



कपड़ा - अग्निशामकों के लिए सुरक्षात्मक दस्ताने - विशिष्टता
IS 16874: 2018 के अनुसार

PRODUCT MANUAL FOR
TEXTILES - PROTECTIVE GLOVES FOR FIREFIGHTERS – SPECIFICATION
ACCORDING TO IS 16874: 2018

विभिन्न उत्पादों के लिए भारतीय मानक ब्यूरो (अनुरूपता मूल्यांकन) विनियम, 2018 की योजना -I के तहत प्रमाणन के संचालन में एकरूपता और पारदर्शिता के लिए इस उत्पाद मैनुअल का उपयोग सभी क्षेत्रीय / शाखा कार्यालयों और लाइसेंसधारियों द्वारा संदर्भ सामग्री के रूप में किया जाएगा। दस्तावेज़ का उपयोग बीआईएस प्रमाणन प्राप्त करने के इच्छुक संभावित आवेदकों द्वारा भी किया जा सकता है।

This Product Manual shall be used as reference material by all Regional/Branch Offices & licensees to ensure uniformity of practice and transparency in operation of certification under Scheme-I of Bureau of Indian Standards (Conformity Assessment) Regulations, 2018 for various products. The document may also be used by prospective applicants desirous of obtaining BIS certification.

1.	मानक संख्या IS No.	:	IS 16874 :2018
	शीर्षक Title	:	Textiles - Protective gloves for firefighters – Specification कपड़ा - अग्निशामकों के लिए सुरक्षात्मक दस्ताने
	संशोधनों की संख्या No. of amendments	:	01
2.	नमूना दिशानिर्देश Sampling Guidelines		
a)	कच्चा माल Raw material	:	No Specific requirements Note: This section indicates the requirements for raw material (if specified in the IS) for which compliance is to be established during Grant of Licence/Change in Scope of Licence/Factory Surveillance
b)	समूहीकरण दिशानिर्देश Grouping Guidelines	:	Please refer to Annex-A
c)	नमूने का परिमाण Sample Quantity	:	14 pairs of gloves + 2m length of Raw materials used Note: This section indicates the quantity of the sample of the product and/or the raw material (if applicable), required to be sent to the laboratory for testing, for the purpose of Grant of Licence/Change in Scope of Licence/ Factory Surveillance (in case of market surveillance, effort may be made to procure the required quantity of product sample, as far as possible since raw material sample may not be available in market)

d)	निगरानी के दौरान सैंपलिंग के लिए दिशानिर्देश Guidelines for Sampling during Surveillance	Out of the Market and Factory samples tested in an year, One FS will be tested for all requirements of IS 16874:2018 and remaining samples will be tested for all requirements excluding Garment Design as per Cl. 4, Heat Transfer (flame exposure) as per Cl. 6.2.2.2, Heat Transfer (Radiant Exposure) as per Cl. 6.2.3.2, Heat Transfer (Conductive exposure) as per Cl. 6.2.4.2, Cut resistance as per Cl. 6.3.2.1, Liquid Penetration resistance as per Cl. 6.4.2.
3.	परीक्षण उपकरणों की सूची List of Test Equipment	: Please refer to Annex- B
4.	निरीक्षण और परीक्षण की स्कीम Scheme of Inspection and Testing	: Please refer to Annex- C
5.	एक दिन में संभावित परीक्षण Possible tests in a day	
	Dimensions, pH, Flame Resistance*, Heat Transfer (Flame Exposure)*, Heat Transfer (Conductive Exposure)*, Heat Resistance*, Cut Resistance*, Tear Resistance*, Puncture Resistance*, Seam Breaking Strength*, Label Legibility, Water Penetration Resistance*, Liquid Penetration Resistance*, Dexterity*, Grip*, Donning* *Testing is possible in one day, before pre-treatment/conditioning or on previously pre-treated/conditioned samples Note: This section is for the guidance of BIS Certification Officers/Technical Auditors of BIS Authorized Outside Surveillance Agencies (OSAs) during factory inspection to provide ready reference regarding the tests which can be witnessed during the inspection in the factory by the officer/auditor.	
6.	लाइसेंस का दायरा /Scope of the Licence:	
	Licence is granted to use Standard Mark as per IS 16874 :2018 with the following scope:	
	Name of the product	Textiles - Protective gloves for firefighters
	Grade Size	6,7,8,9, 10,11
	Glove Material combination(s)	Type of Material used for Outer layer – Moisture Barrier- Inner Lining- (e.g. Leather, textile etc.)
	Optional requirement (visibility)	With or without retroreflective material (for visibility)

