

## Indian Standard

GENERAL REQUIREMENTS FOR  
PLAIN WASHERS AND LOCK WASHERS

( First Revision )

**1. Scope** — Covers the general requirements and permissible deviations for plain washers, lock washers and similar parts.

**2. Grades** — Two grades of washers are specified, namely, Precision and Ordinary.

**3. Dimensional Accuracy**

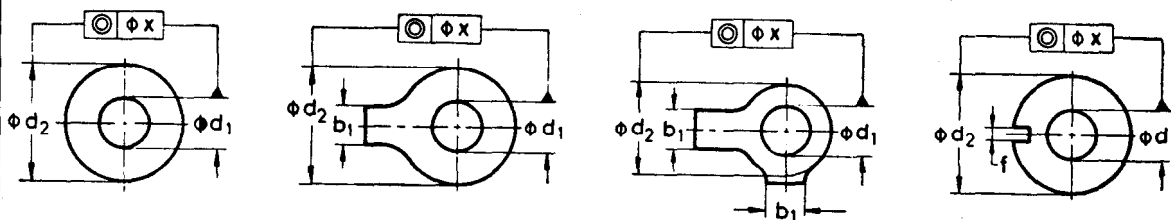
**3.1** The permissible deviations on the main dimensions and concentricity of the hole with respect to the outside diameter of the precision grade washers shall be as specified in Tables 1 and 2.

**3.2** The permissible deviations on the main dimensions and concentricity of the hole with respect to the outside diameter of the ordinary grade washers shall be as specified in Tables 3 and 4.

**TABLE 1 PERMISSIBLE DEVIATIONS FOR PRECISION WASHERS**

( Clause 3.1 )

All dimensions in millimetres.



Reference Dimension		Permissible Deviation ( Tolerance Zone )				Permissible Deviation on Concentricity $x^\dagger$
Over	Up to	$b_1$	$d_1^*$	$d_2$	Lock Width $f$	
—	3	—	H13	h14	h13	2 IT12
3	6	h14	H13	h14	h13	2 IT12
6	10	h14	H13	h14	h13	2 IT12
10	18	h14	H14	h14	h13	2 IT12
18	30	h14	H14	h14	h13	2 IT12
30	50	h14	H14	h14	h13	2 IT12
50	80	—	H14	h15	—	2 IT13
80	120	—	H14	h15	—	2 IT13
120	180	—	H14	h15	—	2 IT13
180	250	—	—	h15	—	2 IT13

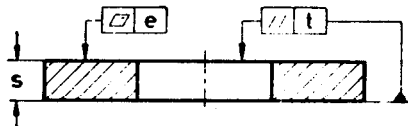
\*In case of punched holes the tolerance zones H13 and H14 for the hole diameter do not apply to the punch exit side of the washers.

†For calculating the magnitude of the concentricity tolerance, the reference dimension shall be  $d_2$ .

**TABLE 2 PERMISSIBLE DEVIATIONS FOR THICKNESS, PARALLELISM AND FLATNESS FOR PRECISION WASHERS**

( Clause 3.1 )

All dimensions in millimetres.

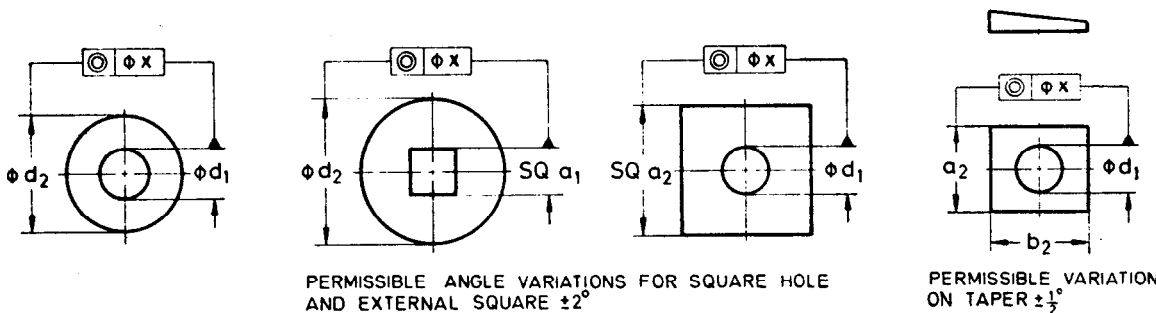


Washer Thickness <i>s</i>		Permissible Deviation for Thickness <i>s</i>	Permissible Devia- tion in Parallelism of Bearing Faces <i>t</i>	Flatness Tolerance <i>e</i>
Over	Up to			
— 1 2.5	1 2.5 4	$\pm 0.1$ $\pm 0.2$ $\pm 0.3$	0.05 0.1 0.15	0.1 0.2 0.3
4 6 10	6 10 18	$\pm 0.6$ $\pm 1$ $\pm 1.2$	0.2 0.3 0.4	0.4 0.6 1

**TABLE 3 PERMISSIBLE DEVIATIONS FOR ORDINARY WASHERS**

( Clause 3.2 )

All dimensions in millimetres.



