ENGINEERING MATERIAL SPECIFICATION

Material Name

VALVE INSERT, Mo-Cr-V-Co-Ni-Fe ALLOY

Specification Number

WSE-M1A324-A1

1. SCOPE

The material defined by this specification is a Molybdenum-Chromium-Vanadium-Cobalt-Nickel-Iron alloy casting.

2. APPLICATION

This specification was released originally for exhaust valve seat inserts.

3. REQUIREMENTS

3.1 STATISTICAL PROCESS

Suppliers must conform to the requirements of Ford Quality System Standard Q-101. A mutually acceptable Control Plan as described therein is required for material/source approval. Appropriate statistical tools must be used to analyze process/product data so that variation in the final product is continuously reduced.

3.2 CHEMICAL COMPOSITION, weight %
(ASTM A 751/ASTM E 1019/ASTM A 484)

Total Carbon	2.0 - 2.5
Silicon	1.5 max
Manganese	1.0 max
Molybdenum	10.0 - 14.0
Chromium	14.0 - 18.0
Vanadium	1.3 - 1.7
Cobalt	5.5 - 7.5
Nickel	1.0 - 2.0
Iron	Balance

3.3 HEAT TREATMENT

2 1/2 h at 693 C followed by air cool.

3.4 HARDNESS
(ASTM E 18/ISO 4498)

50 - 60 HRC

3.5 MICROSTRUCTURE

The microstructure shall consist of a uniform distribution of Molybdenum-Chromium-Vanadium Carbides in a fine lamellar pearlite. The dendrite areas which are of light color shall have a fine dispersion of Chromium-Molybdenum Carbides which can be detected at high magnification, 1000X.

Date	Release No.	Release/Revision
1991 09 10	NE01E10127076022	Released C. Webster

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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.

3.7 SUPPLIER'S RESPONSIBILITY

All materials supplied to this specification must be equivalent in all characteristics to the material upon which approval was originally granted.

Prior to making any change in the properties, composition, construction, color, processing or labeling of the material originally approved under this specification, whether or not such changes affect the material's ability to meet the specification requirements, the Supplier shall notify Purchasing, Toxicology and the affected Materials Engineering activity of the proposed changes and obtain the written approval of the Materials Engineering activity. Test data, test samples and a new code identification are to be submitted with the request.

Substance restrictions imposed by law, regulations or Ford, apply to the materials addressed by this document. The restrictions are defined in Engineering Material Specification WSS-M99P9999-A1, unless a different suffix (e.g., A2 or A3) is specified on the engineering document for the application.

4. APPROVAL OF MATERIALS

Materials defined by this specification must have prior approval by the responsible Materials Engineering activity. Suppliers desiring approval of their materials shall first obtain an expression of interest from the affected Purchasing, Design and Materials Engineering activity. Upon request, the Supplier shall submit to the affected Materials Engineering activity a completed copy of their laboratory test reports, signed by a qualified and authorized representative of the test facility, demonstrating full compliance with all the requirements of this specification (test results, not nominal values), the material designation and code number, and test specimens for Ford evaluation. Ford's engineering approval of a material will be based on its performance to this specification and on an assessment of suitability for intended processes and/or applications. Upon approval, the material will be added to the Engineering Material Approved Source List.

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