



Test of Cup Holder

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 Scope. Applicable for all cup holders.

1.2 Mission/Theme. Checking the cup holder according to various performance criteria.

1.3 Classification.

1.3.1 Fixed Cup Holder, i.e., not foldable or extendable.

1.3.2 Moveable Cup Holder Systems.

1.3.2.1 Swivel system, i.e., a combination of rotating and lifting movements.

1.3.2.2 Drawer system, i.e., part is opened via a lifting movement.

1.3.2.3 Folding system, i.e., part is opened via a folding movement.

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 GMW14264

2.3 Additional References.

Floor Console Best Practices for Container Size

Storage Allocation List

Subsystem Technical Specification Appendix C1

Subsystem Technical Specification Appendix C2

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.

3.1.3.1 Dudenhofen test center or equivalent proving ground (torture track left, Belgian block wave road; Rheinstraße).

3.1.3.2 Climatic chamber.

3.1.3.3 Durability test stand.

3.1.4 Equipment.

3.1.4.1 Tensile/compression gauge with hook and piston with diameters of 10 mm and 20 mm.

3.1.4.2 Caliper gauge.

3.1.4.3 Finished sizes.

3.1.4.4 Steel ruler.

3.1.4.5 Contactless device for measurement of opening time.

3.1.4.6 Weight (500 g).

3.1.4.7 Aluminum fixture of regional container size selected from program Storage Allocation List.

3.1.4.8 One empty and one full commercial European and American 0.33 L and 0.5 L drink cans.

3.1.4.9 Drink container with a total weight of +550 g $\pm$ 5 g by appropriate filling.

3.1.5 Test Vehicle/Test Piece. Cup holder assembly including frame and fastening material.

3.1.6 Test Time. Not applicable.

3.1.7 Test Required Information. Not applicable.

3.1.8 Personnel/Skills. Not applicable.

3.2 Preparation. Not applicable.

3.3 Conditions.

3.3.1 Environmental Conditions. The durability and cycling test may be performed at temperatures representative of vehicle profile (Validation Engineer to use engineering judgment based on materials used). The temperature ranges for the durability and cycling test are described in 3.7.2.2.

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Originating Department: North American Engineering Standards

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Also, engineering judgment (agreement with the Design Engineer (DE) and Design Release Engineer (DRE) of GM), according to the vehicle profile and the value added, is needed to define the temperature range (e.g., $-30^{\circ}\text{C} \pm 3^{\circ}\text{C}$ to $+85^{\circ}\text{C} \pm 3^{\circ}\text{C}$, or as defined in the Subsystem Technical Specification (SSTS)), within the operational performance shall be fulfilled.

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. In some cases, a shorter test can be agreed to between the responsible GM department and the supplier.

3.7.1 Test Results. Variables are provided for values which are not explicitly listed. The required test result values are given in Appendix A Table A2. Deviations of these values are defined in the SSTS Appendix C2, if applicable.

Subjective evaluation shall be made according to GMW14264.

The results shall be entered in the corresponding Data Sheets B1 thru B4 in Appendix B of this document.

3.7.2 Deviations from Test Procedure. Deviations from the requirements of the test procedures shall have been agreed upon. Such requirements shall be specified on component drawings, test certificates, reports, etc.

3.7.2.1 In case nothing else is defined within SSTS Appendix C1 or SSTS Appendix C2, all performance specifications shall be fulfilled within a temperature range of $-30^{\circ}\text{C} \pm 3^{\circ}\text{C}$ to $+85^{\circ}\text{C} \pm 3^{\circ}\text{C}$.

3.7.2.2 The three (3) temperature ranges in Table 1 shall be selected for the tests.

Table 1: Temperature Ranges

-30°C to -25°C
$+20^{\circ}\text{C}$ to $+25^{\circ}\text{C}$
$+75^{\circ}\text{C}$ to $+85^{\circ}\text{C}$

4 Requirements and Procedure

It shall be noted that the procedure for the tests may vary according to the version, system and function.

4.1 General. The cup holder shall be checked for conformance to the current development or release status before each test.

4.1.1 All fasteners shall be present, undamaged and correctly installed. If this is not the case, the fastenings shall be supplemented or corrected. Any modifications shall be noted.

