

Electrical Steel Coil

Product Manual



CSCI China Steel
Corporation India

member of CSC Group 中鋼集團





CONTENTS

| | |
|---|----|
| 1. Foreword | 1 |
| 2. Manufacturing Process | 3 |
| 3. Features and Applications | 4 |
| 4. Specification | |
| 4.1 Symbol Description | 5 |
| 4.2 Magnetic Properties | 6 |
| 4.3 Tolerances | 6 |
| 5. Product Availability | 8 |
| 6. Typical Properties | |
| 6.1 Typical Mechanical Properties and Stacking Factor | 8 |
| 6.2 Typical Electrical and Magnetic Properties | 9 |
| 6.3 Types and Features of Insulating Film | 10 |
| 7. Precaution Notes While in Use | |
| 7.1 Avoiding rust and aging | 11 |
| 7.2 Stress-relief annealing | 11 |
| 8. Marking and Packing | 12 |
| 9. Major International Standards | 14 |
| 10. Units and Conversion Tables | 15 |
| 11. Ordering Information | 16 |
| 12. Services of Sales and Techniques | 17 |



1. Foreword

“We aspire to be a trustworthy steel company of global distinction that pursues growth, environmental protection, energy saving and continuous innovation with corporate values of teamwork, entrepreneurial approach, down-to-earth and pursuit of innovation.” –Founder Chairman Yao Dong Chao.

Devoting to making foundation of Taiwan infrastructure and construction, China Steel Corporation (CSC), the largest steel company in Taiwan, was founded in December 1971 with steel product categories spreading over plates to HR/CR especially the Electrical Steel (ES) domestic market share is up to 90%.

Aiming at Indian industrial upgrading and modernization view, China Steel Corporation India Pvt. Ltd. (CSCI) was appeared for providing energy-saving, eco-friendly material centralized on Non-Oriental ES and JIT service instead of merely international trade. With the equivalent quality assurance applied by CSC Taiwan factory, our products can be used to motor/pump/generator of home appliances, industrial and agricultural applications. Further the in-house slitter also ensured the provision of customized service to increase the clients' satisfaction with continuing support and endless caring.

“Sabka Saath Sabka Vikas” Foreseeing the India economy development with bumpy road but virtuous circle, exploring the incredible India with CSCI will deliver the experience you never met before and allowing CSCI to be forever your family member will be the wisest decision in your life.



CHINA STEEL CORPORATION INDIA

भारतीय मानक ब्यूरो
BUREAU OF INDIAN STANDARDS

अध्यापक शाखा कार्यालय : 'पुष्पाक' भवन सीएन, खारपुर,
अहमदाबाद - 380 001
Ahmedabad Branch Office : 'PUSHPAK' 3rd Floor, Kharpur,
Ahmedabad - 380 001.

URL : <http://www.bis.org.in>
Email : abc@bis.org.in

दूरभाष : 2560 0221, 2560 0187
2560 1348, 2560 1349
2560 1266, 2560 1607

फैक्स : 079-25601440

REGISTERED A/D

Our Ref.:CM/L-7200011479 Dated:23 Apr 2015

Subject: Grant of BIS Certification Marks Licence No. CM/L-7200011479 as per IS 648 : 2006

CHINA STEEL CORPORATION INDIA PVT. LTD.
D-2/6, GIDC DAHEJ-II, TA: VAGRA, DAHEJ-392130,
DISTT : BHARUCH
GUJARAT

Dear Sir,

With reference to your application, we are pleased to inform you that it has been decided to grant you a licence to use the Standard Mark in respect of the following:

Product: Cold Rolled Non-oriented electrical steel sheets and strips – fully processed type
IS No : IS 648 : 2006

Cold Rolled non oriented electrical steel sheets of Width 700mm and of following Grades: 35C360, 50C400, 50C470, 50C530, 50C600, 50C700, 50C800, 50C1000, 65C600, 65C700, 65C800, 65C1000

2. The number assigned to this licence is CM/L- 7200011479 which has been made operative from 22/04/2015 and is valid upto 21/04/2016. The licence number should invariably be referred to in your future correspondence.

मुख्यालय : मानक भवन, १ बाहादुर शाह जफर मार्ग, नू दिल्ली - 110002

HEAD OFFICE : MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG, NEW DELHI - 110002

*For Training needs, please contact National Institute of Training for Standardization, A-20 & 21 Institutional Area, Sector 02, Noida-201307 at Telephone(s) 0120-24-2201 to 05, 467023, tel/Fax No. 0120-24-22-2-03, or e-mail : nits@bis.org.in, nbs@bis.org.in

CERTIFICATE

Management system as per
ISO 9001 : 2008

In accordance with TÜV INDIA procedures, it is hereby certified that

CHINA STEEL CORPORATION INDIA PVT. LTD.
Plot No. D-2/6, GIDC, Dahej-II, Near Jolva Village,
Dahej - 392 130, Dist. Bharuch,
Gujarat,
India

applies a quality management system in line with the above standard for the following scope

Manufacture and Supply of Electrical Steel Coils

Certificate Registration No. QM 02 00933
Audit Report No. Q 7043/2015

Valid until 14.09.2018
(Until 07.11.2018 in case of transition to ISO 9001:2015)

Issue 08.11.2015
Place : Mumbai

Certification Body
at TÜV INDIA PVT. LTD.

