

## ENGINEERING MATERIAL SPECIFICATION

Material Name

Specification Number

**VALVE INSERT, Mo-Cr-W-V-Co-Fe ALLOY**

**WSE-M1A324-A2**

### 1. SCOPE

The material defined by this specification is a Molybdenum-Chromium-Tungsten-Vanadium-Cobalt-Tool Steel Casting.

### 2. APPLICATION

This specification was released originally for exhaust valve seat inserts.

### 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, %) (ASTM A 751/ASTM E 1019)

|              |             |
|--------------|-------------|
| Total Carbon | 1.2 - 1.5   |
| Silicon      | 0.4 - 0.8   |
| Manganese    | 0.3 - 0.6   |
| Molybdenum   | 6.0 - 7.0   |
| Tungsten     | 5.0 - 6.0   |
| Chromium     | 4.0 - 5.0   |
| Vanadium     | 1.35 - 1.65 |
| Cobalt       | 3.0 - 5.0   |
| Iron         | Balance     |

#### 3.3 HEAT TREATMENT

Step One: 3 h at 715 – 730 °C followed by air cooling to room temperature.

Step Two: 2 h at 675 – 690 °C followed by air cooling to room temperature.

#### 3.4 HARDNESS, HRC 38 - 45 (ASTM E 18/ISO 4498)

| Date       | Action           | Revisions              |
|------------|------------------|------------------------|
| 2002 09 23 | Revised          | Updated and renumbered |
| 1992 07 02 | NEO1E10127076061 | Released C. Webster    |

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**3.5 MICROSTRUCTURE**

The microstructure shall consist of a continuous skeletal network of Molybdenum - Chromium - Tungsten - Vanadium carbides. The matrix will have a fine dispersion of spherodized Chromium - Molybdenum - Tungsten - Iron Carbides which can be detected at 500/1000X magnification.

**3.6 SURFACE CONDITION**

Surfaces shall be free of scale and rust. Nicks, cracks, burrs and depressions shall not exceed 0.25 mm in any direction. Visual inspection is to be performed under white light without aid of magnification.