

ENGINEERING MATERIAL SPECIFICATION

Material Name

Specification Number

STEEL, MICROALLOY, BAR

WSE-M1A335-A1

1. SCOPE

The materials defined by this specification are precipitation hardening steel alloys used for high durability applications.

2. APPLICATION

This specification was released originally for materials used in the manufacture of fabricated camshafts. Bearing journals may or may not be hardened, as specified on the Engineering Drawing.

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 (Weight %)

Carbon	0.10 - 0.18
Manganese	1.45 - 1.75
Phosphorus	0.030 max
Sulfur	0.030 max
Silicon	0.50 - 0.70
Chromium	0.20 max
Nickel	0.20 max
Molybdenum	0.15 - 0.20
Vanadium	0.02 max
Colombium	0.09 - 0.12
Titanium	----
Aluminum	----
Copper	0.35 max
Iron	Balance

Date	Action	Revisions
2002 09 25	Revised	Updated
1994 08 31	NE01E10127076138	Released P.Lee C. Sales

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3.3 MECHANICAL PROPERTIES
(ISO 6892/ASTM E 8M)

3.3.1	Tensile Strength, MPa	690 - 860
3.3.2	Yield Strength, MPa	345 - 520
3.3.3	Hardness, HRB	90 - 100
3.3.4	Microstructure	

The general microstructure in unhardened components shall display a normalized microstructure. If specified on Engineering Drawing, critical hardened areas shall consist of a tempered martensitic structure, with no acicular transformation products such as bainite permitted.