固溶退火的材料增加了一个强制性的晶间腐蚀敏感度试验，从而使数据变化情况积累，就像过去已对再加热进行固溶退火的材料所作试验。

SUMMARY OF CHANGES

修改摘要

Committee A01 has identified the location of selected changes to this standard since the last issue (A 479/A 479M – 06a) that may impact the use of this standard. (Approved October 1, 2008.)

因为上一版出版（A 479/A 479M-06a）可能影响本标准的使用（2008-10-1批准出版的），A01委员会已经决定本标准的修改部分：

(1) 在表1和表2中增加新牌号S3220

(1) New grade S32202 added to **Table 1** and **Table 2**.