मानकः पथप्रदर्शकः

COMPENDIUM OF INDIAN STANDARDS ON

PROTECTIVE TEXTILES FOR FIRE-PROTECTION

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INTRODUCTION

Protective textiles are specialized textiles designed to safeguard users from hazards such as heat, flames, chemicals, and environmental threats. These textiles products are majorly used in defense, firefighting, industries and emergency services. These textiles enhance safety and performance by combining durability, comfort, and functional properties tailored to specific protective applications. The work of standardization of protective textiles is undertaken by Protective Textiles Sectional Committee, TXD 32 under the Textiles Division Council.

LIST OF INDIAN STANDARDS ON PROTECTIVE TEXTILES FOR FIRE-PROTECTION

A) List of Product Standards

1. **IS 15748 : 2022 Protective Clothing — Clothing to Protect Against Heat and Flame — Minimum Performance Requirements (First Revision)**
   This Standard specifies performance requirements for protective clothing made from flexible materials, which are designed to protect the wearer's body, except the hands, from heat and/or flame. For protection of the wearer's head and feet, the only items of protective clothing falling within the scope of this standard are gaiters, hoods, and overboots. However, concerning hoods, requirements for visors and respiratory equipment are not given.
2. **IS 16655: 2017 Textiles — Protective Clothing for Use in Welding and Allied Processes**
   This standard outline minimum safety requirements and test methods for protective clothing, including hoods, aprons, sleeves, and gaiters, designed to shield welders from spatter, brief flame contact, radiant heat, and electrical shock up to 100 V D.C. It does not cover protections for feet, hands, face, or eyes, requiring additional PPE for comprehensive safety.
3. **IS 16890: 2024 Textiles — Protective Clothing for Firefighters — Specification (First Revision)**
   This standard specifies test methods and performance requirements for 2 categories (Category 1 for structural firefighting and category 2 for support activities during firefighting) of firefighter protective clothing, addressing design, material performance, and testing for heat/flame protection, but excludes, head and foot protection, and other hazards like biological or electrical risks.
4. **IS 16874: 2018 Textiles — Protective Gloves for Firefighters — Specification**
   This standard outlines test methods and minimum requirements for firefighter gloves, covering design, thermal, mechanical, ergonomic, and visibility aspects, but excludes protection for other body parts or hazards like chemical, biological, or electrical risks.
5. **IS 15741 : 2007 Textiles — Resistance to Ignition of Curtains and Drapes — Specification**

This standard specifies requirements for the resistance to ignition of curtains and drapes used for public places/buildings. Curtains and drapes for domestic use and transport are not covered in this standard.

6. **IS 15742 : 2007 Textiles — Requirements for Clothing Made of Limited Flame Spread Materials and Material Assemblies Affording Protection Against Heat and Flame — Specification**
   This standard specifies the performance requirements for the limited flame spread properties of textile materials and material assemblies used in protective clothing affording protection against heat and flame.
7. **IS 14744 : 1999 Flame Retardent Protective Hoods — Specification**
   This standard prescribes requirements, method of test and sampling for flame retardant protective hoods. Some of the special requirements for the cloth to be used for making such hoods have been also specified in this standard.

