बी एच ई एल Ranipet	**Technical Delivery Condition (TDC)** *FOR* ***Cold Rolled Low Carbon Steel Flat Product for Cold Forming (Collecting Electrode Coils)***	Doc Ref:	**TDC:RTE:257**
		Rev.No.	**03**
		Date:	**21.03.2013**
		Page No	**1 of 3**

1.0 SCOPE

This TDC specifies the requirements for the supply of cold rolled steel sheet coils for Collecting Electrode.

2.0 MATERIAL SPECIFICATION

2.1 The applicable specifications are as follows;

2.1.1 Carbon steel:

a) JIS G 3141 SPCD – SD
b) IS:513 Gr.DD (killed, matt finish & best surface)

2.1.2 Corrosion Resistant Steel:

a) EN 10130 – DC 03 (1.0347) – B- m
b) COR-TEN A or equivalent

3.0 ADDITIONAL REQUIREMENTS

3.1 Tolerance on thickness: ± 0.05 mm
3.2 Tolerance on width + 3.0 mm, - 0.0 mm
3.3 Coil weight shall be restricted between 12-20 MT
3.4 ID of the coil shall be restricted to 500-610mm
3.5 The camber in the coil shall be maximum of 6 mm for any continuous length of 15 M.

4.0 CHEMICAL AND MECHANICAL PROPERTIES

4.1 Carbon steel:

4.1.1 The chemistry & Mechanical properties including hardness for the carbon steel coils shall be as per respective Specification.

4.1.2 Carbon steel coils of IS 513 Gr. DD – in addition to mechanical testing cupping test has to be conducted and acceptance norm shall be as per IS 513 Gr. DD

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	Material Planning.	21/3/13 (M. madhavan)	
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4.2 Corrosion Resistant Steel :

4.2.1 The chemistry and mechanical properties shall be as follows:

a) **Chemical Composition :**

-	C	SI	Mn	P	S	Cr	Cu	Ni
MIN	-	**0.25**	**0.20**	**0.07**	-	**0.30**	**0.25**	-
MAX	**0.12**	**0.75**	**0.50**	**0.15**	**0.035**	**1.25**	**0.55**	**0.65**

b) Mechanical Properties:

- Yield Point: 310 MPa (min),
- Tensile Strength: 445 MPa (min)
- Minimum % Elongation ($L_o = 5{,}65 \sqrt{S_o}$) = 20

5.0 Packing:

5.1 Before packing, the coils shall be given a sufficient coat of rust preventive fluid on both sides (top & bottom).

5.2 Three binding strips through eye of the coil at equal spacing shall tightly be secured.

5.3 Polythene sheet (thickness > 20 microns) shall be wrapped over the coil.

5.4 Subsequently coil shall be wrapped with polythene bonded Hessian cloth.

5.5 ID rings shall be provided at both the sides of the coil to protect the coil edges.

5.6 Entire circumference of the coil shall be covered with GI sheet / painted sheet. Subsequently both the faces shall be protected with metal sheets ie., full coil is to be covered with GI Sheet / Painted Sheet.

5.7 Three cross strapping shall be tightly secured through the ID of the coil at equal spacing.

5.8 Two more strapping along the periphery shall be provided ensuring tight strapping. The outer label shall be pasted on the packed OD of the coil.

5.9 A metal label containing the details as mentioned in clause no. 5.10 shall be secured at one of the outer cross strapping.

5.10 Label containing following details shall be pasted on the ID and OD of the coils.

a. Vendors Name
b. Purchase Order No.
c. Coil No.
d. Specification and grade
e. Gross weight
f. Net weight.

6.0 TEST CERTIFICATE :

Detailed correlated Test Certificates in English, to be submitted along with the supply, for the tests conducted as required in the respective specification and as mentioned in this TDC.

7.0 BHEL reserves the right to carry out incoming materials cross inspection checks on receipt of coils at BHEL Stores and reject the same, if found, not conforming to the requirement of PO and TDC.

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RECORD OF REVISIONS

Rev No	Date	Revision details
00	25.11.1995	TDC: RTE: 024, TDC:RTE:025, TDC:RTE:062, TDC:RTE:070 AND TDC:RTE:071 were reviewed and merged together.
01	15.05.2002	Totally reviewed and re-issued.
02	06.06.2007	Modified for better clarity.
03	21.03.2013	Clause no. 3.3 – Coil weight changed to 12 to 20MT instead of 8-10 MT considering the new roll forming machine installed at R1 Bay.

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1. SCOPE

1.1. This TDC specifies the requirements of cold rolled coils, sheets of CORTEN A/ASTM A 242 and equivalent material specification & Plates of CORTEN B/ASTM A 588 GR A and equivalent material specification used in APH. Steel shall be in fully killed condition.

