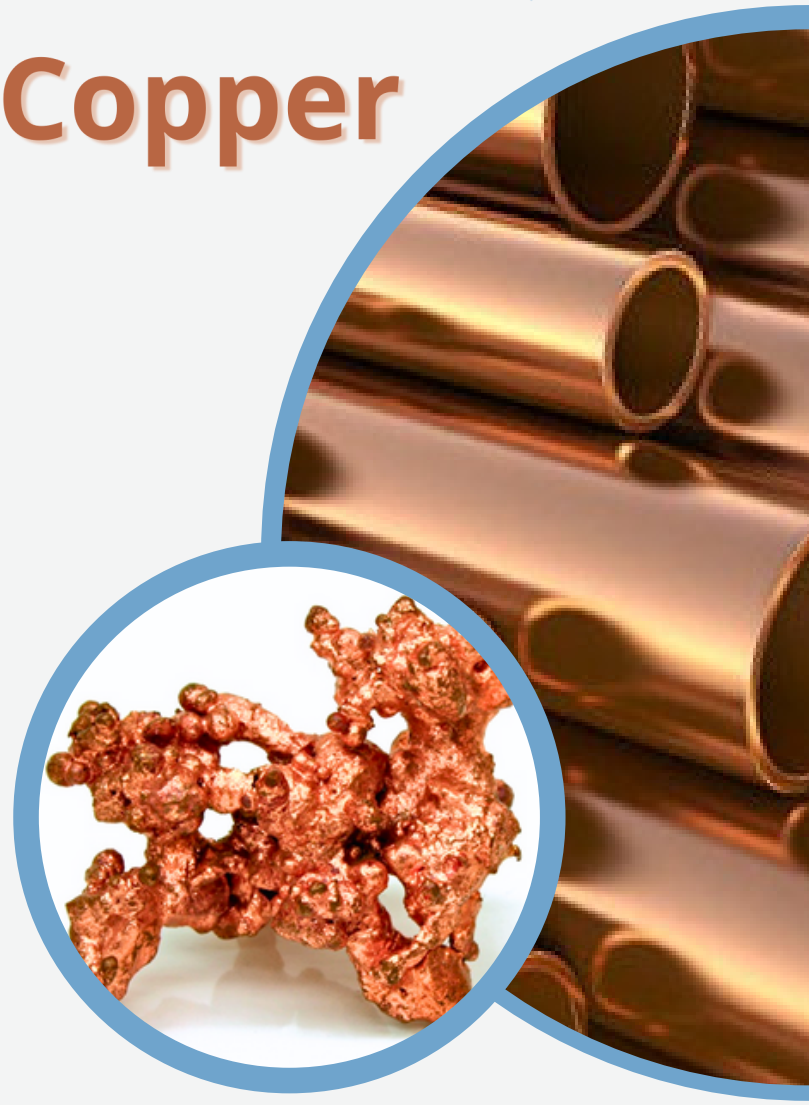
मानकः पथप्रदर्शकः

COMPENDIUM OF INDIAN STANDARDS ON

Copper and Copper Alloys



Prepared By:

Metallurgical Engineering Department

BUREAU OF INDIAN STANDARDS
NEW DELHI

Table of Contents

INTRODUCTION

This compendium gives a list and brief description of the various products and test methods standards formulated by BIS on Copper and Copper alloys. These standard have been formulated by MTD 08, Ores and Feed Stock for Copper Industry, its Metals/ Alloys and Products sectional committee of BIS

Table 1: Indian Standards on Copper and Copper alloys Refinery Shapes

Sl No.	Indian Standard No.	Title
1	IS 28 : 1985	Specification for phosphor bronze ingots and castings
2	IS 191 : 2007	Copper — Specification
3	IS 292 : 1983	Specification for leaded brass ingots and casting
4	IS 304 : 1981	Specification for high tensile brass ingots and castings
5	IS 305 : 1981	Specification for aluminium bronze ingots and castings
6	IS 306 : 1983	Specification for tin bronze ingots and castings
7	IS 318 : 1981	Specification for leaded tin bronze ingots and castings
8	IS 1028 : 1987	Specification for silicon bronze ingots and castings
9	IS 11109 : 1984	Specification for silicon brass ingots and castings

Table 2: Indian Standards on Copper and Copper alloys Wires, Wire Rods and Bars

Sl No.	Indian Standard No.	Title
1	IS 288 : 1981	Specification for arsenical copper rods for boiler stay bolts and rivets
2	IS 291 : 1989	Naval brass rods and sections for machining purposes — Specification
3	IS 319 : 2007	Free cutting brass bars, rods and section — Specification
4	IS 320 : 1980	Specification for high tensile brass rods and sections (other than forging stock)
5	IS 613 : 2000	Copper rods and bars for electrical purposes — Specification
6	IS 4170 : 1967	Specification for brass rods for general engineering purposes
7	IS 4171 : 1983	Specification for copper rods and bars for general engineering purposes
8	IS 4412 : 1981	Copper wires for general engineering purposes
9	IS 7811 : 2019	Phosphor bronze rods and bars
10	IS 8328 : 2007	Free cutting copper bars, rods and sections — Specification
11	IS 12444 : 2020	Copper wire rods for electrical applications

