



Hot Melt Frame Wax

1 Scope

1.1 Material Description. This specification describes a black hot melt wax which provides a protective coating on vehicle frames and chassis components.

Two (2) wax types are described, a standard wax (GMW17220) and a low temperature wax (GMW17220 LT). All wax shall be standard wax, GMW17220, unless specifically noted on the contract, drawing or purchase order.

1.2 Symbols. Not applicable.

1.3 Applicability. Vehicle frames and chassis components.

2 References

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

2.1 External Standards/Specifications.

ASTM D92	ASTM D1321	ASTM D3236	ASTM G154
ASTM D792	ASTM D1475	ASTM E28	

2.2 GM Standards/Specifications.

GMW2	GMW3359	GMW14729	GMW15289
GMW3059	GMW14270	GMW14872	GMW15357
GMW3286	GMW14700	GMW15282	GMW16745

2.3 Additional References.

- Part No. 11561302
- Part No. 11546368
- Part No. TLF-16100
- Part No. TLF-16101

3 Requirements

3.1 All materials supplied to this standard must comply with GMW3059, **Restricted and Reportable Substances**, including the requirement to submit a full material composition disclosure to GM via the International Material Data System (IMDS) or via a completed GMW3059 report form

3.2 Physical Properties. See Appendix A, Table A1. Physical properties apply to both standard and low temperature wax unless specifically noted. The coating shall be 100% solids with no solvents. It shall contain no asphalt or fibrous fillers. It shall be non-toxic and non-injurious to plant personnel.

3.3 Wax Temperature Properties.

3.3.1 Standard Wax. The standard wax will be drip resistant to 124 °C as applied to production frames.

3.3.2 Low Temperature (LT) Wax. The LT wax will be drip resistant to 77 °C as applied to production frames.

3.4 Thickness. The film will be a measured average of 75 µm to 125 µm thick in an area no closer than 305 mm from a leading edge and not near any thin area or runs (example: holes). The coating shall be measured on a vertical surface in relation to dip position of the frame.

3.4.1 Film Thickness Measurements. Film thickness is to be measured using an electronic gauge capable of measuring non-conductive coatings over steel. The probe should be non-destructive and capable of measuring

film builds of 0 μm to 1500 μm . Apply minimal pressure to the wax when measuring to prevent the gauge from damaging the wax. A polyester film spacer may be used. Measure the wax thickness in the specific areas using reference photos or as noted in 3.3.

3.5 Performance Requirements.

3.5.1 Performance Properties. Performance properties and procedures described in Table A2 shall be met on all test panels. Performance properties apply to both standard and low temperature wax unless specifically noted.

3.5.2 Test Panels. Substrate panels for all performance testing shall be 1.5 mm to 3 mm thick by 75 mm to 101 mm $\times$ 150 mm to 305 mm steel per GMW2M-ST-S-HR (for example: ACT Part No. 11817, 102 mm $\times$ 305 mm, or Part No. 12137, 102 mm $\times$ 152 mm). The test panel shall be alkaline cleaned and rinsed prior to all testing. The test panels shall be processed following production preheat and coating parameters to obtain an average thickness of 75 μm to 125 μm .

3.5.2.1 Welded Test Panels. A weld bead as described in Figure A1 is applied to test panels as described in 3.4.2. The weld bead is applied prior to cleaning and coating with hot melt wax.

3.5.3 Test Methods. The following notes describe the test requirements and procedures in addition to the requirements listed in Table A2.

3.5.3.1 Aging Prior to Test. Test panels prepared as described in 3.4.2 shall be aged 72 h at room temperature after coating prior to any testing.

3.5.3.2 Poultice Testing. Test panels described in 3.4.2 shall be poultice tested using the media described in Table 1. Apply poultice and expose panels to the cycles described following the table.

Table 1: Poultice Media

Material	Percent (%) Mass
Sand	70.0
Fire Clay	24.0
Sodium Chloride	1.2
Calcium Chloride	4.7
Ferric Chloride	0.1

One cycle of the poultice, humidity and thermal cycle test consists of the following:

- 16 h humidity at 100% relative humidity (RH) and 38 °C (GMW14729)
- 2 h at -20 °C
- 2 h at room temperature (+25 °C)
- 4 h at +70 °C for Standard Wax and +60 °C for Low Temperature Wax

3.5.3.3 Chip Resistance. Expose panels per GMW14700, Method A or B. Use test panels as prepared in 3.4.2. Rate panels using Table A4 and Figures A2 through A11.

3.5.3.4 Corrosion.

3.5.3.4.1 Cyclic Corrosion Testing. For initial source qualification, test per GMW14872, Underbody, all, four salt sprays (4 sp), Method 1/2, Exposures 0, A, D, and E. Use test panels as prepared in 3.4.2.1 and as exposed to Chip Resistance per 3.4.3.3.

3.5.3.4.2 Salt Spray. Coated panels described in 3.4.2 should be exposed to 1000 h salt spray per GMW3286.

3.5.3.5 Detergent and Car Wash Resistance.

3.5.3.5.1 Detergent Wash Resistance. Immerse test panels as prepared in 3.4.2 in detergent solution at +50 °C. (Detergent solution is composed of 2.5 g No.7 Car Wash Concentrate (Cyclo Industries), or equivalent, per liter of water), rinse under spray nozzle (Spray Systems Company, Full Jet No.1/2 GG-25, or equivalent) at +50 °C water temperature, 70 kPa water pressure and 250 mm between the spray nozzle and the panel per the following cycle:

Immersion 5 minutes

Rinse	1 minute
Immersion	10 minutes
Rinse	2 minutes
Immersion	10 minutes
Rinse	2 minutes

3.5.3.5.2 Car Wash Resistance. The material shall be resistant to warm car wash spray without removal. Expose panels as prepared in 3.4.2 to modified GMW16745. Modification is spray temperature of +45 °C, flow rate of 6 L/minute, pressure of 8000 kPa, spray distance of 300 mm, and spray time of 60 s which consists of 10 passes over 305 mm (12 in) panel.

