

WORLDWIDE FASTENER STANDARD

Date: 2001-07-09

WD 950 Material and Performance Requirements for Spaced Thread Tapping Screws and Thread Cutting Screws

1. SCOPE

This standard covers material and performance requirements for heat-treated carbon and stainless steel tapping screws and carbon steel thread cutting screws. In normal use, these screws produce mating threads in materials into which they are driven without deforming their own threads or breaking during assembly or in service. For details of other requirements affecting thread cutting screws only see the Appendix.

2. REFERENCES

ISO 1502 General purpose metric screw threads - Gauging.
ISO 6507 Metallic materials - Hardness test - Vickers test.

3. GENERAL REQUIREMENTS

Carbon steel screws shall be made from cold heading quality, killed steel wire suitable for case hardening. Stainless steel screws shall be made from Type 304 or similar material.

NOTE: Stainless steel tapping screws need only meet the material requirements specified in Clause 3. Clauses 4 and 5 apply to carbon steel screws only.

4. METALLURGICAL REQUIREMENTS – CARBON STEEL SCREWS ONLY

4.1. CORE HARDNESS

The Core Hardness shall be 270-390 HV5 for all types of tapping screws up to and including ST3.9, and 270-390 HV10 for ST4.2 and larger. Core hardness shall be determined at mid-radius of a transverse section through the full minor diameter.

4.2. SURFACE HARDNESS

The Surface Hardness shall be 450 HV0.3 minimum for all types of tapping screws. For routine quality control purposes, surface hardness may be measured on end, shank or head of the screw after suitable preparation, in cases of dispute surface hardness shall be determined by:

- Sectioning the specimen at the center of the longitudinal axis.
- Metallurgically mounting and polishing the specimen.
- Determining HV0.3 in accordance with ISO 6507, or Knoop (Tukon-500 gram load) hardness at a distance of 0.05mm below the root diameter.

4.3. TOTAL CASE DEPTH

A microhardness test shall be carried out at the thread flank midpoint between crest and root or, in the case of smaller screws up to No. 7 or M4, in the root of the thread. The case depth shall be at the point where the hardness exceeds the actual core hardness by HV25 and shall be in accordance with the following. (Note: For thread cutting screw requirements see the Appendix.)

Tapping Screw Size	Total Case Depth (mm)
Sizes 2.2 and 2.6mm	0.04 - 0.1
Sizes 2.8 and 3.5mm	0.05 - 0.18
Sizes 4.2 to 5mm	0.1 - 0.23
Sizes 6.3mm and larger	0.15 - 0.28

WORLDWIDE FASTENER STANDARD

Date: 2001-07-09

WD 950 Material and Performance Requirements for Spaced Thread Tapping Screws and Thread Cutting Screws

4.4. MICROSTRUCTURE

The microstructure shall show no band of free ferrite between case and core, as determined by metallographic examination.

5. PERFORMANCE REQUIREMENTS – CARBON STEEL SCREWS ONLY

5.1. DRIVE TEST

Sample screws (coated or uncoated, as received) shall, without deforming their own thread, produce a mating thread in a test plate described below until a thread of full diameter is completely through the test plate.

5.1.1. TEST PLATE

The test plate shall be made of low carbon steel with a carbon content not exceeding 0.23%, having a hardness of 130-170HV, and thickness as specified in Table 1. Test holes shall be drilled, or punched and redrilled, or reamed, to diameters specified in Table 1 for the size of tapping screw being tested.

NOTE: Thread cutting screw hole diameters are specified in the Appendix.

Table 1. Standard test plate thickness and hole sizes for drive test inspection of tapping screws

Dimensions in mm

Tapping Screw		Plate Thickness		Hole Diameter	
ST	Ref NR	Min.	Max.	Min.	Max.
2.2	2	1.17	1.3	1.905	1.995
2.5	3	1.17	1.3	2.185	2.235
2.9	4	1.17	1.3	2.415	2.465
3.3	5	1.17	1.3	2.68	2.73
3.5	6	1.85	2.06	2.92	2.97
3.9	7	1.85	2.06	3.24	3.29
4.2	8	1.85	2.06	3.43	3.48
4.8	10	3.1	3.23	4.015	4.065
5.5	12	3.1	3.23	4.735	4.785
6.3	14	4.67	5.05	5.475	5.525
8	16	4.67	5.05	6.885	6.935