



Black Anodized Aluminum Bar Coded Plates

1 Scope

This standard gives the requirements of the anodized aluminum which has been colored black by electrolytically depositing a cobalt or tin mineral salt at the base of the anodized layer and then sealed. It also gives durability requirements of the laser bar and Quick Response (QR) coded plates made from the material. The objective is to make certain that the purchased material will respond properly to the laser and make bar codes that are readable by typical scanning devices for 20 years.

1.1 Material Description. Not applicable.

1.2 Symbols. Not applicable.

1.3 Applicability. Vehicle Identification Number (VIN) tags attached to instrument panel.

2 References

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

2.1 External Standards/Specifications.

ASTM B137	ASTM D523	ISO 2808	ISO 7724-1
ASTM B680	ISO 1463	ISO 2813	SAE J1545

2.2 GM Standards/Specifications.

GMW3059	GMW14124	GMW14458
GMW3417	GMW14162	GMW14729

2.3 Additional References.

- Aluminum Association Standards.

3 Requirements

3.1 Base Metal. The base metal shall be 0.45 mm to 0.56 mm thick anodizing quality aluminum alloy AA 5005-H34 or equivalent if agreed to by GM Materials Engineering.

3.1.1 Chemical Composition. The chemical composition shall meet limits given in the Aluminum Association Standards.

3.1.2 Mechanical Properties. The mechanical properties of the aluminum sheet shall meet limits for tensile strength, yield strength and elongation as given in the Aluminum Association Standards.

3.2 Coating Properties.

3.2.1 Coating Thickness. The coating thickness shall be 5.5 μm to 7.0 μm on the front side of the material and 5.5 μm minimum on the back side of the material. Film thickness shall be measured by microscope method (ISO 1463) or by eddy current method (ISO 2808). In case of disagreement between purchaser and supplier the microscope method shall be the preferred method.

3.2.2 Corrosion Resistance.

3.2.2.1 There shall be no base metal corrosion or coating degradation after 3 h in Copper Accelerated Acetic Acid Salt Spray (CASS) test when conducted per GMW14458.

3.2.2.2 Bar and QR coded plates shall be readable by the bar code scanner after 6 h in CASS test when conducted per GMW14458. The plates may have to be lightly wiped to remove deposits before reading.

3.2.2.3 There shall be no base metal corrosion or coating degradation after 5 cycles of an environmental corrosion cycle test per GMW14124, Cycle G.

3.2.3 Seal Quality. The maximum Acid Dissolution Test (ADT) rating shall be 6.0 when tested as per ASTM B680 and calculated as per the following equation:

$$Rating = \frac{w_1 - w_2}{w_1 - w_3} \times 7.8 T$$

Where:

- $w_1 - w_2$ = Weight of coating in milligrams (mg), dissolved in chromic-phosphoric acid solution as per ASTM B680.
- $w_1 - w_3$ = Total coating weight in milligrams (mg) as per ASTM B137.
- T = Coating thickness in micrometers (μm)

3.2.4 Colorfastness in Humidity. There shall be no detrimental change in coating color or appearance after 72 h at 100% Relative Humidity (RH) per GMW14729 Option A or Option B.

3.2.5 Weathering. There shall be no detrimental change in color, gloss or reflectance of the white etched surfaces or the black background after 5000 kJ/m² exposure per GMW14162 cycle D (accelerated weathering), and 100 000 Temperature Normalized Radiation (TNR) Langley (4200 TNR mJ/m²) per GMW3417 L1, F2, G1, T5 (natural weathering).

3.3 Surface and Finish Requirements.

3.3.1 Gloss. The 60 degree gloss of the black surface shall be 20 ± 5 with the grain of the material when tested per ASTM D523 or ISO 2813.

3.3.2 Color. The CIELAB (L*a*b* color space) color of the black surface shall be L - 20 ± 1 , A - 0.8 ± 0.2 , and B - 0.0 ± 0.3 when tested per SAE J1545 or ISO 7724-1.

3.3.3 Color Match. The black material shall match the appropriate Finish Standard, available from Finish and Textile Engineering of the vehicle group.

3.4 Testing. The tests are shown in Table 1. Tests indicated by a D shall be performed for initial coating system approval. Tests indicated by a Q shall be performed routinely on every lot of material after the coating system has been approved. Bar coded plates shall be fastened with production rivets to painted steel panels for all testing, except Acid Dissolution Test. All bar coded plates shall be readable by the bar code scanner after completing the specified tests.

Table 1: Testing Requirements

Requirements	Black Stock	Bar-coded
3.2.1 Thickness	Q, D	-
3.2.2.1 CASS (3 h)	Q, D	-
3.2.2.2 CASS (6 h)	-	D
3.2.2.3 Corrosion Cycle	-	D
3.2.3 Acid Dissolution	Q, D	D
3.2.4 Humidity	-	D
3.2.5 Xenon (5000 kJ/m ²)	-	D
3.2.5 Arizona	-	D
3.3.1 Gloss	Q, D	-
3.3.2 Color	Q, D	-
3.3.3 Color Match	Q, D	-