ANNEX A

GROUPING GUIDELINES

For the purpose of Grant of Licence (GoL)/Change in Scope of Licence (CSoL), the following grouping guidelines shall apply:

- i) Gloves of the largest and smallest sizes intended to be covered in the scope, shall be tested to cover the intermediate sizes in the scope of licence.
- ii) Gloves of each material combination (Material used for Outer layer, Moisture Barrier, and Inner Lining) intended to be covered in the scope of licence, shall be tested
- iii) In case gloves with retroreflective material attached (to meet the optional requirement of visibility) are intended to be covered in the scope of licence, samples of gloves with retroreflective material attached to the outermost surface of the gloves shall be tested. (OPTIONAL)
- iv) Scope of licence shall be restricted based on the manufacturing and testing facilities available.
- v) During operation of licence, samples of each variety covered in the scope of licence, shall be tested in rotation, to the extent possible.

ANNEX – B
LIST OF TEST EQUIPMENTS
(INDICATIVE LIST, FOR GUIDANCE ONLY)

Major test equipment required to test as per the Indian Standard

Sl. No.	Tests Used In With Clause Reference	Test Equipment/Chemical
1	Dimensions: Glove body length, Cl. 4.2 Wristlet or cuff, Cl. 4.3 Glove Size, Cl. 4.4	Vernier Calipers, Measuring Scale/Tape
2	pH value, Cl. 4.5	For determination of pH value of leather material as per IS 582 (Part 9): 2022 Reagents: • Water, minimum grade 3 in accordance with ISO 3696, • Buffer solution, for calibrating the electrode system Apparatus: • Suitable shaker, rotating shaker with a frequency of (50 ± 10) r/min or other suitable shaker • pH meter, with glass electrode, with a measuring range of 0 pH units to 14 pH units, graduated in 0,01 pH units • Analytical balance, capable of weighing to an accuracy of 0,01 g • Wide mouthed flask, with leak-proof stopper, capacity 250 ml. • Measuring cylinder, capacity 100 ml, graduated in 1 ml divisions. • Volumetric flask, capacity 100 ml • Pipette, capacity 10 ml. For determination of pH value of non-leather material as per IS 1390:2022 Reagents: • Distilled or deionized water, of at least grade 3 as defined in ISO 3696, having a pH between 5,0 and 7,5 • Potassium chloride solution, 0,1 mol/l, • Buffer solutions Apparatus: • Stoppered glass or polypropylene flasks, chemically resistant • Mechanical shaker, providing rotational or reciprocating movement sufficient to obtain a ready exchange of liquid between the interior of the textile material and the solution used in preparing the extract.

