

ENGINEERING MATERIAL SPECIFICATION

Material Name

Specification Number

CAST IRON - CHROMIUM ALLOY, CHILLED CAMSHAFT

WSD-M1A305-A1

1. SCOPE

The material defined by this specification is a chromium alloy cast iron suitable for mechanically chilled components.

2. APPLICATION

This specification was released originally for material used for camshafts employing a distributor/oil pump skew drive gear produced by mechanically chilling cams in a shell mold or green sand casting process.

3. REQUIREMENTS

Material specification requirements are to be used for initial qualification of materials.

3.1 STANDARD REQUIREMENTS FOR PRODUCTION MATERIALS

Material suppliers and part producers must conform to the Company's Standard Requirements For Production Materials (WSS-M99P1111-A).

3.2 CHEMICAL COMPOSITION (Weight Percent)

Carbon	3.1 – 3.9
Silicon	2.6 max
Manganese	0.6 – 0.9
Phosphorus	0.2 max
Sulphur	0.15 max
Chromium	0.5 – 1.1
Molybdenum	0.8 max
Nickel	0.25 max
Copper	1.0 max

Composition shall be selected generally from within the above range in order to meet microstructural, chill depth, chill distribution, machinability and strength requirements. Specific composition limits and foundry practice to meet performance and manufacturing requirements will form part of an agreed Control Plan for each component.

Date	Action	Revisions
2002 10 09	Revised	Updated
2001 04 11	Revised	Updated Wolfgang Janssen
1989 02 01	SM/ER3161TC	Released N.Riley

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3.3 MECHANICAL PROPERTIES

3.3.1 Ultimate Tensile Strength (ASTM E 8M/ISO 6892)

Standard Test Bar, min, MPa 260
or

Diabolo Test Bar, min, MPa 275
(DIN 50109)

Tensile strength should be determined on separately cast test bar. Where practical, test bars machined from components should also exceed the minimum limits.

If the component UTS is considered a requirement, the tensile strength and test bar location shall be specified on the Engineering drawing.

3.3.2 Hardness (unless otherwise stated on the Engineering drawing) (ASTM E 10/ISO 6506; ASTM E 18/ISO R 80)

Finished Camshaft Only (surface)

Cams and Eccentrics	HRC	45 min*
Bearing Journals	HB	229 min
Distributor, Oil Pump Gears, etc.	HB	229-310

Note: Correction factors for surface curvature are applicable on the above HRC values.

*Applicable to all chill areas designated on Engineering drawing.

For large volume survey on castings, bearing hardness may be taken 0.5 mm above the finished diameter.

3.4 MICROSTRUCTURE (Finished Camshaft)

3.4.1 Cam (see WSD-M99A4-A for carbide assessment).

The cam contact surface (within designated chill zone) shall consist of 30 % min (by area) acicular carbide, measured at 200 X magnification, and fine pearlite. Graphite up to a level of 5 % (by area) in a fine interdendritic form shall be permitted.

3.4.2 Eccentric

A similar microstructure to that described above, for cam contact surface, shall be present at the complete contact surface periphery.