Reference Dimension		Permissible Deviation ( Tolerance Zone )					Permissible Deviation on Concen- tricity $x^\dagger$
Over	Up to	$a_1$	$a_2$	$b_2$	$d_1^*$	$d_2$	
3 6 10	6 10 18	H15 H15 H15	— — $\pm 1$	— — —	H14 H14 H14	— h16 h16	2 IT16 2 IT16 2 IT16
18 30 50	30 50 80	H15 — —	$\pm 2$ $\pm 2.5$ $\pm 3$	js16 js16 js16	H14 H15 H15	h16 h16 h16	2 IT16 2 IT16 2 IT17
80 120 180	120 180 250	— — —	$\pm 4$ $\pm 5$ —	— — —	H15 H15 —	h16 h16 h16	2 IT17 2 IT17 2 IT17

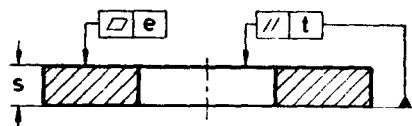
\*In case of punched holes the tolerance zones H14 and H15 for the hole diameter do not apply to the punch exit side of the washers.

†For calculating the magnitude of the concentricity tolerance, the reference dimension shall be  $d_2$ .

**TABLE 4 PERMISSIBLE DEVIATIONS FOR THICKNESS, PARALLELISM AND CONVEXITY FOR ORDINARY WASHERS**

( Clause 3.2 )

All dimensions in millimetres.



Washer Thickness <i>s</i>		Permissible Deviation for Thickness <i>s</i>	Permissible Devia- tion in Parallelism of Bearing Faces <i>t</i>	Flatness Tolerance <i>e</i>
Over	Up to			
—	1	$\pm 0.2$	0.2	0.2
1	2.5	$\pm 0.3$	0.2	0.4
2.5	4	$\pm 0.6$	0.3	0.6
4	6	$\pm 1$	0.5	0.8
6	10	$\pm 1.2$	0.6	1.2
10	18	$\pm 1.5$	1.0	2.0

**4. Material** — The material of plain washers and lock washers shall be according to the respective product standard.

**5. Finish** — The plain washers and lock washers shall be supplied in natural finish unless otherwise specified by the purchaser. At the request of the purchaser, washers may be phosphate-coated, nickel-plated, tinned, galvanized, copper-plated or cadmium-coated. In such cases, the dimensions of the washers shall apply before coating. The properties of the washer shall not, however, be impaired by the protective coating specified by the purchaser.

#### 6. Other Requirements

**6.1** The washers shall be free from cracks, burrs, pits and other defects. All sharp edges shall be removed. In particular, precision grade washers shall not have any tool marks.

**6.2** The supply requirements in the case of metallic washers shall conform to IS: 1387-1967 'General requirements for the supply of metallurgical materials (first revision)'.

**7. Sampling and Acceptance** — The sampling procedure for the testing and inspection of washers shall be in accordance with IS: 6821-1973 'Methods for sampling non-threaded fasteners'.

**8. Testing of Material and Coating** — The material constituting the washers and lock washers has to be tested only if special requirements are specified for the material; similarly it applies to testing of coating.

**9. Packing** — Unless otherwise specified the precision grade washers shall be packed in cartons of 100, 500 and 1 000 or multiples thereof. The ordinary grade washers shall be packed in cartons of 2.5 kg, 5 kg or bags of 50 kg. Each carton or bag shall contain washers of one size only.

**10. Marking** — The label on the carton or bag shall carry the size, number of pieces and the manufacturer's mark or trade-mark.

**10.1 Certification Marking** — Details available with the Bureau of Indian Standards.

**EXPLANATORY NOTE**

This standard was first published in 1969. In the present revision the changes and additions made are enumerated below:

- a) 'Bright' and 'Black' washers have been re-designated as 'Precision' and 'Ordinary' washers respectively. The new designations correspond more closely to the practical situation.
- b) The old terms 'bright' and 'black' no longer have any justification, since depending on the manufacturing method and intermediate material like coating, a washer described as 'bright' or 'black' need not be so in appearance.
- c) The permissible dimensional, positional and form variations specified in the earlier version have been altered and conform to ISO tolerances, and the method of representation also follows the international system.
- d) A clause is also included on testing of material and coating. It may be added that testing of material in the case of washer is rarely necessary unless in exceptional circumstances, for example, when special requirements are to be met by the material.
- e) The clause on packing has been revised making a distinction between packing 'ordinary' and 'precision' washers.

In the preparation of this standard, considerable assistance has been derived from DIN 522 Scheiben; Technische Lieferbedingungen (Washers, technical conditions of delivery), 1974 issued by Deutsches Institut für Normung (DIN).