Designation: F 961 – 96

Standard Specification for Cobalt-35 Nickel-20 Chromium-10 Molybdenum Alloy Forgings for Surgical Implants (UNS R30035)[1]

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1. Scope

1.1 This specification covers the requirements for cobalt-35 nickel-20 chromium-10 molybdenum alloy forgings for surgical implants.

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

2. Referenced Documents

2.1 *ASTM Standards:*

A 751 Test Methods, Practices, and Terminology for Chemical Analysis of Steel Products[2]

E 8 Test Methods for Tension Testing of Metallic Materials[3]

E 10 Test Method for Brinell Hardness of Metallic Materials[3]

E 18 Test Methods for Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials[3]

E 112 Test Methods for Determining the Average Grain Size[3]

E 140 Hardness Conversion Tables for Metals[3]

E 165 Practice for Liquid Penetrant Examination[4]

F 562 Specification for Wrought Cobalt-35 Nickel-20 Chromium-10 Molybdenum Alloy for Surgical Implant Applications[5]

F 601 Practice for Fluorescent Penetrant Inspection of Metallic Surgical Implants[5]

F 688 Specification for Wrought Cobalt-35 Nickel-20 Chromium-10 Molybdenum Alloy Plate, Sheet, and Foil for Surgical Implants[5]

F 981 Practice for Assessment of Compatibility of Biomaterials for Surgical Implants with Respect to Effect of Materials in Muscle and Bone[5]

2.2 *Federal Standard:*

Federal Test Method No. 151 Metals; Test Methods[6]

2.3 *American Society for Quality Control Standard:*

Cl Specification of General Requirements for a Quality Program[7]

3. Terminology

3.1 *Definition of a Term Specific to This Standard:*

3.1.1 *capability*—the word "capability" is used to indicate the ability of cold-worked material to attain specific mechanical properties after thermal aging treatment.

4. Ordering Information

4.1 Inquiries and orders for material under this specification shall include the following information:

4.1.1 Quantity (weight or number of pieces),

4.1.2 ASTM designation and date of issue,

4.1.3 Form,

4.1.4 Condition,

4.1.5 Mechanical properties (if applicable),

4.1.6 Finish,

4.1.7 Applicable dimensions, including size, thickness width, and length (exact, random, multiples), or print number,

4.1.8 Special tests, and

4.1.9 Special requirements.

5. Materials and Manufacture

5.1 Material for forgings shall be bars, plate, sheet, or wire fabricated in accordance with Specification F 562 or Specification F 688. The material shall be generally in the solution-annealed condition with a finish suitable for forging.

5.2 The material shall be forged by hammering, pressing, rolling, extruding, or upsetting and shall be processed, if practicable, so as to cause metal flow to be in the most favorable direction for resisting stresses encountered in service, as may be indicated to the fabricator by the implant manufacturer.

5.3 Forgings shall be free of splits, scale, cracks, inequalities, flaws, and other imperfections not consistent with good commercial practice.

NOTE 1—Compliance to these requirements may be verified by Practice E 165 or Practice F 601 or other suitable methods.

5.4 When specified by the implant manufacturer, a thermal treatment shall be performed, as specified, after all forging

[1] This specification is under the jurisdiction of ASTM Committee F04 on Medical and Surgical Materials and Devices and is the direct responsibility of Subcommittee F04.12 on Metallurgical Materials

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[2] *Annual Book of ASTM Standards*, Vol 01.03.

[3] *Annual Book of ASTM Standards*, Vol 03.01.

[4] *Annual Book of ASTM Standards*, Vol 03.03.

[5] *Annual Book of ASTM Standards*, Vol 13.01.

[6] Available from Standardization Documents Order Desk, Bldg. 4 Section D, 700 Robbins Ave., Philadelphia, PA 19111-5094, Attn: NPODS.

[7] Available from American Society for Quality Control, 161 West Wisconsin Ave., Milwaukee, WI 53203.