



Roof Carrier Static Load Tests

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. To determine if a roof carrier assembly meets the static load requirements specified in the Upper Exterior Trim Subsystem Technical Specification (SSTS) and referenced from DIN 75302 and ISO/Publicly Available Specification (PAS) 11154.

1.2 Applicability. All roof carrier assemblies.

2 References

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

2.1 External Standards/Specifications.

DIN 75302 ISO/PAS 11154

2.2 GM Standards/Specifications.

None

2.3 Additional References.

- Part Number (PN) 19257861, GM Accessory Bicycle Carrier
- Subsystem Technical Specification (SSTS)

3 Resources

3.1 Facilities.

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.

3.2 Equipment.

3.2.1 Wood Board. A wood board with the dimensions, 57 mm × 382 mm × 800 mm, is required for the payload down test.

3.2.2 Test Box. A test box with dimensions shown in Figure 1, may be constructed of plywood (minimum thickness of 20 mm) or steel (minimum thickness of 3 mm), and shall not deflect under load. If distance between outside roof bars is more than 900 mm, the test box length shall be equal to this distance plus 100 mm.

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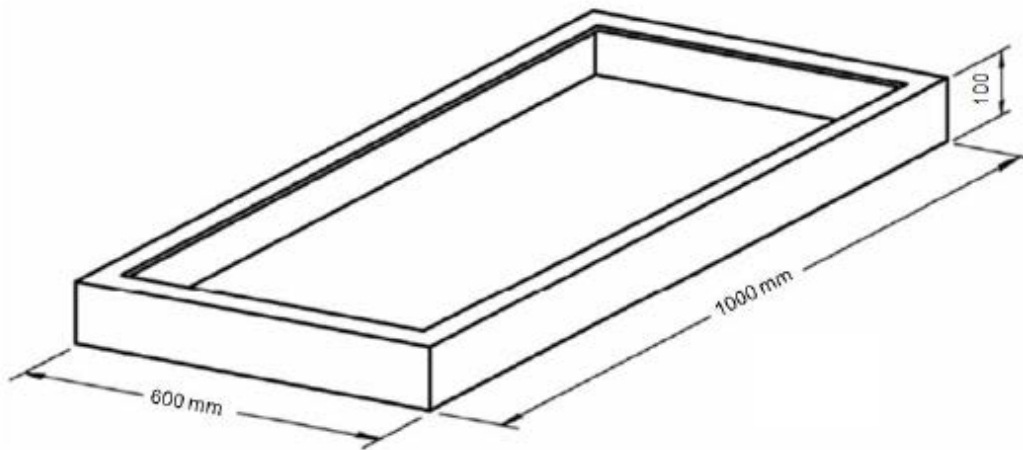


Figure 1: Test Box Dimensions

3.2.3 Nylon Straps. Nylon straps are required to secure the test box to the roof carrier assembly and to perform the stresses from vertical forces test.

3.2.4 Side Force Test Fixture. This fixture represents a side force at the center of gravity of a bicycle as installed to the GM Accessory Bicycle Carrier (PN 19257861). The height of the pull location shall be 490 mm from the top of the test fixture.

3.3 Test Vehicle/Test Piece.

3.3.1 Test Vehicle. A vehicle body or body section cut at the belt line that enables the roof carrier assembly to be attached using the production assembly plant attachment process is required to complete this test.

3.3.2 Test Piece. All roof carrier assemblies are to be Product Validation (PV) level parts manufactured with production tools, using the production process, at the production facility.

3.3.3 Test Piece Quantity. Three (3) roof carrier assemblies. Subject each roof carrier assembly to all static loads outlined in this test procedure.

3.4 Test Time.

Calendar time: 2 d

Test hours: 8 h

Coordination hours: 4 h

3.5 Test Required Information.

3.5.1 Roof Carrier Assembly Class. The class of the roof carrier assembly is to be documented in Data Sheet A1, Appendix A.

3.5.2 Test Loads. The test load for each static load test is defined by roof carrier assembly class as specified in the SSTs.

3.6 Personnel/Skills. Prior experience in setting up and running similar tests and experience in the use of the referenced test equipment is critical to achieving the estimated times shown in 3.4.

4 Procedure

4.1 Preparation. Not applicable.

4.2 Conditions.

4.2.1 Environmental Conditions. All tests are to be run at ambient temperature, $23\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$.

4.2.2 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.