		• Beakers, chemically resistant, with a capacity of 150 ml
		• Rods, chemically resistant • pH-meter, with a glass electrode, with a resolution of at least 0,01 pH-units. • Balance, with a resolution of at least 0,01 g. • 1 l volumetric flasks, of grade A quality
3	Leather Chromium VI Content, Cl. 4.6	Reagents • Dipotassium hydrogen phosphate $K_2HPO_4 \cdot 3H_2O$ • 1,5-diphenylcarbazine $CO(NHNHC_6H_5)_2$ • acetone $(CH_3)_2CO$ • glacial acetic acid CH_3COOH • o-phosphoric acid • Argon or nitrogen, oxygen-free. • Distilled water, Grade 3 quality • Potassium dichromate ($K_2Cr_2O_7$), • Methanol, HPLC grade. Apparatus • Suitable mechanical shaker • Conical flask, of capacity 250 ml, with stopper • Aeration tube and flow meter • pH meter, with glass electrode. • Membrane filter, 0,45 μm pore size (polytetrafluoroethylene or nylon) • Volumetric flasks, of capacity 25 ml, 100 ml and 1 000 ml • Pipettes, various nominal volumes. • Spectrophotometer or filter photometer, wavelength 540 nm • Photometric cell, quartz, 4 cm length or any other suitable cell length • Glass or polypropylene cartridges filled with suitable reversed phase material, e.g. reversed phase (RP) 18 • Solid Phase Extraction (SPE) system, with vacuum device or solvent resistant medical syringe • Balance, with a resolution of at least 0,01 g. • Drying Oven
4	Washing pre-treatment, Cl. 5.4.1	Front loading horizontal drum machine with a detergent which achieves a pH of 7.0 Tumble dryer as per IS 15370

5	Dry Conditioning, Cl. 5.4.2	Conditioning Chamber equipped with temperature and relative humidity indicator and capable of maintaining temperature of $(27 \pm 2)^{\circ}\text{C}$ and at a relative humidity of (65 ± 5) percent for at least 24 h
6	Wet Conditioning, Cl. 5.4.3	Arrangement for completely immersing the glove or the glove specimen in water at a temperature of $(27 \pm 2)^{\circ}\text{C}$ Arrangement for hanging gloves in a vertical position for 5 min with the fingers uppermost, laid horizontal with textile blotting paper both under and over the specimen, under a pressure of 3.5 kPa for a period of 20 min
7	Flame Resistance, Cl. 6.2.1	- Apparatus for Test For Limited Flame Spread as per IS 15758 (Part 4) : 2020 which shall have the following specifications: Construction: consisting of material which shall not be adversely affected by the fumes and that is resistant to heat and flame. Location: surrounded without cabinet by a volume of air sufficient not to be affected by any reduction of oxygen concentration. Where an open-fronted fume hood is used for the test, provision shall be made to permit the specimen to be mounted at least 300 mm from any wall. - Specimen holders consisting of a rectangular metal frame constructed of 10 mm to 20 mm wide metal and having a specimen support pin at each corner of a rectangle of (190 ± 1) mm length by (150 ± 1) mm width for Procedure A and (190 ± 1) mm length by (70 ± 1) mm width for Procedure B - Supporting pins, for the specimen having a $(2 \pm 0,5)$ mm diameter and a length of (25 ± 1) mm. - Spacer stub, for the purpose of locating the specimen in a plane at least 20 mm away from the frame (see 9.1.2.1 and 9.1.3.1), of 2 mm diameter and a length of at least 20 mm and positioned adjacent to each of the four pins. - Gas burner

		• Mounting frame • Templates - Flat and rigid, made of a suitable material and of a size corresponding to the size of the specimen (200 mm × 160 mm for Procedure A and 200 mm × 80 mm for Procedure B). • Timing devices • Filter paper
8	Heat Transfer (Flame Exposure), Cl. 6.2.2	Apparatus for determination of heat transmission on exposure to flame as per IS 15758 (Part 1) : 2020- which consists of: a Meker gas burner; a copper disc calorimeter; a specimen support frame; a calorimeter location plate; a support stand; suitable measuring and recording equipment; a template.
9	Heat Transfer (Radiant Exposure), Cl. 6.2.3	Apparatus for Assessment of material assemblies when exposed to source of radiant heat as per IS 15758 (Part 2):2007 which consists of: • Source of Radiation i.e. Six Silicon Carbide Heating Rods as per Cl. 5.2 of IS 15758 (Part 2):2007 • Test Frame and Specimen Holder as per 5.3 • Curved Copper Plate Calorimeter as per 5.4 • Temperature Recorder as per 5.5 # Apparatus to be located where it will be shielded from air currents or place baffles or shields to limit the air movement at the apparatus location
10	Heat Transfer (Conductive Exposure), Cl. 6.2.4	• Apparatus for Determination of contact heat transmission through protective clothing or constituent materials as per ISO 12127-1 which consists of: Heating cylinder, Calorimeter and Assembly for mounting as well Suitable electronic devices to control the temperature of heating cylinder and calorimeter, rate of contact, and measure the threshold time • Test Chamber/environment having a temperature of $(20 \pm 5) ^\circ\text{C}$ and relative humidity between 15 % and 80 %

