



BIHAR STATE POWER TRANSMISSION COMPANY LIMITED

MANUFACTURING QUALITY PLAN : GALVANIZED TOWER STRUCTURES/PARTS

Manufacturer's Details :-	Customer : BSPTCL	Vendor's Code :	Item : Galvanized Tower Structures / Parts	M.Q.P.No.: 37 Rev. No. : 00 Date:06.01.2016	Valid From: 15-01-16 Valid Up to: till revision
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INSTRUCTIONS FOR CODE ALLOCATION

<p>Code 1 Indicates place where testing is planned to be performed i.e. Inspection location</p> <p>A At Equipment Manufacturer's works (Fabricator)</p> <p>B At Component Manufacturer's works (Re-roller)</p> <p>C At Authorized Distributor's place</p> <p>D At Independent Lab</p> <p>E At Turn Key Contractor's location</p> <p>F Not specified</p>	<p>Code 2 Indicates who has to perform the tests i.e. Testing Agency</p> <p>J The Equipment Manufacturer</p> <p>K The Component Manufacturer</p> <p>L The Third Party</p> <p>M The Turnkey Contractor</p>
<p>Code 3 Indicates who shall witness the tests i.e. Witnessing Agency</p> <p>P Component Manufacturer itself</p> <p>Q Component Manufacturer and Equipment Manufacturer</p> <p>R Component Manufacturer, Equipment Manufacturer and Contractor</p> <p>S Equipment Manufacturer itself</p> <p>T Equipment Manufacturer and Contractor</p> <p>U Equipment Manufacturer, Contractor and BSPTCL</p> <p>V Third Party itself</p>	<p>Code 4 Review of Test Reports/Certificates</p> <p>W By Equipment manufacturer during raw material / bought out component inspection</p> <p>X By Contractor during product/process inspection</p> <p>Y By BSPTCL during product/process inspection</p> <p>Z By Contractor and/or BSPTCL during product/process inspection</p>
<p>Code 5 Whether specific approval of sub-vendor / Component make is envisaged?</p> <p>E Envisaged</p> <p>N Not Envisaged</p>	<p>Code 6 Whether test records required to be submitted after final inspection for issuance of Dispatch Clearances / Instructions ?</p> <p>Y Yes</p> <p>N No</p>



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A. Raw Material Inspection (Indigenous)

Sr. No.	Components/ Operation & Description of Test	Type of Check	Quantum of Check / Sampling with basis	Reference document for Testing	Acceptance Norms	Format of Record	Applicable Codes						Remarks
							1	2	3	4	5	6	
1.1	Structural Steel (Sections and Plates)										E		Structural Steel to be procured from BSPTCL approved Sources. For re-rollers specific approval of BSPTCL is to be ensured and Dispatch Instruction for every lot at re-roller's works.
1.1.1	Mechanical Properties												
(a)		Test For Ultimate Tensile Strength	2 - Samples for cast/heat size up to 100 MT 3 - Samples for cast /heat size between 100-200 MT 4 - Samples for cast/heat size over 200 MT	IS: 2062:2011 Grade E250A BSPTCL Specn. IS: 2062:2011 Grade E350A	410 N/mm ² (Min.) 490 N/mm ² (Min)	BSPTCL REPORT	A	J	S	Z		N	
(b)		Yield Stress	2 - Samples for cast/heat size up to 100 MT 3 - Samples for cast/heat size between 100-200 MT 4 - Samples for cast/heat size over 200 MT as per IS 2062:2011	IS: 2062:2011 Grade E250 A & BSPTCL Specn.	i) <20mm thick 250 N/mm ² min ii) 20to40 mm thick 240 N/mm ² Min. iii) >40mm thick 230 N/mm ² min.	BSPTCL REPORT	A	J	S	Z		N	



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							1	2	3	4	5	6	
(c)		Percentage Elongation at $5.65\sqrt{\text{Area}}$	2 - Samples for cast/heat size up to 100 MT 3 - Samples for cast/heat size between 100-200 MT 4 - Samples for cast/heat size over 200 MT as per IS 2062:2011	IS: 2062:2011 Grade E 350 A & BSPTCL Specn.	below 20 mm min 350 N/mm ² 20-40 mm min 330 N/mm ² above 40 mm min 320 N/mm ²								
				IS: 2062:2011 Grade E250 A & BSPTCL Specn.	23% Min.	BSPTCL REPORT	A	J	S	Z		N	
				IS: 2062:2011 Grade E 350 A BSPTCL Specn.	22% min.								
(d)		Bend Test	1 Sample for 50 MT per Section per cast or Part thereof as per IS 2062-2011	IS: 2062:2011 Grade E250 A BSPTCL Specn.	Piece at room temp. shall with stand bending through 180 degree to an internal dia i) not greater $2t$ for \square 25 mm, ii) $3t$ for > 25 mm, with both side parallel, without cracking.	BSPTCL REPORT	A	J	S	Z		N	



