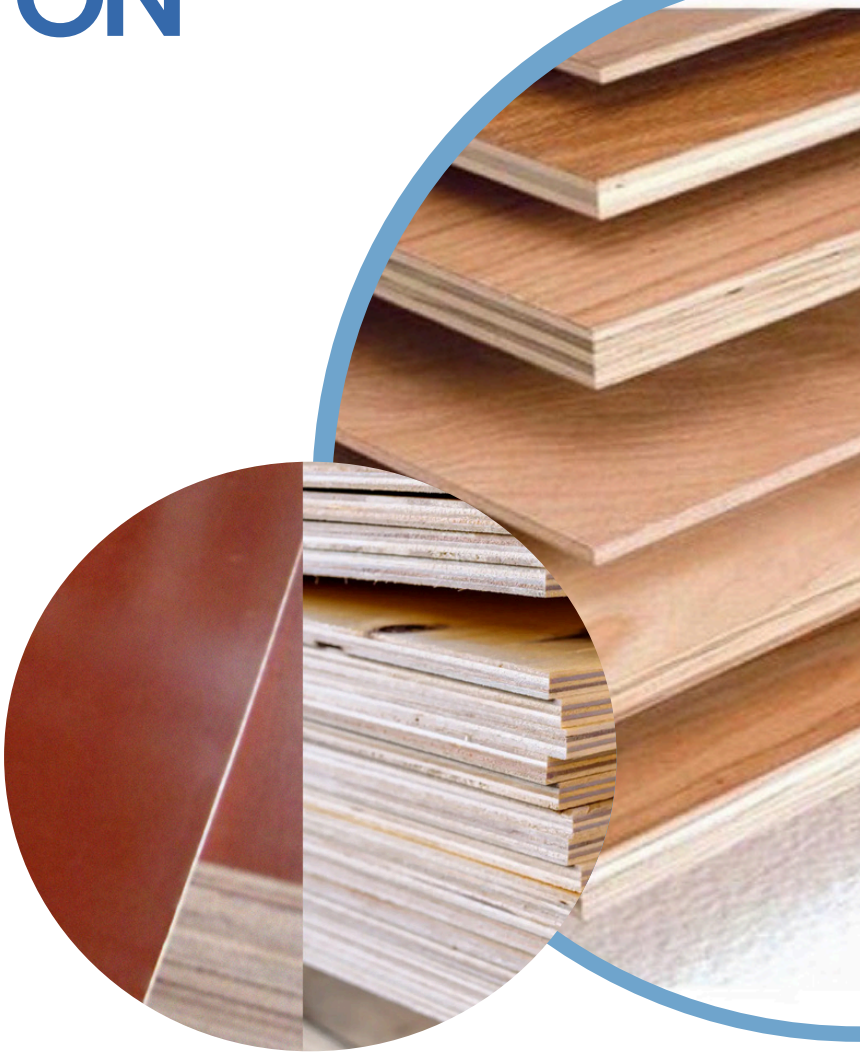
COMPENDIUM OF INDIAN STANDARDS ON PLYWOOD



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INTRODUCTION

Plywood is a widely used engineered wood products in the construction, furniture, and interior design industries and manufactured by bonding together wood veneers with their grains placed at right angles. This unique construction gives plywood its strength, stability, and resistance to warping, making it an ideal choice for everything from furniture and interiors to structural applications.

To ensure consistent quality, the Bureau of Indian Standards (BIS) has developed a range of Indian Standards that cover different types of plywood, including general-purpose, decorative, marine, and structural grades along-with their test methods and code of practice on preservative treatments of Plywood. These standards set out the technical requirements, testing methods, and treatment that guide the industry in producing plywood that performs reliably in a variety of conditions.

This compendium brings together all the relevant Indian Standards on plywood in one place. It is designed to serve as a handy reference for professionals in construction, woodworking, and manufacturing, helping them work with materials that meet national quality standards and deliver lasting performance.

1. **IS 303 : 2024 PLYWOOD FOR GENERAL PURPOSES – SPECIFICATION (*Fourth Revision*)**

- This standard covers the technical requirements for plywood used in general-purpose applications. It provides guidelines for grade, type, class, construction, properties, and marking.
- The properties given in this standard for plywood which is commonly used in furniture, panelling, and interior applications are related to surface finishes, water resistance, bending strength etc. These properties help user to select the appropriate variety of plywood as per desired applications.
- Formaldehyde requirements have also been in this standard to protect human health from prolonged exposure to formaldehyde emissions from the plywood.