11	Heat Resistance, Cl. 6.2.5	Apparatus for evaluation of the heat resistance of materials, as per ISO 17493 consisting of • Forced air circulating oven • Rigid, square templates for sizing material specimens • Ruler, graduated in millimetres
12	Abrasion Resistance, Cl. 6.3.1	• Martindale Abrasion Resistance Testing Apparatus as per ISO 12947-1
		• Abrasive medium (standard fabric) i.e. 300 g/m² finish glass paper (grade 100/F2)
13	Cut Resistance, Cl. 6.3.2	Apparatus for determination of resistance to cutting by sharp edges as per ISO 13997 which consists of: • Rigid framework that supports the constituent parts when a force of up to 200 N is exerted between the cutting edge and the specimen. • Force application system to move the specimen holder towards the blade, or the blade towards the specimen holder during operation of the machine such that the force between the cutting edge and the specimen is constant $\pm 5\%$. • Specimen holder, with surface made of metal on which the specimen is mounted • Blades, made of stainless steel with a hardness greater than 45 HRC. • Blade holder, capable of holding the blade rigidly and with minimum distortion so that $(12,0 \pm 0,5)$ mm of the blade width is exposed. • Cutting-motion system to move the specimen holder and cutting edge relative to each other • Cut-stroke length measurement system, to measure the length of the cutting edge that is drawn across the specimen to completely cut through it accurate to 0.1 mm
14	Tear Resistance, Cl. 6.3.3	• Constant-rate-of-extension (CRE) tensile testing machine • Clamping device • Equipment for cutting out test specimens, preferably a hollow punch or template

15	Puncture Resistance, Cl. 6.3.4	- Constant-rate-of-extension (CRE) tensile testing machine - Test spike, made of steel, with a minimum hardness of 60 HRC - Clamping rings, to prevent slippage during the test
16	Seam Breaking Strength, Cl. 6.3.5	Constant-rate-of-extension (CRE) tensile testing machine
17	Water penetration resistance, Cl. 6.4.1	Apparatus for Determination of resistance to water penetration as per ISO 811 which includes: - Fabric clamp. - Mechanism for measuring the increase in water pressure - Manometer (for manual types of equipment that are not electronic).
18	Liquid Penetration Resistance, Cl. 6.4.2	Apparatus for Determination of the resistance of protective clothing materials to penetration by liquids under pressure as per procedure C1 of ISO 13994 which includes: - Thickness gage, suitable for measuring thickness to the nearest 0,02 mm - Penetration test cell, to restrain the specimen during contact with the pressurized test fluid - Air pressure source, capable of providing air at $(13,8 \pm 1,38)$ kPa. - Stopwatch, or electronic timer - Analytical balance, with a precision of 0,001 g - Vessel, graduated to measure water, with a precision of 1 ml - Standard laboratory glassware and apparatus Reagents: sodium hydroxide, hydrochloric acid, sulfuric acid, toluene, iso-octane
19	Dexterity, Cl. 6.5.1	- Solid, centreless ground stainless steel test pin 40 mm long and of diameter 11 mm - flat surface, for example a table top

20	Grip, Cl. 6.5.2	9.5 mm diameter, 3-strand pre-stretched polyester rope attached to a calibrated force measuring device
21	Conditioning	Conditioning chamber(s) equipped with relative humidity and temperature controls/indicators

ANNEX C

SCHEME OF INSPECTION AND TESTING

1. QUALITY ASSURANCE PLAN

1.1 It is expected that manufacturers (licensees/applicants) will implement a Quality Assurance Plan i.e. a plan of regular testing and in-process controls, designed to ensure that the product bearing the Standard Mark conforms to all requirements of the Indian Standard.

