



ENGINEERING MATERIAL SPECIFICATION

Material Name

Specification Number

CORROSION PROTECTIVE TUBE COATING,
RESIN BONDED FLUOROPOLYMER

ESA-M21P20-A

1. SCOPE

This specification defines a resin bonded fluoropolymer coating which has excellent corrosion protection, adhesion, and formability qualities when applied over an electrolytic or nonelectrolytic zinc or zinc/aluminum alloy plating.

2. APPLICATION

This specification was released originally to provide additional corrosion protection to external surfaces of power steering gear turn lines.

3. REQUIREMENTS

3.1 STATISTICAL PROCESS

Suppliers must conform to the requirements of Ford Quality System Standard Q-101. A mutually acceptable Control Plan as described therein is required for material/source approval. Appropriate statistical tools must be used to analyze process/product data so that variation in the final product is continuously reduced.

3.2 INFRARED SPECTROPHOTOMETRY AND/OR THERMAL ANALYSIS

Ford Motor Company, at its option, may conduct infrared and/or thermal analysis of material/parts supplied to this specification. The IR spectra and thermograms established for initial approval shall constitute the reference standard and shall be kept on file at the designated material laboratory. All samples shall produce IR spectra and thermograms that correspond to the reference standard when tested under the same conditions.

3.3 SUBSTRATE

The substrate shall be low carbon steel butt welded or double wall brazed construction which conforms to one of the following specifications.

SAE J526	-	Welded Low Carbon Steel Tubing
ESF-M1A80-EA	-	Type 3 Construction
SAE J527	-	Brazed Double Wall LC Steel Tubing
WSA-M1A308-A1/A2	-	Tubing

Date	Release No.	Release/Revision
890809	NCOO-E-00362150-C16	K A Grubbs/Am 891
		Released

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The above tubing shall be coated with either Zinc/Aluminum alloy per ESA-M1A270-A or Electrolytic zinc with a minimum coating thickness 0.025 mm. If necessary, a chromate conversion coating may be used over the zinc/aluminum alloy or the zinc plating to enhance the adhesion and corrosion resistance properties of the tube.

3.4 FILM PROPERTIES

3.4.1 Film Type

The film shall consist of a single fluoropolymer coating or a fluoropolymer topcoat and primer system.

3.4.2 Film Cure

Must be sufficiently cured at the time of packing to withstand normal handling and shipping without marring.

3.4.3 Appearance

The coating shall be uniform in color and free from discontinuities. The coating shall be black in color unless otherwise specified on the engineering drawing.

3.4.4 Film Thickness, min (Metallographic method)

0.010 mm

3.5 RESISTANCE PROPERTIES

3.5.1 Adhesion

No chipping or flaking

Test Method: Scribe the tubing surface to obtain a 3.2 mm square crosshatched pattern covering a minimum of 180 deg of circumference and 25 mm in length of tubing. Apply 3M #898 type adhesive tape firmly to the scribed surface. Remove tape slowly, applying an even consistent tension.

3.5.3 Salt Spray Evaluation

After salt spray per ASTM B117 for 3000 h the test samples shall show no more than 0.1% red rust per ASTM D 610 photographic standard No. 9.

Test samples shall consist of two types, straight and bent tubes. Straight tubes shall be approximately 300 mm long. Bent tubes shall be bent in a U-shape with a radius equal to 3 times the diameter of the tube.

3.5.3 Water Resistance Properties, (FLTM BI 4-1)

240 h

No rust or blistering

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