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							1	2	3	4	5	6	
				IS: 2062:2011 Grade E350A BSPTCL Specn.	Piece at room temp. shall withstand bending through 180° to an internal dia not greater than 2t								
1.1.2	Chemical Composition	Chemical Analysis	2 - Samples for cast size up to 100 MT 3 - Samples for cast size between 100-200 MT 4 - Samples for cast size over 200 MT as per IS 2062 :2006	As per Chemistry enclosed for each source	As per Chemistry enclosed for each source	BSPTCL REPORT	A / D	J / L	S / V	Z	-	N	
1.1.3	Visual Inspection	Visual	One sample for 50 MT / Section or Part Thereof	IS 2062:2011 BSPTCL specn.	Material to be free from surface defects like laminations, rough/jagged and imperfect edges, cracks, rounded apex, deep roll marks, pipe and any harmful defects	BSPTCL REPORT	A	J	S	Z		N	



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Sr. No.	Components/ Operation & Description of Test	Type of Check	Quantum of Check / Sampling with basis	Reference document for Testing	Acceptance Norms	Format of Record	Applicable Codes						Remarks
							1	2	3	4	5	6	
1.1.4	Dimensional Inspection	Measurement	One sample for 50 MT / Section or Part Thereof	IS 808/ IS 1730 / IS 1852 & BSPTCL Specn.		BSPTCL REPORT	A	J	S	Z		N	
	Angle section		One sample for 50 MT / Section or Part Thereof	IS 1852/ IS 808		BSPTCL REPORT	A	J	S	Z		N	
	a) Tolerances For Leg Length of Angles Equal / Un Equal					Equal: (i) Up to 45 mm Leg Length ± 1.5 mm (ii) > 45 to 100 mm Leg Length ± 2.0 mm (iii) >100 mm Leg Length ± 2.0 % of leg length Difference between Leg Length of Equal Angles shall be limited to 75 % of Total Tolerance (Plus & Minus) Unequal: tolerance as per IS							
	b) Out of Square ness	Measurement	One sample for 50 MT / Section or Part Thereof	IS 1852 BSPTCL Specn.	±1°	BSPTCL REPORT	A	J	S	Z		N	



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							1	2	3	4	5	6	
	c) Camber	Measurement	One sample for 50 MT / Section or Part Thereof	IS 1852	(i) For Flange Less than 100 mm Reasonably Straight (ii) For Flange 100 mm & above Max 0.2% of length	(BSPTCL REPORT)	A	J	S	Z		N	
	d) Root radius	Measurement	-do-	IS 808	IS 808	Test Report	A	J	S	W	-	N	
	e) Weight Tolerance For Angle Sections	Unit Weight Test	One sample for 50 MT / Section or Part Thereof	IS 1852 / IS 808	i) Up to 3 mm thick ±5% ii) > 3 mm thick + 5%, - 3 % over weights specified in IS 808	(BSPTCL REPORT)	A	J	S	Z		N	
	Plate												
	a) Weight Tolerances	Unit Weight Test	One sample for 50 MT / Section or part thereof	IS 1852 / IS 1730	+5%, -2.5% over weights specified in IS 1730	(BSPTCL REPORT)	B	K	*	Z	-	Y	*P/U as per BSPTCL approval
	b) Thickness Tolerance	Measurement	One sample for 50 MT / Section or Part Thereof	IS 2062:2006IS 1730 / IS 1852	< 8 mm thick + 12.5 %, - 5 % 8 mm - 12 mm + 7.5 %, - 5 % over 12 mm ± 5 %	(BSPTCL REPORT)	B	K	*	Z	-	Y	*P/U as per BSPTCL approval