1.2 The manufacturers shall define a Quality Assurance Plan defining the control unit (i.e. lot/batch etc.) and the levels of control (i.e. the frequency and number of samples for conducting the different tests as per the Indian Standard) and submit the same to BIS Branch Office for information. The manufacturer shall comply with the same and maintain test records in accordance with para 2.4.

1.3 RECOMMENDED LEVELS OF CONTROL/CONTROL UNIT

For the guidance of manufacturers, the recommended definition of control unit is: all the completed protective gloves of the same type, with same assemblies, produced in one facility, using the same production processes and materials, and being offered for delivery at one time to buyer against a dispatch note.

1.3.1 For the guidance of manufacturers in preparing the Quality Assurance Plan, recommended levels of control are given in **Table 1**.

1.3.2 The manufacturer shall ensure inspection and testing as per the Quality Assurance Plan submitted by them on the whole production of the factory which is covered by this plan. Alternatively, the manufacturer has the option of adherence to the quality plan as per levels of control recommended in column 3 of Table 1.

1.4 However, all manufacturers shall ensure compliance of their products to all the requirements of the Indian Standard.

2. ENSURING COMPLIANCE THROUGH TESTING- It is expected that manufacturers (licensees/applicants) will establish a suitably equipped and staffed in house laboratory (In house testing facility) for testing at least those parameters of the Indian Standard which require routine testing for ensuring quality of the product. This includes in-process controls as may be defined and put in place by the manufacturer and testing parameters/requirements which can only be performed in the factory.

2.1 For the guidance of manufacturers, Table 1 giving the recommended levels of control is given below. Column 2 of Table 1 indicates routine tests where test equipment is required in house as "R" or other tests which can be subcontracted as "S". Subcontracting is permitted to BIS recognized/empanelled laboratory or any other laboratory having valid NABL accreditation as per IS/ISO/IEC 17025.

2.2 For MSME manufacturers, the requirement of maintaining a laboratory/in-house testing facility for routine tests (indicated as "R" in Column 2 of Table 1) is also optional.

2.2.1 MSME manufacturers may utilize common cluster based facilities as per guidelines for the utilization of cluster based test facilities by MSMEs or the provisions of Sharing of testing facilities or get testing done from BIS recognized/empaneled laboratory or any other laboratory having valid NABL accreditation as per IS/ISO/IEC 17025.

2.3 Large Scale manufacturers shall maintain an in-house laboratory equipped at least with test facilities for routine tests (indicated as “R” in Column 2 of Table 1), where different tests given in the specification shall be carried out in accordance with the method given in the specification. They shall also implement a calibration plan for the in-house test equipment.

2.3.1 Alternatively, in lieu of an in-house laboratory, large scale manufacturers can also utilize the provisions of Sharing of testing facilities as per the Guidelines for Grant of Licence available on BIS website www.bis.gov.in. (Under Conformity Assessment>Product Certification Process). Even for subcontracted tests, provisions for sharing of testing facilities can be utilized.

2.4 TEST RECORDS- The manufacturers maintaining an in-house laboratory or utilizing common cluster based facilities or shared test facilities shall maintain test records for the tests carried out to establish conformity. For the tests being subcontracted to BIS recognized/empanelled laboratory or any other laboratory having valid NABL accreditation as per IS/ISO/IEC 17025, test reports issued by the laboratories shall be available for inspection by BIS.

3. PACKING AND MARKING – The Standard Mark as given in the Schedule of the licence shall be incorporated legibly and indelibly on each glove and each packaging enclosure that immediately contains the gloves, provided always that the material so marked conforms to each requirement of the specification.

