GM	WORLDWIDE ENGINEERING STANDARDS	Material Specification	GMW16133

Flame Treatment Surface Preparation for Plastic Parts

1 Scope

1.1 Material Description. This specification covers the requirements for the flame treatment surface preparation of plastic parts. A flame treatment is required to enhance adhesion of the coatings to non-polar plastic surfaces. Suitable flame treatment may eliminate a priming step in the coating process.

1.1.1 Surface preparation is part of a total painted product system and must meet requirements set forth in this specification and those shown in engineering drawings. This specification shall be used in conjunction with the Approved Paint on Parts System (APOPS), a section of the MATSPC system, which lists approved substrate, cleaning preparation, priming and topcoat combinations.

1.2 Symbols. Not applicable.

1.3 Applicability. Painted Thermoplastic Polyolefin (TPO) Parts, painted wheel covers, etc.

1.4 Remarks. Not applicable.

2 References

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

2.1 External Standards/Specifications.

None

2.2 GM Standards/Specifications.

GMW3059 GMW14797 GMW15777

2.3 Additional References.

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

3 Requirements

3.1 Processing Requirements. The following minimum requirements shall be met for the flame treatment surface preparation of plastic parts for subsequent painting operations.

3.1.1 Surface Preparation. Prior to flame treatment, plastics should be power washed and dried thoroughly. Any deviation from this process must be approved by the responsible GM Materials Engineer.

3.1.2 Additional Requirements: Equipment. The following minimum requirements shall be met for the flame treatment unit used in the surface preparation of plastics.

3.1.3 Conveying System. An automatic conveying system shall be installed to transport the part through the cleaning, flaming and paint process. Any handling by hand between the steps is not allowed**.**

3.1.4 Air Gas Ratio. Flame treatment system shall be equipped with an Air Gas Ratio measurement system, which is controlled by mass flow rate or pressure.

3.1.5 Flame to Part Surface Distance. The distance depends on the flame equipment unit and the part surface geometrie and must be chosen in appropriate manner. The mechanical handling system of the flame treatment device shall be capable of profiling the part's surface. The burner flame shall be stable and have uniform ionization throughout the operating length of the flame head.

3.1.6 Residence Time. The mechanical handling system of the flame treatment device shall be capable of maintaining a constant speed relative to the surface. Additionally, profiling of the parts surface shall be uniform, without voids or overlapping of treatment.

© Copyright 2014 General Motors Company All Rights Reserved

Documents
Document Sharing Hub

Copyright General Motors Company
Provided by IHS Markit under license with General Motors Company
Reproduction, distribution or publication of these standards is expressly prohib
Licensee=/, User=,
Not for Resale,
Full document details: GMW GMW16133 2014

3.1.7 Parts Monitoring. The systems should be interfaced with the other relevant equipment on-line to ensure that each part that passes through the treating booth area is treated to a program conclusion. Failure to identify this critical control interface may result in untreated parts passing through the system undetected.

3.2 Performance Requirements. The effectiveness of the flame treatment shall be demonstrated through changes in the surface energy of the parts and, more importantly, through acceptable adhesion of the paint to the part. Used in this context, adhesion of paint is intended to encompass adhesive failures between paint and plastic, as well as cohesive failure within the plastic's upper surface layer that may be attributable to the use or misuse of the flame treatment process. Acceptable adhesion of paint to the part shall be met on all surfaces. Tests for adhesion shall include short and long term tests.

3.2.1 Adhesion of Paint. Parts must meet the requirements of GMW14797 on either all program colors or a minimum of four top coated colors. Additionally, if the part supplier also ships part in primer only, primed parts painted with an approved After Sales Paint System shall also meet these requirements:

3.2.2 Surface Tension. To be deemed effective, the flame treatment must cause an increase in the surface tension of the part by ≥ 15 mN/m. The surface tension of the part shall be 45 mN/m minimum upon presentation of those parts for subsequent painting operations. To prevent loss of the treatment's effectiveness, time between treatment and subsequent painting operations should be minimal. Additionally, the area through which the parts are transported between the flame treating and painting operations should be enclosed and restricted to prevent contamination to or handling of the part's surface. Following the flame treatment operation and prior to painting, the surface tension shall not decrease more than 5 mN/m. Surface tension measurements shall be determined using certified standard test inks with remaining shelf life. Cleaning of the parts following flame treatment is prohibited unless said cleaning is proven to not interfere with the effectiveness or paint adhesion of the parts.

3.2.3 Appearance. The flame treatment operation shall not degrade the visible surface appearance of the plastic part in any way. This degradation may include but is not limited to surface distortions, reflow waves, and sink holes or non-uniformity in reflectivity. Finished parts must meet the requirements of GMW15777 after topcoat.

3.3 Dimensional Stability. The flame treatment operation shall in no way cause the dimensional characteristics of the part to vary beyond the normal control limits set forth for that part and its prescribed process.

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.

If not otherwise agreed, all release tests shall be repeated and documented by the supplier prior to commencement of delivery of non-conforming bulk supplies. In individual cases, a shorter test can be agreed to between the responsible Engineering department and the supplier.

© Copyright 2014 General Motors Company All Rights Reserved

Documents
Document Sharing Hub

Copyright General Motors Company
Provided by IHS Markit under license with General Motors Company
Reproduction, distribution or publication of these standards is expressly prohib
Licensee=/, User=,
Not for Resale,
Full document details: GMW GMW16133 2014