



AEROSPACE MATERIAL SPECIFICATION

AMS03-040**REV. A**Issued 2016-03
Stabilized 2017-03

Superseding AMS03-040

Electrodeposition of Zinc-Nickel Alloys

RATIONALE

AMS03-040A stabilizes this document because this document contains mature technology that is not expected to change and thus no further revisions are anticipated.

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AMS2417 Plating, Zinc-Nickel Alloy

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FOREWORD

REVISION NOTE

Deliberately left blank; no previous issues.

HISTORICAL RECORD

This standard supersedes the following:

Def Stan 03-40 Issue 1, 25 July 2008

INTRODUCTION

This Standard has been introduced to provide the requirements for the electrodeposition of zinc-nickel coatings. Zinc electrodeposits have been employed for a considerable time and are covered by AMS03-20/Def Stan 03-20. Electrodeposited zinc-nickel alloys have been developed to yield superior corrosion resistance than is afforded by unalloyed zinc coating. In the context of identifying alternatives to cadmium deposition (see Def Stan 03-36), which is the subject of increasingly stringent legislation, zinc-nickel electrodeposition represents one alternative that can be considered for many cadmium-substitution applications.

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1. SCOPE

This SAE Standard specifies the guidance and the requirements for the electrodeposition of zinc-nickel alloy coatings on a range of metallic substrates for the provision of corrosion resistance to steel components and galvanic compatibility between some bi-metallic contacting surfaces.

2. WARNING

This section which appeared in Def Stan 03-40 has been deliberately deleted.

3. NORMATIVE REFERENCES

3.1 The publications shown below are referred to in the text of this standard. Publications are grouped and listed in alpha-numeric order.

BS EN ISO 1463	Metallic and Oxide Coatings. Measurement of Coating Thickness. Microscopical Method
BS EN ISO 2177	Metallic Coatings, Measurement of Coating Thickness. Coulometric Method by Anodic Dissolution
BS EN ISO 2178	Non-magnetic Coatings on Magnetic Substrates. Measurement of Coating Thickness. Magnetic Method
BS EN ISO 2360	Non-Conductive Coatings on Non-Magnetic Electrically Conductive Basis Materials. Measurement of Coating Thickness. Amplitude Sensitive Eddy Current Method
BS EN ISO 3497	Metallic Coatings. Measurement of Coating Thickness. X-Ray Spectrometric Methods
BS EN ISO 3543	Metallic Coatings. Measurement of Coating Thickness. Beta Backscatter Method
BS EN ISO 6507-1	Metallic Materials. Vickers Hardness Test. Test Method
BS EN ISO 9227	Method for Salt Spray Corrosion Tests in Artificial Atmospheres
BS ISO 9588	Metallic and other inorganic coatings – post-coating treatments of iron and steel to reduce the risks of hydrogen embrittlement
BS 6338	Chromated Conversion Coatings on Electroplated Zinc and Cadmium Coatings
Def Stan 03-2	Cleaning and Preparation of Metal Surfaces
AMS03-2	Cleaning and Preparation of Metal Surfaces
Def Stan 03-4	The Pre-treatment and Protection of Steel Items of Maximum Tensile Strength Exceeding 1450 MPa
AMS03-4	The Pre-treatment and Protection of Steel Items of Maximum Tensile Strength Exceeding 1450 MPa
Def Stan 03-20	Electro-deposition of Zinc
AMS03-20	Electro-deposition of Zinc
Def Stan 03-21	Mechanical Methods for the Inducement of Compressive Surface Residual Stresses
Def Stan 03-36	Guidance to the Use of Cadmium Alternatives in the Protective Coating of Defence Equipment

Def Stan 03-38 Guidance for the use of Alternatives to Hexavalent Chromium for the Protective Coating of Defence Equipment

Def Stan 03-41 Trivalent Chromium Passivation Treatments for Electrodeposited Zinc-Base Coatings

3.2 This section which appeared in Def Stan 03-40 Issue 1 has been deliberately deleted.

3.3 This section which appeared in Def Stan 03-40 Issue 1 has been deliberately deleted.

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4. ABBREVIATIONS

The following abbreviations are used in this Standard:

HV	Vickers Hardness Number
Micron	Micrometer, 1×10^{-6} m
NSS	Neutral Salt Spray Test
TDS	Total Dissolved Solids content of water
UTS	Ultimate Tensile Stress
XRF	X-Ray Fluorescence

5. DEFINITIONS

5.1 For the purpose of this Standard, the following definitions apply:

5.2 PROCESS CONTROL SCHEDULE

The document which specifies/defines:

- a. the sequence of manufacturing operations and processes
- b. the control parameters and their tolerances for each individual within the total sequence

5.3 SIGNIFICANT SURFACE

That area of the item, covered or to be covered by the coating, and for which the coating is essential for serviceability and/or appearance and where the coating must meet all of the specified requirements.

5.4 SHOT PEENING

Impingement of a stream of spherical particles on to the surface to be coated in order to produce compressive stresses in the surface regions of the substrate metal.

5.5 TENSILE STRENGTH OF STEELS

5.5.1 Throughout this Standard the tensile strength figures refer to specified maximum tensile strength. Steels shall be categorized according to specified maximum tensile strength in accordance with Table 1. Where the steel strength is available only as the minimum tensile strength, the equivalent maximum tensile strength category shall be determined from Table 1.