4.2 Actuation Forces. The test of the actuation forces includes the measurement of the:

- Release force
- Opening force (cup holder with pull function)
- Closing force
- Locking force

The tensile/compression gauge with hook or piston with a 10 mm diameter shall be used for measuring the actuation forces.

The measurement shall be performed at the specified measuring points. Each measurement shall be recorded three times.

4.2.1 Measuring Point Specifications.

4.2.1.1 Measuring Line for Tip Function in Swivel and Drawer Systems. The measurement

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shall be performed at the height of the center cup holder panel if no pushing recess has been provided (see Figure 1).

If a pushing recess is provided, it shall determine the height for the points of application (see Figure 1).

4.2.1.2 Measuring Line for Tip Function in Folding Systems. The measurement shall be performed at the height of the maximum distance between the piston and rotation axis, if no pushing recess is provided.

If a pushing recess is provided, it shall determine the height for the points of application.

4.2.1.3 Measurement Line for Pull Function in Swivel, Folding and Drawer Systems. Measurement shall be performed on the provided grip or handle recess, etc. of cup holders which are opened via the pull function.

4.2.1.4 Measurement Points on the Measuring Line.

4.2.1.4.1 Tip Function. For cup holders which are opened via the tip function, measurement of the actuation forces shall be performed along the measuring line, on the left, in the center and on the right of the panel (see Figure 1).

4.2.1.4.2 Pull Function. For cup holders which are opened via the pull function, measurement of the opening and release forces shall be performed in the center of the provided grip or handle recess, etc.

4.2.1.4.2.1 If the grip is > 50 mm, the opening and release forces shall be additionally measured on the left and right of the grip.

4.2.1.4.2.2 Measurement of the closing force shall always be performed at the height of the handle recess, in the center, and on the right and left of the panel.

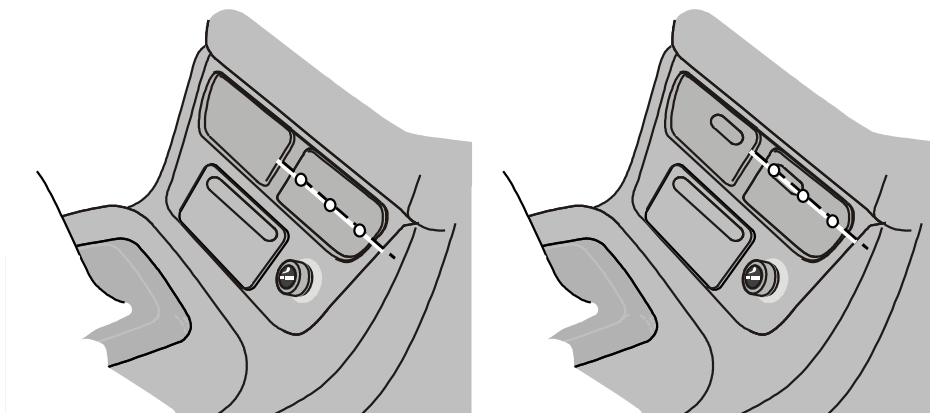


Figure 1: Determining the Measuring Points for the Tip Function (With and Without Handle Recess) in Swivel Systems

4.2.2 Measurement of the Release Force F1. See Table A2 for the required release force, locking force F1. The variable F1 is applicable for all systems.

4.2.2.1 Tip Function. The tensile/compression gauge with piston with a 10 mm diameter shall be used for measurement of the release force in cup holders with tip function.

4.2.2.1.1 The tensile/compression gauge piston shall push the relevant measuring points until the cup holder is released on the panel (see Figure 2).

Care shall be taken to avoid pressing against any existing stops.

4.2.2.2 Pull Function. The tensile/compression gauge with hook shall be used for measuring the release force in cup holders with pull function.

4.2.2.2.1 The hook of the tensile/compression gauge shall be applied to the relevant measuring points in the grip recess of the cup holder and shall pull the cup holder out through the locating device (see Figure 2).