This certification was conducted in accordance with the TÜV INDIA auditing and certification procedures and is subject to regular surveillance audits.

TÜV India Pvt. Ltd., Raheja Plaza - 1, L.B.S. Marg, Chhatkopar (W), Mumbai - 400 086, India. www.tuv-nord.com

CERTIFICATE

Management system as per
BS OHSAS 18001 : 2007

In accordance with TÜV NORD CERT procedures, it is hereby certified that

CHINA STEEL CORPORATION INDIA PVT. LTD.
D-2/6, GIDC, Dahej-II, Near Jolva Village,
Dahej - 392 130, Gujarat,
India

applies a management system in line with the above standard for the following scope

Manufacture of Electrical Steel Coil

Certificate Registration No. 44 116 16391024
Audit Report No. 2.5-7307/2016

Valid until 25.06.2019

Issue 26.06.2016
Place : Mumbai

Certification Body
at TÜV NORD CERT GmbH

This certification was conducted in accordance with the TÜV NORD CERT auditing and certification procedures and is subject to regular surveillance audits.

TÜV NORD CERT GmbH Langemarckstrasse 20 45141 Essen www.tuv-nord-cert.com

TÜV India Pvt. Ltd., 801, Raheja Plaza - 1, L.B.S. Marg, Chhatkopar (W), Mumbai - 400 086, India www.tuv-nord.com

BIS MARK Certificate

CSCI is successfully get certification of BIS License from Bureau of Indian Standards on 22nd April, 2015.

License No.: **CM/L - 7200011479**

CSCI had certified products from BIS as below: 35C360, 50C400, 50C470, 50C530, 50C600, 50C700, 50C800, 50C1000, 65C470, 65C600, 65C700, 65C800, 65C1000.

CSCI successfully renew BIS certificate up to 21st April, 2018.

ISO 9001 : 2008 Certificate

CSCI is successfully get certification of ISO 9001:2008 Quality Management System from TÜV Nord, India on 08th November, 2015 and Valid up to 14th September 2018.

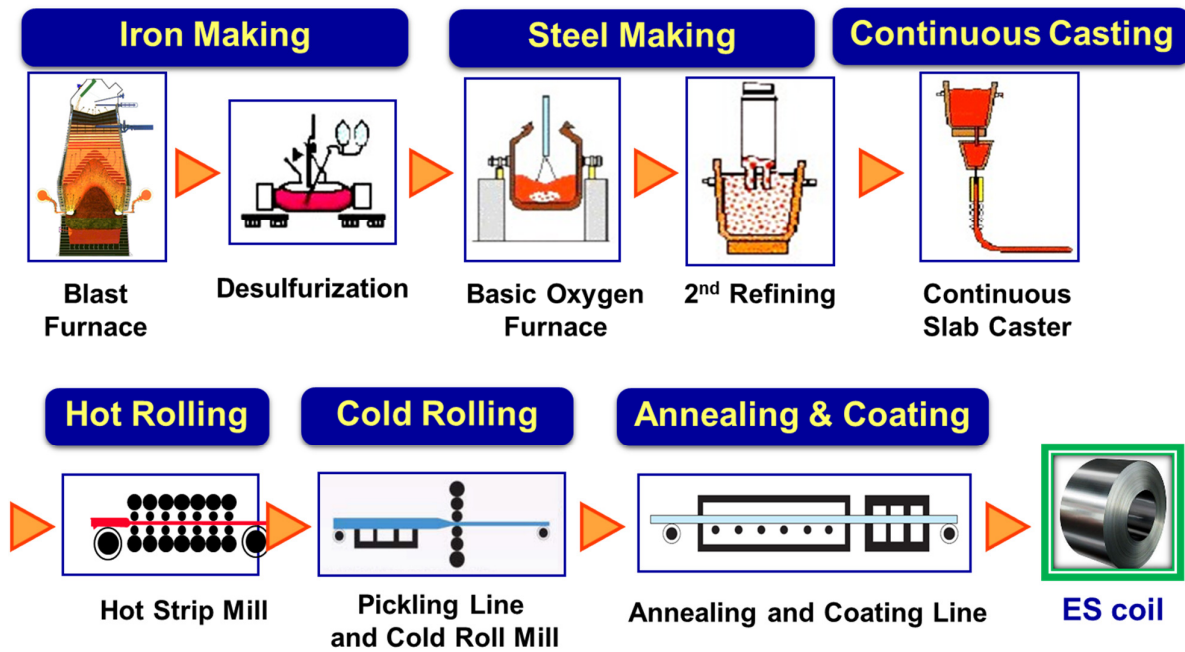
Certificate Registration No.: **QM 02 00933**

BS OHSAS 18001 : 2007

CSCI is successfully get certification of BS OHSAS 18001:2007 from TÜV Nord, India on 26th June, 2016 and Valid up to 25th June, 2019.

