

**WB 910**

2016-11-02

General and Dimensional Requirements of Pan Head Bolts and Screws, Pan Head Bolt & Washer and Screw & Washer Assemblies

1. SCOPE

This standard specifies the mechanical properties and dimensional requirements of pan head bolts and screws, pan head bolt & washer and pan head screw & washer assemblies with recess drive systems and ISO metric thread diameters M5 to M16 inclusively.

2. REFERENCES

- ISO 898/1 - Mechanical properties of fasteners - Part 1: Bolts, screws and studs.
- ISO 3269 - Fasteners - Acceptance inspection.
- ISO 4759/1 - Tolerances for fasteners.
- ISO 6157/3 - Fasteners – Surface discontinuities.
- ISO 8992 - Fasteners - General requirements for bolts, screws, studs and nuts.
- WA 900 - Dimensional requirements for hexagon and flanged hexagon bolts and screws, and hexagon screw and washer assemblies.
- WA 950 - Material Requirements & Mechanical Properties of Bolts, Studs, and Bolt & Washer Assemblies.
- WA 990 - Surface discontinuities of bolts and screws.
- WF 900 - Dimensional, Material, Heat Treatment, Hardness and Performance Requirements for Flat, Toothed, Conical, Bowed and Wavy Washers for general use and for use in Screw or Nut and Washer Assemblies.
- WX 100 - Finish Specification

3. MECHANICAL PROPERTIES

Bolts, screws, bolts and screw & washer assemblies shall have the mechanical properties as specified in WA 950 and shall meet the requirements of ISO 898/1 for tensile strength under wedge loading of full-size bolts and screws and head soundness.

4. GENERAL REQUIREMENTS**4.1 DIMENSIONS AND TOLERANCES**

The basic dimensions are shown in the individual product standards or Utility Part's drawings. Unspecified general requirements, dimensions and tolerances not stated here within shall be in accordance with:

ISO 8992.

ISO 4759-1 Product grade A for the fully threaded shank portion of pan headed bolts.

4.2 ACCEPTANCE INSPECTION

The acceptance inspection procedure to determine lot acceptability shall be according to ISO 3269 for requirements not included in a specific product standard.

4.3 SCREW THREAD CONFORMANCE

Screw threads must conform to the dimensions, tolerance, gauging acceptability and protective finish allowance as specified in WA 900.

4.4 WASHERS.

The dimensions, tolerances and materials requirements of the washer component of machine screw and washer assemblies shall be in accordance with WF 900.

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4.5 SHORT 'NP' PILOT POINT.

The length, diameter and end of pilot points shall be as specified here within unless otherwise specified on the Utility Part's drawings.

4.5.1 LENGTH AND DIAMETER

The length and diameter of pilot points shall be as specified in Table 1.

4.5.2 ENDS OF BOLTS

Unless otherwise specified on the Utility Part's drawings, the ends of bolts shall be as specified in Figure 1. Ends of pilot point shall be flat or slightly indented to permit normal material flow as illustrated in Figure 1.

Figure 1 - Pilot Details of Pan Head Bolts.

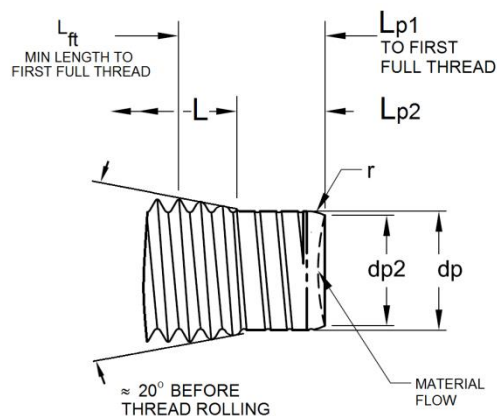


Table 1 - Pilot Details of Pan Head Bolts.

Size		M5	M6	M8	M10	M12	M14	M16
L _{p1}	max	4.3	5.15	6.7	8.05	9.65	10.93	11.60
L _{p2}	max	2.7	3.15	4.2	5.15	6.15	6.93	7.70
	min	2.2	2.65	3.7	4.65	5.65	6.43	7.20
dp ¹⁾	max	4.12	4.9	6.62	8.36	10.09	11.82	13.82
	min	3.97	4.77	6.49	8.21	9.91	11.67	13.67
dp2	max	3.0	4.0	5.5	7.0	8.5	10.0	11.5
r	min	0.3	0.5	1.0	1.5	2.0	2.5	3.0
Before Thread Rolling								
dp	max	4.030	4.800	6.540	8.230	9.950	11.700	13.700
	min	3.954	4.724	6.447	8.143	9.880	11.604	13.609

Notes:

1) After Thread Rolling

4.6 GAUGING REQUIREMENTS

RECESSES

The gauging requirements shall be in accordance with WB 900 Appendix F, which specifies the shape and basic dimensions of enhanced hexalobular internal driving feature for bolts and screws including the gauging method.

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4.7 PROTECTIVE FINISH.

4.7.1 DIMENSIONS AND TOLERANCES. All dimensions and tolerances defined in this specification apply prior to the application of the protective finish except where otherwise specified.

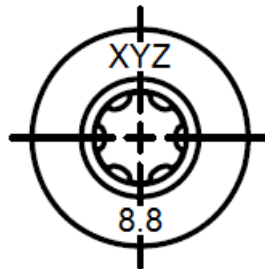
4.7.2 FINISH SPECIFICATION. Finish used on Worldwide Standard and Utility Parts shall be as specified per WX 100. Utility Fastener based on a Standard fastener with a special, or S900 series surface finish, shall have the finish requirements specified on the drawing.

4.8 MARKING

Pan head bolts and screws shall be marked with the manufacturer's identification mark and with the marking symbol of the property class per WA 950, unless otherwise specified on a Utility drawing. The marking is obligatory for all property classes and shall be on the top of the head by indenting or embossing. Marking is required for pan head bolts and screws with nominal diameters $d > 5$ mm.

Note: Embossed head markings (See WA 950) are excluded from head height measurements but must not protrude more than 0.4

Figure 2 - Example of marking on Pan Head Bolts and Screws.


5. DIAMETER OF SHANK (UNTHREADED PORTION)
5.1 BOLTS AND SCREWS.

Reduced shank is the only shank design permitted unless otherwise specified on a Utility drawing.

5.2 BOLTS, SCREWS, BOLT & WASHER AND SCREW & WASHER ASSEMBLIES.

The diameter of the unthreaded portion of bolt & washer assemblies must be less than the major diameter of the bolt thread by an amount sufficient to permit free rotation of the washer, while disassembly from the bolt is prevented. The fillet type use for bolt and washer assemblies shall be at the discretion of the manufacturer provided all other requirements of the standard are met. The washer's thickness shall be greater than the bolt's pitch to prevent washer binding.

6. FILLET AND THREAD RUNOUT

ISO Type F (Permissible Shape) fillet per WA 900 shall be supplied for all parts unless the Type 'U' fillet per WA 900 is stated otherwise per the Utility drawing.