



Standard Practice for Applying Non-Electrolytic Conversion Coatings on Magnesium and Magnesium Alloys¹

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1. Scope

1.1 This practice covers a guide for metal finishers to clean and then provide a paint base for the finishing of magnesium and magnesium alloys using chemical conversion coatings. Where applicable (for example, aerospace) secondary supplementary coatings (for example, surface sealing) can be used (see [Appendix X1](#)).

1.2 Although primarily intended as a base for paint, chemical conversion coatings provide varying degrees of surface protection for magnesium parts exposed to indoor atmosphere either in storage or in service under mild exposure conditions. An example is the extensive use of the dichromate treatment (see [5.2](#)) as a final coating for machined surfaces of die cast magnesium components in the computer industry.

1.3 The traditional numbering of the coating is used throughout.

1.4 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.5 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 The following documents form a part of this practice to the extent referenced herein.

2.2 *ASTM Standards:*²

[D1732 Practices for Preparation of Magnesium Alloy Surfaces for Painting](#)

¹ This practice is under the jurisdiction of ASTM Committee B08 on Metallic and Inorganic Coatings and is the direct responsibility of Subcommittee B08.07 on Conversion Coatings.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

2.3 *SAE Standard:*³

[AMS 2475 Protective Treatments—Magnesium Alloys](#)

2.4 *Military Specifications:*⁴

[MIL-M-3171 Magnesium Alloy, Processes for Pretreatment and Prevention of Corrosion on](#)

[DTD 911 \(British\), Protection of Magnesium-Rich Alloys Against Corrosion](#)

[DTD 5562 \(British\), Clear Baking Resin for Surface Sealing Magnesium](#)

[DTD 935 \(British\), Surface Sealing of Magnesium Rich Alloys](#)

3. Significance and Use

3.1 The processes described in this practice clean and provide a paint base for the finishing of magnesium and magnesium alloys. Service conditions will determine, to some degree, the specific process to be applied.

4. Reagents

4.1 The chemicals that are used to formulate and control the processing solutions are listed in [Table 1](#). Commercial grade chemicals are satisfactory. The concentrations stated for chemicals that are normally supplied at less than a nominal 100 % strength are those typically available. Other strengths may be used in the proportions that yield the specified processing concentrations. Unless otherwise stated all solutions are made up using water.

5. Types of Coating

5.1 *Chrome Pickle (Traditional Number 1) Treatment (See Practices [D1732](#)):*

5.1.1 With slight variations this treatment can be applied to all alloys and forms of magnesium. The treatment removes up to 15 μm of metal per surface, 30 μm per diameter. Therefore, it may not be applicable to machined surfaces with close tolerances. Parts with steel inserts may be processed, but some slight etching of the steel surface may occur.

³ Available from Society of Automotive Engineers (SAE), 400 Commonwealth Dr., Warrendale, PA 15096-0001, <http://www.sae.org>.

⁴ Available from Standardization Documents Order Desk, DODSSP, Bldg. 4, Section D, 700 Robbins Ave., Philadelphia, PA 19111-5098, <http://dodssp.daps.dla.mil>.