

THE AMERICAN RAILWAY ENGINEERING AND MAINTENANCE
OF WAY ASSOCIATION

Committee: 4 (Rail), **Subcommittee:** 6 (Joint Bars, Insulated Joints, Track Bolts, Spring Washers)

Letter Ballot Number: 04-21-05

Assignment: None

Explanation of Ballot:

This ballot was a result of general review of Section 3.6 Specification for Spring Washers. This section was last updated in 1967. With this ballot general revisions will be made and a drawing and table will be added.

Reason: Bring section up to date with current practices.

Draft Not Yet Approved

SECTION 3.6 SPECIFICATIONS FOR SPRING WASHERS^{1 2}

— 1967 —

3.6.1 GENERAL SCOPE (1967)

These specifications prescribe the general dimensions, tolerances and physical properties intended for the material of the spring washers purchased and state in detail the method of testing for providing their fulfillment.

3.6.2 MATERIAL (1967)

Material for spring washers shall be of steel, manufactured by the electric furnace, open-hearth, basic oxygen or crucible process. **Spring washers shall be heat-treated by oil quenching and tempering.**

3.6.3 METHOD OF TESTING (1967)

Test specimens shall be interposed between the platens of a compression machine of approved design, equipped with a deflection recorder calibrated to 0.001 inch and located so that readings are recorded from approximately the center of the platens, and shall be subjected to the preliminary load of 20,000 lb three successive times, the washer each time being completely released to its free height.

3.6.4 MECHANICAL STRENGTH AND DUCTILITY (1967)

- a. After application of the preliminary loads, the washer shall again be compressed to test load in Col. 2 of [Table 4-3-14](#) and the load shall be released by opening the platens through the prescribed distance, Col. 3, for respective sizes of spring washers for bolts in Col. 1. A reactive spring pressure of not less than the limits of the loads in Col. 4 shall then be required.
- b. Ductility shall be determined by twisting one end of a finished spring washer through 90 degrees without sign of fracture, while the other end is held securely in a vise, as follows:
 - (1) Fasten one-fourth of the length of the coil from one end between the jaws of a vise.
 - (2) Grip one-fourth of the length of the coil from the other end between the jaws of wrench.

Table 4-3-14. Washer Strength Test

Spring Washers for Bolt Diameter Inches	Applied Load Pounds	Platens Released from Loads by Distances Inches	Minimum Reactive Spring Pressure Pounds
3/4	20,000	0.025	2,500
7/8	20,000	0.025	2,500
1	20,000	0.030	5,000
1-1/16	20,000	0.030	5,000
1-1/8	20,000	0.030	5,000
1-1/4	20,000	0.030	5,000

¹ These specifications have been prepared and are recommended for the use of roads purchasing spring washers. This recommendation of these specifications, however, does not imply any recommendation for or against the use of spring washers. Reapproved with revisions 1967

² References, Vol. 34, 1933, pp. 635, 823; Vol. 49, 1948, pp. 378, 614; Vol. 54, 1953, pp. 1180, 1414; Vol. 62, 1961, pp. 587, 952; Vol. 64, 1963, pp. 499, 690; Vol. 68, 1967, p. 409.

- (3) Rotate the wrench, thus causing the end of the coil to describe a circle about the middle point of the coil as a center so that open ends of washer shall pass each other.

3.6.5 PROPORTION OF TESTS (1967)

- a. Tests shall be made of 3 specimens selected by the inspector at random from each lot of 15,000 finished spring washers for bolts less than 1 inch in diameter or from each lot of 10,000 finished spring washers for bolts 1 inch or more in diameter. The 3 test specimens from each lot or fraction thereof shall be tested for reactive pressure and ductility, and if all specimens meet the specification requirements the lot will be accepted.
- b. If 1 of the 3 test specimens should fail, 2 more specimens shall be selected from the same lot and if both meet the specification requirements the lot will be accepted. If 1 or both fail the lot will be rejected
- c. .If 2 of the first 3 specimens selected from a lot should fail, all the washers from that lot shall be rejected.

