Ford Motor Company

ENGINEERING MATERIAL SPECIFICATION

Material Name | Specification Number

GREY CAST IRON | **WSD-M1A288-A1/A5**

1. SCOPE

The material defined by this specification is a grey cast iron with a minimal alloy content.

2. APPLICATION

This specification was released originally for various automotive components.

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

The specific composition for a given grade may vary according to the prevailing section size of the casting being produced. Minor alloying elements may be employed as required to meet mechanical property, microstructural or machinability requirements, or provide other properties needed for particular service conditions, e.g.,

0.2/0.45% Cr - Wear resistance for certain cylinder blocks and heads.

0.025/0.04% Ti - Controlled "friction" for certain brake application.

When required, the above shall be specified on the Engineering drawing. The optimum composition and foundry processing will form part of the agreed control plan.

3.3 MECHANICAL PROPERTIES (As Cast Condition)

3.3.1 Tensile Strength, MPa, min (Cast Test Bars)
(ISO 6892/ASTM E 8M)

A1	A2	A3	A4	A5
125	150	180	220	260

Note: Cast test bars shall be processed and cooled at the same cooling rate as the castings they represent.

Date	Action	Revisions
2002 07 22	Revised	Updated and renumbered
1987 10 28	SM/ER1248TC	Released - N. P. Riley EAO

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3.3.2 Hardness HB (As Cast Components)
(ISO 6506/ASTM E 10)

A1	A2	A3	A4	A5
118 - 187	156 - 207	170 - 229	179 - 241	197 - 255

3.4 MECHANICAL PROPERTIES (Finished Components)

3.4.1 Tensile Strength

Where required, the location and mechanical property requirements of test pieces machined from components shall be shown on the Engineering drawing.

3.4.2 Hardness

Where required, the location and requirements shall be specified on the Engineering drawing.

Note: Mechanical properties of finished components may differ from the test bars due to section size and foundry practice. Unless otherwise specified, castings may be annealed or normalised to meet the desired hardness range.

3.5 MICROSTRUCTURE
(ASTM A 247)

The microstructure shall contain Form VII Flake Graphite in a combination of types A and B with type A predominating. Minor amounts of type C would be permitted in larger section, lower strength grades. Types D and E permitted in lighter sections but should be restricted in A4 and A5 strength grades to 10% maximum.

Type A Flake Size shall be:

A1 & A2	2 to 6	Predominantly 3 to 5
A3, A4, A5	3 to 6	Predominantly 4 to 5

Matrix structure shall consist predominantly of fine lamellar pearlite with allowable ferrite levels, as follows:

A1 For A1, the matrix structure shall consist of predominantly ferrite with pearlite.

A2	25% max
A3	15% max
A4, A5	10% max

Primary carbides are undesirable but, if present, should be evenly distributed and at levels generally less than 1%.

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