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उत्पाद मानुयल
व्यक्तिगत फॉल एरेस्ट प्रणाली
भाग 2 डोरी और ऊर्जा अवशोषक
3521 (भाग 2) : 2021 के अनुसार

PRODUCT MANUAL FOR
PERSONAL FALL ARREST SYSTEM
PART 2 : LANYARDS & ENERGY ABSORBER
ACCORDING TO IS 3521 (PART 2): 2021

भारतीय मानक ब्यूरो (अनुरूपता मूल्यांकन) विनियम 2018 की स्कीम-I के तहत यह उत्पाद मानुयल प्रमाणीकरण के प्रचलन मे रीति और पारदर्शिता के सुसंगता सुनिश्चित करने के लिए सभी क्षेत्रीय/शाखा कार्यालयों एवं लाइसेन्स धारियों द्वारा संदर्भ सामग्री के रूप मे उपयोग किया जाएगा। बीआईएस लाइसेन्स/प्रमाण पत्र प्राप्त करने के इच्छुक भावी आवेदकों द्वारा भी इस दस्तावेज़ का उपयोग किया जा सकता है।

This Product Manual shall be used as reference material by all Regional/Branch Offices & licensees to ensure coherence 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 licence/certificate.

1.	**उत्पाद** **Product**	:	IS 3521 (Part 2) : 2021
	शीर्षक **Title**	:	व्यक्तिगत फॉल एरेस्ट प्रणाली भाग : 2 डोरी और ऊर्जा अवशोषक के लिए विशिष्टि Personal Fall Arrest Systems : Part 2 Lanyards & Energy Absorbers
	संशोधनों की संख्या **No. of Amendments**	:	Nil
2.	**नमुनाकरण दिशा निर्देश** **Sampling Guidelines:**		
a)	**कच्चा माल** **Raw material**	:	कृपया Annex-A देखें Please see Annex – A
b)	**समूहीकरण दिशानिर्देश** **Grouping guidelines**	:	प्रत्येक किस्म के नमूने का परीक्षण आईएस 3521 भाग 2 : 2021 के Cl. 4.2 और Cl. 4.3 के अनुसार किया जाएगा।

			Sample of Each Variety shall be tested as per Cl. 4.2 & Cl. 4.3 of IS 3521 Part 2 : 2021
c)	**नमूने का परिमाण** **Sample Size**	:	Adjustable Lanyard – 04 Nos. of each Variety Energy Absorbers (Type-1/Type-2)/Energy Absorbing Lanyard/Energy Absorbers with Full Body Harness-04 Nos. of each Variety 04 Nos. of each Variety for Optional Test
3.	**परीक्षण उपकरणो की सूची** **List of Test Equipment**	:	कृपया Annex-B देखें Please see Annex – B
4.	**निरीक्षण व परीक्षण स्कीम** **Scheme of Inspection and Testing**	:	कृपया Annex-C देखें Please see Annex – C
5.	**एक दिन में संभावित परीक्षण** **Possible tests in a day :**		
	Since testing facility is not available in any BIS/BIS recognized lab, complete testing has to be carried out in the Factory for certification and during surveillance. 3 days inspection required for complete testing.		
6.	**लाइसेन्स का कार्यक्षेत्र/Scope of the Licence :**		
	IS 3521 (PART 2): 2021 के अनुसार मानक मुहर का उपयोग करने के लिए लाइसेन्स निम्नलिखित कार्यक्षेत्र के लिए प्रदान किया जाता है "Licence is granted to use Standard Mark as per 3521 (Part 2) : 2021 with the following scope:		
	Name of the product	Personal Fall Arrest Systems : Part 2 Lanyards & Energy Absorbers	
	Types	Adjustable and/or Non adjustable Lanyards Energy Absorber- Type-1 and/or Type-2, integral with Lanyard/ Full Body Harness/Connector	
	Lanyard Component	Three Strand Polyamide Rope/ Three Strand Polyester Rope/ Braided Rope/ Webbing/ Wire Rope/ Chain	

ANNEX A
Raw Materials

1. Fibre ropes, webbing and sewing threads for lanyards shall be made from virgin high-tenacity filament or multifilament synthetic fibre or fibres suitable for the intended use.
2. Three Strand Polyamide Rope Shall Comply with IS 4572 & Three Strand Polyester Ropes shall Comply to IS 11066 requirements.
3. If Braided Rope is used in Lanyards, it shall comply with EN 892(Single Rope) or EN 1891 Type A Requirements. Any Equivalent Material is acceptable.
4. Chains shall comply with the requirements for 6.0 mm chains given in IS 3109 (Part 1). Egg-shaped or similar end links and all connecting links shall be compatible with the chain in all respects. After manufacture, chain lanyards shall be proof tested to the levels given in IS/ISO 1834.
5. The Metal Components used as a raw Material shall complies to Corrosion Resistance Test as per ISO 9227.

