

Navigating the Automotive Specifications for Aluminum Anodizing



AACOA, Inc.

The Standard Makers

General Motors

Ford Motor Company

DaimlerChrysler Corporation

Japanese Standards Association

German Standards

European Union Standards



Aluminum Anodizing

General Motors - GM4472M

Coating requirements dependent upon application “Type”:

🚗 “Type” depends upon the following:

Finish: Clear or Color

Use: Functional or Decorative

Location: Exterior or Interior

Coating for each application type must pass some combination of the following tests:

🚗 ADT, Weatherometer, Florida exposure, CASS, Coating Thickness, Coating Mass (Weight)



Ford Motor Company

Specification

WSB-M4P9-B1

WSB-M4P9-B2

WSB-M4P10-B1

WSB-M4P11-B1

Finish, Application

Clear, Interior

Clear, Exterior

Dyed, Interior

Electrolytic color, Exterior

All specifications require the following tests:

🚗 ADT, Weatherometer, Florida exposure, CASS,
Coating Thickness, Coating Mass (Weight)



DaimlerChrysler Corporation

Specifications dictate performance and process

<u>Specification</u>	<u>Finish, Application</u>
PS-1576	Dyed, Interior/Exterior
PS-4905	Clear, Exterior
PS-5385	Clear, Interior
PS-6426	Clear, Interior/Exterior
PS-7362	Electrolytic color, Interior/Exterior

All specifications require the following tests:

- 🚗 ADT, Coating thickness

Some specifications may require the following:

- 🚗 Paint adhesion testing, UV light testing, or Gloss



Japanese Standard-JIS H 8601

Specification outlines process parameters as opposed to dictating them

Coatings identified as “Classes” based upon coating thickness:

- 🚗 Interior parts - Classes AA5, AA6, or AA10
- 🚗 Exterior parts - Classes AA15, AA20, AA25

Testing requirements may include any of the following:

- 🚗 UV testing, Coating thickness, ADT, Abrasion resistance, CASS, Crazing, Gloss, Coating mass



German Standard-DIN 17611

Coating types - Class 10 and Class 20

- 🚗 Class 10 - Interior, arid

- 🚗 Class 20 - Exterior or Interior, humid

Specifies type of pretreatment

- 🚗 Ground, brush, polish, etch, bright dip

Testing requirements may include any of the following:

- 🚗 Coating thickness, dye stain, admittance, ADT

European Standard-EN 12373

Specification contains 19 parts

- 🚗 Part 1 - Method of specifying anodizing
- 🚗 Parts 2-19 - Quality testing procedures

Specifies the following finishes:

- 🚗 Clear and Bright Dip
- 🚗 Color - Integral, Electrolytic, Dyed, Combination, Interference
- 🚗 Decorative and/or Protective
- 🚗 Sealing methods

European Standard-EN 12373

Pretreatment specification similar
to DIN 17611

Coating thickness testing required;
purchaser may require any combination
of the following performance tests:

- 🚗 Coating mass, Dye stain, Admittance, ADT (with and w/o acid pretreatment), UV light fastness, Abrasion resistance, Specular gloss, Reflectance, Crazeing by deformation, Continuity, Electric breakdown potential, Pitting corrosion evaluation

ADT Testing

$$(W_1 - W_2) \times K \times CT / (W_1 - W_3) = \text{Rating (Maximum of 6.0)}$$

W_1 = Weight of coupon (prior to testing)

W_2 = Weight after ASTM B680 (prior to ASTM B137)

W_3 = Weight after ASTM B137

CT = Coating thickness (mils or microns)

K = Constant

<u>Standard</u>	<u>K</u>	<u>CT</u>	<u>K x CT = ?</u>
General Motors	7.8	μm	$7.8 \times 25.4 = 198.12$
Ford and Chrysler	200	mils	$200 \times 1.00 = 200.00$

Japanese and European (including German) standards
limit weight loss ($W_1 - W_2$) to 1.935 mg/in² max.



Standards/PPAP Websites

www.autoweb.net

www.sae.org

www.global.ihs.com

www.techstreet.com

www.techsavvy.com

www.wssn.net

stinet.dtic.mil

www.astm.org

www.dsccl.dla.mil

www.document-center.com

www.lib.washington.edu/engineering/standards

www.aiag.org



Documentation for a PPAP

The Production Part Approval Process





Required Documents

Initial Process Study

Qualified Laboratory Documentation

Process Flow Diagram

Process Control Plan

Process FMEA

Dimensional Results

Material, Performance Test Results

Measurement Systems Analysis Study

Part Submission Warrant

Appearance Approval Report





Initial Process Study

SPC charting and statistics for the following:

- * Coating thickness
- * Coating weight
- * ADT rating

Charts include the following:

- * X-Bar
- * Range
- * Control
- * Moving average (subgroups with minimum of 4)
- * C_{pk}





Qualified Lab Documentation

QS/TS/ISO Documentation

- * Registration certification
- * Process control plan

Laboratory Scope

- * Tests for which lab is qualified to perform

Certification Statements

- * Results from testing performed on products/samples (in-house or outsourced)

Calibration records

- * Any equipment used in quality assurance testing





Refer to the Handouts

Process Flow Diagram

Process Control Plan

Process FMEA

Dimensional Results

Material, Performance Test Results

Measurement Systems Analysis Study

Part Submission Warrant

Appearance Approval Report

**Thank you
to the Following**

Aluminum Anodizers Council

AACOA, Inc.