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							1	2	3	4	5	6		
1.2	Zinc To be procured from BSPTCL approved sources or Imported LME registered source													
	Chemical Composition	Chemical Analysis	Every Consignment	IS 209/IS 13229	IS 209/IS 13229	Zinc Manufacturer TC	B	K	P	W			N	
	Chemical Composition	Chemical Analysis	One sample for 100MT or Part thereof	IS 209/IS 13229	IS 209/IS 13229	TPL Reports	D	L	V	W			N	
	Chemical Composition	Chemical Analysis	One sample of molten zinc taken from bath per quarter	IS 209/IS 13229	Min Zinc purity 98.5%	TPL Reports	D	L	V	W			N	

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ANNEXURE – I
Chemical Composition

A) RINL billet/bloom - All values as below are including Tolerance

Element	C18HMn-For HT (E350)	C20 MMn-For MS (E250)
C	0.15- 0.22	0.17- 0.25
Mn	1.1- 1.45	0.6- 1.05
Si	0.10- 0.37	0.10- 0.37
P	0.045 max	0.05 max
S	0.045 max	0.05 max
Cr	0.08 max	0.08 max
Ni	0.03 max	0.03 max
Cu	0.03 max	0.03 max
B	0.004 max	0.004 max
Mo	0.005 max	0.005 max
V	0.025- 0.060	0.005 max
Al	0.015 min	0.015 min
CE	0.45 max	0.28- 0.42

Note: For Blooms size 150x150 mm and above Al and Si shall be read as follows:

Al- 0.015 max
Si- 0.10 to 0.45

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B) SAIL (BSP/DSP)- All values as below are including Tolerance

Element	SAIL Tower Grade VI For HT (E350)	C20 MMn-For MS (E250)
C	0.15- 0.22	0.16 -0.25
Mn	1.25- 1.60 for blooms size 350x150mm 1.20-1.60 for other sizes of blooms & billets	0.6-1.05
Si	0.15- 0.30	0.15- 0.30 for DSP 0.10 max for BSP
P	0.047 max	0.047 max
S	0.047 max	0.047 max
S+P	0.090 max	0.090 max
Cr	0.20 max	0.20 max
Ni	0.05 max	0.05 max
Cu	0.10 max	0.10 max
B	0.005 max	0.005 max
Mo	0.05 max	0.05 max
V	0.03 min for blooms of 160 mm and above 0.025 min for billets and blooms upto 150 mm	As per Test Certificate
Nb	Actual, 0.015 min if added alone	-
CE	0.36 -0.45 for BSP & 125x125 mm billet of DSP 0.38-0.47 for DSP billet above 125x125 mm	0.28- 0.42

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C. Jindal: Chemistry of billets (Laddle):

Element	C18 HMn-HT (E350)	C20 MMn-For MS (E250)	C18 MMn-For MS (E250)
C	0.15- 0.20	0.17- 0.23	0.15- 0.21
Mn	1.20- 1.50	0.6-1.0	0.6-1.0
Si	0.15- 0.30	0.10- 0.40	0.10-0.40
P	0.03 max	0.040 max	0.040 max
S	0.03 max	0.040 max	0.040 max
Cr	0.07 max	0.07 max	0.07 max
Al	0.015 min	0.010 min	0.010 min
Ni	0.07 max	0.07 max	0.07 max
Cu	0.10 max	0.10 max	0.10 max
Mo	0.07 max	0.07 max	0.07 max
V	0.030 min	-	-
V+Nb+Ti	≤0.25	≤0.25	≤0.25
CE	0.45 max	0.42 max	0.42 max

Permissible variation in Jindal Chemistry in angles specified max or under min limits-

C-0.02, Mn-0.03, S-0.005, P-0.005

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D. Adhunik Metaliks: Chemistry of billets:

Element	C18 HMn-HT (E350)	C20 MMn-For MS (E250)
C	0.15- 0.20	0.17- 0.23
Mn	1.20- 1.50	0.6-1.0
Si	0.15- 0.30	0.10- 0.40
P	0.04 max	0.04 max
S	0.04 max	0.04 max
Cr	0.06 max	0.06 max
Al	0.020 min	-
Ni	0.08 max	0.08 max
Cu	0.07 max	0.07 max
Mo	0.03 max	0.03 max
V	0.030 min	-
Ti	0.01 max	0.01 max
Sn	0.015 max	0.015 max
CE	0.43 max	0.39 max

Permissible variation in Adhunik Metaliks Chemistry in angles specified max or under min limits-

C-0.02, Mn-0.03, S-0.005, P-0.005, Si-0.03

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E. Jayaswal Neco Industries Ltd Chemistry

