

**Dimensional, Material and Performance Requirements for Screws Used in Thermoplastics Materials****1. SCOPE**

This standard covers dimensional, material and performance requirements for through hardened carbon steel tapping screws. In normal use, these screws produce mating threads in thermoplastic materials, without deforming their own threads.

NOTE: Some lubricants may degrade the mating materials therefore, dry film or integral lubricants should be specified. Examples of acceptable finishes include S437, S451 and S450B.

1.1 REFERENCES

ISO 6157-1	Fasteners-Surface Discontinuities
WSS-M99A3-A	Embrittlement Avoidance

2. MATERIALS

Screws shall be made from cold heading quality fully killed, fine grain, spherodized annealed steel wire. The following chemical composition is given for guidance only.

Table 1. Chemical Composition - Ladle

Material and Treatment	Chemical Element	Composition Limits (% by weight)
Carbon steel quenched and tempered	Carbon Phosphorus Sulfur	0.20 – 0.40 0.035 Max 0.035 Max
Carbon Steel with additives (e.g. Boron or Mn or Cr) quenched and tempered	Carbon Phosphorus Sulfur	0.15 ¹⁾ – 0.40 0.035 Max 0.035 Max

¹⁾ In the case of carbon boron alloyed steel with a carbon content below 0.25% (ladle analysis), the minimum manganese content shall be 0.7%.

3. MECHANICAL PROPERTIES**3.1 HEAT TREATMENT**

Screws shall be hardened and tempered to a core hardness of 320-380 HV, (32-39 HRC). The surface hardness shall not be more than 30 Vickers points above the measured core hardness on the product when readings of both surface and core are carried out at HV 0.3. Any increase in hardness at the surface which indicates that the surface hardness exceeds 390 HV is not acceptable. The tempering temperature shall be 340°C minimum. The requirements of WSS-M99A3-A shall apply.

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3. MECHANICAL PROPERTIES (cont.)
3.2 HEAD SOUNDNESS

There shall be no fracture at the head/shank intersection when a permanent deformation of 6° is induced between the plane of the underhead bearing face and a plane normal to the axis of the screw. The test shall be regarded as satisfactory even if a crack should appear in the first thread, provided that the head does not snap off. This test does not apply to countersunk head screws.

The sample screw shall be inserted into a drilled hole of a diameter equal to the maximum major thread diameter +0.05mm up to and including 5mm dia. and +0.1 for 6mm dia. and above in a hardened wedge block, or other suitable device and an axial compressive load applied against the top of the screw. Loading shall be continued until the plane of the underhead bearing face is bent permanently through 6° with respect to a plane normal to the axis of the screw.

NOTE: It is normal procedure to induce the 6° deformation by a blow or blows from a hand held hammer.

3.3 TORSIONAL STRENGTH TEST

The shank of the sample screw (coated, or uncoated, as received) shall be clamped in a mating, split, blind-hole die (Figure 1) or other means, such that the **minor or root diameter** of the thread is not damaged and at least two full threads project above the clamping device and at least two full form threads exclusive of point and end slot are held within the clamping device. (A blind hole may be used in place of the clamping device, providing the hole depth is such to ensure that breakage will occur beyond the point. By means of a suitable calibrated torque measuring device, apply torque to the screw until failure occurs. The torque required to cause failure shall equal or exceed the minimum value shown in Table 2 for the type and size of screw being tested.

Figure 1. Typical Test Device for Torsional Tests

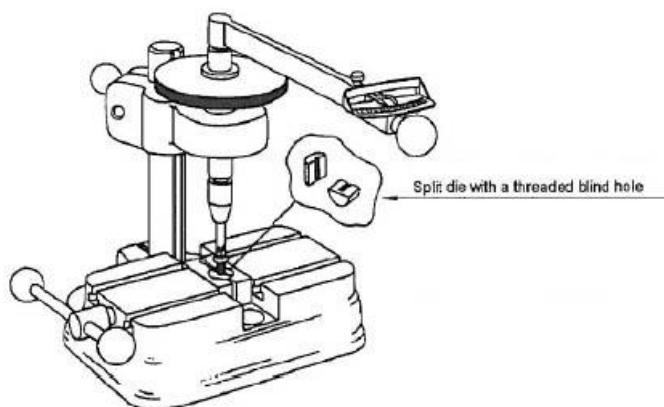


Table 2

Shank Torsion by Thread Form									
Screw Size, mm	2.0	2.5	3.0	(3.5)	4.0	(4.5)	5.0	6.0	8.0
Remform®/Remform® II™/PT® Screws									
Torque min. Nm	0.3	0.7	1.1	1.7	2.5	3.3	4.7	7.7	17.0
Remform® II™ "HS"/Delta PT® Screws									
Torque min. Nm	0.42	0.9	1.5	2.5	3.7	5.2	7.1	12.8	30.0