

**PRODUCT MANUAL FOR**  
Cold rolled Non-Oriented Electrical Steel Sheet and Strip- Fully Processed Type  
**according to IS 648:2006**

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.	<b>Product</b>	:	<b>IS 648:2006</b>
	<b>Title</b>	:	Cold rolled non-oriented electrical steel sheet and strip - Fully processed type
	<b>No. of amendments</b>	:	5
2.	<b>Sampling Guidelines</b>		
a)	<b>Raw material</b>	:	No specific requirement
b)	<b>Grouping Guidelines</b>	:	Please refer Annex – A
c)	<b>Sample Size</b>	:	1. 40 pieces Epstein test strips (of 280-300 mm length & 30 mm width) 2. 250 mm x 100 mm piece (10 pieces) 3. 20 pieces ( 280-300mm length & 30 mm width) Dimensional requirements on full width sample are usually tested in factory testing.
3.	<b>List of Test Equipment</b>	:	Please refer Annex – B
4.	<b>Scheme of Inspection and Testing</b>	:	Please refer Annex – C
5.	<b>Possible tests in a day</b>	:	All Physical, Mechanical and Magnetic properties excluding specific core loss (on aged test pieces)
6.	<b>Scope of the Licence :</b>		
	Licence is granted to use Standard Mark as per IS 648:2006 with the following scope:		
	<b>Name of the product</b>	Cold rolled non-oriented electrical steel sheet and strip - Fully processed type	
	<b>Dimensions</b>	Width upto ...mm Length upto ...mm (in case of sheets)	
	<b>Grade</b>	50C100,..	

**ANNEXURE A**  
**TO PRODUCT MANUAL FOR**  
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**GROUPING GUIDELINES**

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1. Grain Oriented Electrical Steel Sheet and Strip according to IS 648: 2006 is classified on the basis of the following:

- Nominal Thickness
- Maximum Specific Total Loss
- No. of bends

2. Accordingly, following grouping based on quality of product, shall be followed for considering grant of licence/inclusion as per IS 648:2006:-

Group	Grades	Remarks
1	35C230 to 35C360	Grade Designations of one thickness is considered as one group. The grades are thickness specific and in each case grade with the minimum of (max) core loss is considered to be superior to the other grades. Accordingly, one sample of grade with lower Maximum Specific Total Loss is drawn and tested, all other grades within the group having higher Maximum Specific Total Loss alongside the grade of lower Maximum Specific Total Loss, can also be covered in scope of licence.  In addition, within a group, one sample of any other grade having maximum number for the requirement of bend test should also be drawn and tested.  Eg: Samples of 35C230 and 35C360 are to be drawn and tested to all grades in group-1.
2	50C250 to 50C1000	
3	65C310 to 65C1000	
4	100C600 to 100C1300	

3. It shall however be ensured that firm has necessary manufacturing capabilities and testing facilities for the entire grades/conditions proposed to be covered under scope of BIS Certification.

4. During the operation of license, BO shall ensure that all sizes / grades covered in the license are drawn for independent testing on rotation over a period of time.

**ANNEXURE B**  
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**LIST OF TEST EQUIPMENTS**

Major test equipment essentially required to test as per requirements of Indian Standard.

<b>Sl. No.</b>	<b>Test Equipment/Chemicals and Identification Numbers (Where applicable)</b>	<b>Tests Used in with Clause Reference</b>
1.	Weigh Bridge	Conditions of Delivery(6.1)
2.	Depth gauge, Vernier Caliper, Bend tester with bend former radius of 5mm	Surface Condition(6.3)
3.	Epstein Test Frame, Tesla meter (0-2.0T),Timer, Vernier Calipers, Frequency meter, Flux Volt meter, RMS Volt meter, Watt meter, RMS Ammeter , Ageing oven, Micrometer, Thermometer, Air conditioner with Heater Shearing machine, Punching m/c, lab stress relieving furnace (reducing or neutral atmosphere) with Temp indicator,Weighing balance	Magnetization test (7.1.1) & Core Loss (7.1.2)
4.	Franklin tester with Test Head, Press, Pressure Gauge ,Ammeter, Voltmeter Hot Plate, Weighing machine, Vernier callipers, thermometer, Lab. Oven	Surface Insulation characteristics (7.2 to 7.2.7)
5.	Hot Plate, Vernier calipers, Thermometer, Trough, Trichloroethylene or Xylene	Resistance to solvents and cleanliness (7.2.8)
6.	Measuring tape, measuring scale, Micrometer, Long arm digital gauge, Straight edge, Depth gauge, Steel scale Taper Gauge/Dial Gauge, Surface plate, Vernier callipers,	Geometric Characteristic and Tolerances (8)
7.	Compression device/CTM Pressure gauge Vernier calipers, dial gauge, Weighing machine Rigid metal plates	Stacking factor (9.1)
8.	Bend tester(Capable of bending 90° & 180°), Test mandrels (for each Thickness/width), Measuring tape, Micrometer, Steel scale	Bend Test (9.2)

Note: The above is an indicative list for the purpose of guidance only

**ANNEXURE C**  
**TO PRODUCT MANUAL FOR**  
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**SCHEME OF INSPECTION AND TESTING**

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**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 equipments.

