



## Indian Standard

SPECIFICATION FOR DOUBLE COIL  
HELICAL SPRING WASHERS

(First Revision)

1. **Scope** — Covers the requirements for double coil helical spring washers in the size range 4 to 36 mm.

2. **Dimensions** — Shall be as given in Table 1.

3. **Material** — The spring washers shall be made from suitable grade, according to IS : 4072-1975 'Specification for steel for spring washers (first revision)', having a minimum tensile strength of 700 N/mm<sup>2</sup> after normalizing and at least 15 percent elongation (gauge length =  $5.65 \sqrt{A}$ , where A is area of cross section) when tested in accordance with IS : 1521-1972 'Methods for tensile testing of steel wire'.

4. **Heat Treatment** — The spring washers after coiling shall be suitably heat-treated so as to result in the finished washer having a hardness in the range of 43 to 50 HRC when tested in accordance with IS : 1586-1968 'Methods for Rockwell hardness test (B and C scales) for steel (first revision)'.

5. **Finish** — The spring 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 plated. The functional properties of the spring washers shall not be impaired as a result of the protective coatings. The spring washers when coated, shall be subjected to appropriate treatment to avoid hydrogen embrittlement.

Note — A list of Indian Standards on metallic finishes and coatings on steel including the methods of test is given in Appendix A.

6. **Accuracy** — The chamfered ends of the spring washers shall not increase the diameter when the washer is compressed. The washers shall not interlink.

7. **Designation** — The spring washers shall be designated by the nominal size, the number of this standard and the surface protection, if any.

*Example:*

A double coil helical spring washer having a nominal size 10 mm with phosphate coating shall be designated as:

Spring Washer 10 IS : 6755 Phosphate Coated

7.1 In case the spring washer is intended for use with left hand threads, the designation shall be modified as follows:

Spring Washer LH 10 IS : 6755 Phosphate Coated

8. **General Requirements** — The flat faces of the spring washer and the inner and outer peripheries shall be smooth and free from knurling serrations, die marks, deep scratches, etc, although slight free roll marks shall be permissible.

8.1 The spring washer shall also be free from burrs, rust, pit marks and loose scale. The internal and external circumferential edges shall be rounded sufficiently to avoid checks.

8.2 The spring washers shall be cranked in such a manner that the washer lies flat when closed under compression.

8.3 During use the spring washers shall remain circular and their section shall be such as not to cause them to spread, when set down by a nut under normal service conditions.

8.4 In regard to other requirements, not covered in this standard, the spring washers shall conform to precision grade of IS : 5369-1975 'General requirements for plain washers and lock washers (first revision)'.

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Price Rs 6.00

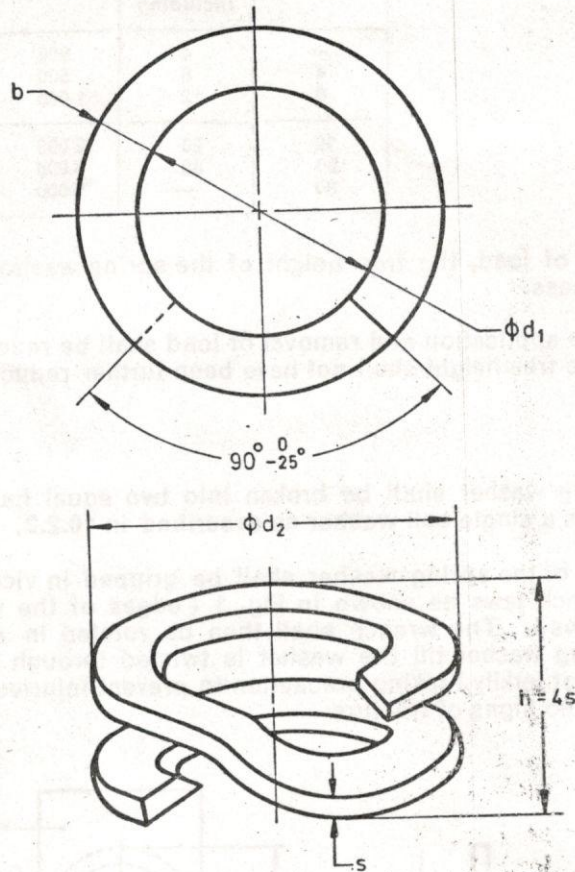
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**TABLE 1 DIMENSIONS FOR DOUBLE COIL HELICAL SPRING WASHERS**  
( Clause 2 )

All dimensions in millimetres.