2. **IS 710 : 2024 MARINE PLYWOOD - SPECIFICATION (*Third Revision*)**

- This standard specifies the quality requirements, manufacturing processes, and testing methods for plywood intended for high-moisture and marine applications. Compliance to this standard ensures that plywood used in boats, shipbuilding, coastal construction etc. is resistant to water, fungal attack, and delamination when exposed to prolonged moisture.
- The properties given in this standard that makes the plywood suitable for applications in marine conditions are water resistance, bending strength (both wet and dry), tensile strength, retention of preservative etc.
- Formaldehyde requirements also have been in this standard to protect against the harm to human health with prolong exposer to formaldehyde emissions from the plywood.

3. **IS 1328 : 1996 VENEERED DECORATIVE PLYWOOD – SPECIFICATION (*Third Revision*) (Reaffirmed in March 2022**

- IS 1328 covers the veneered plywood that is used for decorative purposes. It ensures that the surface veneer has an aesthetically pleasing appearance without compromising on the structural properties of the plywood.
- It includes different requirements for the decorative surface of plywood as well as the qualities related to bond strength in between the veneers of the plywood.
- This plywood is commonly used in interior design and decorative panelling, and compliance to this standard ensures that the final product maintains both desired decorative finish and strength as well.

4. **IS 5509: 2021 FIRE RETARDANT PLYWOOD – SPECIFICATION (*Third Revision*)**

- While manufacturing of plywood as per IS 303 or even after manufacturing as per IS 303, to make the plywood fire-retardant, the plywood or veneer are further treated with certain fire-retardant chemicals during its manufacturing process. This standard

specifies the list of commonly used fire-retardant chemicals, method of treatment, retentions and requirements of fire-retardant plywood.

- The properties to check the fire-retardant effectiveness of the plywood after fire-retardant chemical treatment given in this standard are flammability, flame penetration and rate of burning.

5. IS 4990: 2024 "PLYWOOD FOR CONCRETE SHUTTERING WORKS – SPECIFICATION (*Fourth Revision*)

- Shuttering plywood is primarily used in the construction industry for formwork (shuttering) in concrete casting. It must be able to endure the stress and strain associated with concrete pouring and curing.
- This standard i.e. IS 4990 specifies the requirements of shuttering plywood related to bending strength (both dry and wet), tensile strength, water resistance, mycological test, preservative treatment etc. These properties help to design the formwork for shuttering purpose as per the desired requirements.
- The properties given in this standard related to different types of surface overlays of the plywood ensures its higher finish desired requirements and re-usability.

6. IS 10701:2012 STRUCTURAL PLYWOOD-SPECIFICATION (*First Revision*)

- Plywood conforming to IS 10710 can be used for structural purposes such as in manufacturing of stressed skin panels, plywood web beams, sheathing, silos, rails and ship containers.
- To meet the desired requirements to design the final products for such structural applications, this standard specifies the properties like bending strength (both wet and dry), tensile strength, compressive strength, shear strength etc.

7. IS 709:1974 SPECIFICATION FOR MEDIUM STRENGTH AIRCRAFT PLYWOOD (*First Revision*)

- This standard lays down the requirements for quality, bonding, manufacture and strength of medium strength aircraft plywood suitable for use in the manufacture of secondary structural parts of aircraft and gliders, such as gussets, reinforcing plates, fuselage covering, etc, where medium or low strength plywood are generally specified.

8. IS 13957:1994 METAL FACED PLYWOOD – SPECIFICATION

- Metal-faced plywood is a composite material made by bonding a galvanized iron or aluminium sheet to one or both sides of plywood. Metal-faced plywood compliance to this standard providing strong and durable building boards as this standard specify the requirements of both plywood and metal sheets (used as face) conforming the referred Indian Standards along with the final product requirements of veneers and metal bond quality.
- The scope of this standard is limited to the use of galvanized iron sheet or aluminium sheet only, as metal sheet.

9. IS 15791:2007 MUSEUM PLYWOOD – SPECIFICATION

- This standard specifies the requirements of plywood, including that of materials and manufacture; suitable for making shelves, cupboards, cabinets, etc, in museums, art galleries and other similar institutions.
- Specific to such uses the properties given in this standard are fire retardant and formaldehyde content.

10. IS 1734 (PARTS 1 TO 20):1983 METHODS OF TEST FOR PLYWOOD (*Second Revision*)

IS 1734 provides the comprehensive methods of testing for plywood, divided into multiple parts (Parts 1 to 20 in one volume). This standard covers a wide range of tests that help evaluate various properties of plywood.