2. Chemical & Mechanical properties:

2.1. Chemical (melt wise)

Specn	C	Mn	Si	P	S	Cu	Cr	Ni	V
CORTEN A/ ASTM A 242 & EQUIVALENT	0.12 Max	0.20-0.50	0.25-0.75	0.07-0.15	0.05 Max	0.25-0.55	0.35-1.25	0.65 Max	--
CORTENB/ ASTM A 588 GR A & EQUIVALENT	0.19 Max	0.80-1.25	0.30-0.65	0.04 Max	0.05 Max	0.25-0.40	0.40-0.65	0.40 Max	0.02-0.10

2.2. Mechanical Properties

Specification	**Yield point (Mpa) (Min)**	**T S (MPA) (Min)**	**% of Elonga (Min) 5.65 √ So**
CORTEN A/ ASTM A 242 & EQUIVALENT	**310**	**445**	**20**
CORTEN B/ ASTM A 588 GR A & EQUIVALENT	**≤ 16 thick 355** **>16 thick 345**	**490 - 630**	**20**

2.3. Bend test shall be conducted for coils as per JIS 3125 SPA –C.

3. Supply condition (Coils)

3.1. The coils shall be free from slit edges, scales and rust etc.

3.2. The tolerance thickness and width shall be as follows:
On width : Plus 0.00 to Minus 1.5 mm
On thickness : Plus 0.07mm to minus 0.00 mm

3.3. The camber, out of flatness, bend shall be permitted only to the extent specified in the applicable standard.

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	Purchase		
	MPL	09/02/12	
	QC(Proc)		(Head / QA)
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3.4. The ID of the coil shall be 500 mm ± 20mm, OD of the coil shall be 1500 mm(max). **Coil weight**: 2 to 5 MT for coil width of ≤ 503 mm and 5 to 10 MT for coil width > 503 mm.

3.5. Surface condition shall be cold rolled with matt finish with an oil coat to protect from rusting.

4. Supply conditions (Plates and sheets)

4.1. Tolerance for the plates is as per ASTM A6.

4.2. Tolerance for sheets on thickness is Plus 0.15 minus 0.00

4.3. The plates / sheets shall be free from scales and rust.

4.4. Plates thickness 12 mm and above shall be ultrasonically tested and accepted as per ASTM A 435.

5. Packing and preservation (for coils)

5.1. Before packing, the coils shall be given a sufficient coat of rust preventive fluid on the outer part to prevent rusting.

5.2. Three binding strips through eye of the coil at equal spacing shall tightly be secured.

5.3. Polythene sheet (thickness more than 20 microns) shall be wrapped over the coil.

5.4. Subsequently coil shall be wrapped with Hessian cloth.

5.5. ID rings shall be provided at both the sides of the coil to protect the coil edges.

5.6. Entire circumference of the coil shall be covered with GI sheet / painted sheet. Subsequently, both the faces shall be protected with metal sheets i.e. full coil is to be covered.

5.7. Three cross strapping shall be tightly secured through the ID of the coil at equal spacing.

5.8. Two more strapping along the periphery shall be provided ensuring tight strapping. The outer label containing details as in 7.1 shall be pasted on the packed OD of the coil.

5.9. A metal label containing the detail as in 7.1 shall be secured at one of the outer cross strapping.

6. Packing and Preservation (for sheets / plates)

6.1. **The sheets** shall be coated with a coat of rust Preventive Fluid on both sides and polythene sheets (thickness more than 20 Microns) shall be wrapped over the sheet bundle, subsequently sheets shall be wrapped with Hessian cloth and suitable metal belt.

6.2. **The plates** shall be suitably bundled for withstanding the handlings during loading & unloading.

7. Identification

7.1. **For coils** the following details shall be stenciled with paint / pasted with sticker on the ID of the coil and **for sheets** on the bundle.

a. Vendor's Name
b. P.O. No.
c. Coil No. / Sheet No. / Plate No.
d. Specification & Grade.
e. Net Weight

For Plates, the details a,c,d, in clause 7.1. are to be hard stamped and bordered with paint and b & e are to be painted.

7.2. For coils two more labels containing all the details as in 7.1. shall be pasted, one on the eye and another on the outer surface of the packed coil.