Certificate Registration No.: **44 116 16391024**

2. Manufacturing Process



3. Features and Applications

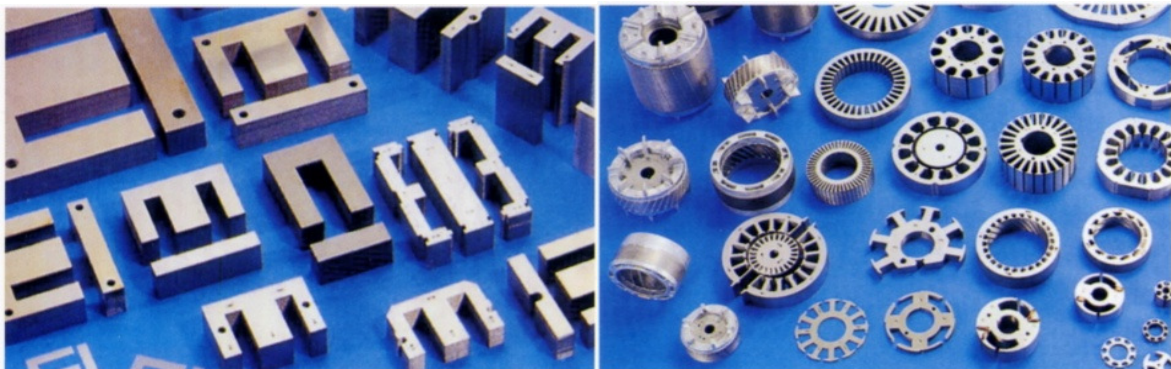
Because non-oriented Electrical steel has the features of uniform electrical and magnetic properties, it is the most suitable material for rotating machines/ static electrical machines. The primary chemical composition of electrical steel is Silicon which is beneficial to electromagnetic properties like reducing the hysteresis loss (iron loss). Further the coating is important for rust prevention and punch efficiency. CSCI apply chromate (C628) and chrome-free (C6N8) for eco-friendly and better performance.

With respect to CRNO categories: Gr.1000 is Low-grade accompanied, Gr. 600~800 of Mid. grade and High grade is above Gr. 470.

Core applications of CRNO central on motor, transformer and pump application. Please refer to the table.1 as follows:

Table 1: Product Designation and Applications are listed.

| Applications | | Grade | 35C360 | 50/65C 400~470 | 50/65C 600~800 | 50/65C 1000 |
|----------------------|--|-------|--------|-------------------|-------------------|----------------|
| Rotating Machines | Large Rotating Machines | | | O | | |
| | Medium Rotating Machines | O | | | O | |
| | General use A-C Motors | | | | O | O |
| | Hermetically Seales Motors | O | O | O | O | |
| | Small Motors & Intermittent Service A-C Motors | O | | | O | O |
| Static Machines | Small &Medium Power Transformers | O | O | O | O | O |
| | Audio Transformers | O | O | O | O | O |
| | Welding Transformers | O | O | O | O | O |
| | Ballast | | | O | O | O |
| | Magnetic Switch Cores | O | | | | |

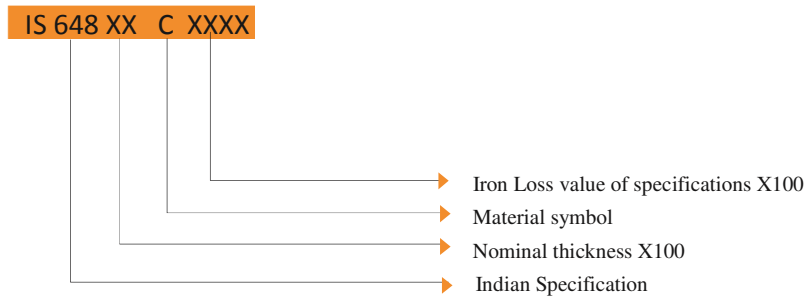


4. Specification

The quality of non-oriented Electrical steel coils completely conform to the requirements of IS 648. The specification are stated in the following paragraphs.

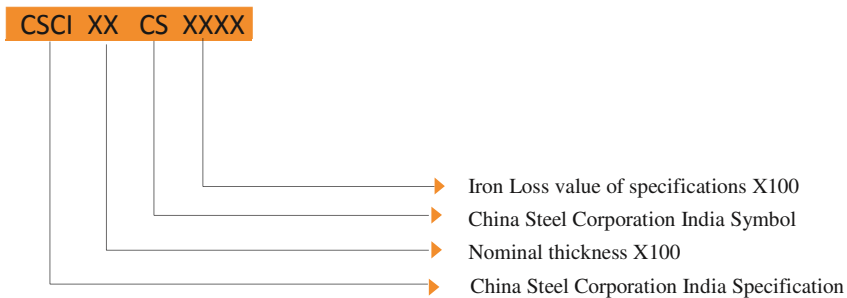
4.1 Symbol Description

- The specifications of IS 648(For Domestic) Electrical steel coils are stated as the following:



Example: IS 648 50C1000 grade of IS 648.

