COMPENDIUM OF INDIAN STANDARDS

ON

AGROTEXTILES FOR CROP PROTECTION

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INTRODUCTION

This compendium covers the standards on Agrotextiles for crop protection. It provides brief description of the list of product standards on crop protection and test methods, outlines the scope of the standard, variety/size covered in the standard.

The standardization in the field of Agrotextiles is undertaken by Technical Textiles for Agrotech Sectional Committee, TXD 35 under Textiles Division Council.

A)LIST OF PRODUCT STANDARDS

1. **IS 16008 (PART 1) : 2016 AGRO TEXTILES - SHADE NETS FOR AGRICULTURE AND HORTICULTURE PURPOSES — SPECIFICATION PART 1 SHADE NETS MADE FROM TAPE YARNS**

   This Indian Standard specifies the constructional and performance requirements for agro shade nets made from tape yarns to provide partially controlled climatic conditions. Based on shading percentage shade nets are classified into three types: *Type I*, *Type II* and *Type III* having shading percentage of 50 percent, 75 percent and 90 percent respectively.

2. **IS 16008 (PART 2) : 2016 AGRO TEXTILES - SHADE NETS FOR AGRICULTURE AND HORTICULTURE PURPOSES — SPECIFICATION PART 2 SHADE NETS MADE FROM MONO FILAMENT YARNS**

   This Indian Standard specifies the constructional and performance requirements for agro shade nets made from monofilament yarns to provide partially controlled climatic conditions. Based on shading percentage shade nets are classified into four types: *Type I*, *Type II & IIA*, *Type III* and *Type IV* having shading percentage of 35 percent, 50 percent, 75 percent and 90 percent respectively.

3. **IS 16513 : 2016 AGRO TEXTILES - INSECT NETS FOR AGRICULTURE AND HORTICULTURE PURPOSES**

   This Indian Standard prescribes the constructional and performance requirements for insect nets to protect the crops from insects such as aphids, whitefly, carrotfly, caterpillars etc. Based on the mesh (the number of openings per inch in longitudinal direction), insect nets

are classified into three types: *Type I*, *Type II & IIA* and *Type III* having mesh 30, 40 and 50 respectively. *Type II* inspect nets 105 g/m² and *Type IIA* have 125 g/m².

4. **IS 16718 : 2021 TEXTILES - POLYPROPYLENE SPUN BONDED NON-WOVEN CROP COVERS AND FRUIT SKIRTING BAGS**

This standard prescribes the specification and performance requirements for polypropylene spun bonded non-woven fabric used for crop cover and fruit skirting bags. Crop covers used as covering for protection of seedling whereas Fruit Skirting Bags used as covering for protection of growing fruits. Based on the fabric mass, non-woven fabrics used to produce crop covers and fruit skirting bags are classified into two types: *Type I* and *Type II* having minimum mass of 17 g/m² and 22 g/m².

5. **IS 17356 : 2020 AGRO TEXTILES - WINDSHIELD NETS FOR AGRICULTURE AND HORTICULTURE PURPOSES**

This standard specifies constructional and performance requirements for windshield nets fabricated from mono filament yarns to protect the flora from the damage caused by high wind speed. Based on the mass in g/m^2, the windshield nets are classified into two types: *Type I,* having minimum mass of 100 g/m², suitable for wind speed up to 55 km/h; and *Type II,* having minimum mass of 150 g/m², suitable for wind speed up to 80 km/h.

6. **IS 17357 : 2020 AGRO TEXTILES - HARVEST NETS FOR AGRICULTURE AND HORTICULTURE PURPOSES**

This standard prescribes constructional and performance requirements for harvest nets fabricated from mono filament yarns for the purposes to avoid damage protection of fruits by avoiding their contact with ground. Standard specifies a minimum mass per unit area of 75 g/m² for harvest nets.

7. **IS 17358 (PART 1) : 2020 FENCING NETS MADE FROM EXTRUDED POLYMER MESH**

This standard specifies constructional and performance requirements for HDPE fencing nets for protection from stray animals or for restricted entry etc. Three types of aperture shapes fencing nets are specified a) Hexagonal shape b) Diamond shape c) Square shape. Based on the application, the fencing nets are classified as: Light duty, Medium duty and Heavy-duty fencing nets.

