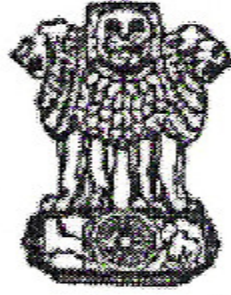


भारत सरकार  
Government of India  
रेल मंत्रालय  
MINISTRY OF RAILWAYS  
(Railway Board)



सत्यमेव जयते

उच्च तन्यता के फिश बोल्ट एवं नट के लिए  
भारतीय रेल मानक विशिष्टि  
संख्या टी 28-73

INDIAN RAILWAYS  
STANDARDS SPECIFICATIONS  
for  
HIGH TENSILE FISH BOLTS AND NUTS  
(Having metric screw threads with ISO profile)  
Serial No. T 28-73



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## **0. FOREWARD**

0.1 This specification is issued under fixed Serial No. T 28; the final number indicates the years of original adoption as standard, or in the case of revision, the year of last revision.

ADOPTED, 1973.

## **1.0 SCOPE**

1.1 This specification covers the requirements of materials, quality and tests etc., for high tensile fish bolts and nuts for use in track.

## **2.0 MATERIAL**

2.1 The fish bolts covered in this specification shall be made from steel produced by the open-hearth, electric furnace, duplex or basic oxygen processes. The maximum contents of sulphur and phosphorous shall not exceed 0.06% each. In case of oxygen processes the maximum contents of Nitrogen shall not exceed 0.008%. The mechanical properties of the fish bolts shall conform to the property class 8.8, specified in IS:1367-1967. Samples selected by the Purchaser or the Inspecting Officers from the bars as rolled and finished nuts and bolts shall be subjected to the mechanical and chemical tests specified below: -

2.2 The fish nuts covered in this specification shall be made from steel produced by the open-hearth, electric furnace, basic oxygen or duplex processes. The mechanical properties of the fish nuts shall conform to the property class 8 specified in IS:1367-1967.

## **3.0 GRADE**

3.1 The fish bolts and nuts covered in this specification shall conform to the requirements of Black Grade B specified in IS:1367-1967 unless otherwise specified in this standard and the drawings.

## **4.0 DIMENSIONS**

4.1 The bolts and nuts shall conform to the dimensions shown on the relevant drawings. The bolt heads shall be formed by upsetting the bars when hot. The nuts shall be hot forged from solid and the bearing faces smooth. The bolts and the nuts shall be neatly formed, free from harmful defects and shall have a workman-like finish. The concentricity and angularity errors of the bolt heads and nuts shall be within the limits specified for black grade fasteners in clauses 5.3 and 5.4 of IS: 1367-1967 respectively.

4.2 The threads of the fish bolts and nuts shall be cut to the design profile of the ISO Metric Screw Threads without allowances as referred to in IS:4218-1967 'ISO Metric Screw Threads' and having modified dimensions as given in Table I of this specification. The fish bolts and nuts shall pass the unscrewing tests specified in Clause 7.3.

**Table I**  
**\*Main design dimensions of ISO Metric Screw Threads – Bolts**  
**(without allowance) & Nuts.**

Size (nominal dia.)	Pitch	MAJOR DIAMETER		EFFECTIVE DIAMETER		MINOR DIAMETER	
		Bolt	Nut	Bolt	Nut	Bolt	Nut
20	2.5	20.00	20.00	18.376	18.376	16.933	17.294
22	2.5	22.00	22.00	20.376	20.376	18.933	19.29

All figures are in millimeters.

4.3 When fish nuts are ordered independently of the fish bolts or vice versa, the threads of the bolts or nuts, as the case may be, shall be cut to the design profile of the ISO metric Screw Threads without allowance as referred to in IS:4218-1967 “ISO metric Screw Threads” and having dimensions and tolerances as given in Table II and III of this specification.

