



Test of Switch and Switch Mounting Interface

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 specification establishes the test conditions and requirements for testing interior switch interfaces to confirm the ability of the switch to be fully actuated in a variety of interior applications with consideration of dimensional variation and cavity combinations. This is done by switch/button actuation and release at vehicle operation temperatures. It applies to an assembled part where a trim plate surface is adjacent to the moving component of the switch.

1.2 Applicability. All interior interfaces between switches and switch mountings.

1.3 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

2.3 Additional References.

Best Practice KPAC IPTRIM-58 in Auros Active Knowledge System

3 Test Preparation and Evaluation

3.1 Resources.

3.1.1 Facilities. GM certified testing facility.

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

3.1.1.2 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.

3.1.2 Equipment.

3.1.2.1 Climatic chamber that is large enough to accommodate the test apparatus.

3.1.2.2 Durability test stand.

3.1.3 Test Vehicle/Test Piece. The test piece (sample) is an interior switch with the mating interior trim plate or panel. The test method, samples size, and criteria are determined by the criteria listed in Table 1.

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Table 1: Test Methods

Method	Standard Test Sample Quantity	Recommended Conditions	Dimensional Requirements
1	Minimum of 6	Small, low cost parts	If there are three or more parts in assembly, a dimensional analysis of the switch gap shall be performed and provided by the dimensional engineer. Reference Appendix B.
2	1	- Large and/or high cost parts such as electronic modules or decorative trim - Three or more parts in assembly - Tool cavitation of a part in the assembly is four (4) or greater - Multiple switches (often called a "switch bank") are interfacing to a single trim plate opening	- Dimensional analysis of the switch gap shall be performed and provided by the Dimensional Engineer. Reference Appendix B. - Part measurements for the features that control the switch to mating part gap are available. Measurements to be provided by the suppliers of each component.

3.1.4 Test Time.

Calendar time: 3 days

Test time: 8 h

Coordination time: 16 h

3.1.5 Test Required Information.

3.1.5.1 Method 1 Part Selection. The number of test samples are listed in Table 2. In the case where there are three or more parts in the assembly, the dimensional analysis shall be reviewed to determine which two parts has the greatest dimensional influence considering the parts dimensional tolerances. See Appendix B, Figure B1 and the program specific assessment of KPAC IPTRIM-58 in the Auros Active Knowledge System (The supplier shall work with the GM Design Responsible Engineer to comprehend this requirement). A minimum of 6 samples from each cavity are to be collected from the parts identified in Table 2. Refer to Appendix A and Table A1 for an example of how to determine the test sample combinations.

Table 2: Test Sample Quantities for Method 1

Tool Cavitation for Two Parts with Greatest Dimensional Influence (Part 1 Cavities, Part 2 Cavities)	Minimum Number of Assembled Test Samples (Part 1 Cavities x Part 2 Cavities x 6)
1, 1	6
1, 2	12
1, 3	18
1, 4	24
2, 2	24 ^{Note 1}
2, 3 ^{Note 1}	36 ^{Note 2}
2, 4	48 ^{Note 2}

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Tool Cavitation for Two Parts with Greatest Dimensional Influence (Part 1 Cavities, Part 2 Cavities)	Minimum Number of Assembled Test Samples (Part 1 Cavities x Part 2 Cavities x 6)
3, 3	54 ^{Note 2}
3, 4	72 ^{Note 2}
4, 4	96 ^{Note 2}

Note 1: See example in Appendix A.

Note 2: Method 2 is recommended due to large test quantity.

3.1.5.2 Method 2 Part Selection. Parts within assembly are selected to achieve a test sample which represents minimal clearances between the moving switch component and its adjacent part. The typical dimensional feature controls that directly influence the gap are component surface profile and positional tolerances. For assistance in determining what dimensional controls need to be considered for part selection, contact the GM Dimensional Engineering team member. The parts to be included in the test sample should be selected from a minimum 20 piece run of measured parts for each component in the assembly. The only exception to this is if a component's contribution to the gap between the moving switch component and adjacent part is 20% or less based on a dimensional Root Sum Square (RSS), three (3) Dimensional Statistical Simulation (3DCS), or Variation Simulation Analysis (VSA). For such components, a single random sample may be selected. See Appendix B and program specific assessment of KPAC IPTRIM-58 in the Auros Active Knowledge System (The supplier shall work with the GM Design Responsible Engineer to comprehend this requirement).

3.1.5.3 Method 1 versus Method 2 Selection. As outlined in Table 1, the general guidelines for the Method selection is determined on availability of a dimensional analysis and measurements, how many parts make up the assembly for testing, and the part costs.

- The primary advantage of Method 1 is the test can be performed without any dimensional analysis or measurements.
- The primary advantage of Method 2 is the Standard Test Sample size is one (1) versus a minimum of six (6) for Method 1.

3.1.6 Personnel/Skills. Not applicable.

3.2 Preparation.

3.2.1 Test Samples. A test sample includes the switch and its interfacing parts which package the switch. New parts shall be used for each test series described in Table 2.

3.3 Conditions.

3.3.1 Environmental Conditions. All performance requirements shall be fulfilled at the following temperatures:

- (+80 ± 3) °C.
- (-30 ± 3) °C.
- (+38 ± 3) °C and 95% Relative Humidity (RH).

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.

The tests are to be performed "at temperature" and are to be conducted in the environmental chamber after an appropriate minimum thermal soak time has been reached. Parts to be tested are not to be thermally soaked and, subsequently, removed from the chamber for the duration of the test, i.e., soaking the parts in the chamber and bringing them into an ambient temperature for the duration of the test is not permissible under this specification. The tests on each part shall be conducted in the order shown in Table 3.

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