8. Test certificate

8.1. The TC shall be in English and containing the following details.

i. PO No.
ii. Specification and grade
iii. Coil no.
iv. Nominal thickness and width
v. Chemical composition – melt wise.
vi. Mechanical properties – melt wise / HT batch wise
vii. Gross and net weight

8.2. BHEL reserves the right to carry out test and reject the items wherever non conformance to the contract is noticed.

Rev No	Date	Changes made
00	20 05 96	TDC RTA 004 / 00 is revised and re-numbered as RTA 404 Rev.00
01	18 07 96	i. Cl.2.3 table and sketch modified ii. Cl. 6.2, Cl.7.9, Cl.9.1 modified iii. Cl.9.5 deleted.
02	27 11 96	i. Cl. 8.0 deleted ii. Cl. 9.0 re-numbered as 8.0
03	28 03 98	i. Cl. 2.2 min yield strength changed to 310 MPa in line with corten coil specification.
04	22 06 98	Scope of sheets taken out of the purview of the TDC. Please see TDC:RTA:425/001 dt 22 06 98 for corten sheets.
05	10 05 02	TDC totally reviewed and revised. Requirements of TDC RTA 405 (corrosion resistant plate) TDC RTA 425 (Corrosion resistance sheets) are merged to form this TDC:RTA:405,425 deleted.
06	07 02 03	Class 2.1 chemistry details revised. And cl.3.2 modified Clause 2.2 gauge length specified for % of elongation. Cl. 3.4 revised based on supplied feedback. Cl.7.1 modified for better clarity.
07	26 11 11	Cl. 1.1, 2.1 and 2.2 : ASTM A 242 and ASTM A 588 GR A included.

1.0 Scope

1.1 This TDC specifies the requirements for cold rolled sheets of deep drawing quality to specification IS 513 GR- DD/ JIS G 3141 SPCD – SD

2.0 Chemical & Mechanical Properties

2.1 **IS 513**

1. Chemistry
2. Hardness
3. Bend test .

} Shall be as per specfication

4. Erich son cupping value shall be as per fig.1 of IS 513.

JIS G3141

1 .Chemistry shall be as per Table 1 under informative reference of JIS 3141.
2. Hardness shall be 57 HRB MAX
3. Bendability shall be as per table 6 of JIS G 3141.
4. Erichson cupping test shall be conducted and the value shall be as per fig.1 of IS 513.

3.0 Supply condition

3.1 The coils shall be free from slit edges, visual scales & rust.

3.2 The tolerance on thickness and width shall be as follows :
On width : plus 0.00 to minus 1.5mm
On thickness : Plus 0.00 mm to Plus 0.07 mm

3.3 The camber, out of flatness, bend shall be permitted only to the extent specified in the applicable standard.

3.4 The ID of the coil shall be 500mm ± 20 mm, OD of the coil shall be 1500 mm Max and coil wt. 5 to10 MT

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	Engg(APH)		
	Purchase		
	MPL		
	QC/proc.		
	QA		(Head/QA)
Issued by *Quality Assurance*			

3.5 Surface condition

3.5.1 Cold rolled with matt finish with an oil coat to protect rusting and When ordered as per the Japanese standard, it shall be SPCD-SD, that is, skin rolled – dull finished by roll whose surface is made rough mechanically or chemically

4.0 PACKING

4.1 Before packing the coils, shall be given a sufficient coat of rust preventive fluid on the outer part to prevent rusting.

4.2 Three binding strips through eye of the coil at equal spacing shall tightly be secured.

4.3 Polythene sheet(thickness more than 20 microns) shall be wrapped over the coil.

4.4 Subsequently coil shall be wrapped with Hessian cloth.

4.5 ID rings shall be provided at both the sides of the coil to protect the coil edges.

4.6 Entire circumference of the coil shall be covered with GI sheet/painted sheet. Subsequently, both the faces shall be protected with metal sheets. (ie) full coil is to be covered.

4.7 Three cross strapping shall be tightly secured through the ID of the coil at equal spacing.

4.8 Two more strappings along the periphery shall be provided ensuring tight strapping. The outer label containing details as in 5.1 shall be pasted on the packed OD of the coil.

4.9 A metal label containing the detail as in 5.1 shall be secured at one of the outer cross strapping.

5.0 IDENTIFICATION

5.1 The following details shall be ensured in outer label pasted on the ID of the coil.

Vendor's Name
P.O. No
Coil No.
Specification & Grade
Net weight

5.2 Two more labels containing all the details as in 5.1 shall be pasted, one on the eye and another on the outer surface of the packed coil.

6.0 TEST CERTIFICATE

6.1 TC S hall be in English and it shall contain

P.O.NO
Specification and Grade
Coil No
Nominal thickness and width
Chemical composition-melt wise
Bend test results
Max. camber
Gross and Net weight
Hardness and Erichson, cupping values

7.0 BHEL reserves the right to carry out tests and reject the item where ever non conforming to the requirement of P.O and TDC.

Rev.No	Date	Changes made
00	26 02 96	TDC RTA 008 REV 04 Revised and Re numbered as TDC RTA 408/REV OO
01	29 11 02	CL 4.0 and CL 4.1 Revised to change tolerance on thickness plus 0.00 to plus 0.015 mm
02	10 05 02	TDC totally reviewed and revised