B) List of test method standards

1. **IS 11871 : 1986 Method for Determination of Flammability and Flame Resistance of Textile Fabrics**
   This standard prescribes two methods for determining the flammability and flame resistance of textile fabrics. It applies to all types of textile fabrics, clothing and garments whether woven, knitted, bonded, laminated or surface coated.
2. **IS 12467 (Part 1) : 2006 Textiles — Assessment of the Ignitability of Upholstered Furniture Part 1 Ignition Source: Shouldering Cigarette (First Revision)**
   This standard (Part 1) prescribes a test method to assess the ignitability of material combinations, such as covers and fillings used in upholstered seating, when subjected to a shouldering cigarette as an ignition source.
3. **IS 12467 (Part 2) : 2006 Textiles — Assessment of the Ignitability of Upholstered Furniture Part 2 Ignition Source: Match Flame Equivalent (First Revision)**
   This standard (Part 2) lays down a test method to assess the ignitability of material combinations, such as covers and fillings used in upholstered seating, when subjected to a small flame as an ignition source.
4. **IS 12722 : 2024 Textile Floor Coverings — Determination of Flame Resistance by Tablet Test (First Revision)**
   This standard prescribes a method for the determination of flame resistance of textile floor coverings in a horizontal position when exposed to a small source of ignition under controlled laboratory conditions. The method is applicable to all types of textile floor coverings irrespective of their construction or their fibre composition.
5. **IS 13501 : 2025 Textiles — Determination of Flammability by Oxygen Index (First Revision)**
   This standard specifies method for determining the minimum concentration of oxygen, in admixture with nitrogen that will support combustion of small vertical test specimens under specified test conditions. The results are defined as oxygen index values.

The method prescribed in this standard provides a sensitive measure of the burning characteristics of textile materials intended for clothings.

6. **IS 15321 : 2003 Molten Metal Splash Protective Hoods — Specification**
   This standard prescribes requirements, method of test and sampling for molten metal splash protective hoods. Some of the special requirements for the cloth to be used for making such hoods are also specified in this standard.
7. **IS 15589 : 2005 Textile Fabrics — Burning behaviour — Determination of ease of Ignition of Vertically Oriented Specimens**
   This Standard specifies a method for the measurement of ease of ignition of vertically oriented textile fabrics and industrial products in the form of single or multi-component fabrics (coated, quilted, multilayered, sandwich constructions, and similar combinations), when subjected to a small, defined flame.
8. **IS 15590 : 2005 Textile Fabrics — Burning Behaviour — Measurement of Flame Spread Properties of Vertically Oriented Specimens**
   This Standard specifies a method for the measurement of flame spread times of vertically oriented textile fabrics and industrial products in the form of single or multi-component fabrics (coated, quilted, multilayered, sandwich combinations, and similar combinations) when subjected to a small, defined flame.
9. **IS 15612 (Part l) : 2005 Textiles — Burning Behaviour of Curtains and Drapes Part 1 Classification Scheme**
   This standard (Part 1) specifies a classification scheme for the burning behaviour of vertically oriented fabrics intended for curtains and drapes and similar uses such as blinds and textile hangings, where classification is required. Untested materials are not classified.
10. **IS 15612 (Part 2) : 2006 Textiles — Burning Behaviour of Curtains and Drapes Part 2 Measurement of Flame Spread of Vertically Oriented Specimens with large ignition source**
    This standard (Part 2) specifies a method for the measurement of flame spread of vertically oriented textile fabrics intended for curtains and drapes in the form of single or multi-component (coated, quilted, multilayered, sandwich construction and similar combinations) fabrics using a large ignition source.
11. **IS 15612 (Part 3) : 2005 Textiles — Burning behavior of Curtains and Drapes Part 3 Method for Determining the Ignitability of Vertically Oriented Specimens (Small Flame)**
    This standard (Part3) specifies a procedure to determine the ignitability of textiles for curtains and drapes by testing in accordance with IS 15589.
12. **IS 15612 (Part4) : 2005 Textiles — Burning Behaviour of Curtains and Drapes Part 4 Method for Determining the Flame Spread of Vertically Oriented Specimens**
    This standard (Part 4) specifies a procedure to determine the flame spread of textiles for curtains and drapes by testing a vertically oriented specimen in accordance with IS 15590.

