

WORLDWIDE FASTENER STANDARD

Date: 2001-01-04

WD951 MECHANICAL AND PERFORMANCE REQUIREMENTS OF CASE HARDENED THREAD ROLLING SCREWS

1. SCOPE.

This standard specifies the requirements for high performance case hardened and tempered thread rolling screws that have performance capabilities beyond those normally expected of other types of tapping screws. It relates to screws with basic 60° screw thread form, metric series, intended for parts up to and including 5mm nominal thread diameter only. For parts above 5mm, WD 952 is recommended.

Clause 3.4 defines thread-forming capability in steel up to a hardness of 150 HV and thickness equal to the screw diameter. The parameters of material hardness and thread engagement may be varied by analysis of joint requirements and it is therefore recommended that specific applications be investigated to determine joint criteria.

NOTE: Lubrication approved by Ford is permitted on parts to which this specification is applied unless otherwise specified.

1.1 REFERENCES.

ISO 262	-	ISO general purpose metric screw threads - Selected sizes for screws, bolts and nuts.
ISO 898/2	-	Mechanical properties of fasteners - Part 2: Nuts with specified proof load values.
ISO 5954	-	Cold reduced carbon steel sheet to hardness requirements.
ISO 6507	-	Metallic materials - Hardness test - Vickers test.
WSS-M99A3-A	-	Embrittlement Avoidance

2. MATERIALS.

Screws shall be made from cold heading quality fully killed steel wire; the following chemical composition is given for guidance only.

Table 1. Chemical composition

Analysis	Composition Limits (% by Weight)	
	Carbon	Manganese
Ladle	0.18 to 0.28	0.60 to 1.75
Check	0.16 to 0.30	0.54 to 1.81

3. MECHANICAL PROPERTIES.

3.1 HEAT TREATMENT.

Finished screws shall be case hardened and tempered in order to meet all the mechanical and performance requirements of this standard as detailed in Table 3. The case depth shall be as given in Table 4.

The core hardness shall be 370 HV maximum, and the case hardness shall be 450 HV minimum. However, the main criterion for acceptance is that the screws meet all the performance tests specified in this standard.

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Table 2. Mechanical properties to be determined

Criteria	Clause	Test Reference	Referee Tests
Case Hardness	3.1	4.2	*
Core Hardness	3.1	4.1	
Case Depth	3.1 and Table 4	4.3	
Torsional Strength	3.2 and Table 3	4.4	
Thread Forming Capability	<u>3.4</u>	4.5	*
Drive Test	3.4	4.6	

Table 3. Mechanical and performance requirements

Nominal Screw Diameter (mm)	Torsional Test Torque Nm Minimum
2	0.6
2.5	1.2
3	2.2
(3.5)	3.5
4	5.2
5	10.5

Table 4. Case depth

Nominal Screw Diameter (mm)	Case Depth (mm)	
	Minimum	Maximum
2 and 2.5	0.04	0.12
3 and (3.5)	0.05	0.18
4 and 5	0.10	0.25