



उत्पाद मानक
PRODUCT STANDARD
HYDROGENERATOR ENGINEERING

HG - 10066(REV 03)

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गोपनीय एवं अधिकार सुरक्षित इस प्रपत्रा पर दी गई जानकारी भारत हेवी इलेक्ट्रिकल्स लिमिटेड की सम्पत्ति है इसे प्रत्यक्ष या अप्रत्यक्ष रूप से कम्पनी के हितों को नुकसान पहुँचाने के लिए कदापि उपयोग नहीं किया जावे ।

MAGNETIC STEEL SHEET-COLD ROLLED GR.250/350/450/600/700

1.0 GENERAL:

This specification governs the quality requirements of high permeability magnetic steel sheet cold rolled, having a minimum 0.2% proof value as shown below:

GRADE	0.2% Pr. STRESS	GRADE	0.2% Pr. STRESS
250	250 N/mm ² Min	600	600N/mm ² Min
350	350 N/mm ² Min	700	700N/mm ² Min
450	450 N/mm ² Min		

2.0 APPLICATION:

Rim Lamination of Hydro Generators

3.0 CONDITION OF DELIVERY:

Cold Rolled with trimmed edges in straight lengths (sheet form) in the ordered thickness & size as specified on BHEL order.

Material shall be supplied coated with rust preventive oil coating on both sides, and shall not contain any welds. The sheets shall be stacked so that their edges are superimposed in a regular manner.

4.0 DIMENSIONS AND TOLERANCES:

4.1 Sizes:

Magnetic steel sheet shall be supplied to the dimensions specified on BHEL order. The thickness shall preferably be within the range of 1.5 mm to 4.5 mm. Sheets shall be supplied in straight lengths & shall be flat & edges cleanly sheared & truly squared.

Revision:03 , Dated 23.01.2017
Table 7.1 updated. Elongation values for 600 & 700 grades were 10. Also, elongation values given in table are minimum values.

KP

DKC

BKS

हाइड्रोजनरेटर इंजीनियरिंग विभाग
भारत हेवी इलेक्ट्रिकल्स लिमिटेड

तैयारकर्ता
SD/-
GRP/BKS

अनुमोदनकर्ता
SD/-
JKB

जारी करने की
दिनांक
11/07/2005



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4.2 Tolerances:

4.2.1 Thickness:

Nominal Thickness (mm)		Permitted thickness tolerances for widths (mm)
Above	Upto	Upto 1250
1.5	2.0	+/-0.10
2.0	3.0	+/-0.15
3.0	-	+/-0.20

4.2.2 Width (Trimmed Edges)

Width (mm)		Permitted Width tolerances (mm)	
From	Upto	Plus	Minus
-	1250	+7	0
1250	2000	+10	0

4.2.3 Length:

Length (mm)		Permitted Length tolerances (mm)	
		Plus	Minus
Upto 2000		15	0
Above 2000		0.75% of length	0

4.2.4 Flatness;

The maximum distance between the lower face of the sheet and the flat horizontal surface shall not exceed the values given below;

Length (mm)	Maximum distance for nominal thickness
Less than 1250	8
1250 & above	10



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4.2.5 Edge Camber:

The gap which characterizes the edge camber shall not exceed $0.4\% \times \text{Length of the sheet}$ for material supplied with trimmed edges and above 150 mm width.

5.0 FREEDOM FROM DEFECTS:

The surface of the material shall be smooth and clean, free from grease, rust, loose scale and other surface defects such as burrs, cutting distortions, dents, waviness, scratches, blisters, cracks, pitting, cracked edges etc.

6.0 TEST SAMPLES:

~~One bend test and hardness test shall be carried out from each lot of 5000 kg. Of material or part thereof, per melt per consignment.~~

~~Where material of more than two thickness are rolled from the same melt, one additional bend test shall be made for each thickness~~

~~Test pieces shall be cut so that the axis of the bend is parallel to the direction of rolling i.e., bending shall be in perpendicular direction of rolling~~

7.0 PROPERTIES:

The material, when tested as detailed in BS EN 10265 at a temperature of 27 ± 2 deg C shall show the following properties:

7.1 Mechanical:

GRADE	250	350	450	600	700
TENSILE STR. N/ mm ²	350-450	450-550	550-650	700-850	800 Min.
0.2% PR. STR. N/ mm ²	250 Min.	350 Min.	450 Min.	600 Min.	700 Min.
% EL. ON 80 mm GAUGE LENGTH	22 Min.	18 Min.	14 Min.	8 Min.	8 Min.



