



ANODIZED (ANODIC) COATING FOR CAST ALUMINUM, ELECTROLYTIC TYPE, HARD

WSS-M4P12-A1

1. SCOPE

The material defined by this specification is a hard, uniform anodized (anodic) coating on cast aluminum alloy part surfaces.

2. APPLICATION

This material specification was released originally for automotive pistons to improve top ring groove wear resistance at elevated temperatures, reduce micro welding of piston to ring and protect integrity of piston ring groove functional characteristics.

3. REQUIREMENTS

Material specification requirements are to be used for initial qualification of materials. All requirements of this specification shall be met with data representing 3 sigma values.

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 BASE MATERIAL

The requirements of the base material shall be as specified in the applicable Engineering Material Specification for the material to be anodized.

Microstructure shall consist of primary silicon crystallites in a matrix of unmodified aluminum silicon eutectic containing uniformly distributed intermetallic compounds. Grain size of primary aluminum, size and distribution of silicon, copper and intermetallic compounds shall be suitable to produce a consistent anodized surface.

Base material shall be sufficiently free from surface defects, inclusions and excess copper-rich or silicon phases that are detrimental to functional use of the coating.

3.3 MICROSTRUCTURE OF ANODIZED SURFACE (ASTM E 3)

The anodized surface layer shall be uniform and continuous. Random microstructural discontinuities in anodized layer thickness in which silicon or copper-rich phases break the integrity of the anodized surface are permissible up to the following limits:

Date	Action	Revisions
2003 12 15	Activated	



Max. permissible discontinuity length:	0.07mm.
Max. permissible discontinuity thickness:	0.02mm.
Max. permissible number of discontinuities > 0.01 mm in length: (In a measurement length (L) of 0.45 mm @ 500X mag.)	10

Micro-structural field sampling area and locations shall be as specified in supplier's Control Plan, Engineering Specification or Engineering Drawing.

3.4 THICKNESS OF ANODIZED LAYER (t_n), MIN. (ASTM B 244 or B 487)	0.010 mm at top & bottom surface of top ring groove or as specified on Engineering Specification or Engineering Drawing
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4. PROCESS

Any process, including equipment, procedures, and operations may be used to produce a dense, high-quality anodized coating of the specified thickness on cast aluminum alloys which meets all requirements of this specification.

5. GENERAL INFORMATION

The information given below is provided for clarification and assistance in meeting the requirements of this specification.

5.1 REFERENCE DOCUMENTS

The following documents are referenced in this specification:

ASTM E 3	ASTM B 244
ASTM B 487	WSS-M99P1111-A

5.2 SUBJECT REFERENCES

None

5.3 MICROWELDING START TEMPERATURE

Micro-welding can start at a temperature as low as 150 °C on an unanodized surface.