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

**3. MARKING, PACKING** –

The Standard Mark as given in Column (1) of the First Schedule of the license and Licence Number (i.e. CM/L.....) shall be incorporated, and the marking and packing shall be done as per the provisions of the Indian Standard, provided always that the product thus marked and packed conforms to all the requirement of the specification. In addition, on top of package of Sheets and Strips, details of BIS website shall be marked as follows: “For details of BIS certification please visit [www.bis.gov.in](http://www.bis.gov.in)”

**4. CONTROL UNIT** – For the purpose of this scheme, a control unit shall be taken as a single charge of the product of one cast heat treated together with similar quality grading.

**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.

**6. TEST CERTIFICATE**-For each consignment of BIS Certified material conforming to IS 648:2006 there shall be a test certificate which shall contain the Standard Mark, the cast/Control Unit number and the corresponding test results (as given in Annexure-I enclosed)

**7. 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. Any rejected material which is potentially re-salable be sheared or cut or deformed in such a manner that it cannot be used for any other purpose except re-melting. A separate record shall be maintained giving information on quantity and cast number/coil number/control unit number, as applicable, relating to all such rejections/defective/sub-standard material of the production not conforming to the requirements of the Specification and the method of its disposal. Such material shall in no case be stored together with that conforming to the Specification. The Standard Mark (if already applied) on rejected material should be defaced.

**ANNEXURE C**  
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**SCHEME OF INSPECTION AND TESTING**

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**TABLE 1: LEVELS OF CONTROL**

(1)				(2)	(3)		(4)
TEST DETAILS					LEVELS OF CONTROL		REMARKS
Clause	Requirements	Test Method		Test equipment requirement R: required (or) S: Sub-contracting permitted	No. of Samples	Frequency	
		Clause	Reference				
6.1	Condition of Delivery	6.1, 6.1.1 to 6.1.18	IS 648:2006	R	Adequate inspection to ensure each sheet/strip to be free from defects and meet the other general requirements of IS 648:2006.		
6.2	Chemical Composition	6.2	IS 648:2006	S	As and If agreed to between manufacturer and purchaser		Records shall be maintained.
6.3	Surface Condition (Visual)	6.3	IS 648:2006	R	Adequate inspection to ensure each sheet/strip meets the requirements of IS 648:2006.		
7	Magnetic Properties						
	Magnetization Test	7.1.1 to 7.1.1.2, Table-1	IS 648: 2006 IS 649	R	One	Each control unit	
	Core loss	7.1.2 to 7.1.2.6, Annex-B, Table-1, 10		R	One	Each control unit	Test as per clause 7.1.2.4 is to be carried out, if required by the purchaser.
	Surface Insulation Characteristics	7.2.1 to 7.2.3	IS 648: 2006	R	Adequate inspection to ensure that each sheet / strip meets the requirements of 7.2.1 to 7.2.3		Coating and Insulated material as specified by the purchaser
		7.2.4		S	One	Each control unit	
Thermal effect on coating	7.2.7		S	One	Once in a week	If agreed between the purchaser & the Manufacturer	
	Resistance to solvents and cleanliness	7.2.8		S	One	Once in a week	

(1)				(2)	(3)		(4)
TEST DETAILS					LEVELS OF CONTROL		REMARKS
Clause	Requirements	Test Method		Test equipment requirement R: required (or) S: Sub-contracting permitted	No. of Samples	Frequency	
		Clause	Reference				
8	Geometric Characteristic & Tolerances  i) Thickness Tolerances  ii) Width Tolerances  iii) Length Tolerance  iv) Out of Squareness  v) Edge Camber  vi) Residual Curvature  vii) Flatness (Wave Factor)	8.1 & 8.7  8.2 & Table 3 8.3 & 8.4  8.5.1 & Fig. 1  8.5.2 & Fig. 2  8.5.3  8.6, 8.7 & Fig.3	IS 648: 2006	R	Adequate Inspection		i) Length tolerances on sizes other than those covered under 8.1 to 8.3 of IS 648 shall be subject to agreement between purchaser and the manufacturer.  ii) Material required to tolerances other than those specified in 8.1 to 8.6 shall be subject to agreement between the purchaser and the manufacturer.
9	Stacking Factor	9.1 Table-4	IS 648: 2006 IS 649	R	One	Each Control Unit	
	Bend Test	9.2 Table-1		R	One	Each Control Unit	

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: The control unit and levels of control as decided by the Bureau are obligatory to which the licensee shall comply with.

**ANNEXURE I**



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(Para 6 of the Scheme of Inspection and Testing)  
XYZ IRON AND STEEL COMPANY  
(Registered office Address and works address)

**TEST CERTIFICATE FOR Cold rolled non-oriented electrical steel sheet and strip - Fully processed type**

TEST CERTIFICATE No. \_\_\_\_\_

DATE \_\_\_\_\_

TO M/s \_\_\_\_\_

We certified that the material described below fully conforms to IS 648:2006 Magnetic, Physical and Mechanical properties of the product, as tested in accordance with the Scheme of Testing and Inspection contained in the BIS Certification Marks Licence No. CM/L \_\_\_\_\_ are as indicated below against each order No.

(PLEASE REFER TO IS 648:2006 FOR DETAILS OF SPECIFICATION REQUIREMENTS)

**TEST RESULTS**

Order No. & Date	Nominal Thickness and Size	Control Unit No.	grade	Qty in tonnes	No. of coils/sheets	Core loss	Magnetization Test	Anisotropy	Stacking factor	No. of bends	Delivery Cond.	Optional (resistance to solvents, adherence, thermal effect)	Electrical Resistivity/ density/ thermal conductivity

**REMARKS**

WAGON NO.

TRUCK NO.

(It is suggested that size A4 paper be used for this test certificate)

FOR XYZ IRON AND STEEL COMPANY