- The specifications of CSCI(For Export) Electrical steel coils are stated as the following:



Example: CSCI 50CS1000 grade Conforms 50C1000 Grade of IS 648.

4.2 Magnetic Properties

➤ Table 2: Magnetic Properties are listed.

| Grade of IS 648 Spec. | Thickness (mm) | Density ⁽¹⁾ (kg/dm ³) | Iron Loss ⁽²⁾ , max. (W/kg) | Magnetic Flux Density ⁽³⁾ , min. (T) | Stacking Factor% (min.) |
|-----------------------|----------------|--|--|---|-------------------------|
| | | | W15/50 | B50 | |
| 35C360 | 0.35 | 7.65 | 3.60 | 1.60 | 93 |
| 50C400 | 0.50 | 7.70 | 4.00 | 1.63 | 95 |
| 50C470 | | 7.70 | 4.70 | 1.64 | |
| 50C600 | | 7.75 | 6.00 | 1.66 | |
| 50C700 | | 7.80 | 7.00 | 1.69 | |
| 50C800 | | 7.80 | 8.00 | 1.70 | |
| 50C1000 | | 7.85 | 10.00 | 1.72 | |
| 65C470 | 0.65 | 7.65 | 4.70 | 1.63 | 95 |
| 65C600 | | 7.75 | 6.00 | 1.66 | |
| 65C700 | | 7.75 | 7.00 | 1.67 | |
| 65C800 | | 7.80 | 8.00 | 1.70 | |
| 65C1000 | | 7.85 | 10.00 | 1.71 | |

NOTE: (1) This assumed density is used in all calculation of the sectional area of test pieces.

(2) W15/50 indicates the iron loss when the frequency is 50 Hz and the maximum magnetic flux density is 1.5T (1T=1Wb/m²)

(3) B50 indicates the magnetic flux density under the magnetic force 5000A/m.

4.3 Tolerances

➤ Table 3: Tolerance on Thickness, Width & Residual Curvature is listed.

➤ Unit: mm

| Nominal Thickness | Nominal Width | Center Thickness Tolerance in Longitudinal Direction | Deviation of Thickness in Transverse Direction | Width Tolerance | Residual Curvature |
|-------------------|---------------|--|--|-----------------|--------------------|
| 0.35 | W ≥ 900 | ±0.009 | 0.020 and Under | +4/-0 | 35 |
| 0.50 | | ±0.010 | | | |
| 0.65 | | ±0.013 | | | |

NOTE: (1) Thickness Deviation shall be measured at any point 15mm or more apart from both edges in Transverse Direction.

(2) Residual Curvature shall be measured for coil width ≥100mm.

➤ Table 4: Tolerance on Thickness, Width & Residual Curvature for Slit coils are listed.

Unit: mm

| Nominal Thickness | Nominal Width | Deviation of Thickness in Transverse Direction | Width Tolerance | Residual Curvature |
|-------------------|---------------|--|-----------------|--------------------|
| 0.35 to 0.65 | < 150 | 0.020 and Under | +0.2/-0 | 35 |
| | 150 < 300 | | +0.3/-0 | |
| | 300 < 600 | | +0.5/-0 | |
| | 600 < 1000 | | +1.0/-0 | |
| | 1000 < 1250 | | +1.5/-0 | |

NOTE: (1) Residual Curvature shall be measured for slit coil width ≥ 100 mm.

➤ Table 5: Tolerance on Edge Camber for coils are listed.

Unit: mm

| Nominal Width | Edge Camber |
|---------------|------------------|
| > 30 ≤ 150 | 4 in length 2000 |
| > 150 | 2 in length 2000 |

➤ Table 6: Tolerance on Flatness are listed.

Unit: mm

| Nominal Width | Wave Factor |
|---------------|-------------|
| > 100 mm | < 2 % |

5. Product Availability

➤ Table 7: Product Availability are listed.

Unit: mm

| Product Type | Thickness | Width | Coil Inside Diameter | Coil Outside Diameter |
|----------------------|-------------|------------|----------------------|-----------------------|
| Electrical Coil | 0.35 ~ 0.65 | 900 ~ 1200 | 508 | 2000 |
| Electrical Slit Coil | 0.35 ~ 0.65 | 30 ~ 600 | | |

NOTE: The available size in the table above are for reference, the practical available size follow the seasoning announcement made by producing and planning department.

6. Typical Properties

6.1 Typical Mechanical Properties and Stacking Factor

➤ Table 8: Typical Mechanical Properties and Stacking factor are listed. For CSCI & IS 648 Specification (Data in below table is for reference only)

