



# Standard Specification for Wrought Stainless Steels for Surgical Instruments<sup>1</sup>

This standard is under development under designation F899; it is based on the data reported in the original standard specification for wrought stainless steels for surgical instruments, designated F899-82a, and is intended to be published as a revision of that standard. It is the responsibility of the user to verify that the appropriate edition and revision of this standard is being used.

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

## 1. Scope\*

1.1 This specification covers wrought stainless steels for surgical instruments. The data are given in **Table 1-4**. The chemical composition and mechanical properties are given in **Table 1-4**. The mechanical properties are given in **Table 1-4**. The mechanical properties are given in **Table 1-4**.

1.2 This specification covers wrought stainless steels for surgical instruments. The data are given in **Table 1-4**. The chemical composition and mechanical properties are given in **Table 1-4**.

## 2. Referenced Documents

- 2.1 *ASTM Standards:*<sup>2</sup>
- A276 *Standard Specification for Stainless Steel Bars and Shapes*
  - A313/A313M *Standard Specification for Stainless Steel Wire*
  - A314 *Standard Specification for Stainless Steel Bars and Shapes*
  - A480/A480M *Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip*
  - A484/A484M *Standard Specification for General Requirements for Stainless Steel Bars, Pipes, and Fittings*
  - A555/A555M 2.3A *Standard Specification for Quality (ASQ) Standard*

ASQ CI Standard General Requirements for Quality

## 3. Classification and Type

- 3.1 *Classes*—Standard Specification for Wrought Stainless Steels for Surgical Instruments is divided into four classes:
- 3.1.1 *Class 3*—Austenitic Stainless Steel
  - 3.1.2 *Class 4*—Martensitic Stainless Steel
  - 3.1.3 *Class 5*—Precipitation Hardening Stainless Steel
  - 3.1.4 *Class 6*—Ferritic Stainless Steel
- 3.2 *Type*—

## 5. Manufacture

5.1 *Condition*—Samples shall be prepared in accordance with the procedures described in ASTM A 440, A 440A, A 440B, and A 440C. The test pieces shall be prepared in accordance with the procedures described in ASTM A 440, A 440A, A 440B, and A 440C. The test pieces shall be prepared in accordance with the procedures described in ASTM A 440, A 440A, A 440B, and A 440C.

5.2 *Conditioning*—Batches of material shall be conditioned in accordance with the procedures described in ASTM A 440, A 440A, A 440B, and A 440C.

5.3 *Finish*—The surface finish of the test pieces shall be as described in ASTM A 440, A 440A, A 440B, and A 440C.

## 6. General Requirements for Delivery

6.1 In addition to the requirements specified in the preceding sections, the material shall conform to the requirements specified in ASTM A 276, A 313/A 313M, A 314, A 480/A 480M, A 484/A 484M, A 555/A 555M, A 564/A 564M, A 582/A 582M, and A 751, as applicable to the applicable chemical composition.

6.2 The test pieces shall be prepared in accordance with the procedures described in ASTM A 440, A 440A, A 440B, and A 440C.

## 7. Chemical Requirements

7.1 The chemical composition of the material shall conform to the requirements specified in Table 5-8.

7.2 TheUNS designation (UNS) shall be as specified in Table 5-8.

7.3 The test pieces shall be prepared in accordance with the procedures described in ASTM A 440, A 440A, A 440B, A 440C, and A 430F.

7.4 The material shall be prepared in accordance with the procedures described in ASTM A 751.

## 8. Mechanical Requirements

8.1 The material shall conform to the requirements specified in ASTM A 440, A 440A, A 440B, and A 440C.

8.2 The yield strength (R<sub>e</sub>), tensile strength (R<sub>m</sub>), and elongation (A<sub>5</sub>) shall be as specified in Table 1.

## 9. Heat Treatment

9.1 The material shall be prepared in accordance with the procedures described in ASTM A 440, A 440A, A 440B, and A 440C.

9.2 The test pieces shall be prepared in accordance with the procedures described in ASTM A 440, A 440A, A 440B, and A 440C.

9.3 The heat treatment shall be in accordance with the procedures described in ASTM A 564/A 564M.

9.4 The surface finish of the test pieces shall be as described in ASTM A 440, A 440A, A 440B, and A 440C.

## 10. Special Information

10.1 The material shall conform to the requirements specified in Table 3 and Table 4.

NOTE 1: Refer to the applicable sections of the standard for details.



