



Standard Specification for Magnetic Particle Examination of Continuous Grain Flow Crankshaft Forgings¹

This standard is issued under the fixed designation A 986/A 986M; 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 the magnetic particle examination of forged continuous grain flow (CGF) crankshafts intended for medium speed diesel engines.

1.2 For the purpose of magnetic particle indication assessment, the crankshaft is divided into four zones of decreasing operational stress. Acceptance criteria have been set for each zone.

1.3 The engines to which these crankshafts are fitted are commonly used for diesel electric locomotives, marine propulsion, and power generation. Engines fueled by natural gas also fall into this medium speed category.

1.4 Specification A 983/A 983M is a product specification that covers the manufacture of CGF crankshafts.

1.5 The values stated in either inch-pound units or SI units are to be regarded separately as standard. Within the text, the SI units are shown in brackets. The values stated in each system are not exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in nonconformance with the specification.

2. Referenced Documents

2.1 *ASTM Standards:*²

A 788/A 788M Specification for Steel Forgings, General Requirements

A 966/A 966M Test Method for Magnetic Particle Examination of Steel Forgings Using Alternating Current

A 983/A 983M Specification for Continuous Grain Flow Forged Carbon and Alloy Steel Crankshafts for Medium Speed Diesel Engines

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

Current edition approved March 1, 2006. Published April 2006. Originally approved in 1998. Last previous edition approved in 2001 as A 986/A 986M – 01.

² 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.

3. Ordering Information

3.1 Specification A 983/A 983M requires that crankshafts made to that specification be examined in accordance with Specification A 986/A 986M for magnetic particle examination. It is the responsibility of the purchaser to specify any changes to the zone allocations for the crankshaft surfaces.

4. Procedure

4.1 Magnetic particle examination shall be conducted in accordance with Test Method A 966/A 966M. The use of prod type contacts is not permitted on finished crankshaft surfaces. Magnetic leeches may be used only on flat noncritical surfaces, and within the limitations specified in Test Method A 966/A 966M.

4.2 The magnetic particle examination shall be conducted using the wet fluorescent method described in Test Method A 966/A 966M.

5. Areas of Examination

5.1 *Zone 1—Major Critical Areas:*

5.1.1 *Crankpin Journals*—The major critical area of each crankpin journal shall include that area ± 60 from the 6 o'clock position of the crankpin and extend $\frac{3}{8}$ in. [10 mm] above the fillet collar and $\frac{5}{8}$ in. [15 mm] along the crankpin surface as measured from the blend of the fillet radius and the journal surface. These positions are shown in Fig. 1.

5.1.2 *Main Bearing Journals*—The major critical areas of any main bearing journal shall include that area ± 60 from the 12 o'clock position on top of the journal and extend $\frac{3}{8}$ in. [10 mm] above the fillet collar and $\frac{5}{8}$ in. [15 mm] along the journal as measured from the blend of the fillet radius and the journal surface. These positions are shown in Fig. 1.

5.1.3 *Oil Holes*—The major critical areas in also shall include the surfaces surrounding the journal oil holes. The diameter of this critical area shall be 3d, where d is the oil hole diameter before the radius. The critical area shall be centered on the centerline of the oil hole. In addition, the Zone 1 critical area shall extend down the oil hole for a distance from the journal surface equal to the hole diameter.

5.2 *Zone 2—Minor Critical Areas:*