| Grade of IS 648 Spec. | Yield Strength (N/mm ²) | | Tensile Strength (N/mm ²) | | Elongation (%) | | Hardness HR30T | Number of Bend | Stacking Factor (min.) (%) |
|-----------------------|-------------------------------------|-----|---------------------------------------|-----|----------------|----|-------------------|----------------|-------------------------------|
| | L | T | L | T | L | T | | | |
| 35CS440/35C360 | 285 | 288 | 425 | 435 | 31 | 32 | 65 | 33 | 98.65 |
| 50CS400/50C400 | 311 | 318 | 455 | 467 | 31 | 33 | 67 | 28 | 97.50 |
| 50CS470/50C470 | 290 | 293 | 436 | 443 | 34 | 35 | 64 | 27 | 98.56 |
| 50CS600/50C600 | 279 | 280 | 427 | 436 | 36 | 37 | 62 | 29 | 98.20 |
| 50CS700/50C700 | 275 | 276 | 411 | 416 | 36 | 37 | 59 | 29 | 98.64 |
| 50CS800/50C800 | 293 | 298 | 418 | 424 | 36 | 37 | 60 | 30 | 98.51 |
| 50CS1000/50C1000 | 292 | 294 | 403 | 409 | 37 | 38 | 59 | 31 | 98.30 |
| 50CS1300 | 313 | 353 | 402 | 410 | 37 | 38 | 59 | 25 | 97.73 |
| 65CS470/65C470 | 318 | 329 | 469 | 483 | 32 | 34 | 68 | 19 | 97.37 |
| 65CS600/65C600 | 273 | 275 | 422 | 442 | 36 | 38 | 62 | 20 | 98.12 |
| 65CS700/65C700 | 284 | 275 | 423 | 425 | 37 | 38 | 61 | 21 | 98.22 |
| 65CS800/65C800 | 277 | 282 | 404 | 413 | 38 | 40 | 59 | 22 | 97.96 |
| 65CS1000/65C1000 | 302 | 309 | 423 | 430 | 36 | 37 | 59 | 24 | 98.47 |
| 65CS1300 | 316 | 324 | 402 | 408 | 37 | 38 | 58 | 24 | 98.34 |

NOTE: 1. This result was tested in accordance with IS 648 Method.

2. L: Specimens taken longitudinal to the rolling direction. T: Specimens taken transverse to the rolling direction.

6.2 Typical Electrical and Magnetic Properties

➤ Table 9: Typical Electrical and Magnetic Properties are listed. For CSCI & IS 648 Specification (Data in below table is for reference only)

| Grade of IS 648 Spec. | Resistivity ($\mu \Omega$ - cm) | Iron Loss,(W/kg) | | Magnetic Flux Density (T) | | |
|-----------------------|----------------------------------|------------------|--------|---------------------------|------|------|
| | | W10/50 | W15/50 | B25 | B50 | B100 |
| 35CS440/35C360 | 39 | 1.26 | 2.98 | 1.60 | 1.69 | 1.80 |
| 50CS400/50C400 | 44 | 1.28 | 2.96 | 1.61 | 1.70 | 1.82 |
| 50CS470/50C470 | 43 | 1.45 | 3.31 | 1.62 | 1.70 | 1.81 |
| 50CS600/50C600 | 34 | 1.64 | 3.92 | 1.61 | 1.70 | 1.81 |
| 50CS700/50C700 | 29 | 1.93 | 4.55 | 1.63 | 1.72 | 1.83 |
| 50CS800/50C800 | 32 | 2.19 | 5.06 | 1.64 | 1.72 | 1.83 |
| 50CS1000/50C1000 | 26 | 2.46 | 5.60 | 1.66 | 1.74 | 1.85 |
| 50CS1300 | 26 | 2.77 | 5.97 | 1.66 | 1.75 | 1.87 |
| 65CS470/65C470 | 44 | 1.56 | 3.67 | 1.61 | 1.70 | 1.81 |
| 65CS600/65C600 | 29 | 1.83 | 4.42 | 1.60 | 1.68 | 1.80 |
| 65CS700/65C700 | 29 | 2.11 | 4.84 | 1.65 | 1.71 | 1.84 |
| 65CS800/65C800 | 29 | 2.23 | 5.64 | 1.65 | 1.72 | 1.84 |
| 65CS1000/65C1000 | 27 | 2.78 | 6.78 | 1.65 | 1.74 | 1.85 |
| 65CS1300 | 27 | 3.32 | 6.88 | 1.68 | 1.74 | 1.86 |

NOTE: (1) W15/50 & W10/50 indicates the iron loss when the frequency is 50 Hz and the maximum magnetic flux density is 1.5T & 1.0T Respectively ($1T=1Wb/m^2$).

(2) B25, B50 & B100 indicates the magnetic flux density under the magnetic force 2500A/m, 5000A/m & 10000A/m respectively.

(3) Above Information is for reference, if any question please contact our Sales Department.

6.3 Types and Features of Insulating Film

The insulating film used on Electrical steel coil is a type of water-based mixture of inorganic and organic matter. There are two kinds of Insulating Film that are design for different applications.