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7.2 Magnetic:

The material when tested on a Epstein frame at an AC Magnetic field in amperes/meter shall show the following minimum corresponding value of magnetic flux density in Tesla.

Magnetic field strength A/m	Grade	Magnetic flux Density Tesla (Minimum)				
		250	350	450	600	700
5000	For information	1.6	1.6	1.6	1.5	1.5
15000	Guaranteed	1.8	1.8	1.8	1.78	1.78

8.0 TEST CERTIFICATE:

Three copies of Test Certificate shall be supplied unless otherwise agreed to.

In addition, the supplier shall ensure to enclose one copy of the test Certificate along with their dispatch documents, to facilitate quick clearance of the material.

The test certificate shall bear the following information:

Material grade, BHEL Order No, Supplier's Name/Grade/Identification No., Size & Weight, Packet/Bundle No, Test Results of – a)Dimensions & Tolerances, b) Mechanical & c) Electromagnetic properties viz: Magnetic Flux Density in Tesla – Guaranteed at 15,000 A/m and For Information at 5000 A/m and B.H.Curve form 0 to 15000 A/m.

9.0 PACKING AND MARKING:

9.1 Packing:

Magnetic steel sheets shall be supplied in bundles. The packing shall be sea worthy and shall protect the material from damage in transit. Proper supports are to be provided to avoid bulging/ distortion of the sheets.

Each sheet shall be marked with supplier's grade/ references. These markings shall be along the rolling direction.



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Note :

Water proof paper lining shall be preferably Volatile Corrosion Inhibitor (V.C.I) Coated paper with additional polythene (100 micron) enveloped.

Approximate weight of bundle shall be 2 to 3 metric tons. Bundle weighing 2 metric tons is however preferred.

The packing shall ensure that there is no seepage of moisture and the sheets reach BHEL in completely rust free condition. It shall be strong enough to with stand handling at the docks, at sea and on the road.

9.2 Marking

A metal label/tag shall be securely attached with each bundle, outside its wrapping and shall be legibly marked with the following information:

BHEL Order No, Supplier's Name / Grade / Identification No, size & weight, Melt No., Packet / Bundle No.

Revision History : -

Rev No.	Detail	Initiated By	Approved By
01	Product standard updated to include all grades (Dt.11.06.16)	-	JKB
02	Sr. No. 6 Deleted (Dt. 30.12.2009)	-	JKB



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MAGNETIC STEEL SHEET-COLD ROLLED GR.250

1.0 GENERAL:

This specification gives the quality requirements of high permeability magnetic steel sheet cold rolled, having a minimum 0.2% proof value of 250 N/mm².

2.0 APPLICATION:

Pole Laminations of Hydro Generators / Lift Irrigation Motors.

3.0 CONDITION OF DELIVERY:

Cold Rolled with trimmed edges in straight lengths (sheet form) in the ordered thickness & size as specified on BHEL order.

Material shall be supplied coated with rust preventive oil coating on both sides and shall not contain any welds. The sheets shall be stacked so that their edges are superimposed in a regular manner.

4.0 DIMENSIONS AND TOLERANCES:

4.1 Sizes:

Magnetic steel sheet shall be supplied to the dimensions specified on BHEL order.

The thickness shall preferably be selected from the following standard sizes 0.8 / 1.00 mm. Sheets shall be supplied in straight lengths & shall be flat & edges cleanly sheared & truly squared.

4.2 Tolerances:

4.2.1 Thickness:

Nominal Thickness (mm)		Permitted thickness tolerances for widths (mm)
Above	Upto	Upto 1250
0.8	1.0	+/-0.05

संशोधन:01, Dated 24/07/2017.

Reviewed Clause no.3, 4.1, 4.2.5, 5 & 6.

