

ENGINEERING MATERIAL SPECIFICATION

Material Name	Specification Number
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GREY IRON, CHILLED FACE TAPPET, HARDENED AND TEMPERED	WSD-M1A276-A
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GREY IRON, CHILLED FACE TAPPET, AS CAST	WSD-M1A276-A2
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1. SCOPE

The material defined by these specifications is a controlled low alloy cast iron capable of component surface mechanical chilling and responding to subsequent heat treatment.

2. APPLICATION

This material is primarily proposed for tappets, e.g. mushroom type, running against mechanically chilled camshafts. WSD-M1A276-A is applicable to the higher stressed applications.

3. REQUIREMENTS

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 (Ladle Analysis, wt %)

Total Carbon	3.25 - 3.55*
Silicon	2.00 - 2.50
Sulphur	0.12 max
Phosphorus	0.3 max
Manganese	0.50 - 1.10
Chromium	0.20 - 0.90
Molybdenum	0.75 max*
Nickel	1.10 max

Specific composition limits and foundry practice to meet performance and manufacturing requirements will form part of an agreed Control Plan for individual component geometries and process routes.

3.3 AS CAST PROPERTIES

3.3.1	Hardness	A	A2
	Mechanical chilled face +	48 HRC, min	50 HRC, min
	Body	285 HB, max	250 HB, min

+ Test at area equivalent to finished tappet face.

Date	Action	Revisions
2002 09 24	Revised	Updated and renumbered
1991 07 16	C10124239	A2 Added; Rev.& Updated N. Riley, EAO P. Lee, NAAO
1984 08 29	SM/ER1482TC	Released

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3.4 AS CAST PROPERTIES

3.4.1 Microstructure

Chill surface +. Predominantly interdendritic and acicular carbide with dendritic pearlite. Due to rapid cooling rates, martenistic transformation products can also be present. Carbide orientation to be generally normal to cam face surface. Graphite, where present, shall be restricted to fine isolated interdendritic networks.

+ Examine at area equivalent to finished tappet face.

Body. Flake graphite type VII, with distribution and size predominantly A and 4 respectively (ASTM A 247), in a pearlitic matrix, some discontinuous carbide networks are permitted.

3.4.2 Chill Depth**

Full Chill Depth +, min	1 mm
Effective Chill Depth, min	2 mm

+ measure from area equivalent to finished tappet face.

** See General Information for chill definitions.

3.5 HEAT TREATED REQUIREMENTS

3.5.1	Hardness	A	A2* local hardening
	Finished Machined Tappet, Chill face, min	60 HRC	---
	Body, min	45 HRC	45 HRC

* Location as directed on Engineering drawing.

3.5.2 Microstructure

Finished machined tappet, chill surface (A Only).

Interdendritic and acicular carbide and tempered martensite. Any temper graphite shall be well distributed in a fine aggregate form.

Minimum primary carbide target levels to be 30 % with a 4 sigma allowance down to 20 %.

Maximum temper graphite target levels to be 5% with a 4 sigma allowance up to 6 %. Carbide and graphite levels to be part of the Control Plan.