3.6.6 REHEAT TREATMENT (1967)

- a. If the results of the physical tests do not conform to the requirements specified, the manufacturer may reheat-treat each lot, but not more than 3 additional times, unless authorized by the purchaser, and retests shall be made as specified in [Article 3.6.5](#).
- b. No lot which has failed to pass the tests shall be offered for further test until after the spring washers in that lot have been retreated.

3.6.7 TOLERANCES

The spring washers shall conform to the dimensions and tolerances specified in Table 4-X-XX.

3.6.8 UNIFORMITY OF STOCK (1967)

Uniformity in size of steel stock used in making spring washers and the dimensions around which the spiral is coiled are desirable. In cross section the faces of the finished spring washer which bear against the joint bar and the nut must be parallel.

3.6.9 PERMANENT SET (1967)

Previous to offering any lot of spring washers for inspection, each individual piece shall have been subjected as a part of the routine manufacturing process to shock or pressure sufficient to cause permanent set and any individual pieces defective through seams, quenching cracks, etc., shall be discarded.

3.6.10 FINISH (1967)

All finished pieces must be clean, smooth, without burrs or rough edges, of uniform size, with well-shaped symmetrical coil and cross section, free from injurious mechanical defects, and be finished in a first class, workmanlike manner.

3.6.11 PACKING

The finished spring washers shall be packed in **securely hooped kegs, well fastened boxes or pails**. Containers shall be left open until the inspection is completed.

FigureXXX

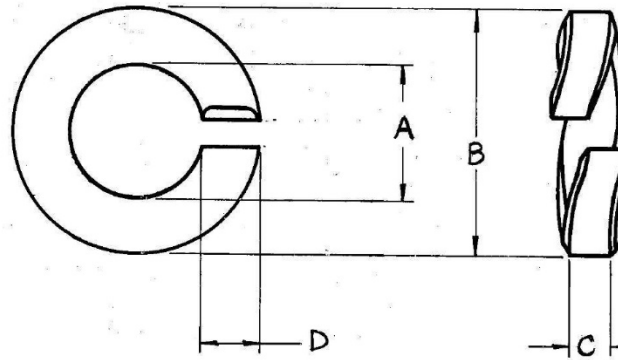


Table 4-X-XX. Spring Washer Dimensions and Tolerances

Nominal Size	Inside Diameter (A)		Section Width (D)	Section Thickness (C)		Outside Diameter (B)
	Min	Max		Min	Max	
3/4"	0.778	0.816	0.394	0.425	0.449	1.630
7/8"	0.903	0.941	0.394	0.425	0.449	1.755
1"	1.028	1.065	0.518	0.518	0.542	2.149
1-1/16"	1.091	1.128	0.518	0.550	0.574	2.212
1-1/8"	1.153	1.191	0.518	0.550	0.574	2.255
1-1/4"	1.278	1.316	0.518	0.550	0.574	2.380

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3.6.12 BRANDING (1967)

- a. Identification will be by the manufacturer's marks.
- b. Spring washers shall be individually marked for identification.
- c. Containers shall be marked as follows:
 - (1) Name of manufacturer.
 - (2) Size of spring washer (bolt size over thread, width and thickness).
 - (3) Number of spring washers.

3.6.13 REJECTION

Spring washers failing to meet the requirements of this specification will be rejected. Material which shows injurious defects subsequent to their acceptance at the place of manufacture or sale will be rejected and returned to the manufacturer.

3.6.14 PLACE OF TESTS (1953)

All tests and inspection shall be so conducted as not to interfere unnecessarily with the operation of the mill, and shall be made at the place of the manufacturer prior to shipment.

3.6.15 ACCESS TO WORKS (1953)

Inspectors representing the purchaser shall have free entry to the works of the manufacturers at all times while the contract is being executed, and shall have all reasonable facilities afforded them by the manufacturer to satisfy them that the spring washers are furnished in accordance with the terms of these specifications.

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