



उत्पाद मैनुअल
आई एस 14493 (भाग 5) : 2023/ आई इ सी 61156-5 : 2020 के अनुसार
डिजिटल संचारण के लिए बहुकोड और सममित पेयर / कैंड केबल
भाग 5 1 000 MHz तक संचरण लक्षण वाली सममित पेयर / कैंड
क्षैतिज ताल वायरिंग - अनुभागीय विशिष्टि (पहला पुनरीक्षण)
दस्तावेज संख्या – पीएम/आईएस 14493 (भाग 5)/ आई इ सी 61156-5
/2/ नवंबर 2024

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। दस्तावेज का उपयोग बीआईएस प्रमाणन प्राप्त करने के इच्छुक संभावित आवेदकों द्वारा भी किया जा सकता है।

PRODUCT MANUAL FOR

Multicore and symmetrical pair / quad cables for digital communications: Part 5
symmetrical pair / quad cables with transmission characteristics up to 1000 MHz
- Horizontal floor wiring - Sectional specification (First Revision)

ACCORDING TO
IS 14493 (Part 5): 2023/ IEC 61156-5 : 2020

Document No - PM/IS 14493 (Part 5) / IEC 61156-5 /2/November 2024

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.

भारतीय मानक ब्यूरो
BUREAU OF INDIAN STANDARDS
मानक भवन, ९, बहादुर शाह ज़फर मार्ग
Manak Bhawan, 9, Bahadur Shah Zafar Marg
नई दिल्ली - ११०००२
New Delhi – 110002



उत्पाद मैनुअल
डिजिटल संचारण के लिए बहुकोड और सममित पेयर / क्वैड केबल
भाग 5 1 000 MHz तक संचरण लक्षण वाली सममित पेयर / क्वैड क्षैतिज ताल
वायरिंग - अनुभागीय विशिष्टि (पहला पुनरीक्षण)
आई एस 14493 (भाग 5) : 2023/ आई इ सी 61156-5 : 2020 के अनुसार

PRODUCT MANUAL

Multicore and symmetrical pair / quad cables for digital communications: Part 5
symmetrical pair / quad cables with transmission characteristics up to 1000 MHz -
Horizontal floor wiring - Sectional specification (First Revision)

ACORDING TO IS 14493 (Part 5): 2023/ IEC 61156-5 : 2020

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 14493 (Part 5): 2023/ IEC 61156-5 : 2020
	शीर्षक Title	:	Multicore and symmetrical pair / quad cables for digital communications: Part 5 symmetrical pair / quad cables with transmission characteristics up to 1000 MHz - Horizontal floor wiring - Sectional specification (First Revision)
	संशोधनों की संख्या No. of amendments	:	NIL
2.	नमूना दिशानिर्देश Sampling Guidelines:		
a)	कच्चा माल Raw material	:	NIL

b)	समूहीकरण दिशानिर्देश Grouping Guidelines	:	Please refer ANNEX – A
c)	नमूने का परिमाण Sample Quantity	:	CAT5e and CAT6 - 500 m CAT6A – 1000 m CAT7 and CAT7A – 500 m
3.	परीक्षण उपकरणों की सूची List of Test Equipment	:	Please refer ANNEX – B
4.	निरीक्षण और परीक्षण की स्कीम Scheme of Inspection and Testing	:	Please refer ANNEX – C
5.	एक दिन में संभावित परीक्षण Possible tests in a day:	:	Please refer ANNEX-D
6.	लाइसेंस का दायरा /Scope of the Licence	:	As per below table
Licence is granted to use Standard Mark as per IS 14493 (Part 5): 2023/ IEC 61156-5 : 2020 with the following scope:			
	Name of the Product	Multicore and symmetrical pair / quad cables for digital communications: Part 5 symmetrical pair / quad cables with transmission characteristics up to 1000 MHz - Horizontal floor wiring - Sectional specification	
	Type of cable.:	Symmetrical pair / quad cables	
	Cable Category:	Category 5e/ Category 6/ Category 6A / Category 7/ Category 7A	
	Screening of the cable core:	a) an aluminium tape laminated to a plastic tape which may be bonded to the sheath; b) an aluminium tape laminated to a plastic tape and a metal-coated or plain copper drain wire whereby the metal tape is in contact with the drain wire; c) metallic braid; d) an aluminium tape laminated to a plastic tape and a metallic braid; e) plain copper or aluminium tape.	
	Screening of the cable element:	a) an aluminium tape laminated to a plastic tape; b) an aluminium tape laminated to a plastic tape and a metal-coated or plain copper drain wire whereby the metal tape is in contact with the drain wire; c) metallic braid; d) an aluminium tape laminated to a plastic tape and a metallic braid.	
	Insulation type:	Polyolefin/ Fluoropolymer/ Low-smoke zero-halogen thermoplastic material/ Others (as declared by the manufacturer)	