Table 3: Indian Standards on Copper and Copper alloys Tubes

Sl No.	Indian Standard No.	Title
1	IS 1545 : 1994	Solid drawn copper and copper alloy tubes for condensers and heat exchangers — Specification
2	IS 2501 : 1995	Solid drawn copper tubes for general engineering purposes — Specification
3	IS 10773 : 1995	Wrought copper tubes for refrigeration and air-conditioning purposes – Specification
4	IS 14810 : 2000	Copper tubes for plumbing — Specification
5	IS 407 : 1981	Specification for brass tubes for general purposes

Table 4: Indian Standards on Copper and Copper alloys Strips

Sl No.	Indian Standard No.	Title
1	IS 410 : 1977	Specification for cold rolled brass sheet, strip and foil
2	IS 1897 : 2008	Copper strip for electrical purposes — Specification
3	IS 3331 : 2007	Copper and brass strips/foils for radiator cores — Specification

Indian Standards on Copper and Copper alloys Refinery Shapes

IS 28 : 1985 Specification for phosphor bronze ingots and castings: This standard covers the requirements for mechanical and chemical properties of phosphor bronze ingots and castings. However, this standard does not cover the requirements of material for use in railways.

IS 191 : 2007 Copper — Specification: This standard specifies the chemical composition, physical properties, and refining methods for various copper grades used in industrial applications. It also covers electrical conductivity, resistivity, ensuring consistency across wire bars, cakes, billets, and ingots.

The standard categorizes copper into several grades, such as Cu-CATH-1, Cu-ETP, Cu-FRHC, Cu-DHP, and Cu-ATP, each with distinct mechanical and chemical characteristics. IS 191 : 2007 ensures manufacturers, engineers, and consumers receive high-quality, standardized copper, crucial for electrical, construction, and mechanical applications.

IS 292 : 1983 Specification for leaded brass ingots and casting: This standard specifies the requirements for mechanical and chemical properties of leaded brass ingots and castings. This standard covers two grades of leaded brass ingots and casting designated as LCB 1 and LCB 2.

IS 304 : 1981 Specification for high tensile brass ingots and castings: This standard specifies the requirements for chemical and mechanical properties of high tensile brass ingots for remelting purposes and castings.

This standard covers two grades of high tensile brass ingots designated as HTB 1 (High Tensile Brass 1) and HTB 2 (High Tensile Brass 2).

IS 305 : 1981 Specification for aluminium bronze ingots and castings: This standard specifies the requirements for chemical and mechanical properties of aluminium bronze ingots and castings. This standard covers two grades of aluminium bronze ingots and castings designated as AB 1 (Aluminium Bronze 1) and AB 2 (Aluminium Bronze 2).

IS 306 : 1983 Specification for tin bronze ingots and castings: This standard specifies the requirements for chemical and mechanical properties of tin bronze ingots and castings.

IS 318 : 1981Specification for leaded tin bronze ingots and castings: This standard specifies the requirements for chemical and mechanical properties of leaded tin bronze ingots and castings. This standard covers six grades of leaded tin bronze ingots and castings designated as LTB 1, LTB 2, LTB 3, LTB 4, LTB 5 and LTB 6.

IS 1028 : 1987 Specification for silicon bronze ingots and castings: This standard specifies the requirements for chemical and mechanical properties of silicon bronze ingots and castings.

IS 11109 : 1984 Specification for silicon brass ingots and castings: This standard specifies the requirements for chemical and mechanical properties of silicon brass ingots and sand castings.

Indian Standards on Copper and Copper alloys Wires, Wire Rods and Bars

IS 288 : 1981 Specification for arsenical copper rods for boiler stay bolts and rivets: This standard covers the requirements for mechanical and chemical properties of arsenical copper rods of size 10 mm and above for locomotive boiler stay bolts, rivets, etc.

IS 291 : 1989 Naval brass rods and sections for machining purposes — Specification: This standard specifies requirements for mechanical and chemical properties of two grades of naval brass rods and sections for machining purposes.

IS 319 : 2007 Free cutting brass bars, rods and section — Specification: This standard covers the requirements for mechanical and chemical properties of free cutting brass bars, rods and sections having a minimum cross-sectional dimension over 6 mm suitable for high speed screw cutting and turning work.

IS 320 : 1980 Specification for high tensile brass rods and sections (other than forging stock): This standard covers the requirements for mechanical and chemical properties of rods and sections of high tensile brasses.