**TABLE 3 Examples of Selected Stainless Steels That Have Been Used for Surgical Instruments in Accordance with ISO 7153/1**

•	Cl <sub>2</sub> Dr t <sub>o</sub> r	N <sub>2</sub> -Cl <sub>2</sub> Dr t <sub>o</sub> r
303	Cr, Ni, Mn, N, Cu, S, P	Ar
304	Cr, Ni, N, S, P	Ar
410	Cr, Ni, Mn, N, Cu, S, P	Ar
420A	B, Cr, Ni, Mn, N, Cu, S, P	Ar, PA
420B	Cr, Ni, Mn, N, Cu, S, P	Ar, PA
420C	Cr, Ni, Mn, N, Cu, S, P	Ar, PA
420 M <sup>a</sup>	Cr, Ni, Mn, N, Cu, S, P	Ar, PA, PA

**TABLE 4 Examples of Selected Stainless Steels That Have Been Used For Surgical Instruments in the United States**

•	Cl <sub>2</sub> Dr t <sub>o</sub> r	N <sub>2</sub> -Cl <sub>2</sub> Dr t <sub>o</sub> r
302	Cr, Ni, Mn, N, Cu, S, P	Ar
303 <sup>A</sup>	Cr, Ni, Mn, N, Cu, S, P	Ar
304	Cr, Ni, N, S, P	Ar
316	Cr, Ni, Mo, N, S, P	Ar
410	Cr, Ni, Mn, N, Cu, S, P	Ar
410	Cr, Ni, Mn, N, Cu, S, P	Ar
416 <sup>A</sup>	Cr, Ni, Mn, N, Cu, S, P	Ar
420 <sup>B</sup>	Cr, Ni, Mn, N, Cu, S, P	Ar
420F <sup>A</sup>	Cr, Ni, Mn, N, Cu, S, P	Ar
431	Cr, Ni, Mn, N, Cu, S, P	Ar
440 <sup>C</sup>	Cr, Ni, Mn, N, Cu, S, P	Ar
420 M <sup>a</sup>	Cr, Ni, Mn, N, Cu, S, P	Ar
630	Cr, Ni, Mn, N, Cu, S, P	Ar
M-16	Cr, Ni, Mn, N, Cu, S, P	Ar
M-13	Cr, Ni, Mn, N, Cu, S, P	Ar
11100	Cr, Ni, Mn, N, Cu, S, P	Ar
16500	Cr, Ni, Mn, N, Cu, S, P	Ar

<sup>A</sup> For 303, 303<sup>A</sup>, 304, 316, 410, 410, 416<sup>A</sup>, 420<sup>B</sup>, 420F<sup>A</sup>, 431, 440<sup>C</sup>, and 420 M<sup>a</sup>, the steel is not austenitized and cooled in air.

<sup>B</sup> For 420A, 420B, 420C, and 420M, the steel is austenitized and cooled in air.

<sup>C</sup> For 440A, 440B, and 440C, the steel is austenitized and cooled in air.

11.2 Terms and Definitions: See ASTM F899, 11.2.2.

**12. Keywords**

12.1 austenitic stainless steel; ferritic stainless steel; martensitic stainless steel; stainless steel; surgical instruments.

TABLE 5 Composition of Class 3, Austenitic Stainless Steels, %

N	•	C	Mn	P	S	Cr	Ni	Cu	Nb	Other
301	301	0.15	2.00	0.045	0.030	1.00	16.00 18.00	6.00 8.00		
30151		0.07 0.09	1.50 2.00	0.025	0.010	1.20 1.80	16.0 18.0	7.0 9.0		Ct 0.40 M 0.50 N 0.07 0.11
30200	302	0.15	2.00	0.045	0.030	1.00	17.00 19.00	8.00 10.00		N 0.10
30300	303	0.12 <sup>B</sup>	2.00	0.06 <sup>B</sup>	0.15 0.35 <sup>B</sup>	1.00	17.00 19.00	8.00 10.00		M 0.70
30400	304	0.07 <sup>B</sup>	2.00	0.045	0.030	1.00	17.00 19.00 <sup>B</sup>	8.00 11.00 <sup>B</sup>		N 0.10
31600	316	0.07 <sup>B</sup>	2.00	0.045	0.030	1.00	16.50 18.50 <sup>B</sup>	10.50 13.50 <sup>B</sup>		M 2.00 2.50 <sup>B</sup> N 0.10
31700	317	0.08	2.00	0.045	0.030	1.00	18.00 20.00	11.00 15.00		M 3.00 4.00 N 0.10
30430	M-7	0.1	2.00	0.045	0.030	1.00	17.00 19.00	8.00 10.00		Ct 3.00 4.00





SUMMARY OF CHANGES

Change F04, added, designating a standard, (F899 12a)  
 was added, designating a standard. (Approved Dec. 1, 2012.)

(1) Add UNS 18235, **Tab 6**.

Change F04, added, designating a standard, (F899 12)  
 was added, designating a standard. (Approved Nov. 1, 2012.)

(1) Add T 1.4310, **Tab 5**.

(2) Add F, A, **Tab 5**, designating a carbide  
 designating a standard, designating a standard,  
 designating a standard.

Change F04, added, designating a standard, (F899 11)  
 was added, designating a standard. (Approved Jan. 1, 2012.)

(1) Add UNS S42027, **Tab 1, Tab 2, and Tab 7**. (3) **Revised Tab X1.1 and X1.10.2**.  
 (2) Add **ca X1.10.3**.

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