➤ Table 10: Characteristics of Insulating film are listed

| Film code | C6N8 | C628 |
|--|---|---------------|
| Item | Corresponding IS 648 symbol - C6 | |
| Composition | inorganic + organic (Inorganic base substance including organic substance) | |
| Average Thickness of film | 0.6μm ± 0.2μm | |
| Color | Silver Brown | Silver Green |
| Purpose | General Motor | General Motor |
| Adhesion | Excellent | Good |
| Bending Test | No film peeled after bending (Bending Radius 10 mm) | |
| Solvent Test | No film peeled after rubbing 50 times with CuSO ₄ | |
| Weld Ability | Excellent | Excellent |
| Punch ability | Excellent | Excellent |
| Anneal Ability (N ₂ Gas) | OK | OK |
| Corrosion Resistance (rust area for 5 hrs SST) | Area of rust ≤ 30 % after 5 hrs Spraying by 5%, 35° C NaCl Solution | |
| Notice | Without Chromium | With Chromium |

7. Precaution Notes while in Use

7.1 Avoiding rust and aging:

- (1) Due to slitting and punching, that broken coating film, the ruptured surface will easily rusted, particularly in summer season when the relative humidity is high. So, it needs careful package and anti-rust treatment.
- (2) For having better magnetic property, Electrical steel generally was produced without temper rolling process. To avoid coil break in slitting process, it is necessary to keep coils away from long storage time.

7.2 Stress-relief annealing

Magnetic properties of Electrical steel coils will be deteriorated by mechanical strains when it was sheared and punched into laminations or cores. In order to relieve these stress and restore the original magnetic properties, general stress-relief annealing is necessary. The following points are observed when laminations or cores are processed to stress-relief annealing.

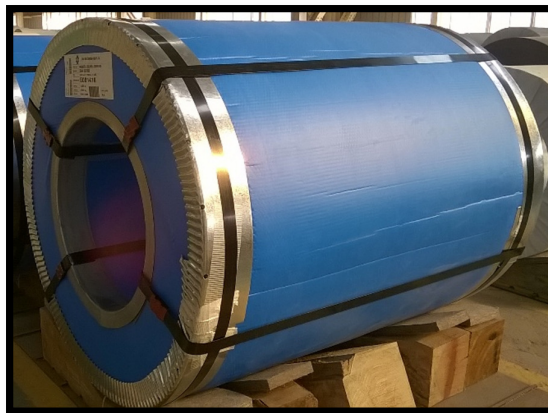
- (1) There are two kind of coating films to be used in CSCI Electrical steel coils and they are adapted to various annealing temperature. Please refer the information of table 10 when stress-relief is necessary to be done.
- (2) The magnetic property almost was not affected by ordinary industrial cooling rate scale, but abrupt heating and cooling will make distortion in cores. However, cooling should be taken until it reaches 350°C so that no strain will occur in material.
- (3) Since decarburization and excessive oxidation will affect the deterioration of magnetic properties of steel, the atmospheric gas must be carefully controlled and the dew point must be kept low. On the other hand, the oiled grease remained during fabrication also must be removed completely, and the low carbon materials are recommended to be used in the base and cover of annealing furnace.

8. Marking and Packing

- Standard Marking Label for Electrical Steel Coil.

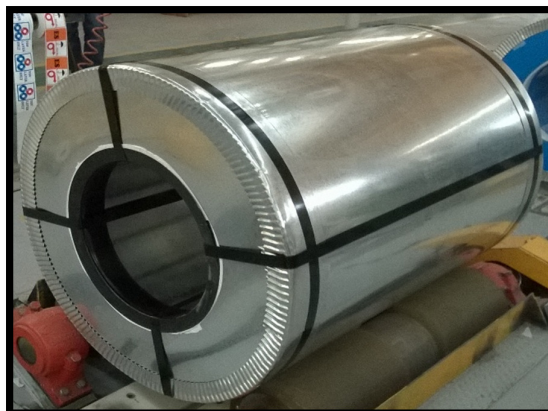
| | | | | |
|---|--|--|--|---|
|  | | China Steel Corporation India Pvt. Ltd. | | IS : 648  CML-7200011479 |
| Product name | ELECTRICAL STEEL COIL(NON – ORIENTED) | | | |
| Specification | IS648 50C600 | | | |
| Size | 0.50 mm X 1200 mm X COIL | | | |
| Identification No. | E016318 | | | |
| Net mass | 5,030 kg |  <small>*E016318 0*</small> | <div style="border: 1px solid black; padding: 2px;">Heat No. 4A064</div> | |
| Gross mass | 5,060 kg | | | |
| Film code | C6N8 / C6N8 | | | |

- Standard Packing for Electrical Steel Coil.



For Domestic:-

VCI Paper (90 GSM) + Body, Inner & Side Protector (PP Bubble) + Inner & Outer Corner Protector (Hard board & Metal Sheet) + Eye Banding Strapping + OD Banding Strapping + Pad for OD Banding Strapping + Banding Seal



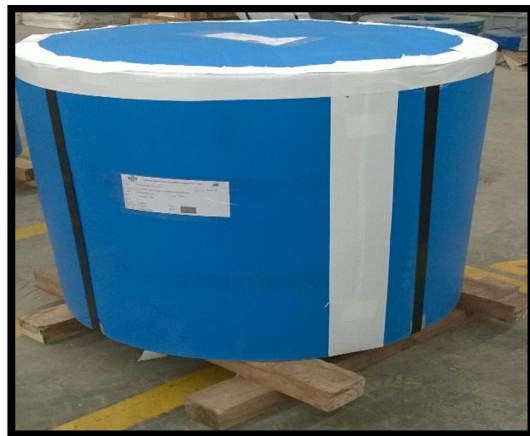
For Export:-

VCI Paper (125 GSM) + Body, Inner & Side Protector (PP Bubble & Metal Sheet) + Inner & Outer Corner Protector(Hard board & Metal Sheet) + Eye Banding Strapping + OD Banding Strapping + Pad for OD Banding Strapping + Banding Seal