Element	C18 HMn-HT (E350)	C20 HMn-HT (E350)	C18 MMn MS (E250)	C20 MMn- MS (E250)
C	0.15- 0.20	0.15- 0.20	0.15- 0.20	0.17- 0.23
Mn	1.20- 1.50	1.20-1.50	0.6-1.0	0.6-1.0
Si	0.15- 0.35	0.15- 0.35	0.15-0.35	0.15-0.35
P	0.035 max	0.035 max	0.035 max	0.035 max
S	0.035 max	0.035 max	0.035 max	0.035 max
V	0.030 min	0.030 min	-	-
Al	0.015 -0.035	0.015 -0.035	0.010-0.035	0.010-0.035
CE	0.38-0.42 max	0.38-0.42 max	0.41 max	0.41 max

Permissible variation in Jayaswal Neco Industries Ltd Chemistry in angles specified max or under min limits-

C- 0.02, Mn- 0.05

Max value of Trace Elements-

Cu- 0.10, Sn- 0.10, Cr- 0.05, Ni- 0.05, Mo- 0.05

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F) Visa Steel Limited : Chemical Composition

Element (%)	C18 HMn-HT (E350)	C20 HMn-HT (E350)	C18 MMn-For MS (E250)	C20 MMn-For MS (E250)
C	0.15 - 0.20	0.17 - 0.20	0.15 - 0.20	0.17 - 0.21
Mn	1.20 - 1.50	1.20 - 1.50	0.60 -1.00	0.60 -1.00
Si	0.15 - 0.35	0.15 - 0.35	0.15 - 0.30	0.15 - 0.30
P	0.035 max	0.035 max	0.035 max	0.035 max
S	0.035 max	0.035 max	0.035 max	0.035 max
Cr	0.05 max	0.05 max	0.05 max	0.05 max
Al	0.020 min	0.020 min	0.025 max	0.025 max
Ni	0.05 max	0.05 max	0.05 max	0.05 max
Cu	0.05 max	0.05 max	0.05 max	0.05 max
Mo	0.05 max	0.05 max	0.05 max	0.05 max
V	0.030 min	0.030 min	-	-
Ti	0.010 max	0.010 max	0.010 max	0.010 max
V+Nb+Ti	0.15 max	0.15 max	0.15 max	0.15 max
CE	0.44 max	0.44 max	0.39 max	0.39 max

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Permissible variation in Visa Steel Limited in angles specified max or under min limits-

C - 0.02, Mn - 0.03, S - 0.005, P-0.005, Si – 0.03

G. Usha Martin Ltd: Chemistry of MS & HT billets excluding tolerance

Element	C18HMn-For HT (E350)	C20 MMn-For MS (E250)	C18 MMn for MS (E250)
C	0.15- 0.20	0.17- 0.23	0.15- 0.21
Mn	1.20- 1.50	0.6- 1.00	0.6- 1.00
Si	0.15- 0.30	0.10-0.40	0.10-0.40
P	0.03 max	0.04 max	0.04 max
S	0.03 max	0.04 max	0.04 max
Cr	0.07 max	0.07 max	0.07 max
Ni	0.10 max	0.07 max	0.07 max
Cu	0.10 max	0.10 max	0.10 max
Al	0.015 min	0.002 min	0.002 min
Mo	0.010 max	0.010 max	0.010 max
V	0.030 min	-	-
V+Nb+Ti	≤0.25	≤0.25	≤0.25
CE	0.45 max	0.42 max	0.42 max

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H.Electrosteel Steels Ltd: Chemistry of MS & HT billets including tolerance

Element	C18HMn-For HT (E350)	C20 MMn-For MS (E250)
C	0.15- 0.22	0.17- 0.25
Mn	1.2- 1.50	0.6- 1.00
Si	0.10- 0.35	0.10- 0.35
P	0.045 max	0.045 max
S	0.045 max	0.045 max
Cr	0.08 max	0.08 max
Ni	0.03 max	0.03 max
Cu	0.03 max	0.03 max
B	0.004 max	0.004 max
Mo	0.005 max	0.005 max
V	0.030- 0.060	0.005 max
CE	0.36 to 0.45	0.28- 0.42

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I.Monnet Ispat & Energy Ltd: Chemistry of MS & HT billets including tolerance