	Sheath type:	Polyolefin/ PVC/ Fluoropolymer /Low-smoke zero-halogen thermoplastic material/ Others (as declared by the manufacturer)
	Application	With remote powering/ without remote powering

ANNEX A

समूहीकरण दिशानिर्देश
Grouping Guidelines

1. Manufacturer of the cables shall declare the parameters indicated at Scope of licence for the cables manufactured by them.
2. For the purpose of GoL/CSoL, each variety of the cable to be tested.
3. The Firm shall declare the Varieties and Sizes of various Cables they intend to cover in the Licence. The Scope of Licence may be restricted based on the Manufacturing and Testing capabilities of the Manufacturer.
4. During the operation of the Licence, BO shall ensure that all the Varieties covered in the Licence are tested in rotation to the extent possible.

ANNEX -B
परीक्षण उपकरणों की सूची

List Of Test Equipment

(INDICATIVE LIST, FOR GUIDANCE ONLY)

Major test equipment required to test as per the Indian Standard

Sl. No.	Test Equipment	Tests used in with Clause Reference	
		Cl. Ref.	Tests
1.	Vernier Calipers	5.2.1, 4.2	Conductor, Bending radius
2.	Steel Scale, measuring tape	4.2, 6.4, 6.5	Bending radius, Dimensional requirements, Shrinkage of insulation
3.	Micrometer	5.2.1	Conductor
4.	DCM Network Analyzer to Test Transmission Characteristics as per IS 14493-5 upto 1 GHz	6.2.1, 6.2.2.1, 6.2.5, 6.2.6, 6.3.2, 6.3.2.1, 6.3.3.1, 6.3.3.3, 6.3.4, 6.3.5, 6.3.6, 6.3.7, 6.3.8, 6.3.10, 6.3.11	Conductor resistance, Resistance unbalance, Mutual Capacitance, Capacitance unbalance, Phase delay, Delay skew, Attenuation, Elevated Attenuation, TCL, NEXT, FEXT, ANEXT, AFEXT, Impedance, Return Loss
5.	Mega ohmmeter, Kelvin double bridge	6.2.1, 6.2.4, 6.2.2	Conductor resistance, Insulation resistance, resistance imbalance
6.	Capacitance meter,	6.2.6	Capacitance imbalance
7.	Tensile Testing Machine	6.5.4, 6.5.5	Elongation at break, Tensile strength
8.	Dumb-Bell Cutting Machine with Die	6.5.4, 6.5.5	Elongation at break, Tensile strength
9.	Hot Air oven with thermostatic Temperature controller	6.5.4, 6.5.5	Elongation at break, Tensile strength
10.	Thermal Ageing Oven with Thermostatic Temperature controller, Air flow Meter & Hour Meter	6.5.4, 6.5.5	Elongation at break, Tensile strength
11.	Air-conditioner		For maintaining temperature for low temperature test
12.	Wire Cutter		For preparing samples for various tests
13.	AC HV Tester	6.2.3	Dielectric strength
14.	Water Bath, Stop Watch	6.2.3	Dielectric strength
15.	Conditioning Chamber, Humidity Chamber	6.3.3.3	Attenuation at Elevated Temp
16.	Deep Freezer, Mandrel	6.5.7	Cold Bend
17.	Glass Thermometer, Hygrometer		For maintaining temperature
18.	Digital weighing balance	6.5.14	Hygroscopicity

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

ANNEX – C

निरीक्षण और परीक्षण की स्कीम

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:

1.3.1 For the guidance of manufacturers, the recommended definition of control unit is: **Multicore and symmetrical pair / quad cables for digital communications - Horizontal floor wiring of each variety manufactured under similar conditions in a day shall constitute a control unit.** The manufacturer has the choice to define their own control unit/batch/lot and submit the same to the BIS.