The Indian Standard IS 1734 provides detailed testing methods for evaluating the quality, strength, durability, and performance of plywood. It consists of 20 parts, each covering a specific test.

Part-wise Breakdown of IS 1734 Testing Methods is as follows:

Part 1. Determination of Density and Moisture Content

- Measures the density of plywood to assess its weight and compactness.
- Determines the moisture content to ensure stability and resistance to swelling/shrinkage.

Part 2. Determination of Resistance to Dry Heat

- Tests how well the plywood withstands high temperatures without deformation, cracking, or damage.
- Essential for plywood used in hot and dry conditions.

Part 3. Determination of Fire Resistance

- Evaluates fire retardancy of plywood.
- Checks how quickly plywood catches fire and its burning behavior.

Part 4. Determination of Glue Shear Strength

- Measures the bonding strength of adhesive layers between veneers.
- Ensures plywood does not delaminate under stress or moisture exposure.

Part 5. Test for Adhesion of Plies

- Evaluates the quality of adhesion between veneer layers.
- Ensures strong bonding for durability and resistance to peeling.

Part 6. Determination of Water Resistance

- Tests plywood's ability to withstand water exposure without swelling or delamination.
- Key for moisture-resistant (MR), boiling water-resistant (BWR), and boiling water-proof (BWP) plywood.

Part 7. Mycological Test

- Checks resistance to fungal and mold growth under humid conditions.
- Important for plywood used in tropical and coastal regions.

Part 8. Determination of pH Value

- Assesses the acidity or alkalinity of plywood, which can impact bonding and long-term durability.

Part 9. Determination of Tensile Strength

- Measures plywood's ability to withstand pulling forces without breaking.
- Critical for structural applications.

Part 10. Determination of Compressive Strength

- Evaluates plywood's resistance to crushing or compression under load.
- Important for load-bearing furniture and construction applications.

Part 11. Determination of Static Bending Strength

- Measures the flexibility and stiffness of plywood under bending stress.
- Ensures plywood does not break or deform under load.

Part 12. Determination of Scarf Joint Strength

- Tests the strength of angled (scarf) joints in plywood.
- Essential for laminated or engineered plywood products.

Part 13. Determination of Panel Shear Strength

- Evaluates plywood's shear resistance when force is applied parallel to the surface.
- Important for wall panels and furniture joints.

Part 14. Determination of Plate Shear Strength

- Similar to panel shear strength but tested in larger plywood sheets (plates).
- Checks structural integrity in high-stress applications.

Part 15. Central Loading of Plate Test

- Measures how plywood handles a centralized load without breaking or excessive bending.
- Useful for tabletops, shelves, and flooring.

Part 16. Vibration of Plywood Plate Test

- Tests plywood's response to vibrations and dynamic loads.
- Relevant for transport applications (buses, trains, ships, etc.).

Part 17. Long-Time Loading Test of Plywood Strips

- Evaluates how plywood reacts to a constant load over time.
- Assesses long-term durability and creep resistance.

Part 18. Impact Resistance Test

- Measures plywood's ability to absorb shocks and sudden impacts without cracking or breaking.
- Essential for flooring, furniture, and construction.

Part 19. Determination of Nail and Screw Holding Power

- Tests the grip strength of nails and screws in plywood.
- Crucial for furniture, cabinetry, and construction applications.

Part 20. Acidity and Alkalinity Resistance Test

- Assesses plywood's resistance to chemical exposure, such as acidic and alkaline environments.
- Important for plywood used in industrial and laboratory settings.

11. IS 12120:1987 CODE OF PRACTICE FOR PRESERVATION OF PLYWOOD AND OTHER PANEL PRODUCTS

- This standard provides guidelines for protecting plywood, blockboard, flush doors, and particle boards used in various conditions to ensure a longer service life. It outlines the use of preservatives to guard against damage from biological agents and explains methods for applying these at different stages of production. Since some preservatives may affect gluing or painting, users are advised to consult manufacturers. Safety precautions are also recommended, as certain chemicals can be harmful to skin and eyes. Additionally, using termite-resistant construction practices can further improve durability.

- This standard deals with the preservative treatment of wood panel products and their raw materials like stiles, battens, veneers, and wood chips, to protect them from biological damage such as sap-stain, wood rot, termites, insects, marine borers, and bacteria, ensuring they last longer and perform well over time.

- The preservative types mentioned in this standard are oil type, organic solvent type, water soluble non-fixed type and water-soluble fixed type.

- Different methods of treatments are also mentioned in this standard like surface application, soaking treatment, hot and cold process, pressure process and glue-line poisoning.