



Thin Film; Nanometers Thick (NT) Pretreatment Generic Qualifications

1 Scope

This specification details the general material performance, compatibility, and processing information requirements for international corporate approval of Nano Ceramic Conversion Coatings.

1.1 Material Description. Materials qualified to this standard shall meet the performance shown in Appendix A, Table A1. Additional testing and any exceptions to the requirements detailed herein are noted in the Appendix A. Suppliers must demonstrate the technology as being production capable to reduce undue risk prior to release in a production facility. Any material development issues, such as chemical or performance values that fall outside of specified ranges, must be discussed with the appropriate material engineer for resolution. Material must successfully complete a production trial in a target facility prior to release for general use.

1.2 Symbols. Not applicable.

1.3 Applicability. This specification applies to Nano Ceramic Conversion Coating materials that are intended for use on automotive vehicles. These coatings must provide a corrosion resistant, paint adhesion promoting surface to bare Cold Rolled Steel (CRS), Electrogalvanized (EG) coated steel, Hot Dipped Galvanized (HDG) coated steel, Galvanneal (GA)/Zinc-Iron Alloy (ZnFe), and Aluminum (Al) substrates.

1.4 Remarks. In the event of any conflict between the English and domestic language regarding this document, the English language will take precedence. The Nanometers Thick (NT) process bath material is qualified to this standard. However, make-up and replenishment chemicals are to be referenced to this document as well. All chemical materials used in this continuous pretreatment process must be provided by the same supplier.

2 References

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

2.1 External Standards/Specifications.

None

2.2 GM Standards/Specifications.

GMW2	GMW8738 (ID)	GMW14829	GMW15282
GMW8	GMW14270	GMW14872	GMW16170
GMW11	GMW14700	GMW14873	
GMW3059	GMW14704	GMW15192	

(ID) = This standard is limited to internal distribution within General Motors and shall not be distributed outside this company. Contact the GM Lead Engineer for further instructions.

2.3 Additional References.

- Surface Coatings Process Control Relationships (SCPCR) Manual

3 Requirements

3.1 Requirements on Test Specimens. Not applicable.

3.1.1 Chemical Fingerprint. GM may conduct analysis of the materials supplied to this specification. Analysis may also be performed on representative panels. The analysis 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 key manufacturing control characteristics must be provided as part of the submission package. If a product change is proposed that is outside the technology formulation limits, the responsible Manufacturing Engineering (ME) Vehicle Systems (VS) Global Paint Subject Matter Expert (SME) must be

notified. All ingredient ranges, key manufacturing control limits, and certificate of analysis ranges must pass standard gage repeatability and reproducibility study.

3.1.1.1 Delivery Documentation. The supplier shall be responsible for submitting a certificate of analysis with each batch of material arriving at a plant.

3.1.2 Physical Requirements.

3.1.2.1 Product Information. The responsible engineer 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.

3.1.2.2 Mini-Submissions. Some approvals will require mini submissions when only minor changes are made to previously approved NT materials. Tests may be added or deleted according to the degree of material modification. These shall be determined prior to testing by agreement between the supplier and responsible ME VS Global Paint SME.

3.1.2.3 Panel Preparation. The specific number and substrate combinations to be evaluated are shown in Table 1. A maximum profilometer roughness of 0.8 μm to 1.25 μm is allowed on the test substrates. Initial test panel roughness must be recorded prior to any coating applications.

The decision regarding the required paint system of the panels, Electro-deposition Primer (ELPO), and topcoat, shall be agreed upon by the responsible ME VS Global Paint SME and the supplier prior to initial testing.

3.1.2.4 Test Substrates. Table 1 outlines the material type/test substrates and durability requirements. Test substrate thickness requirement is: 0.6 mm to 0.90 mm.

Table 1: Substrate Combinations

Material Type/Test Substrates	Old	New
Cold Rolled Steel (CRS)	SAE 1008 or ST 1405	GMW2
Electrogalvanized (EG) Steel	QS 1010ZZ	GMW11
Hot Dip Galvanized (HDG) Steel	Not applicable	GMW8
Galvanneal (GA) (Zinc-Iron Alloy, ZnFe)	Not applicable	GMW8
Aluminum (Al)	AA5182	GMW15192M AL-S-5000-xxx
Aluminum (Al)	AA6016	GMW15192M AL-S-6000

Note: Other aluminum alloys such as AA5754, AA5083 and/or others may be requested for testing as needed. These alloys should be included as part of the plant specific testing when appropriate.

3.1.2.5 Sample Size. The number of samples for each test shall be three (3), unless the responsible ME VS Global Paint SME and the supplier agree on a different number for specific tests, prior to the start of testing. All substrates, pretreatments, and coating layers shall be fully identified with source, product code, batch number, bake description and film build.

3.1.2.6 Conditioning. 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 bake cycle.

3.1.2.7 Storage Requirements. The materials approved to this standard must be stable for 365 days, at + 5 °C to +35 °C. To validate this capability, test panels must be able to pass all initial test requirements after 365 days storage in the application facility (i.e., assembly plant). If there is any disagreement with these requirements, the supplier must contact the responsible ME VS Global Paint SME.

3.1.2.8 Appearance. Upon visual inspection (without magnification), the NT coating on samples shall be smooth and uniform prior to the application of subsequent layers.

3.1.2.9 Nano Ceramic Coating Thickness/Coating Weight. The NT coating weight or thickness is to be determined using an approved X-Ray Fluorescence (XRF) device. Certified calibration standards are required