

CORROSION TESTING OF THREADED FASTENER FINISHES

Application

This test method describes the preparation and evaluation of threaded fasteners subjected to the Global Laboratory Accelerated Cyclic Corrosion Test, CETP 00.00-L-467. This test may be used to evaluate the relative corrosion performance of fastener finishes. It is a developmental tool for the evaluation of new finishes and for comparing different finish types. It is not intended to be a routine quality control test. The use of metal test panels with the coatings specified represent actual vehicle interfaces.

Apparatus and Materials Required

Torque wrench or powered torque controlled device for assembling fasteners to panels

Sockets and drive bits for assembling bolts, nuts, or screws to panels

Corrosion test chamber capable of running cyclic corrosion testing per CETP 00.00-L-467

Slotted plastic racks with drainage to hold the test panel assemblies

Test Panels

Dimensions

Test panels will be rectangular, 15.2 x 10.1 cm (6 x 4 inches) with holes for fasteners arranged in a pattern so that corrosion from the upper row of fasteners does not run down onto the lower row, see Figure. 1. Holes must be formed prior to coating and test panels can usually be ordered this way from the test panel manufacturers. Test panel clearance hole size should be specified based on the type and size of fastener being tested, see the Table 1 below for guidance.

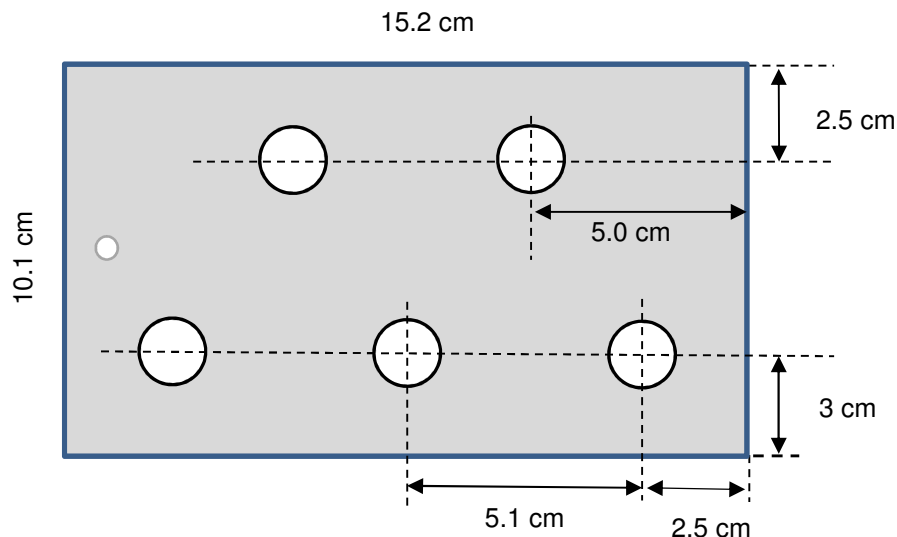


Figure 1. Test Panel hole spacing

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Table 1. Recommended hole size based on fastener size

Bolt Size	M4	M5	M6	M8	M10	M12	M14	M16
Clearance Hole Diameter, mm	4.8	5.8	7	10	12	14.5	16.5	18.5
Recommended Torque for bolt and nut assemblies, Nm	1.5	3.1	5.2	12.5	23.5	40.0	66.5	100.0

Test Panel Substrates and Coatings

New fastener finishes should be tested against panels 1 through 4 to determine the possible range of applications for that finish. Current finishes may be tested to a reduced number of substrates. All requests to run this laboratory test method should specify which panels to use if not all four panels. The basecoat color for panels 2 and 3 should be chosen so that white or red corrosion on the fastener is easily photographed against the basecoat color.

Panel 1. Cold Rolled Low Carbon Steel Sheet with E-coat

- a. Substrate: cold rolled low carbon steel, 0.7- 0.9 mm thick
- b. Phosphate: Henkel Bonderite 958 + Parcolene 99X or PPG Chemfos 700 + Chemseal 59, or equivalent
- c. E-Coat: Axalta Aqua EC6100, BASF Cathoguard 525, or PPG Powercron 590/6100HE/Advantedge, 17-24 µm thick

Panel 2. Galvanized Steel Sheet with E-coat, Primer, Basecoat and Clear Coat

- d. Substrate: 50G or 60G EG or HD galvanized cold rolled steel sheet, 0.7 – 0.9 mm thick
- e. Phosphate: PPG Chemfos 700 or equivalent
- f. E-Coat: Axalta Aqua EC4027 or equivalent, 17-24 µm thick
- g. Primer: BASF U28AU227F Light grey or equivalent 17-24 µm thick
- h. Basecoat: BASF E387AU325F Magnetic Metallic (M-7325), or equivalent, 15-20 µm
- i. Clearcoat: BASF R10CG392D or equivalent, 38-50 µm

Panel 3. Aluminum Sheet with E-coat, Primer, Basecoat and Clear Coat

- j. Substrate: 6022-T43 aluminum sheet 0.7 – 0.9 mm thick
- k. Zirconium Oxide: PPG Zircobond, or equivalent
- l. E-Coat: Axalta Aqua EC4027 or equivalent, 17-24 µm thick
- m. Primer: BASF U28AU227F Light grey or equivalent 17-24 µm thick
- n. Basecoat: BASF E387AU325F Magnetic Metallic (M-7325) or equivalent, 15-20 µm
- o. Clearcoat: BASF R10CG392D or equivalent, 38-50 µm

Panel 4. Cast Aluminum A380

- p. Substrate: die cast aluminum (ASTM B85 UNS A13800 or similar), about 3 mm thick
- q. Coating: none

Test panels may be purchased to these specifications from a number of sources, for example:

ACT Test Panel Technologies

273 Industrial Drive

Hillsdale, MI 49242

<https://www.acttestpanels.com/home.aspx>