



Coating, High-temperature Resistant

1 Scope

1.1 Material Description. This specification covers two types of high-temperature resistant, anti-corrosion coating. Type A is a black coating that is usually applied by a spray operation. It is capable of withstanding temperatures up to 450 °C without a loss of corrosion-resisting properties. Higher test temperatures are permissible in consultation with the responsible Materials Engineer. Type B coating can withstand high temperatures up to 600 °C without adverse effects.

Note: Type B should not be specified on vehicles that are intended for use in countries that apply salt to roads in winter.

1.2 Symbols. Not applicable.

1.3 Typical Applications. These coatings are typically used for visible exhaust system components such as tailpipes and the side and bottom portions of mufflers and may be applied to stainless steel, aluminized stainless steel, or aluminum.

1.4 Remarks. Only the substrate/paint combinations that are shown in the Approved Source List shall be used. When material approval testing is performed, each test must be completed on a minimum of three panels.

2 References

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

2.1 External Standards/Specifications.

ISO 4628-2

2.2 GM Standards/Specifications.

GMW3059

GMW14700

GMW14829

GMW3286

GMW14729

2.3 Additional References.

TMC003 Material Safety Data Sheet guidance documents (available at www.gmsupplypower.com).

Approved Source List (available in MATSPC).

3 Requirements

3.1 General.

3.1.1 Coatings shall be free of Chrome VI.

3.1.2 Chrome VI used as an adhesion promoter is not permitted.

3.1.3 Post-treatments. Post-treatments, if performed, shall be Chrome VI free.

3.2 Appearance. The cured coating shall be homogeneous and free of impurities. It shall be black in color and have a smooth, flat finish unless specified otherwise on the part drawing.

3.3 Requirements Specific to Type A Coatings. Production part performance tests have been incorporated into this specification in 3.3.1.2, 3.3.3.2 and 3.3.4.2. Any conflicting performance testing which is specified on the drawing supercedes these tests.

3.3.1 Neutral Salt Spray Resistance.

3.3.1.1 Test Panels. Test panels as prepared in 3.5.2 and 3.5.3.1 shall withstand 168 h of neutral salt spray exposure per GMW3286. The panels from 3.5.2 shall neither develop any base metal corrosion nor exhibit film

breakdown, porosity, adhesion loss, blisters, or wrinkles, exclusive of sharp edges and handling damage. The panels from 3.5.3.1 shall not exhibit more than 10% base metal corrosion (red or white, depending on substrate) after salt spray exposure.

3.3.1.2 Production Parts. Production parts shall withstand 168 h neutral salt spray exposure per GMW3286. Parts shall neither develop any base metal corrosion nor exhibit film breakdown, porosity, adhesion loss, blisters, or wrinkles, exclusive of sharp edges, welds, and handling damage.

3.3.2 Thermal Cycle Test. Test panels as prepared in 3.5.3.1 shall withstand the five thermal cycles without a significant loss of color or adhesion. Acceptance is to be determined by the GM Materials Engineer.

3.3.3 Humidity and Tape Adhesion.

3.3.3.1 Test Panels. Panels prepared in 3.5.2 and 3.5.3.1 shall withstand 96 h humidity exposure per GMW14729. After humidity, the coating shall not exhibit any blistering, wrinkling, etc. The coating shall exhibit a rating of at least 1 when tape tested per GMW14829 after humidity exposure (cohesive failures are allowed).

3.3.3.2 Production Parts. After exposure to 96 h humidity per GMW14729, the coating on production parts shall not exhibit any blistering or wrinkling; however, within 30 mm of mechanical and welded joints, blisters a maximum size of 2 mm and density of 3 mm per ISO 4628-2 are allowed. The coating shall exhibit at least a rating of 1 when tape tested per GMW14829 after humidity exposure (cohesive failures are allowed).

3.3.4 Chip Resistance.

3.3.4.1 Test Panels. Panels as prepared in 3.5.2 and 3.5.3.1 shall withstand gravelometer exposure per GMW14700, Method A or Method B. Panels from 3.5.2 shall exhibit a gravelometer rating of 6 or better. Heat-cycled panels from 3.5.3.1 shall exhibit a gravelometer rating of 8 or better.

3.3.4.2 Production Parts. Samples cut from production parts shall exhibit a rating of 6 or better after gravelometer exposure per GMW14700, Method A or Method B.

3.4 Requirements Specific to Type B Coatings.

3.4.1 Thermal Cycle Test. Prepare test panels or production parts by scribing the panel or part with an "X" per GMW14829, Method B. Expose each of the samples to 30 minutes at 600 °C and then test adhesion. Expose each of the same samples to 24 h at 300 °C and test adhesion again.

There shall be no adverse effects such as material breakdown, color change, or appearance change. Check tape adhesion per GMW14829 after cooling to ambient temperature at the end of each exposure. Allowable loss of adhesion is less than 1.5 mm peelback.

3.4.2 Humidity and Tape Adhesion. Test panels or production parts per GMW14729 for 24 h. There shall be no blisters or objectionable defects which may affect appearance or serviceability. Scribe the samples per GMW14829, Method B before exposure. Tape test after ten minutes recovery period at the end of exposure. Allowable loss of adhesion is less than 1.5 mm peelback.

3.5 Test Panel Preparation, Both Types. Standard size laboratory test panels shall be used for evaluation. Panel preparation is as follows:

3.5.1 Painting. Each distinct substrate/paint combination shall be prepared for testing as specified by the paint supplier. Preparation shall be capable of being reproduced in a production process.

3.5.2 Aging. Painted panels from 3.5.1 shall be allowed to age at room temperature for 72 h.

3.5.3 Heat Cycling.

3.5.3.1 Type A Panels. Panels from 3.5.2 shall be subjected to the following heat/quench cycle:

3.5.3.1.1 Bake in a 450 °C oven for 30 minutes, then water quench (<5 °C), holding panels in the water until they reach water temperature. Repeat five times. For the first bake cycle, it is acceptable to ramp up the oven from room temperature to 450 °C with the panels inside, then hold at temperature for a full 30 minutes. For subsequent cycles, the panels must remain in the furnace for the full 30 minutes before quenching.

3.5.3.2 Type B Panels. After exposure to conditions in 3.4.1, follow with exposure to 3.4.2. There shall be no adverse effects such as material breakdown, color change, or appearance change. Allowed loss of adhesion is 1.5 mm peelback maximum.