



CORROSION PROTECTIVE COATING, ZINC NICKEL ALLOY, CHROMIUM-FREE PASSIVATE, U.V. RESISTANT BLACK SEALER

WSS-M21P25-B1

1. SCOPE

The materials defined by this specification provide a corrosion protective coating applied over steel. The materials consist of an alkaline zinc nickel alloy electro-deposit, followed by a chromium-free passivate, with the addition of a water soluble organic sealer designed to provide consistent torque-tension control and impart other desirable properties (i.e. additional corrosion protection, ultra violet protection, etc.).

The finish is free of chromium, lead, and cadmium.

2. APPLICATION

This specification was originally released to define the performance and appearance requirements for a chromium-free, alkaline zinc/nickel alloy coating on fasteners. The finish may also be suitable for other steel components, but requires testing appropriate for the part. The application processes may induce hydrogen embrittlement; therefore, this coating system must be hydrogen embrittlement relieved when applied to high hardness parts in accordance with WSS-M99A3-A.

The water soluble organic sealer must be baked at a peak metal temperature of 190 °C for a minimum of 10 minutes to ensure the sealer is cured. Therefore, this finish shall not be specified if the cure temperature adversely affects the component being coated.

2.1 SERVICE TEMPERATURE

The maximum continuous service temperature for the finished part is 275 °C.

3. REQUIREMENTS

Material specification requirements are to be used for initial qualification of materials.

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). Finished parts must comply with Ford Motor Company's restricted substances standard, WSS-M99P9999-A1.

Part producers must use approved materials specified on the Company's Approved Source List.

3.2 APPROVED APPLICATOR QUALITY REQUIREMENTS

Applicators must follow coating manufacturer procedures and recommendations for chemical usage, equipment, analysis, and processing. Applicators must have documentation to show that procedures and recommendations are being followed.

Date	Action	Revisions
2006 02 20	Activated	

Documents
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3.3 APPEARANCE (ASTM D 523)

The coating shall be a uniform black color and shall be free from discontinuities when viewed without magnification. The finish shall exhibit a gloss of 4 or higher when measured with a 20° gloss meter per ASTM D523, shall not fill recesses and/or threads, or interfere with normal installation procedures.

3.4 COATING COMPOSITION

The alkaline ZnNi electro-deposit shall have a nickel content of 12 to 15% as measured by calibrated X-ray fluorescence spectrometers in accordance with the supplier's requirements. The plating shall be a uniform, homogeneous alloy of zinc and nickel throughout the thickness of the deposition and across the high and low current densities of the part. To ensure proper integrity, uniformity, adhesion, and corrosion resistance, "strikes" are not permitted. Zinc/nickel is to be the only deposit applied directly to the base metal.

The ZnNi plating, passivate, and water soluble organic sealer shall all have compositions in accordance with the chemical supplier's requirements.

3.5 COATING THICKNESS

3.5.1 The ZnNi electro-deposit will have an optimum thickness of 8 +/- 3 microns measured on flat significant surfaces in accordance with ISO 4042 clause 10. Documentation demonstrating throwing power, measured in accordance with supplier's instructions, in excess of 70% will generally provide adequate thickness in recessed areas, including threads. The ZnNi thickness shall not exceed 24 microns.

3.5.2 The hexavalent chromium-free passivate thickness is not subject to measurement.

3.5.3 The water soluble organic sealer thickness shall be 2 +/- 1 micron. The weathering resistance and torque tension characteristics imparted by the sealer shall meet the requirements of WZ101 and SAE J1960, across the entire range of thicknesses for each layer (ZnNi, passivate, and sealer), including all layers at minimum and all layers at maximum thickness (see Table1).

3.5.4 The corrosion resistance of the finished part shall meet the number of cycles required by this specification across the entire range of thicknesses for each layer (ZnNi, passivate, and sealer), including all layers at minimum and all layers at maximum thickness (see Table1).

3.5.5 Fasteners with retained washers shall show no evidence of excessive sticking of screw/washer and nut/washer assemblies. Parts shall meet the washer adhesion requirements outlined in WX100.

3.5.6 Excessive coating thickness on threaded components may cause assembly concerns. The general requirements of the Ford Worldwide Fastener Standards, Finish Specification WX100, and Section 5 apply to this finish.

3.6 THREAD ACCEPTANCE REQUIREMENTS (WA900, WE900, WX100)

For thread acceptance requirements see Ford Worldwide Fastener Standards WA900, WE900 and WX100.