**Table II**  
**\*Dimensions and Tolerances for ISO Metric Screw Threads – Bolts**  
**(without allowance).**  
**(Clause 4.3)**

Size (nominal dia.)	Pitch	MAJOR DIAMETER			EFFECTIVE DIAMETER			MINOR DIAMETER		
		Max.	Tol.	Min.	Max.	Tol.	Min.	Max.	Tol.	Min.
20	2.5	20.00	0.335	19.665	18.376	0.120	18.206	16.993	0.350	16.583
22	2.5	22.00	0.335	21.665	20.376	0.120	20.206	18.933	0.350	18.583

All figures are in millimeters.

\*Based on IS:4218-1967.

**TABLE-III**  
**\*Dimensions and Tolerances for ISO Metric Screw Threads – Nuts**  
**(without allowance).**  
**(Clause 4.3)**

Size (nominal dia.)	Pitch	Major dia. Min.	EFFECTIVE DIAMETER			MINOR DIAMETER		
			Max.	Tol.	Min.	Max.	Tol.	Min.
20	2.5	20.00	18.600	0.224	18.376	17.794	0.500	17.294
22	2.5	22.00	20.600	0.224	20.376	19.794	0.500	19.294

All figures are in millimeters.

\*Based on IS:4218-1967.

## **5.0 HEAT TREATMENT**

5.1 Bolts shall be heat treated under uniform conditions. They shall be hardened by quenching in oil and shall then be tempered. Nuts may be heat treated if required, to meet the mechanical property requirements.

## **6.0 SUBMISSION OF SAMPLES**

6.1 If required by the Purchaser or the Inspecting Officer, the Contractor shall submit two samples of each diameter of fish bolts and nuts ordered, and manufacture in bulk shall not be proceeded with, until these samples have been approved.

6.2 In case, the samples have been submitted, one sample shall be returned to the contractor sealed to guide in the manufacture. Such samples shall be made in the dies and machines with which general manufacture will be carried out.

## **7.0 TESTS FOR BOLTS & NUTS**

### **7.1 CHEMICAL ANALYSIS**

7.1.1 The Contractor shall supply a complete analysis of each cast of steel when required to do so by the purchaser or Inspecting Officer. Samples shall also be taken by the Purchaser or Inspecting Officer from the bars or the finished bolts and nuts and shall be subjected to complete analysis, if necessary, at the expense of the Purchaser.

### **7.2 TEST FOR MECHANICAL PROPERTIES OF NUTS AND BOLTS**

#### **7.2.1 Tests for Mechanical Properties and Surface**

Decarburisation of fish bolts – The tests on bolts shall be carried out as per Test Programme B specified in Clause 8.2 of IS: 1367-1967.

7.2.2 Tests for Mechanical Properties of fish nuts – The tests on nuts shall be carried out as per clause 8.3 of IS:1367-1967.

### **7.3 UNSCREWING TEST**

7.3.1 All finished bolts and nuts shall be capable of passing the following tests for resistance to unscrewing.

7.3.2 First Unscrewing Tests – The nut shall be screwed on to the fish bolts until it is flush with the end of the fish bolt and a spanner of the kind mentioned in clause 7.3.5 shall than be affixed to the nut in a horizontal position and weighted as specified in clause 7.3.4.

7.3.3 Second Unscrewing Test – The nut shall then be screwed further on to the fish bolt until the end of the fish bolt projects four threads beyond the face of the nut and the spanner weighted as before shall be again similarly applied to the nut.

7.3.4 Under each of the above tests, the nut shall carry neither less than the minimum nor more than the maximum weights specified in the following table.

<b>Diameter of fish bolts</b>	<b>Test weight in Kg.</b>	
	<b>Minimum</b>	<b>Maximum</b>
20mm	1.4	7.0
22mm	1.6	8.0

7.3.5 The spanner specified above shall weigh 4.5 Kg and the distance between the centre of the nuts and the point of suspension of the test weight shall be 1 metre.

#### **7.4 DRIFTING TEST FOR NUTS**

7.4.1 From each batch, samples at the rate of 1 per 5000 or part thereof but not less than 5 from any batch shall be selected by the Purchaser or the Inspecting Officer.