JSY DKC/AD AB

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भारत हेवी इलेक्ट्रिकल्स लिमिटेड

तैयारकर्ता
-sd-

GRP/BKS

अनुमोदनकर्ता
-sd-

JKB

जारी करने की
दिनांक

13/07/2005



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4.2.2 Width (Trimmed Edges)

Width (mm)		Permitted Width tolerances (mm)	
From	Upto	Plus	Minus
-	1250	7	0
1250	2000	10	0

4.2.3 Length:

Length (mm)	Permitted length tolerances	
	Plus	Minus
Upto 2000	15 mm	0
Above 2000	0.75% of length	0

4.2.4 Flatness:

The maximum distance between the lower face of the sheet and the flat horizontal surface shall not exceed the values given below;

Length (mm)	Maximum distance for nominal thickness (mm)
Less than 1250	8
1250 & above	10

4.2.5 Edge Camber:

The gap which characterizes the edge camber shall not exceed $0.4\% \times \text{Length of the sheet}$ for material supplied with trimmed edges.



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5.0 FREEDOM FROM DEFECTS:

The surface of the material, before application of rust preventive oil coating, shall be smooth and clean, free from grease, rust, loose scale and other surface defects such as burrs, cutting distortions, dents, waviness, scratches, blisters, cracks, pitting, cracked edges etc.

6.0 TEST SAMPLES:

One bend test and one hardness test shall be carried out from each lot of material or part thereof, per melt per consignment.

Where materials of more than two thicknesses are rolled from the same melt, one additional bend test shall be made for each thickness.

Test pieces shall be out so that the axis of the bend is parallel to the direction of rolling i.e. bending shall be in perpendicular direction of rolling

7.0 PROPERTIES:

The material, when tested as detailed in BS EN 10265 at a temperature of 27+/-2 °C shall show the following properties:

7.1 Mechanical:

Tensile Strength	: 350-450 N/mm ²
0.2% Proof Stress	: 250 N/mm ² minimum
Elongation on 80 mm Gauge length	: 22% minimum

7.2 Magnetic :

The material when tested on a Epstein frame at an AC Magnetic field in amperes/meter shall show the following minimum corresponding value of magnetic flux density in Tesla.

Magnetic field strength (A/m)	Minimum Magnetic flux Density (Tesla)
5000	1.6 (For information)
15000	1.8 (Guaranteed)



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8.0 TEST CERTIFICATE:

Three copies of Test Certificate shall be supplied unless otherwise agreed to.

In addition, the supplier shall ensure to enclose one copy of the test Certificate along with their dispatch documents, to facilitate quick clearance of the material.

The test certificate shall bear the following information:

Material grade, BHEL Order No, Supplier's Name/Grade/Identification No., Size & Weight, Packet/Bundle No, Test Results of – a)Dimensions & Tolerances, b) Mechanical Properties & c) Electromagnetic properties viz: Magnetic Flux Density in Tesla – Guaranteed at 15000 A/m & For information at 5000 A/m and B.H. Curve from 0 to 15000 A/m.

9.0 PACKING AND MARKING:

9.1 Packing:

Magnetic steel sheets shall be supplied in bundles. The packing shall be sea worthy and shall protect the material from damage in transit. Proper supports are to be provided to avoid bulging/ distortion of the sheets.

Each sheet shall be marked with supplier's grade/ references. These markings shall be along the rolling direction.

NOTE :

- a) Water proof paper lining shall be preferably volatile corrosion inhibitor (V.C.I.) coated paper with additional polythene (100 micron) enveloped.
- b) Approximate weight of each bundle shall be 2 to 3 metric tonnes. Bundle weighing 2 metric tonnes is however preferred.
- c) The packing shall ensure that there is no seepage of moisture and the sheets reach BHEL in completely rust free condition. It shall be strong enough to withstand handling at the docks, sea and on the road.

9.2 Marking:

A metal label/tag shall be securely attached with each bundle, outside its wrapping and shall be legibly marked with the following information:

BHEL Order No, Supplier's Name / Grade / Identification No, size & weight, Melt No, Packet / Bundle No.