➤ Standard Marking Label for Electrical Steel Slit Coil.

| | | | | |
|---|--|--|------------|--|
|  | | China Steel Corporation India Pvt. Ltd. | | IS : 648  CM/L-7200011479 |
| PACK No. | P000850 | | | |
| Product name | ELECTRICAL STEEL COIL(NON – ORIENTED) | | | |
| OrderNo. | M1603NDLS009 | ITEM No. | 002 | |
| Spec. | IS648 50C1000 | | | |
| Pieces | 3 | | | |
| Net mass | 1,430 kg |  *P000850 0* | | |
| Gross mass | 1,445 kg | | | |
| Film code | C6N8 / C6N8 | | | |

➤ Standard Packing for Electrical Steel Slit Coil.



For Domestic:-

VCI Paper (125 GSM) + Side Washer [Wooden Blocks(40 x 50 x {OD-ID}) (H x W x L)] + Body, Inner & Side Protector (PP Bubble) + Side Protector Top & Bottom (GP Sheet) + Inner & Outer Corner Protector (GP) + Eye Banding Strapping + Banding Seal + Wooden Pallets



For Export:-

VCI Paper (125 GSM) + Side Washer [Wooden Blocks(40 x 50 x {OD-ID}) (H x W x L)] + Body, Inner & Side Protector (PP Bubble & Metal Sheet) + Inner & Outer Corner Protector(Hard board & Metal Sheet) + Eye Banding Strapping + OD Banding Strapping + Pad for OD Banding Strapping + Banding Seal+ Wooden Pallets

9. Major International Standards

| Thickness (mm) | Iron Loss W/kg W15/50 | India | India | Japan | IEC | BS/EU | China | America |
|----------------|-----------------------|----------|---------|------------------|----------------------|--------------------|------------------|-----------------------|
| | | CSCI ES | IS 648 | JIS C2552 (2000) | IEC 60404-8-4 (1998) | BS EN 10106 (2007) | GB/T 2521 (1996) | ASTM A677-05 (W15/50) |
| 0.35 | 2.10 | – | – | 35A210 | – | – | – | – |
| | 2.30 | – | – | 35A230 | M230-35A5 | – | 35W230 | – |
| | 2.35 | – | – | – | M235-35A5 | M235-35A | – | – |
| | 2.50 | – | – | 35A250 | M250-35A5 | M250-35A | 35W250 | 36F145(2.52) |
| | 2.70 | – | – | 35A270 | M270-35A5 | M270-35A | 35W270 | 36F155(2.70) |
| | 2.87 | – | – | – | – | – | – | 36F165(2.87) |
| | 3.00 | – | – | 35A300 | M300-35A5 | M300-35A | 35W300 | 36F175(3.05) |
| | 3.22 | – | – | – | – | – | – | 36F185(3.22) |
| | 3.30 | – | – | – | M330-35A5 | M330-35A | 35W330 | – |
| | 3.40 | – | – | – | – | – | – | 36F195(3.40) |
| | 3.60 | – | 35C360 | 35A360 | M360-35A5 | – | 35W360 | 36F205(3.57) |
| | 4.00 | – | – | – | – | – | 35W400 | – |
| 4.40 | 35CS440 | – | 35A440 | – | – | 35W440 | – | |
| 0.50 | 2.30 | – | – | 50A230 | – | – | 50W230 | – |
| | 2.50 | – | – | 50A250 | M250-50A5 | M250-50A | 50W250 | – |
| | 2.70 | – | – | 50A270 | M270-50A5 | M270-50A | 50W270 | – |
| | 2.90 | – | – | 50A290 | M290-50A5 | M290-50A | 50W290 | 47F165(2.87) |
| | 3.10 | – | – | 50A310 | M310-50A5 | M310-50A | 50W310 | 47F180(3.13) |
| | 3.30 | – | – | – | M330-50A5 | M330-50A | 50W330 | 47F190(3.31) |
| | 3.50 | – | – | 50A350 | M350-50A5 | M350-50A | 50W350 | 47F200(3.48) |
| | 3.64 | – | – | – | – | – | – | 47F210(3.64) |
| | 4.00 | 50CS400 | 50C400 | 50A400 | M400-50A5 | M400-50A | 50W400 | 47F240(4.18) |
| | 4.70 | 50CS470 | 50C470 | 50A470 | M470-50A5 | M470-50A | 50W470 | 47F280(4.87) |
| | 5.30 | – | 50C530 | – | M530-50A5 | M530-50A | – | – |
| | 5.40 | – | – | – | – | – | 50W540 | – |
| | 6.00 | 50CS600 | 50C600 | 50A600 | M600-50A5 | M600-50A | 50W600 | – |
| | 7.00 | 50CS700 | 50C700 | 50A700 | M700-50A5 | M700-50A | 50W700 | 47F400(6.96) |
| | 8.00 | 50CS800 | 50C800 | 50A800 | M800-50A5 | M800-50A | 50W800 | 47F450(7.84) |
| 9.40 | – | – | – | M940-50A5 | M940-50A | – | – | |
| 10.00 | 50CS1000 | 50C1000 | 50A1000 | M1000-50A5 | – | 50W1000 | – | |
| 13.00 | 50CS1300 | – | 50A1300 | – | – | 50W1300 | – | |
| 0.65 | 3.10 | – | – | – | M310-65A5 | M310-65A | – | – |
| | 3.30 | – | – | – | M330-65A5 | M330-65A | – | – |
| | 3.50 | – | – | – | M350-65A5 | M350-65A | – | 64F200(3.48) |
| | 3.66 | – | – | – | – | – | – | 64F210(3.66) |
| | 3.92 | – | – | – | – | – | – | 64F225(3.92) |
| | 4.00 | – | – | – | M400-65A5 | M400-65A | – | 64F235(4.09) |
| | 4.33 | – | – | – | – | – | – | 64F250(4.33) |
| | 4.70 | 65CS470 | 65C470 | – | M470-65A5 | M470-65A | – | 64F275(4.79) |
| | 5.30 | – | – | – | M530-65A5 | M530-65A | – | 64F320(5.57) |
| | 6.00 | 65CS600 | 65C600 | – | M600-65A5 | M600-65A | 65W600 | – |
| | 7.00 | 65CS700 | 65C700 | – | M700-65A5 | M700-65A | 65W700 | – |
| | 8.00 | 65CS800 | 65C800 | 65A800 | M800-65A5 | M800-65A | 65W800 | 64F500(8.70) |
| | 10.00 | 65CS1000 | 65C1000 | 65A1000 | M1000-65A5 | M1000-65A | 65W1000 | 64F550(9.58) |
| | 13.00 | 65CS1300 | – | 65A1300 | – | – | 65W1300 | – |
| 16.00 | – | – | 65A1600 | – | – | 65W1600 | – | |

