BUREAU OF INDIAN STANDARDS

Draft AMENDMENT NO. 1

TO

IS 4824: 2022 BEAD WIRE FOR TYRES — SPECIFICATION

(*Second Revision***)**

ICS 77.140.65

Wrought Steel Products Sectional Committee, MTD 04	Last date for receipt of comments: **27 June 2025**

(*Page* 1, *Clause* **1.2**) — Substitute the following for the existing:

'**1.2** The bead wire mentioned in this specification can be supplied in the form of rounds and flats for the sizes specified in the standard.'

(*Page* 1, *Clause* **2,** *Row* 3) — Substitute the following for the existing:

1608 (Part 1) : 2022 / ISO 6892-1 : 2019	Metallic materials — Tensile testing: Part 1 Method of test at room temperature (*fifth revision*)

(Page 1, Clause **6.1,** *sentence* **1***)* — Substitute the following for the existing sentence 1:

'6.1 The ladle analysis of steel, when carried out either by the method specified in relevant parts of IS 228 or any other established instrumental/chemical method should be as given in Table 1 or any other chemical composition as agreed between the purchaser and the manufacturer.

(*Page* 1, *Clause* 7.2.2**,** line 1) — Delete 'minimum'.

(Page 2, *Table* **1)** — Substitute the following for the existing table:

Table 1 Chemical Composition

(*Clause* 6.1)

Constituent, Percent, *Max*							
Sl No.	**Tensile strength**	**C**	**Si**	**Mn**	**S** *Max*	**P** *Max*	**N** *Max*
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
i)	NT	0.60 to 0.76	0.10 to 0.30	0.40 to 0.70	0.035	0.035	0.009
ii)	HT	0.70 to 0.90	0.10 to 0.30	0.40 to 0.60	0.025	0.020	0.009
NOTE — Nitrogen content of steel shall be ensured by the manufacturer by occasional check analysis.							

(Page 2, *Table* **3)** — Substitute the following for the existing table:

Table 3 Requirements for Tensile Strength and Elongation

(*Clauses* 7.2.2 *and* 7.2.3)

Sl. No.	**Diameter/Size** mm	**Tensile Strength** NT N/mm^2	**Tensile Strength** HT N/mm^2	**Minimum Elongation at Rupture (gauge length = 200 mm)** A_t Percent
(1)	(2)	(3)	(4)	(5)
i)	$0.80 \leq d < 0.95$	1900 to < 2150	2150 to 2500	5.0
ii)	$0.95 \leq d < 1.25$	1850 to < 2050	2050 to 2400	5.0
iii)	$1.25 \leq d < 1.70$	1750 to < 2050	2050 to 2400	5.0
iv)	$1.70 \leq d < 2.10$	1500 to < 2050	2050 to 2400	5.0
v)	Flat 3 × 1.50	1 650 to 1 950	—	2.0
vi)	Flat 2 × 1.30	1 650 to 1 950	—	2.0

$1\ N/mm^2 = 1$ MPa

NOTE — The variation of the tensile strength between the samples of a lot shall not be more than 300 N/mm^2, wherever applicable.

(*Page* 2, *Clause* **7.3**) — Substitute the following for the existing :

'The wire shall withstand the minimum number of turns listed in Table 4 without fracture. Torsion test shall not be applicable for flat wires.'

(*Page* 3, *Clause* **7.4.1**) — Substitute the following for the existing:

'7.4.1 The wire is supplied with one of the following coatings: low-tin bronze or high-tin bronze, brass, copper or zinc. Zinc coating is applicable for flat wires only. The chemical composition of coating material shall be in accordance with Table 5 and shall be determined as per XRF test method given in **B-1** of Annex B. Other established method such as Atomic Absorption Spectrometry (AAS) or Titrimetric Method may also be used if mutually agreed between the purchaser and the manufacturer.

NOTE — Based on mutual agreement between the purchaser and the supplier, the wire may be supplied with Coumarone Resin residue coating, in addition to metallic coating.'

(*Page* 3, *Table* **5**) — Insert the following after the last row :

Zinc	—	—	99 *Min*

(*Page* 3, *Table* **6**) — Substitute the following for the existing:

Table 6 Coating Weight
(*Clause* 7.4.3)

Type of Coating	**Diameter Range** mm	**Weight of Coating** g/kg
(1)	(2)	(3)
Copper, Bronze high-tin (Sn), Bronze low-tin (Sn), Brass	0.8 to ≤ 1.25	0.30 – 1.00
	> 1.25 to 2.1	0.15 – 0.75
Zinc	Flat 2 × 1.30, 3 × 1.50	0.20 – 0.34

(*Page* 3, *Clause* **7.6.1**) — Substitute the following for existing:

The round wires from 0.80 to 2.10 mm diameter and flat wires of 2 × 1.30 mm and 3 × 1.50 mm can be supplied under this specification. For flat wires, the dimensions are in the form of width × thickness.