8. IS 17358 (PART 2) : 2020 FENCING NETS MADE FROM MONO FILAMENT YARNS & COMBINATION OF TAPE & MONO FILAMENT

This standard prescribes constructional and other performance requirements for fencing nets fabricated from mono filament yarns and combination of tape and mono filament yarns.. The fencing nets are classified based on the mass in g/m^2 and construction: *Type 1* - having minimum mass of 110 g/m^2 with Mono × Mono construction; and *Type 2* - having minimum mass of 100 g/m^2 with Tape × Mono construction.

9. IS 17513 : 2020 AGRO TEXTILES - PLANT SUPPORT NETS FOR AGRICULTURE AND HORTICULTURE PURPOSES

This standard prescribes constructional and other performance requirements for plant support nets used for support to flora and vegetation by straightening the crop stem. Plant support nets can be used horizontally or vertically depending on the types of crops. The filament plied knotted plant support nets are classified into three types based on the twine type and twine diameter : *Type I* — Twine type 560 D/3 ply and nominal twine diameter of 0.50 mm; *Type II* — Twine type 840 D/6 ply and nominal twine diameter of 1.25 mm; and *Type III* — Twine Type 1120 D/6 ply and nominal twine diameter of 1.50 mm.

10. IS 17730 (PART 1) : 2021 WARP KNITTED HAIL PROTECTION NETS

This Indian Standard specifies the construction and performance requirements for warp-knitted hail protection nets. Based on the mass per unit area, knitted hail protection nets are classified into two types: *Type I:* 60 g/m^2 mass and *Type II:* 70 g/m^2 mass. Warp-knitted anti-hail nets are highly flexible, allowing them to stretch and adapt well to various conditions, suitable for areas with frequent but less severe hailstorms.

11. IS 17730 (PART 2) : 2021 WOVEN HAIL PROTECTION NETS

This Indian Standard specifies the construction and performance requirements for woven hail protection nets. Woven anti-hail nets have a more rigid structure, making them more effective against heavy impacts. For the effective installation and protection of ends standards specifies the requirement for a reinforcement. Based on the mass per unit area, woven hail protection nets are classified into two types: *Type I:* 60 g/m^2 mass and *Type II:* 70 g/m^2 mass.

12. IS 17731 : 2021 LAMINATED WOVEN ORCHARD PROTECTION COVERS

This standard prescribes constructional and performance requirements for laminated woven orchard protection covers. Based on the thickness, mass and type of reinforcement, the

orchard protection covers are classified into four types: *Type 1* — Having thickness of 0.14 mm and mass of 140 g/m² without reinforcement band; *Type 2* — Having thickness of 0.14 mm and mass of 140 g/m² with laminated reinforcement *Type 3* — Having thickness of 0.16 mm and mass of 160 g/m^2 without laminated reinforcement band *Type 4* — Having thickness of 0.16 mm and mass of 160 g/m^2 with laminated reinforcement band.

13. IS 18310 (PART 1) : 2023 KNOTTED BIRD PROTECTION NETS

This standard specifies constructional and other performance requirements for knotted bird protection nets manufactured from mono filament yarns. Based on the mass knotted bird protection nets are classified into two types: *Type I* — Having mass of 56 g/m^2 and *Type II* — Having mass of 80 g/m^2.

14. IS 18310 (PART 2) : 2023 KNITTED BIRD PROTECTION NETS

This standard prescribes constructional and other performance requirements for knitted bird protection nets manufactured from mono filament yarns. Based on the average mesh size, the knitted bird protection nets are classified into four types: *Type I, Type II, Type III and Type IV* — having average mesh size of 15 mm, 20 mm, 25 mm and 30 mm respectively.

15. IS 18310 (PART 3) : 2023 EXTRUDED BIRD PROTECTION NETS

This standard prescribes constructional and other performance requirements for extruded bird protection nets for agriculture and horticulture purposes to restrict the entry of birds. This standard specifies nets of two types of bird protection nets based on width: *Type I* having 3 meter width and *Type II* having 6 meter width.

