



Designation: F880M – 16

# Standard Specification for Stainless Steel Socket Set Screws (Metric)<sup>1</sup>

This standard is issued under the fixed designation F880M; 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 reapproval. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

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

## 1. Scope\*

1.1 This specification covers the requirements for austenitic grade stainless steel socket set screws (SSS), sizes M1.6 through M24, having Property Classes A1-50 and A1-70.

1.2 *Units*—The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

NOTE 1—This specification is the metric companion of Specification F880.

1.3 The following hazard caveat pertains only to Section 11, the Test Method Section: *This standard does not purport to address the safety problems associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

## 2. Referenced Documents

### 2.1 ASTM Standards:<sup>2</sup>

- A262 Practices for Detecting Susceptibility to Intergranular Attack in Austenitic Stainless Steels
- A342/A342M Test Methods for Permeability of Weakly Magnetic Materials
- A380/A380M Practice for Cleaning, Descaling, and Passivation of Stainless Steel Parts, Equipment, and Systems
- A555/A555M Specification for General Requirements for Stainless Steel Wire and Wire Rods
- A751 Test Methods, Practices, and Terminology for Chemical Analysis of Steel Products
- A967/A967M Specification for Chemical Passivation Treatments for Stainless Steel Parts
- D3951 Practice for Commercial Packaging
- E3 Guide for Preparation of Metallographic Specimens

<sup>1</sup> This specification is under the jurisdiction of ASTM Committee F16 on Fasteners and is the direct responsibility of Subcommittee F16.04 on Nonferrous Fasteners.

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<sup>2</sup> For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

- E18 Test Methods for Rockwell Hardness of Metallic Materials
- E92 Test Methods for Vickers Hardness and Knoop Hardness of Metallic Materials
- E384 Test Method for Microindentation Hardness of Materials
- F738M Specification for Stainless Steel Metric Bolts, Screws, and Studs (Withdrawn 2014)<sup>3</sup>
- F788 Specification for Surface Discontinuities of Bolts, Screws, and Studs, Inch and Metric Series
- F880 Specification for Stainless Steel Socket, Square Head, and Slotted Headless-Set Screws
- F1470 Practice for Fastener Sampling for Specified Mechanical Properties and Performance Inspection

### 2.2 ISO Standards:<sup>4</sup>

- ISO 4026 Hexagon socket set screws with flat point
- ISO 4027 Hexagon socket set screws with cone point
- ISO 4028 Hexagon socket set screws with dog point
- ISO 4029 Hexagon socket set screws with cup point

## 3. Classification

3.1 The designation of the property class for the two materials and conditions of this specification shall be consistent with the stainless steel designations in Specification F738M.

3.2 The austenitic stainless steel socket set screw shall be designation F880MA1–50 or F880M A1–70.

## 4. Ordering Information

4.1 Orders for material under this specification shall include the following information:

- 4.1.1 Quantity (number of screws);
- 4.1.2 Dimensions, including nominal thread designation, thread pitch, nominal screw length (millimetres) and point configuration. A standard part number may be used for this definition;
- 4.1.3 Name of the screw (SSS);
- 4.1.4 Property Class A1-50 or A1-70;

<sup>3</sup> The last approved version of this historical standard is referenced on www.astm.org.

<sup>4</sup> Available from International Organization for Standardization (ISO), ISO Central Secretariat, BIBC II, Chemin de Blandonnet 8, CP 401, 1214 Vernier, Geneva, Switzerland, http://www.iso.org.

\*A Summary of Changes section appears at the end of this standard

4.1.5 Coating, if required. If a finish other than passivation is required, it must be specified on the order or product standard;

4.1.6 ASTM designation and year of issue; and

4.1.7 Any special or supplemental requirements.

4.2 *Example*—50 000 pieces M6 × 1 × 8 cone point SSS A1-70 ASTM F880M – XX.

## 5. Materials and Manufacture

5.1 The screw may be forged, formed, extruded, machined, or ground to meet the dimensional characteristics and performance requirements.