Element	C18HMn-For HT (E350)	C20 MMn-For MS (E250)	C18 MMn for MS (E250)
C	0.17- 0.21	0.18- 0.22	0.16- 0.20
Mn	1.20- 1.35	0.6- 0.8	0.6- 0.8
Si	0.15- 0.30	0.15-0.30	0.15-0.30
P	0.03 max	0.04 max	0.04 max
S	0.03 max	0.04 max	0.04 max
Cr	0.05 max	0.05 max	0.05 max
Ni	0.05 max	0.05 max	0.05 max
Cu	0.05 max	0.05 max	0.05 max
Mo	0.05 max	0.05 max	0.05 max
V	0.025 min	-	-
V+Nb+Ti	≤0.15	≤0.15	≤0.15
CE	0.45 max	0.42 max	0.42 max

For Al killed- 0.02% Al is maintained

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J.JSW Steel Ltd: Chemistry of MS & HT billets including tolerance

Element	C18 HMn-HT (E350)	C20 MMn-For MS (E250)	C18 MMn-For MS (E250)
C	0.15- 0.20	0.17- 0.23	0.15- 0.21
Mn	1.20- 1.50	0.6-1.0	0.6-1.0
Si	0.15- 0.30	0.10- 0.35	0.10-0.35
P	0.03 max	0.040 max	0.040 max
S	0.03 max	0.040 max	0.040 max
Cr	0.07 max	0.07 max	0.07 max
Al	0.015 min	0.010 min	0.010 min
Ni	0.07 max	0.07 max	0.07 max
Cu	0.10 max	0.10 max	0.10 max
Mo	0.07 max	0.07 max	0.07 max
V	0.030 min	-	-
V+Nb+Ti	≤0.25	≤0.25	≤0.25
CE	0.45 max	0.42 max	0.42 max



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Manufacturer's Details :-	Customer : BSPTCL	Vendor's Code :	Item : Galvanized Tower Structures / Parts	M.Q.P.No.: 37 Rev. No. : 00 Date:06.01.2016	Valid From: 15-01-16 Valid Up to: till revision
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B. In Process Inspection

Sr. No.	Components/ Operation & Description of Test	Type of Check	Quantum of Check / Sampling with basis	Reference document for Testing	Acceptance Norms	Format of Record	Applicable Codes						Remarks
							1	2	3	4	5	6	
2.0	INPROCESS INSPECTION Fabrication of Tower Parts												
(a)	Straightening	Visual	100%	IS 802 Part II/ IS 7215/ BSPTCL approved Drwg., Shop Sketches	Length Tolerance ± 2 mm The cut surface to be clean, reasonable square & free from distortion Letter size as per BSPTCL Specn. / TPL norms	BSPTCL REPORT	A	J	S	Z	-	N	
(b)	Cropping (Cutting)	Dimensional	1st Piece and every 50th Piece				A	J	S	Z	-	N	
(c)	Stamping	Visual	1st Piece and every 50th Piece				-do-	A	J	S	Z	-	



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(d)	Punching / Drilling	Dime-nsional	1st Piece and every 50th Piece		<p>Holes for bolts shall be drilled or punched with a jig but drilled holes shall be preferred. The punching may be adopted for thickness up to 12 mm. Tolerances regarding punch holes should be as follows:</p> <p>a)Holes must be perfectly circular and no tolerances in this respect are possible.</p> <p>b)The maximum allowable difference in diameter of the holes on the two sides of plates or angle is 0.8mm,i.e the allowable taper in a punched hole should not exceed 0.8mm on diameter.</p> <p>c)Holes must be square with the plates or angles and have their walls parallel.</p>	-do-	A	J	S	Z	-	N	
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(e)	Edge Security	Dimensional	1st Piece and every 50th Piece	IS 802 Part II/ IS 7215/ BSPTCL approved Drwg., Shop Sketches		-do-	A	J	S	Z	-	N	
(i)	For 13.5 mm dia Hole				Sheared 20mm Min. Rolled 16mm Min.								
(ii)	For 17.5 mm dia Hole				Sheared 23mm Min. Rolled 20mm Min.								
(iii)	For 21.5 mm dia Hole				Sheared 28mm Min. Rolled 25mm Min.								
(iv)	For 25 mm & 25.5 mm dia Hole				As per approved Drawing								
(f)	Drilling & Punching Hole To Hole Distance		1st Piece and every 50th Piece		Tolerance cumulative and between consecutive hole shall be within ± 2 mm and ± 1 mm respectively	-do-	A	J	S	Z	-	N	
(g)	Notching Flange Cut Corner Cut Bevel Cut		1st Piece and every 50th Piece		+ 5mm on specified length of cut operationally shearing up to 12 mm thick by gas cutting for material above 12 mm thick	-do-	A	J	S	Z	-	N	