3.5.3.6 Ultraviolet Light Testing. Use test panels as prepared in 3.4.2. Perform 100 h of testing per ASTM G154 at 50 °C with humidity temperature of +46 °C. Expose panel to 336 h salt spray per GMW3286.

3.5.3.7 Wax Heat Resistance. Test panels prepared as described in 3.4.2 and 3.4.3.8.1 shall show no dripping when coated and tested to the temperature cycle of GMW15289 at the temperatures shown in Table A3.

3.5.3.7.1 Poultice Sticking. Evenly apply 50 g of ground poultice by shaking to panels as prepared in 3.4.2. Heat panels horizontally in an oven at +70 °C for Standard Wax and +60 °C for Low Temperature Wax, for 24 h. Remove and cool. Poultice should show no signs of coating and should be removed with washing without coating damage.

3.5.3.8 Immersion Cold Crack Environmental Cycles. Subject panels prepared as in 3.4.2 and 3.4.3.8.1 to the following Immersion, Cold Crack Environmental Cycles: The test panels shall be aged 72 h at room temperature (25 °C) after the initial scribe per GMW15282.

One cycle shall consist of the following exposure:

- 16 h immerse in water at +25 °C
- 4 h at -20 °C
- 4 h at +25 °C (bench top)
- Following exposure at +25 °C (bench top), perform a 275 kPa (40 psi) air blow-off on each panel
- Air blow the entire scribe line with a Binks Model 152 or 190 gun (3 mm round orifice) held 5 mm to 10 mm above and approximately 45 degrees to the surface

Expose panels to 10 cycles. Examine panels for any cracking of the film and adhesion loss after each cycle. Wax film shall remain crack free and adherent. Cracks which occur around holes are acceptable.

3.5.3.8.1 Heavy Film Builds Application. Coat panel described in 3.4.2 to 960 µm to 1060 µm by dipping inverted room temperature panel in recommended wax application temperature for no more than 5 s. Remove panel and let wax congeal 10 minutes at room temperature.

3.5.3.9 Stability Requirement.

3.5.3.9.1 Standard Wax. After three (3) months of constant, slow agitation at the application temperature of +160 °C, there should be no significant change in performance as measured by hardness (needle pen) and viscosity. After three (3) weeks of storage at application temperature, there should be none to minimal indications of hard settling or stratification and no significant change in performance as measured by hardness (needle pen) and viscosity.

3.5.3.9.2 Low Temperature Wax. After three (3) months of constant, slow agitation at the application temperature of +120 °C, there should be no significant change in performance as measured by hardness (needle pen) and viscosity. After three (3) weeks of storage at application temperature, there should be none to minimal indications of hard settling or stratification and no significant change in performance as measured by hardness (needle pen) and viscosity.

3.5.3.10 Relaxation Requirement. For qualification of new coatings or new processing. Relaxation testing shall be conducted as described in Appendix B. Relaxation limit is listed in Appendix A, Table A2.

4 Manufacturing Process

4.1 Application.

4.1.1 Standard Wax. The coating shall be applied over heated (+150 °C to +190 °C), alkaline cleaned and rinsed bare steel in a hot dip system (+150 °C to +170 °C) to form an adherent low gloss film.

4.1.2 Low Temperature Wax. The coating shall be applied over heated (+115 °C to +140 °C), alkaline cleaned and rinsed bare steel in a hot dip system (+115 °C to +140 °C) to form an adherent low gloss film.

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.

5.5 All materials supplied to this standard must comply with the requirements of the International Material Data System (IMDS) and GMW3059, **Restricted and Reportable Substances**.

6 Approved Sources

Materials supplied to this specification must be approved by General Motors.

A list of approved materials can be found in GM Materials Approved Source List. To access this list, reference GMW14270 for latest location. This GM material file is provided to third parties to reduce redundant testing of materials. If an approved material is used, the part supplier can use the GM material file reference for Production Part Approval Process (PPAP) material approval. If the decision is made to use a not yet approved material, contact Materials – Finishes & Coatings Global Subsystem Leadership Team (GSSLT) for details on the approval process. The material approval process must be completed prior to PPAP start date of the part supplied to General Motors.

7 Notes

7.1 Glossary. Not applicable.

7.2 Acronyms, Abbreviations, and Symbols.

#	Number
4 sp	Four salt spray
cP	centipoise
GHS	Globally Harmonized System of Classification and Labeling of Chemicals
GSSLT	Global Subsystem Leadership Team
IMDS	International Material Data System
kN	kilonewton
LV	Brookfield Torque Range
LT	Low Temperature
MSDS	Material Safety Data Sheet

No.	Number
PPAP	Production Part Approval Process
RH	Relative Humidity
rpm	revolution per minute
SDS	Safety Data Sheet

8 Coding System

This standard shall be referenced in other documents, drawings, etc., as follows:

Material per GMWW17220

Or

Hot Melt Wax per GMW17220

Or

Low-Temperature Hot Melt Wax per GMW17220LT

9 Release and Revisions

This standard was originated in August 2014. It was first approved by the Materials – Finishes & Coatings Global Subsystem Leadership Team in December 2014. It was first published in December 2014.

Issue	Publication Date	Description (Organization)
1	DEC 2014	Initial publication.
2	DEC 2017	Added new product code. (Materials – Finishes & Coatings GSSLT)