ANNEX B

LIST OF TEST EQUIPMENTS
PERSONAL FALL ARREST SYSTEMS
PART 2 : LANYARDS & ENERGY ABSORBERS
ACCORDING TO IS 3521 (PART 2): 2021

Major test equipment required to test as per the Indian Standard

Sr. No.	Test equipment	Tests used in with Clause Reference
1.	• **Salt Spray Chamber as per ISO 9227,** • **Ph Meter,** • **Sodium Chloride** • **Distilled or deionized water** • **Stop Watch** • **Weighing Scale,**	Corrosion Resistance Clause 4.3.2.4 & 4.2.4.3
2.	• **Static strength test apparatus**, as per Clause 5.1.3 • **Marker,** • **Steel Scale** • **Stop Watch**	Adjustment Slippage Clause 4.2.5
3.	• **Static strength test apparatus** as per Clause 5.1.3 • **Stop Watch**	Static Strength Clause 4.2.6 & 4.3.6
4.	• **Test structure** as per Clause 5.1.2, • **Quick-release device** as per Clause 5.1.4, • **Test Mass** of 100 kg as per clause 5.1.5, • **Connectors conforming to IS 3521 (Part 5)** • Steel Scale / measuring Tape or digital distance meter	Dynamic Strength Test Clause 4.2.7
5.	• **Static strength test apparatus**, as per Clause 5.1.3, • **Marker** • **Steel Scale** • **Stop Watch**,	Inadvertent operation Clause 4.3.4
6.	• **Test structure** as per Clause 5.1.2, • **Quick-release device** as per Clause 5.1.4, • **Force Measurement & Indicator device** as per clause 5.1.6 & 5.1.7 • **Test Lanyards** as per Clause 5.1.1 & 5.1.2, • **Test Mass** of 100 kg as per clause 5.1.5, • **Steel Scale** or measuring Tape	Dynamic Performance Clause 4.3.5
7.	• **Hot Air Oven** as per Clause 5.3.8.2**,** • **Wet Chamber** as per Clause 5.3.8.3**,** • **Refrigerated Chamber** as per Clause 5.3.8.4	Dynamic Performance after Conditioning Clause 4.3.7

The above list is indicative only and may not be treated as exhaustive

ANNEXURE-C

SCHEME OF INSPECTION AND TESTING FOR PERSONAL FALL ARREST SYSTEMS PART 2 : LANYARDS & ENERGY ABSORBERS ACCORDING TO IS 3521 (PART 2): 2021

1. **LABORATORY** - A laboratory shall be maintained which shall be suitably equipped (as per the requirement given in column 2 of Table 1) and staffed, where different tests given in the specification shall be carried out in accordance with the methods given in the specification.

1.1 The manufacturer shall prepare a calibration plan for the test equipment.

2. **TEST RECORDS** –The manufacturer shall maintain test records for the tests carried out to establish conformity.

3. PACKING AND MARKING – The Standard Mark, as given in the Schedule of the licence, shall be clearly and indelibly marked on each Lanyard & Energy Absorbers, provided always that material to which this mark is thus applied, conform to every requirement of the specification.

3.1 Marking – Each Lanyard & Energy Absorbers and their packaging shall be clearly and indelibly marked to give the information as per clause 6.2 of IS 3521 (Part 2). In addition, the following details shall be marked legibly and indelibly:

a) BIS Licence No. CM/L..... and
b) BIS website details i.e. – "For details of BIS certification please visit www.bis.gov.in" (in case of space constraints, may be marked only on the package).

3.2 Packing – The material shall be packed as per Cl. 6.3 of IS 3521 (Part 2).

3.3 Instructions for general use, marking, packaging and maintenance shall also be provided as per the provisions of the Indian Standard

4. **CONTROL UNIT** – For the purpose of this scheme, Lanyard & Energy Absorber of the same Variety/Design manufactured from the same consignment of raw material in a day shall constitute one control unit.

5. **LEVELS OF CONTROL** - The tests as indicated in column 1 of Table 1 and the levels of control in column 3 of Table 1, shall be carried out on the whole production of the factory which is covered by this plan and appropriate records maintained in accordance with paragraph 2 above.

5.1 All the production which conforms to the Indian Standard and covered by the licence should be marked with Standard Mark.

6. **REJECTIONS**–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 LEVELS OF CONTROL

(Para 5.0 of the Scheme of Inspection and Testing)