7.4.2 Sample nuts shall withstand, without fracture, drifting hot until the hole is 1.5 times the original diameter.

#### **7.5 COLD BEND TEST**

7.5.1 One cold bend test on the steel used in the manufacture of nuts shall also be made on the test pieces taken from the bars for every 5 tonnes of steel rolled from the same cast or part thereof.

7.5.2 The bend test shall be carried out in accordance with IS:1599-60 "Method for Bend Test for Steel Products other than Sheet, Strip, Wire and Tube". The test pieces, when cold, shall without fracture be doubled over either by pressure or by blows from hammer, until the internal diameter is not greater than the diameter or the thickness of the test piece, and the sides are parallel.

#### **8.0 NUMBER OF TESTS FOR MECHANICAL PROPERTIES AND RESISTANCE TO UNSCREWING**

8.1 Number of tests for Mechanical Properties: - From each batch of 5000 or part thereof of fish bolts and nuts, samples at the rate of 3 per batch shall be selected by the Purchaser or the Inspecting Officer for these tests.

8.2 Number of Unscrewing Tests: - At least one in every batch of 500 or part thereof of fish bolts and nuts shall be tested for resistance to unscrewing. Should the test prove unsatisfactory, the Purchaser or the Inspecting Officer may take further tests at his discretion.

#### **9.0 RETESTS**

9.1 Should any specimen fail to meet the requirements of a specified test, an additional sample of double the number of specimens from the same batch at the time of manufacture shall be tested and if the additional specimens fail to fulfill such tests, the batch from which the test pieces were taken shall be rejected.

## **10.0 PAYMENTS**

10.1 The fish bolts and nuts shall be paid on the basis of actual numbers supplied provided the selected samples are within the permissible dimensional tolerances; those beyond the tolerances shall be rejected.

## **11.0 MARKING**

11.1 The fish bolts shall be marked in raised figures with ISO property class 8.8, the maker's initial/mark and the IRS part number shown on the drawings. In addition, two raised hemispherical dots of not less than 1mm radius symmetrically opposite each other shall also be marked on bolt heads to distinguish between metric high tensile fasteners from others.

11.2 In case of fish nuts, four raised hemispherical dots of not less than 1mm radius 90° apart shall be marked on non-bearing faces of nuts to identify metric high tensile fasteners.

## **12.0 INSPECTION**

12.1 The Inspecting Officer or the Purchaser shall have free access at all reasonable time to the works in which the material is made and also to the works where the bolts and nuts are manufactured. He shall be at liberty to inspect the manufacture at any stage and to reject any material or bolts and nuts that do not conform to the terms of this specification.

## **13.0 TESTING FACILITIES**

13.1 When inspection is carried out during manufacture: - The contractor shall supply the material and samples required for testing free of charge and shall, at his own cost, furnish and prepare the necessary test pieces and supply labour and appliances for such testing as may be carried out in his own premises in accordance with this specification. Failing facilities at his own works for making the prescribed test, the Contractor shall bear the cost of carrying out the tests elsewhere.

13.2 Where bolts and nuts are taken from stock: - The contractor shall provide the samples required for testing free of charge and shall, at his own cost, forward, if necessary, and as may be directed by the Purchaser or the Inspecting Officer, such samples as may have been tested in his own premises or are required for testing elsewhere.

## **14.0 PROTECTION**

14.1 After inspection and approval, the bolts and nuts shall be protected with one coat of boiled linseed oil to IS: 77-50 or with any other approved rust preventive compound and shall not be packed until the oil has dried to an elastic film, free from thickness.

## **15.0 PACKING**

15.1 The bolts shall be packed complete with their nuts screwed on for few threads when bolts and nuts are ordered together. The bolts and nuts shall be packed in double bags conforming to IS:2875-64 “Jute Corn Sacks” and of suitable size. No bag shall contain more than 50 Kg or more than one kind of bolts and nuts.