



DIE CAST ALUMINUM – GENERAL PURPOSE

WSS-M2A171-A1

DIE CAST ALUMINUM – MEDIUM DUTY APPLICATIONS

WSS-M2A171-A2

1. SCOPE

The materials defined by these specifications are die cast aluminum alloys for general purpose and medium duty applications.

2. APPLICATION

WSS-M2A171-A1 is used to specify die cast components where attributes such as pressure tightness are the main requirement, such as water pump housings.

WSS-M2A171-A2 is used to specify die cast components where a minimum set of mechanical properties are required. These specifications are not intended to specify the material used for safety-critical components.

3. REQUIREMENTS

3.1 APPROVED SOURCES

This specification does not use approved sources. Any reliable supplier meeting these requirements may be used.

3.2 CHEMICAL COMPOSITION, % by Weight (ASTM E34 / ASTM E607 / ASTM E1251)

Castings supplied to WSS-M2A171-A1 or -A2 shall be made of a grade chosen from the following list of national standard grades. The chemical composition shall conform to the requirements in the given standard. The grade chosen for a given application shall be listed for reference on the PPAP documentation, and the supplier shall not change the chosen grade without prior engineering approval (SREA).

<u>Standard</u>	<u>Grades</u>
ASTM B85*	UNS A03800, UNS A13800, UNS A03830, UNS A03840
EN 1706	AC46000, AC46200, AC46500
JIS H5302	ADC10, ADCZ10, ADC12, ADCZ12

In addition to the chemical composition requirements within the national standard, the following conditions shall apply:

- A maximum magnesium content of 0.55% is allowed for both grades
- For castings supplied to WSS-M2A171-A2, iron, manganese and chromium are further restricted (commonly known as the "sludge factor") such that $(\%Fe + (2x\%Mn) + (3x\%Cr)) \leq 2.00\%$

Date	Action	Revisions	Rev. 2
2015 10 01	Revised	See Summary of Revisions	G. Weber, NA
2010 09 27	Revised		G. Weber, NA
2009 06 24	Activated		G. Weber, NA



3.3 MECHANICAL PROPERTIES

- A1** Castings supplied to WSS-M2A171-A1 are not required to meet a set of minimum mechanical properties.
- A2** Castings supplied to WSS-M2A171-A2 shall meet the following minimum mechanical properties in the as-cast condition ('F' Temper):

Property	Machined Bars	Cast Bars
0.2% Offset Yield, MPa, min	140	150
Elongation, %, min	0.5	1.0

All test samples shall be machined from cast components. Location(s) and procedure for obtaining test specimen shall be outlined in the component Engineering Specification or on the Engineering Drawing/CAD file and shall form part of the agreed Control Plan. Upon agreement between Ford and the supplier, separately cast test bars may be used if the component dimensions or geometry prevent the machining of an adequately sized test bar.

Upon agreement between Ford and the supplier, functional testing of the part may be substituted for mechanical property testing. Such testing shall stress the part in critical areas to insure that mechanical properties are sufficient for the design. Leak testing is not acceptable as a functional test to assess mechanical properties. Details of the agreed upon functional test shall be documented in the component Engineering Specification or on the Engineering Drawing/CAD file, and Materials Engineering shall review the test details prior to release.

3.4 HARDNESS (ISO 6506/ASTM E10)

- A1** Castings supplied to WSS-M2A171-A1 are not required to meet a specific hardness range.
- A2** 80 HB minimum. Location(s) and procedure for testing hardness shall be outlined in the component Engineering Specification or on the Engineering Drawing/CAD file and shall form part of the agreed Control Plan.

3.5 INTERNAL SOUNDNESS AND ACCEPTANCE CRITERIA (ASTM E505)

When specified in the component Engineering Specification or on the Engineering Drawing/CAD file, castings shall be checked for internal soundness (for example, shrinkage, porosity and other internal defects) by x-ray inspection. Castings shall display soundness of ASTM E505 Level 3 or better throughout the casting. In locations on the casting designated as High Impact Areas, soundness of ASTM E505 Level 2 or better is required. Locations designated as High Impact Areas shall be specified in the component Engineering Specification or on the Engineering Drawing/CAD file. Frequency of testing shall form part of the agreed Control Plan.

Alternate methods of evaluating internal soundness may be utilized, upon agreement between Ford Design Engineering, Ford Materials Engineering, Ford STA and the supplier. Acceptance criteria and frequency of testing shall form part of the agreed Control Plan.

3.6 CONTROL OF CASTING MANUFACTURING PROCESS

Ford Global Manufacturing Standard W-CMS defines a minimum set of required process controls for various casting processes. All castings supplied to WSS-M2A171-A1 or -A2 shall meet the requirements of W-CMS.

