



PERFORMANCE, THIN FILM CONVERSION COATINGS, ZIRCONIUM

WSS-M10P13-A

1. SCOPE

This specification defines the performance requirements for the zirconium nano-scale thin film conversion coatings produced on assemblies made from steel and/or aluminum, which are subsequently painted.

2. APPLICATION

This specification was released originally for the zirconium nano-scale thin film conversion coatings used on iron, steel, zinc or zinc alloy coated steel, and aluminum substrates where maximum paint adhesion and corrosion performance are required. The coating process provides a clean, grease-free surface necessary for painting, and promotes paint adhesion and corrosion protection when the paint film is broken.

3. REQUIREMENTS

The supplier shall contact the responsible Materials Engineer prior to initiating qualification testing. Typical quality documentation requirements are listed in section 4.1 of this document. All materials approved under this specification shall meet all engineering requirements when applied under assembly plant conditions.

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 MATERIAL ANALYSIS

Ford Motor Company, at its option, may conduct analysis of materials, and representative parts/panels supplied to this specification. The analyses that may be conducted include, but are not limited to, material chemical analysis, coating analysis, and corrosion and mechanical resistance testing.

The chemical material analyses established for the initial approval shall constitute reference standards, and all samples shall produce the results within specified ranges of the corresponding reference standards when tested under the same conditions. All the key material component ranges, and the key material manufacturing control limits must pass standard Gauge Repeatability and Reproducibility requirements (AIAG, MSA 2010 - Measurement Systems Analysis Reference Manual).

3.3 MATERIAL COMPATIBILITY

The supplier shall notify the responsible Materials Engineer if any incompatibility with other process related materials (e.g. sealers, adhesives, electrocoat, etc.) is anticipated. The supplier shall keep abreast of changes in technology of the process related materials which may affect the compatibility and performance of the pretreatment products. The supplier shall review the potential incompatibilities with the responsible Materials Engineer to agree on the appropriate material compatibility testing. The appropriate material compatibility testing shall be done to ensure the process will deliver required performance.

Date	Action	Revisions	Rev. 0
2013 05 10	Released		

Documents
E. Kopic, E. Starbowski FNA
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3.4 PHYSICAL PROPERTIES

Zirconium Coating Weight

(XRF Analysis, other analytical method approved by the responsible Materials Engineer)

Note: The zirconium coating weight ranges as defined below only apply to the described materials.

Cold Rolled Steel	20 – 200 mg/m ²
Electro Galvanized Steel	40 – 300 mg/m ²
Hot Dip Galvanized Steel	40 – 300 mg/m ²
Galvannealed Steel	40 – 300 mg/m ²
Aluminum	10 – 150 mg/m ²

Note: The supplier is responsible for setting up an appropriate analytical method for measuring the zirconium coating weight. The coating weight measurement method shall be reviewed with the responsible Materials Engineer, and must pass standard Gauge Repeatability and Reproducibility requirements (AIAG, MSA 2010 - Measurement Systems Analysis Reference Manual).

3.5 PROCESS WINDOW DEFINITION

The final testing requirements shall be defined by the responsible Materials Engineer. The supplier shall perform a Design of Experiments (DOE) (Response Surface Analysis is recommended) to determine the process window of the pretreatment process controls. At a minimum the DOE shall include the concentrations of the main bath components (such as Zirconium, Fluoride, coating deposition accelerators, etc.), pH, process time and process temperature. Additional study variables may include any other pretreatment bath key components or parameters, and the substrate cleaning conditions (fresh vs. aged alkaline cleaner bath). Appropriate screening experiments should be run to determine what variables/parameters and their levels should be tested. The results of the screening experiments should be reviewed with the responsible Materials Engineer in order to set up the final DOE. Response attributes to the DOE will be based on the materials tested, and will be chosen from tests listed within this specification. Minimal testing required: Coating Weight, Paint Adhesion (FLTM BI 106-01, Method B) before and after Water Immersion (FLTM BI 104-01), Stone Chip Resistance (SAE J400 and FLTM BI 157-06), Corrosion Resistance (L-467 and L-3190). The process window characteristics must be submitted with the initial approval package.

3.6 PREPARATION OF TEST PANELS

Testing shall be conducted on standard test panels representing the current production substrates, and current mill oils and pre-lubricants. Test panels shall be prepared according to the exterior performance specification WSS-M2P180-D (latest).

3.6.1 Test Substrates

- Cold Rolled Steel (CRS)
- Electro Galvanized Steel (EG)
- Hot Dip Galvanized Steel (HDG)
- Galvannealed Steel (GA)
- Aluminum 6111 Alloy (AA6111)
- Aluminum 6022 Alloy (AA6022)

Other substrates may be requested as needed, and should be included in plant specific testing when appropriate. This shall be specified by the responsible Materials Engineer.