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Documents

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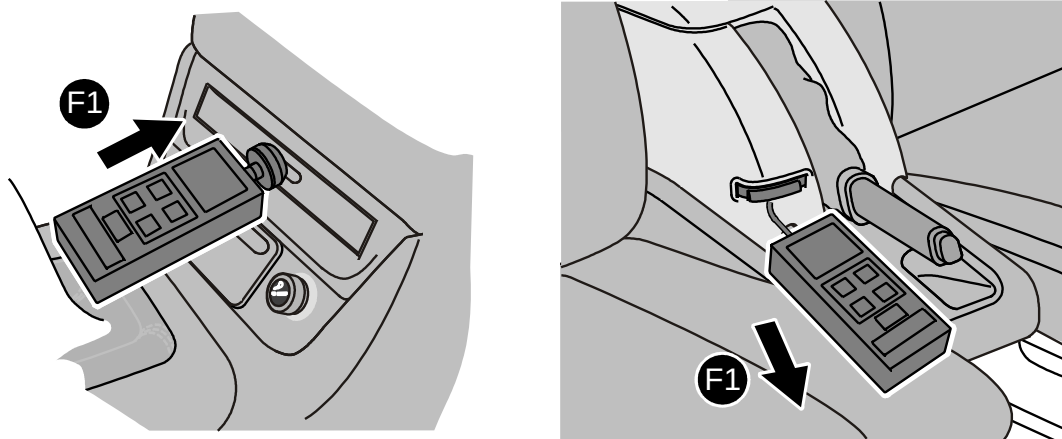


Figure 2: Release Force F1, Cup Holder with Tip/Pull Function Drawer System

4.2.3 Measurement of Locking Force F2. The tensile/compression gauge with piston with a 10 mm diameter shall be used for measuring the locking force.

4.2.3.1 The cup holder shall be closed until just before the locking position.

4.2.3.2 The tensile/compression gauge piston shall be applied to the relevant measuring points and

shall push until the cup holder closes (see Figure 3).

4.2.3.3 Care shall be taken to avoid pushing against any existing stops.

4.2.3.4 See Appendix A Table A2 for the required locking force F2. The variable F2 is applicable for all systems.

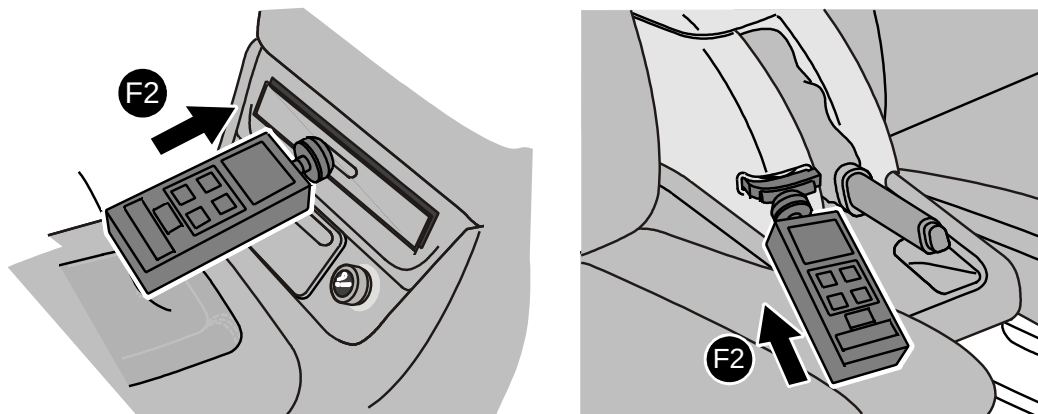


Figure 3: Locking Force F2, Cup Holder with Drawer System

4.2.4 Measurement of Opening Force F3. Measurement of the opening force shall only be performed on non-automatically opening cup holders, i.e., cup holders with pull function.

4.2.4.1 The tensile/compression gauge with hook shall be applied to the grip recess at the relevant measuring points and shall pull the cup holder to the fully opened position (see Figure 4).

4.2.4.2 The cup holder shall be released before the test, i.e., the release distance shall not be taken into account in the measurement.