IS 613 : 2000 Copper rods and bars for electrical purposes — Specification: This standard defines the requirements for mechanical, chemical and physical properties of copper rods and bars used in electrical applications, ensuring superior conductivity and durability.

The standard covers Cu-ETP (Electrolytic Tough Pitch Copper) and Cu-FRHC (Fire Refined High Conductivity Copper) rods and bars.

IS 4170 : 1967 Specification for brass rods for general engineering purposes: This standard covers the requirements for chemical and mechanical properties of brass rods for general engineering purposes. This standard covers CuZn20, CuZn30 and CuZn40 brass rods.

IS 4171 : 1983 Specification for copper rods and bars for general engineering purposes: This standard covers the requirements for mechanical and chemical properties of Copper rods and bars for general engineering purposes. The rods, bars conforming to this standard are generally used in the manufacturing rivets, bolts, hooks fasteners, buckles, springs and machine components.

IS 4412 : 1981 Copper wires for general engineering purposes: This standard outlines the requirements for mechanical and chemical properties of copper wires used in general engineering applications, ensuring high-quality standards for components like rivets, bolts, nuts, wire cloth, and nails.

This standard ensures that copper wires deliver superior quality, reliability, and consistency across diverse engineering purposes, maintaining optimal performance and adherence to industry requirements.

IS 7811 : 2019 Phosphor bronze rods and bars: This standard specifies the requirements for chemical and mechanical properties of phosphor bronze rods and bars.

IS 8328 : 2007 Free cutting copper bars, rods and sections — Specification: This standard covers the requirements for chemical, mechanical and electrical properties of free cutting leaded-copper and tellurium-copper bars, rods and sections.

IS 12444 : 2020 Copper wire rods for electrical applications: This standard defines the mechanical, chemical and electrical properties for copper wire rods used in electrical applications, ensuring high conductivity, durability, and compliance with modern industry standards.

The standard covers ETP (Electrolytic Tough Pitch) and OFC (Oxygen-Free Copper) wire rods, with purity levels of 99.90% for ETP and 99.95% for OFC.

Indian Standards on Copper and Copper alloys Tubes

IS 1545 : 1994 Solid drawn copper and copper alloy tubes for condensers and heat exchangers — Specification: This standard defines the requirements for mechanical, chemical and physical properties of solid drawn copper tubes used in condensers and heat exchangers, ensuring durability, high thermal conductivity, and corrosion resistance. These seamless tubes, produced via a solid drawing process, are essential in power generation, industrial heat exchange systems, air conditioning, and refrigeration.

IS 2501 : 1995 Solid drawn copper tubes for general engineering purposes — Specification: This standard defines the specifications for solid drawn (seamless) copper tubes used in general engineering applications such as fluid transport, heat exchangers, and machinery components. The standard specifies the requirements for mechanical, chemical and physical properties of solid drawn (seamless) copper tubes.

IS 10773 : 1995 Wrought copper tubes for refrigeration and air-conditioning purposes – Specification: This standard specifies the requirements for mechanical, chemical and physical properties of wrought copper tubes used in refrigeration, air conditioning (AC) systems, and heat exchangers.

Additional tests like eddy current, hydrostatic testing, and hydrogen embrittlement resistance ensure material reliability.

IS 14810 : 2000 Copper tubes for plumbing — Specification: This standard covers requirements for mechanical, chemical and physical properties of phosphorized (DHP) copper tubes suitable for general plumbing and similar applications for the conveyance of fluids including water and are commonly used with solder, flared or compression type fittings.

IS 407 : 1981 Specification for brass tubes for general purposes: This standard covers the requirements for chemical and physical properties of solid drawn brass tubes for general purposes. It specifies the preferred method of designating tubes by their outside diameter and lays down the permitted tolerances on outside diameter, wall thickness and length of tubes.

Indian Standards on Copper and Copper alloys Strips

IS 410 : 1977 Specification for cold rolled brass sheet, strip and foil: This standard specifies the requirements for chemical and mechanical properties of cold rolled brass sheet, strip and foil required for engineering and general purposes. This standard covers three alloys of cold rolled brass sheet, strip and foil designated as CuZn30, CuZn37 and CuZn40.

IS 1897 : 2008 Copper strip for electrical purposes — Specification: This standard specifies the requirements for mechanical, chemical and physical properties of copper strips used in electrical applications, ensuring high purity, conductivity, and durability. The standard primarily applies to grades Cu-ETP (Electrolytic Tough Pitch Copper) and Cu-FRHC (Fire Refined High Conductivity Copper), which are manufactured through drawing or rolling processes and can be in annealed, half-hard, or hard conditions.

IS 3331 : 2007 Copper and brass strips/foils for radiator cores — Specification: This standard specifies the requirements for chemical and mechanical properties of copper and brass strips/foils for fabrication of radiators for motor cars, trucks, tractors, earth moving equipments, diesel locomotives and stationary internal combustion engines.