



आई एस 398-2 : 2025
के अनुसार
शिरोपर प्रेषण उद्देश्यों के लिए एल्युमीनियम चालक — विशिष्ट
भाग 2 एल्युमीनियम चालक, जस्तीकृत इस्पात प्रबलन
के लिए
उत्पाद मैनुअल
दस्तावेज़ संख्या – पी एम/आई एस 398 (भाग-2) /4/ फरवरी 2026

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।

PRODUCT MANUAL FOR
Aluminium Conductors for Overhead Transmission Purposes Part 2:
Aluminium Conductors Galvanized Steel Reinforced
According to IS 398 (Part 2): 2025

Document No. - PM/ IS 398 (Part 2)/4 / Feb 2026

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.

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**PRODUCT MANUAL FOR
ALUMINIUM CONDUCTORS FOR OVERHEAD
TRANSMISSION PURPOSES:
PART 2 : ALUMINIUM CONDUCTORS GALVANIZED STEEL
REINFORCED
ACCORDING TO IS 398 (Part 2): 2025**

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1.	मानक संख्या IS No.	:	IS 398 (Part 2) : 2025	
	शीर्षक Title	:	Aluminium Conductors for Overhead Transmission Purposes Part 2 Aluminium Conductors Galvanized Steel Reinforced	
	संशोधनों की संख्या No. of amendments	:	Nil	
2.	नमूना दिशानिर्देश Sampling Guidelines:			
a)	कच्चा माल Raw material	:	EC Grade Aluminium rods	IS 5484
			Zinc	IS 209
			Steel	Cl 6.1.1 of IS 398 (Part 2)
b)	समूहीकरण दिशानिर्देश Grouping Guidelines	:	Please refer ANNEX – A	
c)	नमूने का परिमाण Sample Quantity	:	Before Stranding	Aluminium Wire- 5m Steel wire- 5m
			Stranded conductor	25 m (For Complete testing including types tests) 5 m (For Acceptance and Routine tests)
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:	:	All Acceptance and Routine Tests
6.	लाइसेंस का दायरा /Scope of the Licence	:	License is granted to use Standard Mark as per IS 398 (Part 2): 2025 with the following scope:
	a) Aluminium Conductors Galvanized Steel-Reinforced for overhead power transmission purposes, for sizes up to and including ____mm² (Nominal Aluminium Area) for voltages less than ± 320 kV d.c. and less than 400 kV a.c. b) Aluminium Conductors Galvanized Steel-Reinforced for overhead power transmission purposes, for sizes up to and including ____mm² (Nominal Aluminium Area) for voltages above and including ± 320 kV d.c. and above and including 400 kV a.c. c) Galvanized Steel wire for the core of ACSR, for sizes up to and including ____mm²		

ANNEX A**समूहीकरण दिशानिर्देश****Grouping Guidelines**

1. IS 398 (Part 2) covers the requirements and tests for aluminium conductors galvanized steel reinforced (ACSR) used for overhead transmission lines. The standard also covers the requirements of Galvanized Steel wire for the core of ACSR.
2. For considering GoL/CSoL of ACSR, conductor of any size (Nominal Aluminium Area), preferably the largest in each group, intended to be covered in the license shall be drawn for testing.:

Sl.no.	Group	Nominal Aluminium Area
1	A	Less than 100 mm ²
2	B	100 mm ² and above

3. Galvanized steel wires manufactured for cores of such Aluminium conductors shall be considered as a separate variety in the same License. For considering CSoL (or GoL if only this variety is applied for), galvanized steel wire of any size, preferably the largest intended to be covered in the Licence shall be tested.
4. The firm shall declare the sizes of conductors/steel wires they intend to cover in the license. The scope of license may be restricted based on the manufacturing and testing capabilities of the manufacturer.
5. The firm shall declare maximum voltage rating of the conductors as per scope of the licence.
6. The Scope of Licence w.r.t the voltage may also be restricted based on the voltage(s) at which the Corona test has been carried out.
7. 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	Micrometer	13.4	Measurement of Diameter
2	Vernier Callipers	13.6, 13.7.2, 13.13	Breaking Load Test, Test for Elongation, Surface Condition Test, Ultimate tensile strength
3	Steel Scale		
4	Tensile Testing machine		
5	Micro-Ohm Meter	13.9, 13.12	Resistance Test
6	Torsion Testing Setup and tensile loads	13.7.1	Torsion Test
7	Mandrels	13.8	Wrapping Test
8	Wrap Tester		
9	Cold Chamber	13.10	Galvanizing Test
10	Stop Watch		
11	Burner with tripod		
12	Brush		
13	Burette with stand		
14	Weighing Balance		
15	Pipette		
16	Measuring Cylinder		
17	Beakers		
18	Conical Flask		
19	Thermometer		
20	Hydrometer		
21	Clean cotton cloth		
22	Setup for Corona Test	13.15	Corona Test
23	Setup for Radio Interference Voltage Test	13.16	Radio Interference Voltage Test
List of Chemicals for Galvanizing Test:			
Distilled Water, Naphtha or trichloroethylene or any other suitable organic solvent for washing, Alcohol, Antimony trioxide (Sb ₂ O ₃) or Antimony trichloride (SbCl ₃), Hydrochloric acid (sp. gr 1.16), Technical Grade Copper Sulphate Crystals, Copper Carbonate (Laboratory Grade) Or Copper Hydroxide (Laboratory Grade)			

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 during operation of BIS licence, manufacturers will implement a Quality Assurance Plan (QAP) 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 (QAP) defining the control unit (i.e. lot/batch etc.), the levels of control (i.e. the frequency and number of samples for conducting the different tests as per the Indian Standard) and declare the arrangement for testing i.e. whether in-house or subcontracting/sharing for each applicable test and submit the same to BIS Branch Office for information. The manufacturer shall comply with the QAP and maintain test records in accordance with para 2.1.

