



MATERIAL, MECHANICAL PROPERTIES, TESTING AND PERFORMANCE REQUIREMENTS FOR THREADED AND UNTHREADED PIERCE AND/OR CLINCH NUTS

1. SCOPE

This standard covers material, mechanical properties, testing, and performance requirements for threaded and unthreaded type pierce and/or clinch nuts. Actual performance results (push-out and torque-out) are dependent on application material. This specification is based on testing with steel panels.

1.1 REFERENCES

ISO 898-2	Mechanical properties of fasteners
WE920	Dimensional requirements for hex flange nuts and hexagon flange nut and conical washer assemblies
WE955	Mechanical and performance properties of nuts with specified proof load values for hexagon flanged nut and hexagon flanged nut and conical washer assemblies

2. GENERAL

A pierce nut is defined as an internally threaded fastener having an application material piercing-punch feature. A clinch nut requires a pre-pierced hole. Both pierce and clinch nuts have an anti-rotational and retention features such that when pressed against the application sheet or plate, the nut engages the application material to become an integral part thereof. Application material with a yield strength up to 600 MPa and a thickness range of 0.6mm to 7.0mm.

3. MATERIAL AND MECHANICAL PROPERTIES

The material and mechanical properties for pierce and clinch nuts shall meet WE955 property class 8 or 10, as designated.

4. TEST PROCEDURES

4.1 INSTALLATION

Published performance is based upon proper installation. If a pre-pierced hole is required, the nut should be installed on the punch side of the sheet metal.

4.2 TEST PLATE

Pierce or clinch nut testing shall be conducted using mild sheet steel 45-65 HRB. Coupon thickness shall be the minimum specified panel thickness greater than 1.0mm when testing nuts with thread size M4 through M8 or 1.5 mm when testing nuts with thread size of M10 and greater. Test coupons shall be 50 mm square for M6-M10, and 75 mm square for M12 and greater.

4.3 PUSH OUT TESTING

Samples shall be installed in sheet material as specified in 4.2. The pierce or clinch nut assembly shall be supported on a hollow fixture during push out testing as shown in Figure 1. The push out load shall be applied to a test bolt, engaged through the nut. The applied load shall be through the center axis of the part. The push out force is defined as the maximum axial force that the staked nut can withstand before separating from the test coupon.



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4.4 UNLOADED TORSIONAL RESISTANCE

Samples shall be installed in sheet material as specified in 4.2. Torsional resistance testing shall be conducted using a fixture similar to that shown in Figure 2. Testing shall be performed to determine the maximum torsional separation force without any axially applied load. The maximum torque occurs when the nut either completely separates from the test coupon or rotates 90° in the application material. Torque can be applied directly through a test socket that engages the nut body or indirectly through a test bolt, which engages the nut thread. Test bolts should be of sufficient tensile strength to resist thread stripping. Test torque may be applied to the pierce or clinch nut assembly (Figure 2) in either direction if the nut body is engaged but only in the clockwise directions if a test bolt is used.

5. PERFORMANCE

5.1 PUSH OUT FORCE

When the pierce or clinch nut is installed in the appropriate test coupon, the push out force shall not be less than the value outlined in Table 1. Testing shall be conducted as outlined in the test procedures section.

5.2 UNLOADED TORQUE RESISTANCE

When the pierce or clinch nut is installed in the appropriate coupon, the torque resistance shall not be less than the value outlined in Table 1. Testing shall be conducted as outlined in the test procedures section.

TABLE 1. Target Performance Values for Push-Out and
Unloaded Torque Resistance

Thread Size	Minimum Test Material Thickness (mm)	Minimum Push-Out (N)	Minimum Torque Resistance (Nm)
M4	1.0	900	6
M5	1.0	900	9
M6	1.0	900	15
M8	1.0	900	30
M10	1.5	900	53
M12	1.5	900	78