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

1.3.3 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. MARKING - The Standard Mark as given in the Schedule of the licence shall be incorporated legibly and indelibly **on the insulation/ sheath, wherever applicable** provided always that the material so marked conforms to each requirement of the specification. In addition, marking shall be carried out as per Cl. 5.2.7 of IS 14493 (Part 5) : 2023.

3.1 Additional Marking requirements: The material shall also be marked with the following additional requirement on its packaging:

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

(1)				(2)	(3)		
Test Details				Test Equipment requirement R: Required (or) S: Sub-contracting permitted	Levels of Control		
Cl. of IS 14493 (Part 5)	Requirement	Test Method			No. of Sample	Frequency	Remarks
		Clause	Reference				
4 Installation considerations							
4.1	General Remarks	4	IS 14493 (Part 1)	-	Firm to have adequate in-process controls to check compliance of this parameter as per the tolerances given in the Indian Standard. However, appropriate records shall be maintained by the manufacturer for evidence of conformity		
4.2	Bending radius of installed cable	4.2	IS 14493 (Part 5)	R			
4.3	Climatic Conditions	4.3	IS 14493 (Part 5)	R			
5 Material and cable construction							
5.1	General remarks	5.1	IS 14493 (Part 5)	R	Firm to have adequate in-process controls to check compliance of this parameter as per the tolerances given in the Indian Standard. However, appropriate records shall be maintained by the manufacturer for evidence of conformity		
5.2	Cable construction	5.2	IS 14493 (Part 5)	R			
5.2.1	Conductor	5.2.1	IS 14493 (Part 5), IS 14493 (Part 1)	R			
5.2.2	Insulation	5.2.2	IS 14493 (Part 5)	R			
5.2.3	Cable element	5.2.3	IS 14493 (Part 5)	R			

5.2.3.1	Screening of the cable element	5.2.3.2	IS 14493 (Part 1)	R	Firm to have adequate in-process controls to check compliance of this parameter as per the tolerances given in the Indian Standard. However, appropriate records shall be maintained by the manufacturer for evidence of conformity	
5.2.4	Cable make-up	5.2.4	IS 14493 (Part 5)	R		
5.2.5	Screening of the cable core	5.2.5	IS 14493 (Part 5) IS 14493 (Part 1)	R		
5.2.6	Sheath	5.2.6	IS 14493 (Part 5)	R		
5.2.7	Identification	5.2.7	IS 14493 (Part 5)	R		
5.2.8	Finished cable	5.2.8	IS 14493 (Part 5)	R		
6 Characteristics and requirements						
6.1	General remarks	6.1	IS 14493 (Part 1)	R	Firm to have adequate in-process controls to check compliance of this parameter as per the tolerances given in the Indian Standard. However, appropriate records shall be maintained by the manufacturer for evidence of conformity	
6.2	Electrical Characteristics and tests					
6.2.1	Conductor resistance	6.2.1	IS 14493 (Part 5)	R		
6.2.2	Resistance unbalance	6.2.2.1, 6.2.2.2	IS 14493 (Part 5)	R		
6.2.3	Dielectric strength	6.2.3	IS 14493 (Part 5)	R		
6.2.4	Insulation resistance	6.2.4	IS 14493 (Part 5)	R		
6.2.5	Mutual capacitance	6.2.5	IS 14493 (Part 5)	R		
6.2.6	Capacitance unbalance	6.2.6	IS 14493 (Part 5)	R		
6.3	Transmission characteristics					
6.3.2	Phase delay and differential delay					
6.3.2.1	Phase delay	6.3.2.1	IS 14493 (Part 5)	S	One	Once in six months for each variety of cable manufactured in the period
6.3.2.2	Differential delay (delay skew)	6.3.2.2	IS 14493 (Part 5)	S	One	