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(h)	Heel Cutting	Dimensi- onal	1st Piece and every 50th Piece	BSPTCL Approved Drwgs./ Shop Sketches	for members > 12mm thick gas cutting to be adopted followed By grinding/Machine cutting. Tolerance on heel cutting length +10mm	-do-	A	J	S	Z	-	N	
(i)	Bending		100% Pieces	IS 802(Part II)/ IS 7215/ BSPTCL Approved Drawing / Shop Sketches	(1) HT Sections / Plates All Sections & all plates to be hot bent.	-do-	A	J	S	Z	-	N	
					(2) MS Section i) Cold – Section upto 75X75X6 - Angle upto 10° ii) Cold – Section upto 100X100X8 – Angle upto 5° iii) Hot - Section above 75X75X6 – Angle Above 10° iv) Hot - Section above 100X100X8 – Angle Above 5°	-do-							
					(3) M. S. Plates i) Cold Upto 12 mm thick Upto 15° ii) Hot - Others	-do-							



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(j)	Welding	(a) WPS Approval (Welding procedure specification) (b) PQR/WQR Approval (Procedure /Welder qualification record)		As per BSPTCL Technical specn./approved Drg./BSPTCL approved Welding procedure & Welder's qualification		-do-							WPS approval by BSPTCL Dispatch Instructions at black stage for welded members
(k)	Welding	(1) DP Test (2) Dimensional & visual for welded tower parts	Random Basis	-- do ---		-do-	A	J	U	Z	-	N	Dispatch Instructions
(k)	Final Inspection of Fabricated Parts		Random Basis	All parameters from (a) to (j) above are checked and record maintained before releasing the materials for galvanizing.		-do-	A	J	S	Z	-	N	
(l)	Foundation Bolts i) Cutting & Shearing ii) Chamfering iii) Threading	Physical	1 st piece & every 50 th piece	IS 802/BSPTCL technical spec./approved drawing		BSPTCL REPORT	A	J	S	Z		N	



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3.0	GALVANIZING (Surface Preparation Procedure)												
3.1	Degreasing	Chemical	One sample daily	IS 2629	Manufacturer's plant standard/IS	-do-	A	J	S	Z	-	N	
3.2	Pickling	Chemical	One sample daily	IS 2629	Manufacturer's plant standard/IS Iron contents 100 to 120 gram/litre. Max	-do-	A	J	S	Z	-	N	
3.3	Rinsing	Chemical	One sample daily	IS 2629	Manufacturer's plant standard/IS	-do-	A	J	S	Z	-	N	



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3.4	Pre Fluxing	Chemical	One sample daily	IS 2629	IS 2629	-do-	A	J	S	Z	-	N	
3.5	Pre-heating	Measurement	One check per day	IS 2629	IS 2629	-do-	A	J	S	Z	-	N	
3.6	Dipping After drying is over the material is dipped in molten zinc. Following parameters are controlled a) Zinc bath temperature Recording is done by graphical manner OR sensors with digital display b) Immersion & Withdrawal time. Degree of immersion and withdrawal time is decided based on thickness and length of material.		Hourly check	IS 2629	450+/-10° C.	-do-	A	J	S	Z	-	N	
				IS 2629	IS 2629	-do-	A	J	S	Z	-	N	
3.7	Quenching in Running Water: After dipping the material is quenched in running water			IS 2629	IS 2629	-do-	A	J	S	Z	-	N	
3.8	Dichromating : After quenching, material is dipped in sodium dichromatic solution to avoid the white rust. (Proprietary Chemicals.)		One Sample daily	IS 2629	IS 2629	-do-	A	J	S	Z	-	N	