10. Units and Conversion Tables

Frequently Used Units and Symbols

➤ Table 11: Frequently Used Units and Symbols are listed.

| Parameters | Unit | Symbol |
|---------------------|-------------------|----------|
| Electric current | ampere | A |
| Voltage | volt | V |
| Electric resistance | ohm | Ω |
| Inductance | henry | H |
| Magnetic Flux | weber | Wb |
| Magnetizing Force | Oersted | Oe |
| Magnetic Induction | tesla | T |
| Iron Loss | watt per kilogram | W/kg |
| Frequency | hertz | Hz |
| Power | watt | W |

Conversion Tables

➤ Table 12: Frequently Used Units Conversion are listed

| Magnetic Induction | | | | |
|------------------------|------------------------|------------------------|------------------------|----------------------|
| | Gauss | Tesla | Wb/m ² | Line/in ² |
| 1 Gauss | 1 | 10^{-4} | 10^{-4} | 6.452 |
| 1 Tesla | 10^4 | 1 | 1 | 6.452×10^4 |
| 1 Wb/m ² | 10^4 | 1 | 1 | 6.452×10^4 |
| 1 Line/in ² | 1.550×10^{-1} | 1.550×10^{-5} | 1.550×10^{-5} | 1 |

| Iron Loss | | |
|-----------|-------|------------------------|
| | W/kg | W/lb |
| 1W/kg | 1 | 4.536×10^{-1} |
| 1 W/lb | 2.204 | 1 |

11. Order Information

For prompt and proper processing of your inquiries and orders, please furnish complete details of items as shown in the below table. Please feel free to call CSCI's Sales Department, if you need any information about CSCI's product or services.

| Required Ordering Data | | Example | |
|------------------------|---|--------------------------|---------|
| 1 | Specification & Grade of Electrical Steel | IS 648, 50C1000 | |
| 2 | Coating Thickness | 0.9 μ m | |
| 3 | Surface Quality | Unexposed (UE) | |
| 4 | Dimensions (Thickness x Width x Length (or Coil)) | 0.50mm x 1200mm x Coil | |
| 5 | Coil Size (Inside Diameter, Outside Diameter) | ID 508mm, OD 2000mm max. | |
| 6 | Mass | Max. Mass per Coil | 7t max. |
| | | Order Mass | 50t |
| 7 | Application | Transformer | |
| 8 | The number of interleaves and /or butt welds acceptable in a Coil | No | |
| 9 | Special Requirements (if any) | HRB 60max. | |



12. Service of Sales and Techniques

1. The contents of this catalog are for reference only, customers are urged to consult the specifications published by the corresponding Associations.
2. Information of the available steel grades, sizes, marking and packing as shown herein may be updated without notice to comply with actual production situations.
3. Feel free to contact us for any question concerning steel specifications or ordering requirements.

Phone numbers are listed below for your convenience.

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