Test Details (1)				(2)	Levels of control (3)		
Cl.	Requirement	Test Methods		Test eq. requirement R: Required (or) S: Sub-contracting permitted	No. of Sample	Frequency	Remarks
		Clause	Reference				
4.2.1 Fibre Ropes & Webbing							
4.2.1.1	Material	4.2.1.1	IS 3521 (Part 2) : 2021	S	All	Each Consignment	If ISI marked or accompanied by TC, no further testing is required
4.2.1.2	Fibre Rope	IS 4572/ IS 11066	IS 4572/ IS 11066	S	1 Sample		
4.2.1.3	Braided Rope	EN 892/EN 1891 Type A	EN 892/EN 1891 Type A	S	1 Sample		
4.2.1.4	Protective means	4.2.1.4	IS 3521 (part 2):2021	R	All	Each Control Unit	
4.2.2	Chain	4.2.2	IS 3109 (Part1) & IS/ISO 1834	S	1 Sample	Each Consignment	**If ISI marked or accompanied by TC, no further testing is required**
4.2.3	**Terminations**						
4.2.3.1	Terminations	4.2.3.1	IS 3521 (part 2) : 2021	R	All	Each Control Unit	If applicable
4.2.3.2	Eye Splices	4.2.3.2	IS 3521 (part 2) : 2021	R	All	Each Control Unit	If applicable
4.2.3.3	Stitched Eye terminations	4.2.3.3	IS 3521 (part 2) : 2021	R	All	Each Control Unit	If applicable
4.2.3.4	Eye terminations of wire rope lanyards	4.2.3.4	IS 3521 (part 2) : 2021	R	All	Each Control Unit	If applicable
4.2.3.5	Selection of Swage	4.2.3.5	IS 3521 (part 2) : 2021	R	All	Each Control Unit	If applicable
4.2.3.6	Wire rope end	4.2.3.6	IS 3521 (part 2) : 2021	R	All	Each Control Unit	If applicable
4.2.3.7	Knots	4.2.3.7	IS 3521 (part 2) : 2021	R	All	Each Control Unit	If applicable

4.2.4	**Fittings**						
4.2.4.1	Finish	4.2.4.1	IS 3521 (part 2) : 2021	R	All	Each Control Unit	-
4.2.4.2	Self-Lock	4.2.4.2	IS 3521 (part 2) : 2021	R	All	Each Control Unit	-
4.2.4.3	Corrosion Resistance	5.2.4	ISO 9227	R	1 Sample of each Variety	Each Control Unit/Each Consignment	-
4.2.5	Adjustment Slippage	5.2.1	IS 3521 (part 2) : 2021	R	1 Sample of each variety	Each Control Unit	If applicable
4.2.6	Static Strength	5.2.2	IS 3521 (part 2) : 2021	R	-do-	Each Control Unit	
4.2.7	Dynamic Strength for adjustable lanyards	5.2.3	IS 3521 (part 2) : 2021	R	-do-	Each Control Unit	
4.3	**Energy Absorber**						
4.3.1.1	General	4.3.1.1	IS 3521 (part 2) : 2021	R	All	Each Control Unit	
4.3.1.2	Protective means	4.3.1.2	IS 3521 (part 2) : 2021	R	All	Each Control Unit	
4.3.2	**Terminations**						
4.3.2.1	End Terminations	4.3.2.1	IS 3521 (part 2) : 2021	R	All	Each Control Unit	-
4.3.2.2	Fitting Interfaces	4.3.2.2	IS 3521 (part 2) : 2021	R	All	Each Control Unit	-
4.3.2.3	Finish	4.3.2.3	IS 3521 (part 2) : 2021	R	All	Each Control Unit	-
4.3.2.4	Corrosion Resistance	5.3.9	ISO 9227	R	1 Sample of each Variety	Each Control Unit/Each Consignment	-
4.3.4	Inadvertent Operation	5.3.1 or 5.3.2	IS 3521 (part 2) : 2021	R	1 Sample of each Variety	Each Control Unit	
4.3.5	Dynamic Performance	5.3.3 or 5.3.4 or 5.3.5	IS 3521 (part 2) : 2021	R	1 Sample of each Variety	Each Control Unit	-
4.3.6	Static Strength	5.3.6 or 5.3.7	IS 3521 (part 2) : 2021	R	1 Sample of each Variety	Each Control Unit	-
4.3.7.	Dynamic Performance after Conditioning			R		Each 3rd Control Unit	
4.3.7.2	Elevated Temperature	5.3.3 or 5.3.4 or 5.3.5	IS 3521 (part 2): 2021	R	1 Sample of each Variety	-do-	-
4.3.7.3	Wet			R	1 Sample of each Variety	-do-	-
4.3.7.4	Cold			R	1 Sample of each Variety	-do-	-
4.3.7.5	Wet & Cold			R	1 Sample of each Variety	-do-	-

Note 1: Whether test equipment is required or sub-contracting is permitted in column 2 shall be decided by the Bureau and shall be mandatory. Sub-contracting is permitted to a laboratory recognized by the Bureau or Government laboratories empaneled by the Bureau.

Note 2: Levels of control given in column 3 are only recommendatory in nature. The manufacturer may define the control unit/batch/lot and submit his own levels of control in column 3 with proper justification to BO head.

Note-3**:** Each consignment of material, used in manufacture of Lanyards & Energy Absorber has to be accompanied with supplier's test certificate or test report issued by a third party laboratory recognized by the Bureau or Government laboratories empaneled by the Bureau or In house factory testing to be done. No testing is required if the material is ISI marked.