Note — The spring washer shown is for use with right hand threads.

| Nominal Size | Internal Diameter $d_1$ |      | Outside Diameter $d_2$<br>Nom | Width $b$ |           | Thickness $s$<br>Nom | For Bolt Diameter |
|--------------|-------------------------|------|-------------------------------|-----------|-----------|----------------------|-------------------|
|              | Nom                     | Tol  |                               | Nom       | Tol $\pm$ |                      |                   |
| 4            | 4.1                     | +0.3 | 7.1                           | 1.5       | 0.1       | 0.8                  | M4                |
| 5            | 5.1                     | +0.3 | 8.7                           | 1.8       | 0.1       | 0.8                  | M5                |
| 6            | 6.1                     | +0.4 | 11.1                          | 2.5       | 0.15      | 1                    | M6                |
| 8            | 8.2                     | +0.4 | 14.2                          | 3         | 0.15      | 1.2                  | M8                |
| 10           | 10.2                    | +0.6 | 17.2                          | 3.5       | 0.2       | 1.2                  | M10               |
| 12           | 12.2                    | +0.8 | 20.2                          | 4         | 0.2       | 1.6                  | M12               |
| 16           | 16.2                    | +1.0 | 26.2                          | 5         | 0.2       | 2                    | M16               |
| 20           | 20.2                    | +1.0 | 32.2                          | 6         | 0.2       | 2.5                  | M20               |
| 24           | 24.5                    | +1.0 | 38.5                          | 7         | 0.25      | 3                    | M24               |
| 30           | 30.5                    | +1.3 | 46.5                          | 8         | 0.25      | 3                    | M30               |
| 36           | 36.5                    | +1.3 | 56.5                          | 10        | 0.25      | 3                    | M36               |

9. Sampling — Sampling size and acceptance criteria shall be determined in accordance with IS : 6821-1973 'Methods for sampling of non-threaded fasteners'.



## 10. Tests

**10.1 Compression Test**— The spring washers shall be loaded with the following weights for three minutes:

| Nominal Size mm |                     | Load (N) |
|-----------------|---------------------|----------|
| Above           | Up to and including |          |
| —               | 4                   | 200      |
| 4               | 6                   | 500      |
| 6               | 12                  | 1 000    |
| 12              | 20                  | 2 000    |
| 20              | 30                  | 3 000    |
| 30              | —                   | 5 000    |

After release of load, the free height of the spring washer shall not be less than three times the sectional thickness.

**10.1.1** The above application and removal of load shall be repeated twenty times in quick succession after which the free height shall not have been further reduced.

### 10.2 Twist Test

**10.2.1** The spring washer shall be broken into two equal halves and both the halves shall be tested separately as a single coil washer as described in 10.2.2.

**10.2.2** A portion of the spring washer shall be gripped in vice jaws and then equal portion shall be gripped in wrench jaws as shown in Fig. 1 (edges of the wrench jaws should be sharp and parallel to vice jaws). The wrench shall then be rotated in a direction that increases the free height of the spring washer till the washer is twisted through an angle of 90°. It shall be slowly and evenly bent (not jerkily) taking precaution to prevent injuries through fly splitters. The spring washer shall show no signs of fracture.

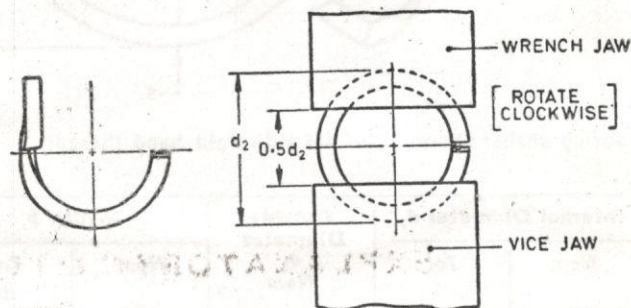


FIG. 1 TWIST TEST

**10.2.3** The spring washer shall be notched and then fractured. The fractured ends shall appear evenly grained and without any cracks.

**11. Packing**— Unless otherwise specified, spring washers shall be packed in carton of 100, 500 and 1 000. Each carton shall contain spring washers of one size only.

**12. Marking**— Each carton shall be marked with the manufacturer's name or trade mark, nominal size, quantity of spring washers and particulars of coating/plating, if any.

**12.1 ISI Certification Marking**— Details available with the Indian Standards Institution.



APPENDIX A

LIST OF RELEVANT INDIAN STANDARDS ON METALLIC FINISHES AND COATINGS ON STEEL

- IS : 1068-1968 Electroplated coatings of nickel and chromium on iron and steel (*first revision*)
- IS : 1359-1977 Electroplated coatings of tin
- IS : 1572-1968 Electroplated coatings of cadmium on iron and steel (*first revision*)
- IS : 1573-1970 Electroplated coatings for zinc on iron and steel (*first revision*)
- IS : 1772-1973 Electroplated coatings of copper (*first revision*)
- IS : 3202-1965 Code of practice for climate proofing of electrical equipment
- IS : 3618-1966 Phosphate treatment of iron and steel for protection against corrosion
- IS : 6012-1970 Method for measurement of coating thickness by eddy current

EXPLANATORY NOTE

Double coil helical spring washers made of steel are for use with bolts and nuts intended for automobile and general engineering purposes. These washers provided not only the necessary reactive pressure to meet most service conditions but also provide reactive resiliency to prevent frozen bolted assembly conditions.

This standard was first issued in 1972. In the present revision the following changes have been made:

The clause on cranking had been found to be contradictory to the stipulation that the spring washers be evenly wound with uniform pitch and without sharp ends. Hence the latter stipulation has been deleted. Also deleted is the requirement that ends of washers should not abutt when the washers are in a closed condition since for double coil washers the above condition does not arise.

The figure of washer has been modified to one that is used with right hand threads. The included angle between the two ends has been specified with tolerance.

The material for spring washers has also been modified in line with the revised Indian Standard on the subject.