



Performance Requirements for Plastic Fasteners: Push Pins, Plastic Rivets and Push Nuts

1. SCOPE. This standard covers the installation requirements, test methods and identification marks for establishing the performance of panel retaining features for the following fasteners – plastic push pins, plastic push nuts, and plastic push rivets.. Figure 1 shows examples of these fasteners. These fasteners are typically installed at vehicle assembly plants by hand, without any additional tools.
2. OVERVIEW
 - a. Material – these fasteners are typically made from acetyl or polyamide plastics. The performance, especially of polyamide, is affected by water absorbed into the body of the part. Test results must state if/how the parts were conditioned for testing.
 - b. Identification – Parts shall be marked with the Manufacturer's identification and material identification, unless exempted on the Ford part drawing. Typical reasons for exemption are that the marks adversely affect form, fit and/or function, or that there is insufficient space.
 - c. Proprietary Variations – Design of retaining feature(s) and other dimensional details of parts produced by individual manufacturers may vary within envelope dimensions specified on the Ford drawing, provided all requirements of this specification are met.
 - d. Test Frequency – this testing shall be performed for initial PPAP (and results included in the DV/PV section) and for change plans which require an SREA (I.E. change of tools, raw materials, manufacturing location), and in case of dispute.

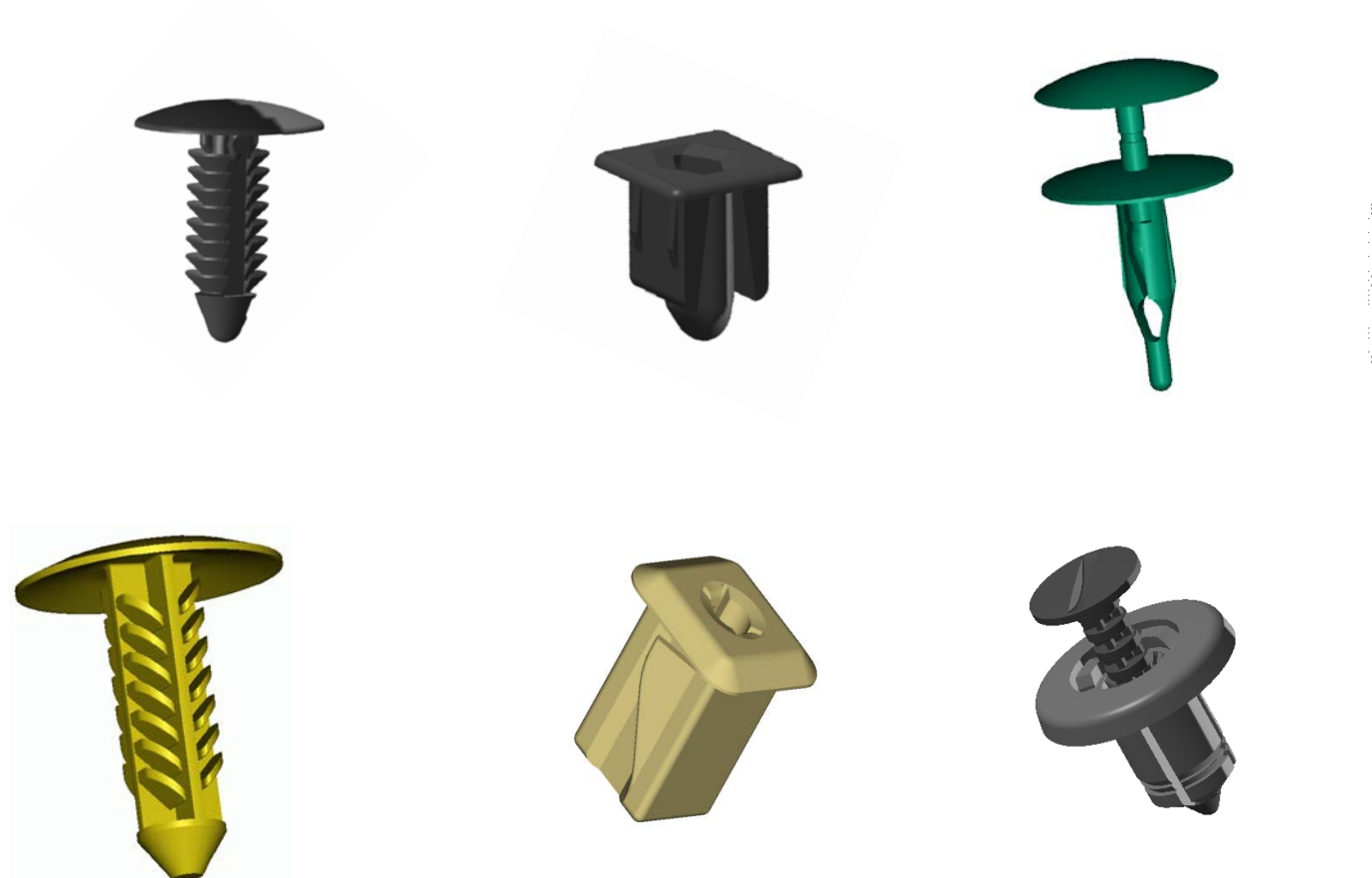


Figure 1 –Examples of the fastener types covered by this Standard.



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3. APPLICATION. This standard will be applied to plastic fasteners with a feature designed to retain the part in a hole in a panel.

4. PERFORMANCE

4.1 INSTALLATION. Using the test method described in Section 4.3, the individual test results must not exceed 45 N, and the upper three sigma limit must not exceed 54 N.

4.2 EXTRACTION. Extraction forces are to be measured using the same test method as described in Section 4.3 with different parameters for hole size and panel thickness. The individual test results must not be lower than the extraction force shown on the Ford part drawing. If there is no extraction value shown on the Ford part drawing, the default minimum extraction force is 110N.

4.3 TEST METHOD – An illustration of typical test equipment is shown in Figure 2.

4.3.1 Panel Type - Unless otherwise specified, test panels shall be constructed of WSD-M1A283-B3 through B5 or equivalent unpainted steel.

