



Zinc Phosphate for Purchased Parts

1 Scope

This specification details the general material performance and paint layering compatibility, for approval of zinc phosphate conversion coatings on purchased parts.

1.1 Material Description. This specification encompasses a crystalline zinc phosphate conversion coating for ferrous, Zinc and Aluminum substrates. Zinc phosphate is used for corrosion protection and to promote paint adhesion.

1.2 Symbols. Not applicable.

1.3 Applicability. This specification applies to zinc phosphate conversion coating materials that are intended for use on purchased parts. These coatings must provide a crystalline, corrosion-resistant, paint adhesion promoting surface to the substrates shown in Table 1.

2 References

Note: Only the latest approved standards are applicable unless otherwise specified.

2.1 External Standards/Specifications.

ISO 3892 ISO 9717

2.2 GM Standards/Specifications.

GMW2	GMW14270	GMW14829	GMW15282
GMW8	GMW14700	GMW14872	GMW16823
GMW3059	GMW14729	GMW15192	GMW17405

3 Requirements

3.1 Requirements on Test Specimens.

3.1.1 Chemical Fingerprint. GM may conduct analyses of the materials supplied to this specification. Analyses may also be performed on representative panels. The analyses established for initial approval shall constitute a reference standard and shall be part of the submission package. Information on the technology's ingredient formulation ranges and manufacturing Key Control Characteristics (KCC) must be provided as part of the submission package. If a product change is proposed that is outside the technology formulation limits, the applicable GM Materials Engineer must be notified. All ingredient ranges, key manufacturing control limits, and Certificate of Analysis ranges must pass standard gage repeatability and reproducibility studies.

3.1.2 Delivery Documentation. The supplier shall be responsible for submitting a Certificate of Analysis with each batch of material arriving at a plant. This document shall be prepared and provide data in accordance with the requirements detailed in GMW17405.

3.1.3 Product Information. The GM Materials Engineer responsible for technical qualification shall be contacted prior to test initiation. A product data sheet, product composition, and all related product processing information must be submitted for review at that time.

3.2 Test Panel Preparation.

3.2.1 Test Panel Substrates. The specific substrate types to be used are shown in Table 1.

- Cold Rolled Steel (CRS)
- Hot Dip Galvanized (HDG) Steel
- Aluminum (Al)

Table 1: Test Panel Substrates

Type	Specification(Reference)
CRS	GMW2
HDG	GMW8
Al	GMW15192 (X611,AA6016, or AA6061)

Note: Additional substrates may be required by the GM Materials Engineer facilitating the approval testing.

3.2.2 Additional Test Panel Substrate Requirements.

- **Thickness:** 0.75 mm to 0.90 mm
- **Roughness:** Test panels are to meet a profilometer Ra roughness per GMW16823 Table 2 titled Surface Roughness and Peaks/cm Requirements for Sheet Steel. Initial test panel roughness must be recorded prior to any coating applications. A 2.5 mm bandwidth cutoff is to be used

3.2.3 Sample Size. For each test condition, three (3) samples are required unless a different quantity is determined by mutual agreement with the applicable GM Materials Engineer. All substrates, pretreatments and coating layers shall be fully identified with source, product code, batch number, bake description and film build. Test panel dimensions are to be 200 mm × 100 mm.

3.2.4 Aging. When testing over fully layered panels, the samples shall be subject to an aging period of at least 72 h at room temperature following the final layer bake cycle.

3.2.5 Paint System to be Applied. The decision regarding the required paint system to be applied to the test panels, Electrodeposition Primer (ELPO) and topcoat shall be agreed upon by the responsible engineer and supplier prior to initial testing. All test panels have to be prepared with an approved non-chrome passivation material. The applicable GM Materials Engineer and supplier shall agree upon the selection of the passivation material.

3.3 Test Panel Conditions. Test methods and performance requirements are shown in Appendix A, Table A1.

3.4 Physical Requirements.

3.4.1 Accelerated Corrosion Testing. GM laboratory cosmetic corrosion testing is required. All test cycles must achieve the equivalent of five (5) years cosmetic corrosion exposure minimum. Creep is to be evaluated using GMW15282 (maximum peak to maximum peak). Laboratory testing is per GMW14872, EXT, Exposure C.

3.4.2 Phosphate Crystal Size. The phosphate crystal morphology shall exhibit a maximum, predominant crystal size of 25 µm. Voids or streaking are not permitted. However, primary body and body metal components are to target crystal sizes in the range of 2 µm to 10 µm.

3.4.3 Phosphate Coating Weight. Phosphate coating weight is to be determined using ISO 3892 and ISO 9717. These coating weight requirements are substrate dependent and must comply with the limits shown in Table 2.

Note: Phosphate coatings nucleated by zinc based, and other Rapid Nucleating Conditioner (RNC) materials, will conform to the coating specifications shown under columns identified as RNC in Table 2. Phosphate crystal size range for RNC will be 1 µm to 10 µm.