GM	WORLDWIDE ENGINEERING STANDARDS	General Specification	GMW16732

Interior Colored, UV Stabilized, Coated Silicone Rubber Button Pad Material Performance

1 Introduction

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 Purpose. This standard covers the material performance requirements for color-matched, soft-feel, coated silicone rubber buttons used in lower or moderate ultraviolet (UV) stability and temperature locations of the vehicle interior. These buttons are color-matched and UV-stable, and the coating may be multi-colored layers and laser etched for graphics and backlighting. This specification excludes thermoplastic elastomer buttons and painted rigid buttons; those are covered by typical GM raw material specifications for thermoplastics, paint and GMW14444 for part performances.

1.2 Applicability. OnStar buttons, universal home remote system buttons, key fobs, steering wheel and door switches.

1.3 Remarks. Not applicable.

2 References

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

2.1 External Standards/Specifications.

AATCC 23	ISO 48	ISO 815-1
FMVSS 302	ISO 105	ISO 23529
ISO 37	ISO 188	ISO 7724-1

2.2 GM Standards/Specifications.

9981062	GMW3221	GMW14124	GMW14729
B 440 0029	GMW3232	GMW14125	GMW14829
GMW3059	GMW3235	GMW14445	GMW15634
GMW3205	GMW3402	GMW14162	

2.3 Additional References.

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

3 Test Preparation and Evaluation

3.1 Resources.

3.1.1 Calibration. The test facilities and equipment shall be in good working order and shall have a valid calibration label.

3.1.2 Alternatives. Alternative test facilities and equipment may also be used. However, all measuring variables as specified in this standard shall be determined correctly with respect to their physical definition.

3.1.3 Facilities. Conforming to the relevant test procedure and to the test sketches on the part drawings.

3.1.4 Equipment. Conforming to the relevant test procedure and to the test sketches on the part drawings.

3.1.5 Test Vehicle/Test Piece. Unless otherwise specified, the shape, size and number of test pieces shall be in accordance with the relevant test procedures.

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Samples are finished parts or to be taken from finished parts. (Where the dimensions on the finished parts do not allow preparing of test pieces, tests shall be performed on sheet material of same production batch. The same state of cure between slabs or buttons and finished parts must be assured by appropriate tests, which must be described in the test report.)

If not otherwise stated, mechanical properties in delivery state and after heat immersion shall be tested at (+23 ± 5) °C and with the same test methods. Unless otherwise stated, ambient temperature test conditions shall be held to (+23 ± 5) °C. Unless otherwise stated, all other temperatures except (+23 ± 5) °C shall be held to ± 3 °C.

3.1.1.1 A minimum of three (3) test samples are required for initial sample testing. A minimum two (2) test samples are required for inspection testing.

3.1.1.2 For Design and Product Validation, test pieces shall be cut from at least three (3) finished parts; for routine quality control from at least one (1) finished part.

3.1.6 Test Time. Not applicable.

3.1.7 Test Required Information. As specified in the relevant Test Methods.

3.1.8 Personnel/Skills. As specified in the relevant Test Methods.

3.2 Preparation. As specified in the relevant Test Methods.

3.3 Conditions. The minimum time between manufacturing and testing shall be 72 h.

3.3.1 Environmental Conditions. Conditioning shall be as specified in the relevant Test Methods.

3.3.2 Test Conditions. Deviations from the requirements of this standard shall have been agreed upon. Such requirements shall be specified on component drawings, test certificates, reports, etc.

3.4 Instructions. Not applicable.

3.5 Data. Not applicable.

3.6 Safety. This standard may involve hazardous materials, operations, and equipment. This standard does not propose to address all the safety problems associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

3.7 Documentation. Samples of components or material released to this standard shall be tested for conformity with the requirements of this standard and approved by the responsible GM Department prior to the start of delivery of production level components or materials.

Any change to the component or material, e.g., design, function, properties, manufacturing process and/or location of manufacture requires a new release of the product. It is the sole responsibility of the supplier to provide the customer, unsolicited, with documentation of any change or modification to the product/process, and to apply for a new release.

If not otherwise agreed to, the entire verification test shall be repeated and documented by the supplier prior to start of delivery of the modified or changed product. In some cases, a shorter test can be agreed to between the responsible GM department and the supplier.

3.7.1 Test Results. With reference to this standard the test results shall be presented in a test report.

4 Requirements and Procedure

4.1 General. All materials tested to this specification shall be conditioned for 24 h according to GMW3221 Code B. The minimum time between vulcanization / coating and testing of elastomers shall be 72 h.

4.2 Coatings. Coatings shall be silicone- or polyurethane-based, non-abrasive, and uniform in color, finish and texture. Coatings must meet the requirements of color and gloss as established by GM Appearance Engineering. The coating shall be approved by GM Appearance Engineering. The coating system shall be identified by layers, color, and dry film thickness on the engineering drawing. The coating thickness, specifically the dry film thickness, shall be documented by measurement for initial approval. The method of cure shall be documented for initial approval.

4.3 Material and Performance Requirements. Material requirements are summarized in Table 1 through Table 3.

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4.4 Design Validation Testing. Material properties (material approval) are summarized in Table 1, Coating Requirements are summarized in Table 2, and Part Performance requirements are summarized in Table 3. For full approval of a compound compliance to the requirements of Table 1 to Table 3 is needed.

4.5 Product Validation Testing. If not defined otherwise, the following testing should be done for production audit testing: All tests on VMQ material per Table 1, Coating Adhesion in as received condition, Resistance to Rubbing in dry condition and Coating Cure Test to Table 2.

4.6 Audit/Inspection Testing. If not defined otherwise, the following testing should be done for production audit testing: All tests on VMQ material per Table 1, Coating Adhesion in as received condition, Resistance to Rubbing in dry condition and Coating Cure Test to Table 2.

Table 1: Requirements to the Silicone Rubber (VMQ)

Property	Test Method	Unit	Value
Hardness			
	ISO 48 Method M	IRHD	60 ± 5
Elongation at Break			
	ISO 37, Type 4 dumb-bell, (200 ± 20) mm/minute	%	200 minimum
Tensile Strength			
	ISO 37, Type 4 dumb-bell, (200 ± 20) mm/minute	MPa	5 minimum
Age Resistance			
	ISO 188 Method B, (168 /-2) h at (+100 ± 3) °C Change of hardness	IRHD	+ 5 maximum
Compression Set			
	ISO 815-1 test piece Type B Note 1, test piece cut from finished part part thickness is test piece thickness (+100 ± 3) °C, (24 /-2) h, 25 % compressed	%	30 maximum

Note 1: The reference to ISO 815 indicates the test piece diameter and refers to the calculation of the results. But test pieces shall be taken from finished part in product thickness.

Table 2: Requirements to the Coating

Property	Test Method	Unit	Value
Coating Adhesion			
	GMW14829 Method A (cross hatch) as received after 24 h to GMW14729 Option A resp. B Test after (60 /+5) minutes after (168 /-2) h at (+85 ± 3) °C to ISO 188 Method B Test after 8 h minimum		 Rating 1 maximum Rating 1 maximum Rating 1 maximum
Resistance to Rubbing			
	GMW14125 Coding I X7 10 000 cycles dry wet with acid perspiration solution to ISO 105-E04 with basic perspiration solution to ISO 105-E04		 no topcoat wear through Note 1 no other adverse effects

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