13. **IS 15727 (Part 1) : 2020 Textiles — Assessment of the Ignitability of Bedding Items Part 1 Ignition Source: Smouldering Cigarette (First Revision)**
    This standard specifies test methods for assessing the ignitability of all bedding items when subjected to a smouldering cigarette. This standard applies to bedding items, which can normally be placed on a mattress, for example: mattress covers, underlays, incontinence sheets and pads, sheets, blankets, electric blankets, quilts (duvets) and covers, pillows (whatever the filling) and bolsters, and pillowcases.
14. **IS 15727 (Part 2) : 2020 Textiles — Assessment of the Ignitability of Bedding Items Part 2 Ignition Source: Match-Flame Equivalent (First Revision)**
    This standard specifies tests for assessing the ignitability of all bedding items when subjected to a match-flame equivalent. This standard applies to bedding items, which can normally be placed on a mattress, for example: mattress covers, underlays, incontinence sheets and pads, sheets, blankets, electric blankets, quilts (duvets) and covers, pillows (whatever the filling), bolsters, and pillowcases.
15. **IS 15758 (Part 1) : 2020 Textiles — Protective Clothing Part 1 Determination of Heat Transmission on Exposure to Flame (First Revision)**
    This document specifies a method for determining the heat transmission through materials or material assemblies used in protective clothing. Materials may then be ranked by comparing heat transfer indices, which provide an indication of the relative heat transmission under the specified test conditions. The heat transfer index should not be taken as a measure of the protection time given by the tested materials under actual use conditions.
16. **IS 15758 (Part 2) :2007 Textiles — Protective Clothing Part 2 Assessment of Material Assemblies When Exposed to Source of Radiant Heat**
    This standard specifies two complementary methods (method A and method B) for determining the behaviour of materials for heat protective clothing subjected to heat radiation. These tests are carried out on representative single or multi-layer textiles or other materials intended for clothing for protection against heat.
17. **IS 15758 (Part 3) : 2007 Textiles — Protective Clothing Part 3 Test Method for Resistance of Material to Penetration by Liquids**
    This Standard specifies a test method for the measurement of indices of penetration, absorption and repellency for protective clothing materials against liquid chemicals, mainly chemicals of low volatility.
18. **IS 15758 (Part 4) : 2020 Textiles — Protective Clothing Part 4 Method of Test for Limited Flame Spread (First Revision)**
    This document specifies two procedures (surface ignition and bottom-edge ignition) for determining flame spread properties of vertically oriented flexible materials in the form of single or multicomponent fabrics (coated, quilted, multilayered, sandwich constructions and similar combinations), when subjected to a small defined flame. This test standard does

not apply to situations where there is restricted air supply or exposure to large sources of intense heat, for which other test methods are more appropriate.

19. **IS 15758 (Part 5) : 2020 Textiles — Protective Clothing Part 5 Assessment of Resistance of Materials to Molten Metal Splash (First Revision)**
    This International Standard specifies a method for assessing the heat penetration resistance of materials intended for use in clothing to protect against large splashes of molten metal. It provides specific procedures for assessing the effects of splashes of molten aluminium, molten cryolite, molten copper, molten iron and molten mild steel. The principle of the test
20. **IS 15782: 2008 Textiles — Method for Determining Deterioration of Visibility Due to Smoke released on Combustion of Materials**
    This standard specifies a method to determine the deterioration of visibility due to smoke produced when materials burn in a given sealed chamber, by assessing the attenuation of a light beam passing through the chamber. The method is applicable to combustion of all kinds of materials including textiles.
21. **IS 17462: 2020 Clothing for Protection against Heat and Flame — Determination of Contact Heat Transmission through Protective Clothing or Constituent Materials**

    i) **Part 1: Contact Heat Produced by Heating Cylinder**
    This standard specifies a test method for contact heat transmission in protective clothing at temperatures between 100°C and 500°C.

    ii) **Part 2: Test Method using Contact Heat Produced by Dropping Small Cylinders**
    This standard evaluates material behavior under high-temperature metal particle impact, for comparative assessment but not for large molten splashes or complete garments.
22. **IS 17468: 2020 Clothing and Equipment for Protection against Heat — Test Method for Convective Heat Resistance using a Hot Air Circulating Oven**
    This standard describes a test method to evaluate protective clothing material resistance to convective heat in a hot air oven, assessing visible changes and shrinkage.