



Standard Specification for Continuous Grain Flow Forged Carbon and Alloy Steel Crankshafts for Medium Speed Diesel Engines¹

This standard is issued under the fixed designation A 983/A 983M; 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 (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This specification covers continuous grain flow forged carbon and alloy steel crankshafts for medium speed diesel and natural gas engines.

1.2 The steel used in the manufacture of the forgings is required to be vacuum degassed.

1.3 Provision is made for treatment of designated surfaces of the crankshaft to provide enhanced fatigue strength, or wear resistance, or both.

1.4 The values stated in either inch-pound units or SI (metric) units are to be regarded separately as standards. Within the text and tables the SI units are shown in brackets. The values stated in each system are not exact equivalents, therefore each system must be used independently of the other. Combining values from the two systems may result in nonconformance with the specification.

1.5 Unless the order specifies the applicable “M” specification designation, the material shall be furnished to the inch-pound units.

1.6 Except as specifically required in this specification, all provisions of Specification A 788 apply.

2. Referenced Documents

2.1 ASTM Standards:

A 370 Test Methods and Definitions for Mechanical Testing of Steel Products²

A 503 Specification for Ultrasonic Examination of Large Forged Crankshafts³

A 788 Specification for Steel Forgings, General Requirements³

A 966/A 966M Test Method for Magnetic Particle Examination of Steel Forgings Using Alternate Current³

A 986/A 986M Specification for Magnetic Particle Examination of Continuous Grain Flow Crankshaft Forgings³

E 45 Practice for Determining the Inclusion Content of Steel⁴

E 112 Practice for Determining Average Grain Size⁴

¹ This specification is under the jurisdiction of ASTM Committee A-1 on Steel, Stainless Steel, and Related Alloys and is the direct responsibility of Subcommittee A01.06 on Steel Forgings and Billets.

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² Annual Book of ASTM Standards, Vol 01.03.

³ Annual Book of ASTM Standards, Vol 01.05.

⁴ Annual Book of ASTM Standards, Vol 03.01.

E 340 Macro Etching Metals and Alloys⁴

2.2 Other Standards:

AWS D1.1 Structural Welding Code⁵

DIN 50 602⁶

JIS G 0555⁷

3. Ordering Information

3.1 In addition to the ordering requirements of Specification A 788, the following items should be included:

3.2 Whether surface hardening in designated areas is required, referencing Supplementary Requirements S10, S11, or S12, and providing the necessary instructions.

3.3 For crankshafts designed to include welded counterweights the purchaser may specify an alternate welding code to AWS D1.1 Structural Welding Code.

3.4 For alternate tensile and hardness test requirements specify Supplementary Requirement S2.

4. Materials and Manufacture

4.1 Melting Practice:

4.1.1 The steel making section of Specification A 788 shall apply together with mandatory vacuum degassing.

4.1.2 Supplementary Requirement S1 may be used if non-metallic inclusion rating of the steel is required.

4.2 Forging:

4.2.1 The use of bar from starting stock produced by slitting a rectangular section is not permitted.

4.2.2 The procedure used in forging the crankshaft shall ensure that the centerline of the starting forged or rolled bar will follow the centerline contour of the main bearings, webs, and crankpins of the crankshaft.

4.2.3 The grain flow present between adjacent main bearing journals, webs, and the intervening crankpin shall be demonstrated for the first article testing of a new crankshaft design by a given forging facility. This need not be repeated for other crankshafts of the same design that differ from the first article crankshaft by the number of crankpin throws or, by agreement with the purchaser, for V-Cylinder configurations of the same engine. The axial grain flow shown after etching a centerline

⁵ Available from American Welding Society, Miami, FL.

⁶ Available from Verlag Stahleisen mbh, Postfach 8229, D-4000 Dusseldorf, Germany.

⁷ Available from Japanese Standards Association, 1-24 Akasaka 4, Minato-Ku, Tokyo 107, Japan.