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Table 1: Test Load by Roof Carrier Assembly Class

Test Number	Static Load Test	Class (Maximum Load Capacity)		
		1 (50 kg)	2 (75 kg)	3 (100 kg)
1	Payload Down	Review SSTS	Review SSTS	Review SSTS
2	Forces in Direction of Travel Number 1			
3	Forces in Direction of Travel Number 2			
4	Forces Applied Opposite Direction of Travel Number 1			
5	Forces Applied Opposite Direction of Travel Number 2			
6	Forces 20 Degrees Horizontal to Direction of Travel Number 1			
7	Forces 20 Degrees Horizontal to Direction of Travel Number 2			
8	Stresses from Vertical Forces (Front Cross Loading)			
9	Stressed from Vertical Forces (Rear Crossbar Loading)			
10	Side Wind Forces			
11	Perceived Quality Side Load			
12	Cargo Tie Down Brackets (attached to longitudinal rails)			

4.3 Instructions. The loads in 4.3.1 thru 4.3.11 are to be applied to the roof carrier assembly in the order specified in this document.

4.3.1 Payload Down.

4.3.1.1 Roof Carrier Assembly Attachment. Attach the roof carrier assembly to the vehicle using the nominal specified fastener torques.

4.3.1.2 Cross Bar Position. Position the front cross bar in the most forward position. Position the rearward cross bar 700 mm apart from the forward cross bar.

4.3.1.3 Position Wood Board. Center the wood board per 3.2.1, cross car on the front and rear cross bars. There should be an equal amount of fore/aft overlap between the wood board and the front and rear cross bars.

4.3.1.4 Apply Test Number 1 Load. The Test Number 1 load per Table 1 shall be distributed over 375 mm at the centerline of the vehicle, evenly distributed between the front and rear cross bars. See Figure 2 for example.

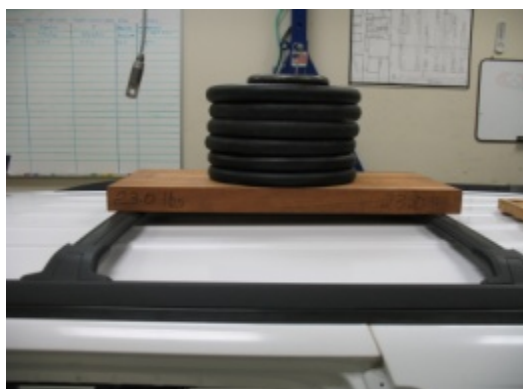


Figure 2: Example of Payload Down Test

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4.3.1.5 Measurements.

4.3.1.5.1 Measure the downward deflection of the loaded front and rear cross bar at the center of each cross bar and document in Data Sheet A1, Appendix A.

4.3.1.5.2 Measure the minimum clearance between the loaded front and rear cross bar and the roof sheet metal and document in Data Sheet A1, Appendix A.

4.3.1.5.3 Remove the load and measure the permanent deflection of the front and rear cross bar and document in Data Sheet A1, Appendix A.

4.3.2 Forces in Direction of Travel Number 1.

4.3.2.1 Test Box. Attach the test box (3.2.2) to the roof carrier with nylon straps as defined in Figure 3, to prevent any movement between the test box and the roof carrier assembly.

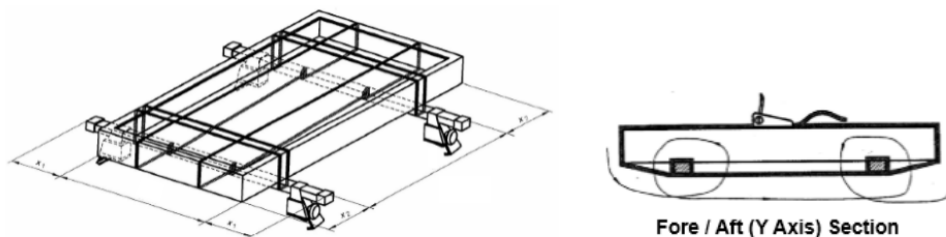


Figure 3: Attachment of Test Box to Roof Carrier

4.3.2.2 Apply Test Number 2 Load. Using a tension tester at the center of the front face of the test box progressively and continuously apply a forward longitudinal force up to the Test Number 2 load per Table 1 and then immediately release the force. See Figure 4.

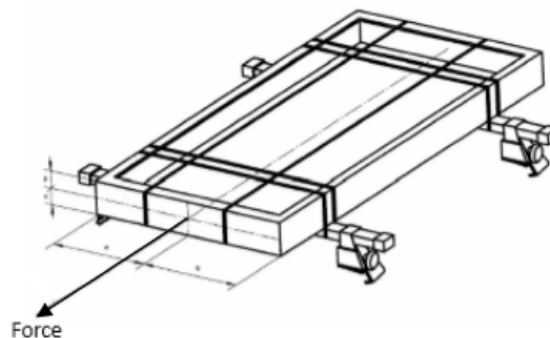


Figure 4: Forces in Direction of Travel

4.3.2.3 Measurements.

4.3.2.3.1 Measure the amount of front and rear cross bar deflection (d) under load, and document in Data Sheet A1, Appendix A. See Figure 5.

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