1.3 RECOMMENDED LEVELS OF CONTROL/CONTROL UNIT:

1.3.1 For the guidance of manufacturers, the recommended definition of control unit is:
Aluminium Stranded conductor/steel wire of continuous production of same nominal Aluminium area/steel wire area, produced in a day from the same heat treated batch of raw material, shall constitute a control unit.

1.3.2 For the guidance of manufacturers in preparing the Quality Assurance Plan, recommended levels of control are given in **Table 1**. Manufacturer has the discretion of declaring their own levels of control or accept the levels of control given in this document.

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.

2. ENSURING COMPLIANCE THROUGH TESTING-

Manufacturers shall ensure compliance of their products to all the requirements of the Indian Standard for which they may have in-house test facilities. However, there is no obligation to maintain in-house laboratory. Licensee may use alternative arrangements for tests of the production as per the declared QAP. Various alternatives are available for operation of BIS certification as given below and the relevant guidelines for availing such relaxations by the manufacturers, as amended from time to time, are to be referred:

- i) Shared testing resources like common facility,
- ii) Cluster based testing facility,
- iii) Sub-contracting to outside laboratories which may either be:
 - a) BIS recognised/empanelled laboratories, or
 - b) Any accredited laboratory as per ISO/IEC 17025

2.1 TEST RECORDS-

The manufacturers shall maintain test records for the tests carried out (either in-house or at a sub-

contracted or at shared test facility) to establish conformity of the product to the Standard for operation of licence. For the tests being subcontracted or conducted at a shared test facility, test results issued by the laboratories or test facilities, shall be made available for inspection by BIS.

3. PACKING AND MARKING

3.1 The Standard Mark as given in the Schedule of the licence shall be incorporated legibly and indelibly on the reels or drums.

Packing of the conductor shall be done as per Cl. 12.2 of IS 398 (Part 2): 2025

Marking shall be done as per Cl. 12 of IS 398 (Part 2): 2025.

3.2 Additional Marking requirements: Additionally, the following shall be marked on product or package or both

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

4. HYGIENIC CONDITIONS (if applicable) – NA.

5. 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)				(3)		
Test Details				Levels of Control		
Cl.	Requirement	Test Methods		No. of Sample	Frequency	Remarks
		Clause	Reference			
Material						
6	Aluminium Conductor	6.1	IS 5484 & IS 398 (Part 2)	One	Each Consignment	No further testing is required if accompanied with the Test Certificate or ISI marked.
	Galvanized Steel wire	6.1.1	IS 398 (Part 2)	One	Each Consignment	
	Zinc	6.2	IS 209 & IS 398 (Part 2)	One	Each Consignment	
Aluminium Wire Before Stranding						
7	Freedom from defects	7	IS 398 (Part 2)	-	Aluminium wire drawn from/ received in each consignment.	If any sample fails in respect of any requirement, three more samples from the same batch shall be tested for that requirement and if there is any further failure in retesting, the batch shall be rejected.
13.1(ii) a	Diameter	8.1.1, 13.4				
13.1(ii) b	Breaking Load	13.6				
13.1(ii) c	Wrapping Test	13.8				
13.1(ii) d	Resistance	13.9				
Galvanized Steel wire before stranding						
6.2	Purity of Zinc	6.2	IS 398 (Part 2)	One	Each Consignment	No further testing is required if accompanied with the Test Certificate or ISI marked.
7	Freedom from defects	7		-	Each coil of Steel wire received/ drawn.	No further testing is required if Galvanized Steel wire is ISI marked. If any sample fails in respect of any requirement, three more samples from the same coil shall be tested for that requirement and if there is any further failure in retesting, the coil shall be rejected.
13.1(iii) a	Diameter	8.1.1, 13.4				
13.1(iii) b	Breaking Load	13.6				
13.1(iii) c	Ductility	13.7				
13.1(iii) d	Wrapping	13.8				
13.1(iii) e	Galvanizing	13.10				

(1)				(3)		
Test Details				Levels of Control		
Cl.	Requirement	Test Methods		No. of Sample	Frequency	Remarks
		Clause	Reference			
9	Joints in wire	9.1-9.3,13.11	IS 398 (Part 2)	Complete length of stranded wires		-
Stranded Conductor						
8.2	Size	8.2.1	IS 398 (Part 2)	One	Each Control Unit	
13.1(i) a	Visual Examination	13.3		-		
13.1(i) b	Stranding including Lay Ratio and Direction of Lay	13.5		One		
13.1(i) c	d.c. Resistance	13.12		One		
13.1(i) e	Surface condition test	13.13		One sample of each nominal Aluminium area	Once in a year	
13.1(i) d	Ultimate Tensile strength	13.14				
13.1(i) f	Corona Test	13.15				
13.1(i) g	Radio interference voltage	13.16				