



Designation: F 799 – 99

## Standard Specification for Cobalt-28Chromium-6Molybdenum Alloy Forgings for Surgical Implants (UNS R31537, R31538, R31539)<sup>1</sup>

This standard is issued under the fixed designation F 799; 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.

### 1. Scope

1.1 This specification covers requirements of cobalt-28chromium-6molybdenum alloy (UNS R31537, R31538, R31539) high-strength forgings for the manufacture of surgical implants. Material conforming to this specification has been evaluated for biocompatibility and corrosion resistance<sup>2</sup> and has been found to be comparable to material conforming to Specification F 75. The properties specified in this document specifically apply to finished or semifinished parts that receive no subsequent metallurgical processing.

1.2 The values stated in inch-pound units are to be regarded as the standard. The metric equivalents of the inch-pound units may be approximate.

1.3 Wrought material to be used as forging stock in the manufacture of forgings conforming to this specification, typically hot worked and unannealed with a surface finish suitable for forging, shall be fabricated and supplied in accordance with F 1537.

### 2. Referenced Documents

#### 2.1 ASTM Standards:

- E 8 Test Methods for Tension Testing of Metallic Materials<sup>3</sup>
- E 18 Test Methods for Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials<sup>3</sup>
- E 112 Test Methods for Determining the Average Grain Size<sup>3</sup>
- E 165 Test Method for Liquid Penetrant Examination<sup>4</sup>
- E 930 Test Methods for Estimating the Largest Grain Observed in a Metallographic Section (ALA Grain Size)<sup>3</sup>
- F 75 Specification for Cast Cobalt-Chromium-Molybdenum Alloy for Surgical Implant Applications<sup>5</sup>
- F 601 Practice for Fluorescent Penetrant Inspection of Metallic Surgical Implants<sup>5</sup>

<sup>1</sup> This specification is under the jurisdiction of ASTM Committee F-4 on Medical and Surgical Materials and Devices and is the direct responsibility of Subcommittee F04.12 on Metallurgical Materials.

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<sup>2</sup> Supporting data are available from ASTM Headquarters, 100 Barr Harbor Dr., West Conshohocken, PA 19428.

<sup>3</sup> *Annual Book of ASTM Standards*, Vol 03.01.

<sup>4</sup> *Annual Book of ASTM Standards*, Vol 03.03.

<sup>5</sup> *Annual Book of ASTM Standards*, Vol 13.01.

F 981 Practice for Assessment of Compatibility of Biomaterials (Non-porous) for Surgical Implants with Respect to Effect of Materials on Muscle and Bone<sup>5</sup>

F 1537 Specification for Wrought Cobalt-28 Chromium-6 Molybdenum Alloy for Surgical Implants<sup>5</sup>

2.2 *American Society for Quality Standard*.<sup>6</sup>

ASQ C1 Specification of General Requirements for a Quality Program

### 3. Significance and Use

3.1 The purpose of this specification is to characterize the properties of currently available cobalt-28chromium-6molybdenum forgings.

### 4. Ordering Information

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

- 4.1.1 Quantity,
- 4.1.2 ASTM designation and date of issue,
- 4.1.3 Mechanical properties,
- 4.1.4 Form (semifinished parts, part No.),
- 4.1.5 Applicable dimensions or print number,
- 4.1.6 Condition (forged, heat treated, annealed),
- 4.1.7 Special tests, and
- 4.1.8 Other requirements.

### 5. Condition

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

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

5.3 Optional identification marks, including the manufacturer's logo, material designation, heat code number, and impression number, may be placed upon each forging, the

<sup>6</sup> Available from American Society for Quality, 161 W. Wisconsin Ave., Milwaukee, WI 53203.