(*Page* 3, *Clause* **7.6.2**) — Insert the following at the end of existing line:

For flat wires, the width tolerance is ± 0.05 mm, and thickness tolerance is ±0.03 mm.

(*Page* 3, *Clause* **7.6.4**) — Substitute the following for the existing:

The finish of the wire shall be such as to give satisfactory adhesion. The bead wire shall be subjected to an adhesion test as given in Annex A or any method as per mutual agreement between the purchaser and the manufacturer. The minimum pull out load and mean pull out load observed during the test shall be as agreed between the purchaser and the manufacturer.

(*Page* 4, *Clause* **8.3**) — Substitute the following for the existing :

Copper and bronze coating weight shall be checked by gravimetric method (weight difference before and after stripping the coating from measured length of samples) or by X-ray fluorescence (XRF) method or by using colorimetric principles (GEDET instrument). For brass or zinc coating, coating weight shall be checked by XRF method (Refer Annex B) or any other established method such as Atomic Absorption Spectrometry (AAS) or Titrimetric method or as per mutual agreement between the purchaser and the manufacturer.

(*Page* 5, *Annex* **A,** *Clause* **A-2.1,** *line* **1**) — Substitute ’12.5 for ‘13’.

(*Page* 5, *Annex* **A,** *Clause* **A-2.1,** *line* **2**) — Substitute ‘200’ for ‘205’.

(*Page* 8, *Annex* **B**) — Insert the following :

B-1.8 For XRF equipment which can measure radiation intensity directly from solid sample (without dissolution into stripping solution), testing to be done as per following steps

NOTE – Use X Ray Fluorescence Spectrometer of table-top model only. Hand held XRF equipment should not be used for testing composition of coating on wires.

B-1.8.1 ***Preparation of samples***

Cut the cleaned wire into pieces longer than the mask window size (as specified for the XRF equipment available) and place them side by side on a plastic disc so as to cover complete surface. Secure the samples with vinyl tape to ensure they do not move.

B-1.8.2 ***Test procedure***

Place plastic disc with wire samples into the sample holder of the instrument. Follow instructions provided by the respective equipment supplier to irradiate the wire surface and measure intensities of Cu, Sn, Zn. Use the intensities values in the equation obtained from calibration curve (determined as per B-1.8.3) to obtain amount of Cu, Sn or Zn in g/kg.
If diameter of the wire under testing is different from diameter of wire used to prepare calibration curve, ensure correction factor is employed as follows:

a) Copper Mass (g/kg) = Calculated value of copper mass for wire under testing × D_o/ D

b) Tin Mass (g/kg) = Calculated value of tin mass for wire under testing × D_o / D

c) Zn Mass (g/kg) = Calculated value of Zn mass for wire under testing × D_o /D

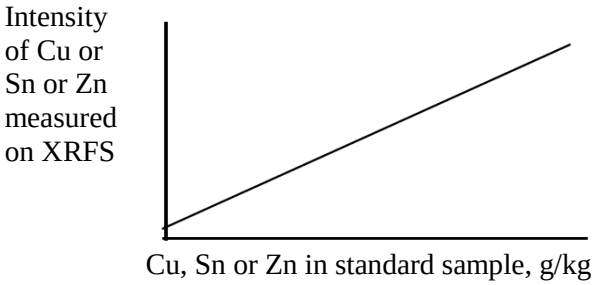
where D_o — the diameter of wire used for preparing calibration curve; and
D — the diameter of wire under testing

B-1.8.3 ***Preparation of standard calibration curve***

Standard calibration curve is prepared by analysing samples with known quantities of Cu, Sn or Zn in the coating. Such samples can be prepared by analysis using ICP spectroscopy or externally available standard samples can be used.

Use samples of at least 5 different levels of Cu, Sn or Zn so as to cover the complete measurement range as specified for the wire. An example is given below:

Level	**1**	**2**	**3**	**4**	**5**	**6**
Cu mass, g/kg	0.15	0.30	0.45	0.60	0.75	1.0
Sn mass, g/kg	0.005	0.009	0.015	0.050	0.070	0.090



- Y (Intensity measured on XRFS) = m (g/kg of Cu, Sn or Zn) + C

- m and C are obtained by plotting the curve using standard samples

FIG 3. TYPICAL CALIBRATION CURVE

(MTD 04)