5.2 *Heat Treatment*—Austenitic alloy Class A1-50 screws shall be annealed by heating to 1040 ± 30°C to obtain maximum corrosion resistance and minimum permeability. The screws shall be held for a sufficient time at temperature, then cooled at a rate sufficient to prevent precipitation of the carbide and provide the properties in accordance with [Table 1](#).

5.3 When Condition A1-70 is specified, the austenitic alloys shall be annealed as specified in [5.2](#), generally by the raw material manufacturer, then cold worked to develop specific properties.

## 6. Chemical Composition

6.1 The analysis of the screw material shall conform to the chemical composition specified in [Table 2](#).

6.2 Unless otherwise specified in the inquiry and purchase order (see Supplementary Requirement S2), the choice of alloy used shall be that of the fastener manufacturer, as determined by his fabrication methods and material availability. The specific alloy used by the manufacturer shall be clearly identified on all certification required in the purchase order and shall have a chemical composition conforming to the limits specified in [Table 2](#).

6.3 When chemical analysis is performed by the purchaser using finished fasteners representing each lot, the chemical contents obtained shall conform to the limits specified in [Table 2](#) for the specific alloy. Chemical composition shall conform to the tolerances specified in Specification [A555/A555M](#).

6.3.1 In the event of a discrepancy, a referee analysis of the samples for each lot as specified in [12.1](#), shall be made in accordance with [11.3.1](#).

## 7. Mechanical Properties

7.1 Socket set screws, when subjected to a torque test in accordance with [12.2.1](#), shall withstand application of the test tightening torque specified in [Table 2](#) without evidence of the socket reaming or the screw bursting.

7.2 The hardness of 95 HRB (210 Vickers) maximum for condition A1-50 and 80 HRB (150 Vickers) minimum for condition A1-70 shall be met as determined using Test Methods [E18](#), [E92](#), or Test Method [E384](#) as appropriate.

## 8. Corrosion Resistance Requirements

### 8.1 Carbide Precipitation:

8.1.1 Rod, bar, and wire in the austenitic alloys groups 1, 2, 3, except the free-machining grades, 303 and 303Se, shall be made fasteners in accordance with this specification used to make fasteners in accordance with this specification shall be capable of passing the test for susceptibility to intergranular corrosion as specified in Practice E of Practices [A262](#).

8.1.2 As stated in Practices [A262](#), samples may be subjected to the faster and more severe screening test in accordance with Practice A. Failing Practice A, specimens shall be tested to Practice E and be considered satisfactory if passing Practice E.

## 9. Dimensions

9.1 Unless otherwise specified, the product shall conform to the requirements of ISO 4026, ISO 4027, ISO 4028 and ISO 4029.

## 10. Workmanship, Finish, and Appearance

10.1 *Surface Treatment*—Unless otherwise specified, screws shall be cleaned, descaled, and passivated in accordance with Practice [A380/A380M](#) or Specification [A967/A967M](#) at the option of the manufacturer.

### 10.2 Surface Discontinuities:

10.2.1 The surface discontinuities for these products shall conform to Specification [F788](#) and the additional limitations specified herein.

**TABLE 1 Torsional Strength Requirements**

Nominal Screw Size	Shortest Nominal Screw Lengths Subject to Torque Testing for:			Test Torque, N-m, min	
	Cup and Flat Points, mm	Cone and Oval Points, mm	Half Dog Points, mm	A1-50	A1-70
1.6	3	3	3	0.03	0.05
2	4	4	4	0.06	0.1
2.5	4	4	4	0.18	0.3
3	4	5	5	0.25	0.42
4	5	6	6	0.8	1.4
5	5	8	8	1.7	2.8
6	6	8	8	3	5
8	8	10	10	7	12
10	10	12	12	14	24
12	12	16	16	25	42
16	16	20	20	63	105
20	25	25	25	126	210
24	25	30	30	200	332