4.2.4.3 See Appendix A Table A2 for the required opening force F3. The variable F3 is applicable for all systems.

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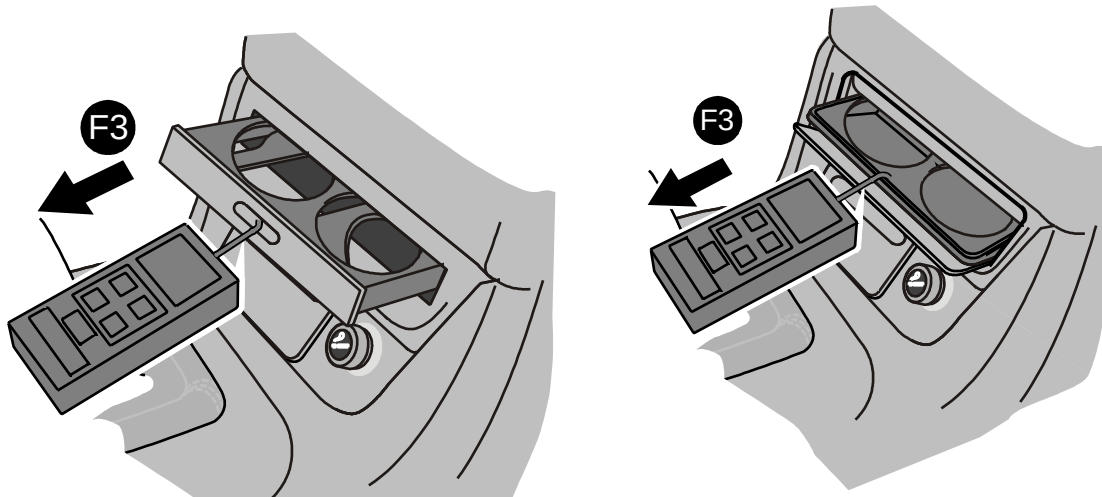


Figure 4: Opening Force F3, Cup Holder with Drawer or Folding System

4.2.5 Measurement of Closing Force F4. The tensile/compression gauge with piston that has a 10 mm diameter shall be used for measurement of the closing force.

4.2.5.1 The tensile/compression gauge piston shall be applied to the relevant measuring points and shall push the open cup holder evenly up to the

locking position, i.e., the measurement shall not be performed in the locking area (see Figure 5).

4.2.5.2 See Appendix A Table A2 for the required closing force F4. The variable F4 is applicable for all systems.

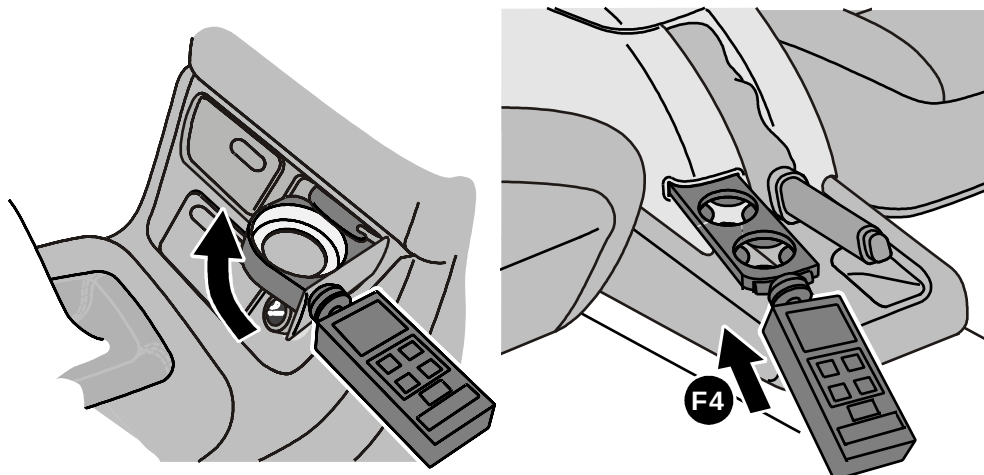


Figure 5: Closing Force F4 in Cup Holders with Swivel or Drawer Systems

4.2.6 Measurement of Clamping Force F5. The tensile/compression gauge with hook shall be used for measuring the clamping force.

4.2.6.1 The hook shall be attached to the empty drinks can. The drink can shall then be pulled

vertically upwards out of the cup holder (see Figure 6).