4.3.2 Hole Fabrication – Holes may be drilled, punched, laser or hydraulically machined and must be deburred on the leading edge. If punched, the fastener must be inserted in the positive direction of the punch.

4.3.3 Speed - Installation and extraction forces shall be measured at a travel rate of 240mm/minute.

4.3.4 Part Conditioning - Unless the fastener can meet the installation specification Dry As Molded (DAM), it must be tested in a hydrated condition (1-4% by weight) and stated as such on the Ford part drawing. For extraction testing however the hydrated condition must be used at all times as this is considered to represent the lowest extraction forces, "worst case" condition.

4.3.5 Sample Size - A minimum sample of 30 fasteners from production tooling for each test condition shall be used to gain a representative sample size.

4.3.6 Fastener Sample Selection – when fasteners are produced from tools with multiple cavities, the minimum 30 samples must be distributed evenly between the cavities. For example, if the production tool has 4 cavities, take 8 samples from any one cavity, 8 samples from the next, and 7 samples from each of the remaining cavities. Or simply test 8 samples from each cavity. If the production tool has more than 30 cavities, one sample must be tested from each cavity.

4.3.7 Measurement of Forces

4.3.7.1 Installation Forces – Panel thickness and hole size for each test condition are as shown on the Ford part drawing. Begin insertion testing using the minimum hole and maximum panel thickness. If insertion efforts meet the requirements of Section 4.1, testing is complete. Otherwise, continue testing by maintaining maximum panel thickness and increasing the hole size by 0.1mm increments. Testing is complete when insertion efforts meet the requirements of Section 4.1. The minimum hole size on the Ford part drawing must be updated

4.3.7.2 Extraction Forces - Panel thickness and hole size for each test condition are determined from the Ford part drawing Use the maximum hole size and minimum panel thickness. If extraction efforts meet the requirements of Section 4.2, testing is complete. If extraction efforts are below the minimum acceptable extraction forces, testing is complete and the Ford part drawing must be updated.

4.3.8 Fastener Setup – Prior to the application of installation force, fasteners must be placed into the test panel such that force is applied perpendicular to the test panel and along the axis of the fastener. For extraction testing, fasteners with multiple fins should have a minimum of 3 fins projecting through the panel prior to the initiation of the testing. Pull forces shall be applied from underneath the head of the fastener.