



PLATING, TIN/ZINC ALLOY, MECHANICALLY PLATED OVER FERROUS SURFACES

WSS-M1P93-A5

1. SCOPE

This specification defines the requirements for mechanically plated deposits that are subsequently E-coated. The material consists of an adherent copper flash, and a tin/zinc deposit.

2. APPLICATION

This specification was released originally to define performance requirements for corrosion resistance. It was subsequently revised to define the plating for hardened self piercing rivets used to join sheet metal. The tin provides lubricity during installation and plating provides sacrificial corrosion protection.

2.1 LIMITATIONS

Due to the low melting point of tin-zinc alloy 197 °C, the long term maximum service temperature is 180 °C.

3. REQUIREMENTS

3.1 APPROVED SOURCES

This specification is performance based and does not have approved sources.

3.2 COATING APPLICATION

Applicators shall follow material supplier procedures and recommendations for chemical usage, equipment, analysis, and processing. Applicators must have documentation to show that procedures and recommendations are followed.

3.2.1 Cleaning

Prior to coating, the parts shall be free of oil, scale, and similar foreign materials. All parts must be degreased using alkaline cleaners and/or mechanically cleaned (shot blast).

3.2.2 Mechanical Plating

Degreased parts are loaded together with water and glass impact media into the open-ended mechanical plating barrel where an adherent layer of copper flash is applied. A flash coating is next applied to the parts by the addition of a small amount of zinc metal powder, after which sequential tin and zinc additions are made, the amounts of which are determined by the desired coating thickness.

3.2.3 Water Polish

Mechanically plated parts are water polished to remove loose surface particles and compact the coating.

Date	Action	Revisions	Rev. 05
2018 08 07	Released	Re-Released A5 See Summary of Revisions	J. Ulferts, NA
2014 10 30	Inactive	A1 replaced by WSS-M1P95-A1; A2 replaced by WSS-M1P95-A2; A3 replaced by WSS-M1P95-A3; A4 replaced by WSS-M1P95-A4. No replacement for A5 and A6	G. Weber, NA P. Lee
1996 03 15	Activated		



3.2.4 Passivate

The coating is not passivated or sealed. Should the formation of white corrosion products prior to installing the rivet be a concern, a passivate or sealer could be added and a new suffix added to the specification.

3.2.5 Appearance

The coating shall be uniform in color and free from discontinuities when viewed without magnification.

3.3 CHEMICAL COMPOSITION

(ASTM B568, E634)

	Tin	Zinc
Weight %	20 - 40	60 - 80

3.4 PLATING THICKNESS

(ASTM B659, ASTM B487)

Average
8 μ m min

Plating thickness requirements represents the average of at least 10 readings on a significant surface. Significant surfaces are defined as visible surfaces after installation.

In case of dispute, the umpire method shall be metallographic sectioning per ASTM B487.

3.5 PLATING ADHESION

(ASTM D3330)

Test Method

Apply a piece of tape onto the significant surface with firm pressure. Remove the tape within 90 +/- 30 seconds of application by pulling it off rapidly (not jerked) back upon itself at as close to an angle of 180° to the sample as possible. Tape shall have a minimum adhesion to steel of 23 oz./in. width (25 N/100mm) when tested per ASTM D3330.

Acceptance Criteria

No removal of the plating such that the substrate is exposed.

3.6 EMBRITTLEMENT

The mechanical plating process defined in this specification does not contain an acid wash and meets the hydrogen embrittlement avoidance requirements in WSS-M99A3-A without the need for embrittlement relief.

3.7 CORROSION RESISTANCE

(CETP 00.00-L-467)

Self-piercing rivets

No Requirement

The rivets are installed in the body sheet metal prior to coating with E-coat primer. Corrosion testing after E-coat is more appropriate. Other applications requiring corrosion resistance must add a separate requirement.

4. GENERAL INFORMATION

The information given below is provided for clarification and assistance in meeting the requirements of this specification. Contact gmfs@ford.com for questions concerning Engineering Material Specifications.