4.2.6.2 See Appendix A Table A2 for the required clamping force F5. The variable F5 is applicable for all systems.

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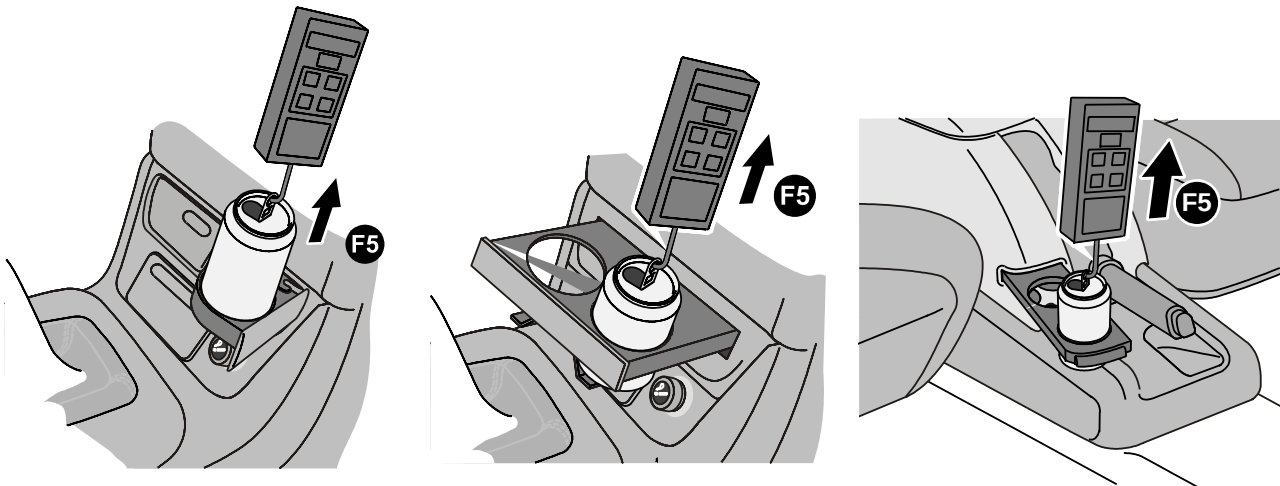


Figure 6: Measurement of Clamping Force F5

4.2.7 Measurement of Push-in Force F6. The tensile/compression gauge with piston that has a 20 mm diameter shall be used for measuring the push-in force.

4.2.7.1 The piston shall push the empty cup that is defined for storage vertically from above into the cup holder (see Figure 7).

4.2.7.2 Reference shall be made to Appendix A Table A2 for the required push-in force F6. The variable F6 is applicable for all systems.

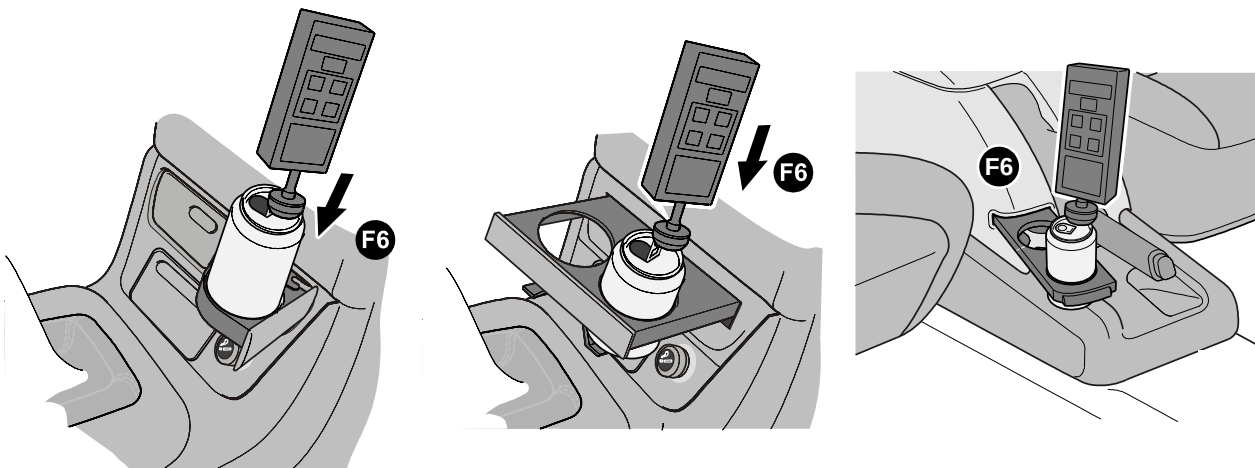


Figure 7: Push-in Force F6

4.3 Continuity.

4.3.1 Downward Vertical Load of the Cup Holder. The cup holder shall be loaded vertically downwards at 3 points of application with the

force F7 using the tension/pressure balance, use a piston diameter of 20 mm (see Figure 8).

4.3.1.1 The points of application shall be located 10 mm from the front edge of the cup holder, in the center, and at the right and left outer ends.

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