3.1 Packing and Marking shall be done as per the Indian Standard.

3.2 Additional Marking requirements: The material shall also be marked with the following additional requirement on each glove and each packaging enclosure that immediately contains the gloves:

a) “For BIS certification details please visit www.bis.gov.in”

4. REJECTION - All the production which conforms to the Indian Standard and covered under the scope of this licence shall be marked with the Standard Mark. Disposal of non-conforming product shall be done in such a way so as to ensure that there is no violation of provisions of BIS Act, 2016.

TABLE 1
(ONLY FOR GUIDANCE PURPOSE)

(1)				(2)	(3)		
Test Details				Test equipment requirement R: required (or) S: Sub-contracting permitted	Levels of Control		
Cl.	Requirement	Test Methods			No. of Sample	Frequency	Remarks
		Clause	Reference				
4	DESIGN REQUIREMENTS						
4.1	Component Assembly	4.1	IS 16874	R	Manufacturer shall put in place adequate in-process controls and inspection to ensure conformity to requirements		
4.2	Glove Body Length	4.2	IS 16874	R	Manufacturer shall put in place adequate in-process controls and inspection to ensure conformity to requirements		
4.3	Wristlet or Cuff	4.3	IS 16874	R	Manufacturer shall put in place adequate in-process controls and inspection to ensure conformity to requirements		
4.4	Glove Sizing	4.4	IS 16874	R	Manufacturer shall put in place adequate in-process controls and inspection to ensure conformity to requirements		

4.5	pH value		IS 582 (Part 9) for leather gloves and IS 1390 for other materials	R	One	Each Month	Also to be tested for gloves made from each type of material and whenever there is any change in type or source of material
4.6	Leather Chromium VI Content		IS 16259	R	One	Each Month	Also to be tested for gloves made from each type of material and whenever there is any change in type or source of material
4.7	Other Design Requirements	4.7	IS 16874	R	Manufacturer shall put in place adequate in-process controls and inspection to ensure conformity to requirements		
6	PERFORMANCE REQUIREMENTS						
6.2	Thermal Requirements						
6.2.1	Flame Resistance		IS 15758 (Part 4)	R	One	Each control unit	After each thermal test, the innermost lining material shall be visually examined. The glove is deemed to have failed the test, if there is evidence of melting. (6.1.2)
6.2.2	Heat Transfer (Flame Exposure)		IS 15758 (Part 1)	R	One	Each control unit	-do-
6.2.3	Heat Transfer (Radiant Exposure)		Method B of IS 15758 (Part 2)	R	One	Each control unit	-do-
6.2.4	Heat Transfer (Conductive Exposure)		ISO 12127-1	R	One	Each control unit	-do-
6.2.5	Heat Resistance		ISO 17493	R	One	Each control unit	-do-

6.3	Mechanical Requirements						
6.3.1	Abrasion Resistance		IS 12673 (Part 4)	R	One	Each control unit	
6.3.2	Cut Resistance		ISO 13997	R	One	Each control unit	
6.3.3	Tear Resistance		IS 6489 (Part 2)	R	One	Each control unit	
6.3.4	Puncture Resistance		ISO 13996	R	One	Each control unit	
6.3.5	Seam Breaking Strength		IS/ISO 13935-2	R	One	Each control unit	
6.3.6	Label Legibility	6.3.6	IS 16874	R	One	Each control unit	
6.4	Barrier Requirements						
6.4.1	Water Penetration Resistance		ISO 811	R	One	Each control unit	
6.4.2	Liquid Penetration Resistance		ISO 13994	R	One	Each control unit	
6.5	Ergonomic Requirements						
6.5.1	Dexterity	Annex C	IS 16874	R	One	Each control unit	
6.5.2	Grip	Annex D	IS 16874	R	One	Each control unit	

6.5.3	Donning	Annex E	IS 16874	R	One	Each control unit	
6.6	Visibility (Optional)	6.6	IS 16874	R	One	Each control unit	
7	Marking and General Information	7	IS 16874	R	Manufacturer shall put in place adequate in-process controls and inspection to ensure conformity to requirements		