

**BOLT PULL OUT PROCEDURES****Application**

This test procedure is used to evaluate out-of-plane and in-plane bolt pull out force on test panels or flat sections of parts. Originally intended for aeroshields or underbody shields and wheel arch/well liners.

Apparatus Required**Universal Testing Machine (Tensile)**

Capable of:

- Movable crosshead with rate of separation: 50 mm/minute
- Load cell capacity: 5000 N
- Recording device relating crosshead separation and load

Sample Fixtures**Method A**

2 steel rings used as clamps with 130 +/- 5 mm nominal ID, (inner diameter) to achieve secure hold of sample (no slippage).

Clamps or steel strips to hold rings in place. See Figure A.

Bolt: M6-1.0 120 mm long (6 mm diameter, 1.0 thread, 120 mm length) with nut

Washer: fender type, M6 x 18, 1.6 mm thick

Gripper jaws or other device to hold the bolt

Method B

Clevis pin – 6 mm diameter, or equivalent

Spacers

A fixture consisting of a U shape steel holder with a 25 mm nominal gap of between its vertical plates and 6 mm diameter holes to support the clevis pin. See Figure B.

Gripper jaws approximately 50 mm x 75 mm textured, to achieve a 50 +/- 3 mm nominal clamp length, to achieve secure hold of sample (no slippage).

Conditioning and Test Conditions

All test values indicated herein are based on material conditioned in a controlled atmosphere of 23 +/- 2 °C and 50 +/- 5 % relative humidity for not less than 24 h prior to testing and tested under the same conditions unless otherwise specified.

Date	Action	Revisions	Rev. 0
2014 10 16	Released		

**Documents**

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Method A Procedure: Out-of-plane bolt pull out

Test Specimen:

- Specimen size: 170 mm x 170 mm,
- Report thickness and area weight (g/m^2)
- Attachment hole size: 7 mm diameter, location: center of test specimen

1. Mount bolt and washer through center hole of the test specimen
2. Clamp test specimen in-between 2 steel rings, with bolt head and washer on the bottom side of test specimen, and securely hold the other end of the bolt with the gripper jaw
3. Pull test: crosshead speed: 50 mm/min, pre-load: 2 N
4. Record maximum force in N to pull bolt and washer out of the test specimen

Figure A.

