GM	WORLDWIDE ENGINEERING STANDARDS	Material Specification	GMW16056

Bumper Quality Steel Sheet for Decorative Plating or Painting

1 Scope

Note: Nothing in this standard supercedes applicable laws and regulations.

Note: In the event of conflict between the English and domestic language, the English language shall take precedence.

1.1 Material Description. This specification covers surface requirements for Hot Rolled (HR) or Cold Rolled (CR) sheet steel that is to be electroplated with nickel and chromium or painted for decorative purposes.

1.2 Symbols. Not applicable.

1.3 Applicability. Decorative nickel-chromium plated or painted steel is often used for truck bumpers.

1.4 Remarks. For general requirements regarding plating, GMW14672 requirements must be met.

2 References

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

2.1 External Standards/Specifications.

ASTM E112	SAE J911

2.2 GM Standards/Specifications.

GMW2	GMW11	GMW3059	GMW14672
GMW8	GMW3032	GMW3224	

2.3 Additional References. None.

3 Requirements

3.1 Requirements on Test Specimens.

All decorative plating requirements for this specification may be met either by mill rolling practice (Type A) or by polishing of steel coils or blanks (Type B). Type B finish is required for chrome plating of HR steel, and is typically used for CR steel. Steel used for exposed, painted bumpers shall meet the Type C finish requirements.

Steels covered by this specification may be any of those listed in and approved to GMW2 and GMW3032.

3.2 Mechanical Properties. Steels must meet the minimum 0.2% offset yield strength and tensile strength mechanical property requirements in GMW2 (low carbon HR or CR grades) or GMW3032 (Low Alloy (LA), Bake Hardenable with 2% pre-strain (B2) or Re-phosphorized (P) grades). Additionally, temper rolling is required in order to eliminate Yield Point Elongation (Lüders Lines) in the formed product. Therefore, the maximum yield strength requirement will be waived. The minimum elongation and minimum n-value shall be negotiated between the steel supplier and the bumper manufacturer.

3.3 Grain Size. The grain size shall meet the following requirements based on the specified substrate:

GMW2: Must meet the grain size requirements for GMW2 HR and CR substrates.

GMW3032: Must meet the grain size requirements for GMW3032 HR and CR substrates.

All grain size measurements shall be done in accordance with ASTM E112.

Note: For best surface appearance after forming, steels of at least 240 MPa yield strength are recommended.

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3.4 Appearance. Stamped steel surfaces that are decorative plated or painted must be capable of meeting part appearance requirements as defined by a master sample. Decorative plated bumpers shall meet the specified standard as agreed between purchaser and supplier, once plated per GMW14672 requirements. Post-forming metal finishing may be used on selected surfaces to meet appearance or corrosion requirements for decorative plated bumpers.

3.5 Surface Quality. Surface shall be free of pits, laminations, inclusions, pickups, or other defects which may affect appearance, durability, or function, once plated in accordance with GMW14672 or painted and as agreed between supplier and purchaser.

3.5.1 Bumper quality steel furnished to this standard shall utilize temper rolled steel to sufficiently eliminate stretcher strain (Lüders Lines) in the formed bumper product, denoted by the "T" surface finish in the specification callout (see Section 8). Use of bumper quality steel does not necessarily preclude the need for post-forming/pre-plating or painting metal finish in local areas to meet appearance requirements.

3.6 Surface Finish. Measurements per SAE J911. (Ra and RPc shall be measured using a 0.8 mm filter cutoff).

3.6.1 Decorative Plated Bumper Steel. If type of finish (A or B) is not specified, Type A shall be assumed.

3.6.1.1 Type A (Mill Finish). All temper rolled steel supplied under this specification shall have the following surface finish: Ra 0.9 µm (35 µin) maximum, and Rm 80 µm (300 µin) maximum.

3.6.1.2 Type B (Flat Polished). Steel blanks shall be finished using a combination dry and wet abrasive belt sequence to Ra 0.3 µm (12 µin) maximum and Rm 3 µm (118 µin) maximum, prior to forming. To allow for metal removal in flat polishing, the upper tolerance limit per GMW3224 is increased by 0.07 mm.

3.6.2 Painted Bumper Steel.

3.6.2.1 Type C (Painted Bumpers). CR or HR steel shall be capable of being painted to meet finished part quality requirements. The surface finish of steel to be used for painted bumpers shall have a Surface Roughness (Ra) of 0.5 µm to 1.3 µm and a Peak Count (RPc) of > 40.

3.6.2.1.1 Coating Requirements. Refer to coating requirements in GMW8 for hot dipped coatings and GMW11 for electro galvanized coatings, if applicable. Coating requirements include, but are not limited to coating composition, coating mass, and coating adhesion.

3.7 All materials supplied to this standard must comply with GMW3059, Restricted and Reportable Substances, including the requirement to obtain a GM-approved International Material Data System (IMDS) submission.

4 Manufacturing Process

Not applicable.

5 Rules and Regulations

5.1 Legal Regulations. All materials must satisfy applicable laws, rules, regulations and recommendations valid in the country of usage.

5.2 Language. In the event of conflict between the English and domestic language, the English language shall take precedence.

5.3 Inspection and Rejection. Samples of components or materials released to a GM material specification shall be tested for conformity with the requirements of this material specification and approved by the responsible Engineering department prior to commencement of delivery of bulk supplies.

A new approval must be received for any changes, e.g., properties, manufacturing process, location of manufacture, etc. If not otherwise agreed, all testing and documentation normally required for initial release must be completed.

It is the responsibility of the supplier to inform the customer in a timely manner, without solicitation, and to include documentation of all modifications of materials and/or processes and to apply for a new release.

5.4 Material Safety Data Sheets/Safety Data Sheets (MSDS/SDS). For new product submissions, or when a change in chemical composition of an existing product has occurred, a complete copy of the Material Safety Data Sheet/Safety Data Sheet must be submitted in compliance with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS) requirements or other country-specific MSDS/SDS requirements.

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