



Sealer – Preformed, Expanding, High Bake, Tacky

1 Scope

This specification details the requirements of a sealer material that is tacky for adhesion to metal, and will expand at high bake conditions. The sealer may be formed into a part that is attached to a body panel at a subassembly source or in the assembly plant body shop, prior to the assembly plant paint shop. The material expands and cures in the paint shop electrocoat oven. The material is intended to seal interior and exterior body joints against water, dust, and air intrusion.

Parts constructed with high expanding versions of these sealers are referred to as baffles, and are used to fill cross sections in body cavities and reduce airborne noise.

1.1 Material Description. Materials approved to this standard are tacky on one (1) side. Tacky sealer materials, formed into parts, are applied directly to oily metal. They must remain in position in the uncured state up to and throughout the pretreatment and electrocoat processes.

1.1.1 The sealer material must adhere to production oily metal, such as cold rolled steel (CRS), hot dipped galvanized metal/electrocoat (HDG/ELPO) substrates and other (i.e., aluminum (AL)), as specified by the requesting GM Engineer.

1.1.2 The sealer material must not accelerate rusting of the metal steel over which it is applied.

1.2 Symbols. Not applicable.

1.3 Applicability. These materials are typically applied manually, in the body shop. These materials are not intended to be weldable or fuel resistant, or applied in the paint shop.

1.4 Remarks.

1.4.1 Technology Approval Documentation. At the conclusion of testing to this specification, the supplier must provide a document package per 1.4.1.1 and 1.4.1.2.

1.4.1.1 Product Data. Documentation of all attributes and test results, per Section 3 and Section 4 of this specification. All test panels should be detail identified and photographed for full documentation. Additional information may be requested by the responsible GM Engineer, including manufacturing site and, trend charting of these attributes over an extended period of production material runs.

1.4.1.2 Bake Charts. Provide bake window charts that identify the Bake conditions where the sealer does meet and no longer meets, requirements. Key Product Characteristics to include at minimum: Volumetric Expansion and Initial Adhesion. The chart is to reflect:

- Time at metal temperature on x-axis (minimum range: 0 minutes to 90 minutes).
- Temperature on y-axis (minimum range: 150 °C to 205 °C).

Additional direction to be provided by the approving material engineer. See Table 1.

Table 1: Sealer Expansion Types

Type	Expansion Range, Percent (%)
A	100 to 199
B	200 to 299
C	300 to 399

Type	Expansion Range, Percent (%)
D	400 to 499
E	500 to 699
F	700 to 899
G	≥ 900
H	< 100

2 References

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

2.1 External Standards/Specifications.

ASTM D1475 EPA Method 24

2.2 GM Standards/Specifications.

GMW2	GMW3059	GMW14706	GMW16152
GMW8	GMW3205	GMW14729	GMW16269
GMW11	GMW3221	GMW15477	GMW16584
GMW3008	GMW3232	GMW15481	GMW17056
GMW3016	GMW14124	GMW15735	

2.3 Additional References.

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

3 Requirements

Unless otherwise specified, the following requirements must be met. All testing shall be performed with materials that are representative of production processes.

3.1 Physical Requirements.

3.1.1 Specific Gravity (ASTM D1475). The specific gravity of the uncured material shall be reported. A specific gravity range will be set at the time of approval and become a requirement for the material. A typical specific gravity is 0.54 kg/L (1.2 lbs/gal) in the uncured state.

3.1.2 Odor (GMW3205). The material shall have a neutral odor that is not unpleasant in the uncured condition and material must not adversely affect those personnel handling it.

3.1.3 Flame Resistance (GMW3232). The material shall resist 50 passes with an open flame and be self-extinguishing.

3.1.4 Plant Emissions Volatile Organic Compounds (VOC) (GMW3016 and EPA Method 24, for U.S). Test and report per the Productive Material Review Process (PMRV).

3.1.5 Solids Content. The solids content must be ≥ 97% of the material mass.

3.1.6 Smoking Resistance. The sealer must not smoke at ≤ 177 °C, with slight smoke allowed at > 177 °C.

3.1.7 Tack. Tack is either satisfactory or not satisfactory. Press a piece of material 10 mm × 25 mm × 25 mm onto an oily metal panel and hold for 2 s. When the finger is lifted off, there shall be no material transfer to the skin nor lifting of the sealer from the panel. The oiled panel shall be prepared per GMW16269.

3.1.8 Expansion. Sealer shall display controlled expansion that is smooth and uniform after all bake conditions. Cell structure shall be closed cell, uniform, and free of large voids. Sealer shall show no loss of expansion or detrimental effects from subsequent bakes.

3.1.8.1 Volumetric Expansion. (GMW15481). Report the volumetric expansion for the material after each of the bakes per Table 3. The volumetric expansion at the Target bake shall be used to determine the approval category per Table 1.

3.1.8.2 Volumetric Expansion Range. The volumetric expansion range shall be calculated using a tolerance of $\pm 25\%$ based on the volumetric expansion at Target bake, and will become a requirement for the material. For example: if a material has an average of 120% volumetric expansion at Target bake, the calculated volumetric expansion range will be 90% to 150%. The volumetric expansion measured for the material shall be contained within the volumetric expansion range after each of the specified bake conditions (Minimum, Target, Maximum and Full System). The volumetric expansion of the material shall be contained within the volumetric expansion range when measured at any point within the bake window defined by the following four (4) points:

- Minimum time/temperature.
- Minimum time/Maximum temperature.
- Maximum time/Minimum temperature.
- Maximum time/Temperature per Table 3.

3.1.8.3 Vertical Expansion/Ramp Expansion (GMW17056). After baking a set of samples at Minimum and Maximum Bakes per Table 4, vertical expansion shall be reported. A vertical expansion range will be established at the time of material approval, and must be fulfilled by the product for all future deliveries.

3.1.8.4 Horizontal Expansion/Bridging (GMW16584). After baking a set of samples at Minimum and Maximum Bakes per Table 4, horizontal expansion shall be reported. A horizontal expansion range will be set at the time of approval, and must be fulfilled by the product for all future deliveries.

3.2 Performance Requirements.

3.2.1 Test Panel Preparation.

3.2.1.1 Sealer Test Specimens. Condition sealer test specimens per GMW3221

3.2.1.2 Test Panels. Prepare test panels per GMW15477, with a minimum of (3) panels per 3.2.2 and 3.2.3.

3.2.1.2.1 Test Panel Substrates. Testing shall be completed with the substrates in Table 2. For oily metal without ELPO, use two (2) challenging lubricants as specified by the approving material engineer. For ELPO panels, use one (1) widely used per GMW3008, as specified by the approving material engineer. ELPO coating shall be Target film thickness and Target bakes.

Table 2: Substrates ^{Note 1}

Oily Cold Rolled Steel (CRS) (GMW2)
Oily Hot Dipped Galvanized Steel (HDG) (GMW8), 60 g/m ² galvanized coating weight
Oily Electrogalvanized Steel (EG) (GMW11), 60 g/m ² galvanized coating weight
Oily CRS (GMW2) with co-processed Electrocoat

Note 1: Corrosion testing is not required with Oily CRS. Other substrate conditions may be added, per requesting GM Engineer (i.e., AL, Magnesium (Mg)).

3.2.1.3 Test Panel Configurations. Non-Tacky sealers shall be tested partially constrained. All expansions > 0%, as defined in GMW15477.

3.2.2 Test Panel Bake Conditions. All bakes are specified as times at metal temperature as shown in Table 3.