B) LIST OF TEST METHODS STANDARDS

1. 1969 (PART 1) : 2018/ISO 13934-1 : 2013 TENSILE PROPERTIES OF FABRICS – PART 1 DETERMINATION OF MAXIMUM FORCE AND ELONGATION AT MAXIMUM FORCE USING THE STRIP METHOD

This standard specifies a procedure to determine the maximum force and elongation at maximum force of woven textile fabrics using a strip method. This test method used for performance evaluation of shade nets, insect nets, windshield nets, harvest nets, fencing nets and hail protection nets.

2. **1966 (PART 1) : 2022/ ISO 13938-1 : 2019 TEXTILES - BURSTING PROPERTIES OF FABRICS PART 1: HYDRAULIC METHOD FOR DETERMINATION OF BURSTING STRENGTH AND BURSTING DISTENSION**

   This standard specifies a procedure to determine the bursting strength of textiles. This test method used for performance evaluation of shade nets, insect nets, windshield nets, harvest nets, fencing nets and hail protection nets.

3. **IS/ISO 105-B02 : 2014 TESTS FOR COLOUR FASTNESS – PART B02 COLOUR FASTNESS TO ARTIFICIAL LIGHT: XENON ARC FADING LAMP TEST**

   This standard specifies a procedure to determine the effect of artificial light on the coloured textile materials. Grading done for the fading of colour 1 rating means highest fading.

4. **IS 1964 TEXTILES – METHODS FOR DETERMINATION OF MASS PER UNIT LENGTH AND MASS PER UNIT AREA OF FABRICS**

   This standard specifies a procedure to determine the mass per unit area of textile fabric.

5. **IS 11056 : 2013 TEXTILES - DETERMINATION OF THE PERMEABILITY OF FABRICS TO AIR**

   This standard specifies a method for measuring the permeability of fabrics to air. Used to determine permeability of insect nets and harvest nets in Agrotextiles.

6. **13935-1 : 2014 SEAM TENSILE PROPERTIES OF FABRICS AND MADE-UP TEXTILE ARTICLES PART 1 DETERMINATION OF MAXIMUM FORCE TO SEAM RUPTURE USING THE STRIP METHOD**

   This standard specifies a procedure to determine the seam maximum force of sewn seams when the force is applied perpendicularly to the seam. This method is used in warp knitted and woven hail protection nets performance evaluation.

7. **IS 5815 (PART 1) : 2021 FISHING GEAR MATERIALS - METHODS OF TEST PART 1: DETERMINATION OF THICKNESS**

   This standard prescribes the method for determination of the thickness of netting yarns defined as the distance between the upper and lower surfaces of a textile material. This method is used for knotted bird protection nets.

8. **IS 5815 (PART 5):2005/ ISO 1806:2002 DETERMINATION OF MESH BREAKING FORCE OF NETTING**

This standard prescribes the method for determining the mesh breaking force of netting. This method is used for the bird protection net performance evaluation.

9. **IS 15891 (PART 3) : 2024/ISO 9073-3:2023 DETERMINATION OF TENSILE STRENGTH AND ELONGATION AT BREAK USING THE STRIP METHOD**

This standard specifies a test method for the determination of the breaking force and elongation of nonwovens using a strip method in conditioned or wet state. This test method is used to evaluate the performance of nonwoven crop cover and fruit skirting bags.

10. **IS 15891 (PART 4) : 2024/ISO 9073-4:2021 DETERMINATION OF TEAR RESISTANCE BY THE TRAPEZOID PROCEDURE**

This standard specifies a method for the determination of tear resistance of nonwovens by the trapezoid method. This document applies to nonwovens and used for the quality evaluation of nonwoven crop cover and fruit skirting bags.

11. **IS 15891 (PART 6) : 2012/ISO 9073-6:2000 TEST METHODS FOR NONWOVENS ABSORPTION**

This standard describes methods for the evaluation of some aspects of the behaviour of nonwoven fabrics in the presence of liquids such as the liquid absorbency time, the liquid absorptive capacity. This method is used for the quality evaluation of nonwoven crop cover and fruit skirting bags.

12. **IS 15891 (PART 15) : 2017/ISO 9073-15:2000 DETERMINATION OF AIR PERMEABILITY**

This standard describes methods of measuring the flow of air passing perpendicularly through a given area of a fabric. This method is used for the quality evaluation of nonwoven crop cover and fruit skirting bags.