6.3.3	Attenuation(α)					
6.3.3.1	Attenuation at 20 °C operating temperature	6.3.3.1	IS 14493 (Part 5)	S	One	Once in six months for each variety of cable manufactured in the period
6.3.3.3	Attenuation at elevated operating temperature	6.3.3.3	IS 14493 (Part 5)	S	One	
6.3.4	Unbalance attenuation (TCL)	6.3.4	IS 14493 (Part 5)	S	One	
6.3.5	Near-end crosstalk (<i>NEXT</i>)	6.3.5	IS 14493 (Part 5)	S	One	
6.3.6	Far-end crosstalk (<i>FEXT</i>)	6.3.6	IS 14493 (Part 5)	S	One	
6.3.7	Alien (exogenous) near-end crosstalk(<i>ANEXT</i>)	6.3.7	IS 14493 (Part 5)	S	One	
6.3.8	Alien (exogenous) far-end crosstalk(<i>AFEXT</i>)	6.3.8	IS 14493 (Part 5)	S	One	
6.3.10	Impedance	6.3.10	IS 14493 (Part 5)	S	One	
6.3.11	Return Loss (RL)	6.3.11	IS 14493 (Part 5)	S	One	
6.4	Mechanical and dimensional characteristics and requirements					
6.4.1	Dimensional requirements	6.4.1	IS 14493 (Part 5)	R	One	Each Control Unit
6.4.2	Elongation at break of the conductors	6.4.2	IS 14493 (Part 5)	R	One	
6.4.3	Tensile strength of the insulation	6.4.3	IS 14493 (Part 5)	R	One	
6.4.4	Elongation at break of the insulation	6.4.4	IS 14493 (Part 5)	R	One	
6.4.6	Elongation at break of the sheath	6.4.6	IS 14493 (Part 5)	R	One	
6.4.7	Tensile strength of the sheath	6.4.7	IS 14493 (Part 5)	R	One	

6.4.8	Crush test of the cable	6.4.8	IS 14493 (Part 5)	S	One	Once in six months for each variety of cable manufactured in the period
6.4.12	Tensile performance of the cable	6.4.12	IS 14493 (Part 5)	S	One	
6.5	Environmental characteristics					
6.5.1	Shrinkage of insulation	6.5.1	IS 14493 (Part 5)	S	One	Once in six months for each variety of cable manufactured in the period
6.5.3	Bending test of insulation at low temperature	6.5.3	IS 14493 (Part 5)	S	One	
6.5.4	Elongation at break of the sheath after ageing	6.5.4	IS 14493 (Part 5)	S	One	
6.5.5	Tensile strength of the sheath after ageing	6.5.5	IS 14493 (Part 5)	S	One	
6.5.7	Cold bend test of the cable	6.5.7	IS 14493 (Part 5)	S	One	
6.5.10	Solar radiation (UV test)	6.5.10	IS 14493 (Part 5)	S	One	
6.5.11	Solvents and contaminating fluids	6.5.11	IS 14493 (Part 5)	S	One	
6.5.14	Hygroscopicity	6.5.14	IS 14493 (Part 5)	S	One	
6.5.15	Wicking	6.5.15	IS 14493 (Part 5)	S	One	
6.5.16	Flame propagation characteristics of a single cable	6.5.16	IS 14493 (Part 1)	S	One	
6.5.17	Flame propagation characteristics of bunched cables	6.5.17	IS 14493 (Part 1)	S	One	
6.5.18	Halogen gas evolution	6.5.18	IS 14493 (Part 1)	S	One	
6.5.19	Smoke generation	6.5.19	IS 14493 (Part 1)	S	One	
6.5.20	Toxic gas emission	6.5.20	IS 14493 (Part 1)	S	One	
6.5.21	Integrated fire test	6.5.21	IS 14493 (Part 1)	S	One	

ANNEX D

एक दिन में संभावित परीक्षण

Possible Tests in a day

1. Conductor - Cl. 5.2.1
2. Insulation - Cl. 5.2.2
3. Conductor resistance - Cl. 6.2.1
4. Resistance unbalance - Cl. 6.2.2
5. Dielectric strength - Cl. 6.2.3
6. Insulation resistance - Cl. 6.2.4
7. Capacitance unbalance - Cl. 6.2.6
8. Phase delay and differential skew - Cl. 6.3.2
9. Attenuation - Cl. 6.3.3
10. Unbalance attenuation (TCL) - Cl. 6.3.4
11. Near-end crosstalk (NEXT) - Cl. 6.3.5
12. Far-end crosstalk (FEXT) - Cl. 6.3.6
13. Alien (exogenous) near-end crosstalk (ANEXT) - Cl. 6.3.7
14. Alien (exogenous) far-end crosstalk (AFEXT) - Cl. 6.3.8
15. Impedance - Cl. 6.3.10
16. Return loss (RL) - Cl. 6.3.11