



WE 990

Surface Discontinuities of Nuts

1. SCOPE. This standard defines limits for various types of surface discontinuities on nuts with thread diameters from 5 up to and including 39mm.

NOTE: The term "permissible discontinuity" only applies provided that all requirements of WE 950 and WE 952 are satisfied. The visual inspection requirements of Clause 3.2 are mandatory. All other requirements are for reference purposes unless otherwise specified on the Ford standard or utility part drawing.

REFERENCES.

- ISO 1 - Standard reference temperature for industrial length measurement.
- ISO 468 - Surface Roughness
- ISO 1302 - Technical Drawings - Method of Indicating Surface Texture.
- ISO 4288 - Rules and Procedures for the measurement of surface roughness parameters using stylus instruments.
- ISO 6157/2 - Fasteners - Surface discontinuities - Part 2: Nuts
- ISO 10485 - Cone proof load test on nuts.
- QS-9000 - Quality System Standard
- WE 950 - Prevailing Torque-Type Steel Hexagon Nuts and Hexagon Flange Nuts - Mechanical and Performance Properties
- WE 952 - Mechanical Properties of Nuts with Specified Proof Load Values

2. REQUIREMENTS General requirements for surface discontinuities are defined in ISO 6157 - Part 2.

3. INSPECTION AND EVALUATION PROCEDURE.

- 3.1 GENERAL REQUIREMENTS. Sampling shall be carried out in accordance with QS-9000 using the following procedures. Surface coatings shall be removed if identification of the surface discontinuities is impaired. The manufacturer may use any inspection procedures provided due care is taken to ensure that products conform to this standard.

- 3.2 NON-DESTRUCTIVE TESTING. A representative sample shall be taken from the lot in accordance with QS-9000 and must be subjected to a visual examination at 10X magnification. If defective parts are suspected but not confirmed, then further tests such as magnetic or eddy current techniques must be carried out for confirmation. If no defective product is found the lot shall be accepted. If surface discontinuities are found exceeding the allowable limits, these shall form the lot size for the procedure shown in Clause 3.3.

If, during the visual inspection, a product is found with quench cracks or other unacceptable discontinuities, the lot shall be subject to rejection or 100% sorting to remove all parts with evidence of that defect.

- 3.3 DESTRUCTIVE TESTING. If defective products are detected by the procedures given in Clause 3.2, then a secondary sample shall be taken from these defective products in accordance with QS-9000, consisting of the parts containing the most severe discontinuities. These shall be subject to the Performance Test requirements as defined in ISO 6157/2. If any part fails the appropriate destructive test, the lot shall be subject to rejection or 100% sorting and re-test.



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4. PERFORMANCE TESTS. For referee purposes nuts must satisfy the widening test specified in Clause 4.1. The cone proof load test according to ISO 10485 may be applied in addition to the widening test by agreement between manufacturer and user.
 - 4.1 WIDENING TEST.
 - 4.1.1 PRINCIPLE After removal of the thread up to the nominal diameter a tapered mandrel is pushed into the nut. The widening is measured as a percentage of the hole diameter.
 - 4.1.2 TEST MANDREL.

The test mandrel shown in Figure 1 shall be used for measurement of widening of 6% or 4% respectively (See Clause 2). It shall have minimum hardnesses of not less than 45 HRC and the cone shall be polished (roughness depth $R_a = 2.5 \mu\text{m}$).
 - 4.1.3 TEST NUT.

Nut to be subjected to the widening test shall have the thread removed to a diameter equal to the nominal diameter of the thread.
 - 4.1.4 PROCEDURE.

Prior to the test, lubricate the mandrel with molybdenum disulphide (MoS_2).

Insert the mandrel into the nut as shown in Figure 2 and apply a load axially in a slow and continuous manner until the mandrel is pushed through the hole up the cylindrical part. The mandrel shall be tightly clamped at the upper end. For referee purposes the speed of insertion shall not exceed 25mm/min.
 - 4.2 CRITERIA.

The total widening of nuts shall be:

 - 6% for nuts of property classes 8, 10, or 12, and
 - 4% for nuts of property classes 04 to 05

Failure of a nut occurs when the wall of the nut breaks entirely before the minimum specified widening value is obtained. In cases of doubt, the fracture may be recognized when the nut is cut on the opposite side and then falls into two single parts.
 - 4.3 SPECIAL CASES.
 - 4.3.1 PREVAILING TORQUE TYPE NUTS.

For prevailing torque type nuts the minimum value of widening shall be 20% below the values specified for hexagon nuts.