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4.0	Galvanizing Checking												
(a)	Visual Checking	Visual	100%	IS 2629	Surface to be free from defects like bare / black spots, (except when small and suitable for patching) heavy ash & flux inclusions, lumps, pimples, runs etc	-do-	A	J	S	Z	-	N	
(b)	Thickness of Zinc coating	Measurement	8 samples / shift	IS 4759	The minimum average zinc coating for all section shall be 87 microns for thickness \geq 5 mm & 65 microns for thickness < 5mm and for plates	-do-	A	J	S	Z	-	N	*For marine mentioned in BPS, \geq 5mm=127 micron, <5mm & plate=87 micron
(c)	Weight of Zinc coating	Measurement	3 samples / shift	IS 4759 / IS 6745	(a) For thickness below 5mm, but not less than 2 mm and for plates- Average Mass of Coating -460gm/m ² (b) For thickness 5mm & above – Average Mass of Coating - 610 gm/m ²	-do-	A	J	S	Z	-	N	*For marine, \geq 5mm=900 gm/ m ² , <5mm & plate=610 gm/ m ²
(d)	Uniformity of Zinc coating	Measurement	3 samples / shift	IS 2633	Material to withstand 4 dips of one minute each without showing signs of copper deposits	-do-	A	J	S	Z	-	N	
(e)	Adhesion Tests of Zinc coating	Pivoted Hammer Test	3 samples / shift	IS 2629	No removal or lifting of coating in areas between hammer impressions	-do-	A	J	S	Z	-	N	



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C. Final Inspection & Testing

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							1	2	3	4	5	6	
5.0	FINAL INSPECTION & TESTING (Inspection Engineer to Check/ensure compliance to notes/General Requirements given on Notes of MQP.												
(a)	VISUAL & DIMENSIONAL INSPECTION For Fabrication (as per approved dwg.) & Galvanizing	Visual & Measurement	One sample for Every 50 MT/ section/Lot or part thereof	Please refer Sr. No 2(a) to 2(j) & Cl. No. 4.3 (a)	Please refer Sr. No 2(a) to 2(j) & Cl. No. 4.3 (a)	Test Report	A	J	U	Z		Y	Dispatch Instructions
(b)	MECHANICAL PROPERTIES	(i) UTS Test (ii) Yield Stress Test (iii) Percentage Elongation Test (iv) Bend Test	One sample for Every 50 MT/ section/Lot or part thereof	Please Refer (for test values) Sr. No. 1.1.1(a), (b) (c), (d)	Please Refer (for test values) Sr. No. 1.1.1(a), (b) (c), (d)	Test Report	A	J	U	Z	-	Y	Dispatch Instructions
(c)	Chemical Properties (only applicable for black angle sections procured from primary sources without stage Dispatch Instructions by BSPTCL at source place)	Spectro Analysis	-do-	IS 2062:2011	Chemistry needs to be comparable with TC of primary sources approved by BSPTCL	Test Report	A / D	J / L	U / V	Z		Y	Dispatch Instructions



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							1	2	3	4	5	6	
(c)	GALVANIZING TESTS	i) Thickness of Zinc Coating ii) Weight of Zinc Coating iii) Uniformity of Zinc Coating iv) Adhesion Test of Zinc Coating	One sample for Every 50 MT/ section and part thereof	IS 2629/IS 4759/IS 6745/IS 2633/	Please refer Cl. 4.0	Test Report	A	J	U	Z	-	Y	Dispatch Instructions
	For Foundation bolt- a) Dimensional test	Measurement	Sampling as per IS 1367/2500	BSPTCL Drawing	BSPTCL Drawing	Test Report	A	J	U	Z	-	Y	Dispatch Instructions
	b) Mechanical Test UTS, Yield & Elongation	Mechanical	2 sample per heat/cast/lot of 100MT	As per IS 2062/SAE 1018	As per IS 2062/SAE 1018	TPL Report							
	c)Chemical Test	Spectro Analysis	2 sample /heat/cast/lot or part thereof	-do-	Chemistry needs to be comparable with raw material supplier TC								
6.0	Packing, Storing, Bundling and Handling	100 %			IS802/BSPTCL specn./Packing list to be submitted along with dispatch documents	Tower manufacturer's Log Book/Format No							Pieces of light sections to be wire bundled and heavy sections to be supplied loose. Stacking to have proper ventilation and kept inclined. Damage to galvanization coating to be avoided while handling. to ensure sequential supplies and other details as per BSPTCL technical specification.



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NOTES/GENERAL REQUIREMENTS TO BE CHECKED/ENSURED

- (1) The manufacturer if purchasing the steel sections directly from the re-rollers, the BSPTCL approved re-roller MQP to be ensured.
- (2) Nuts & Bolts and Step Bolts & Nuts & other bought out items to be procured from BSPTCL approved sources and inspection at sub-vendor's works.
- (3) Welding procedure and Welder's performance qualification approval by BSPTCL is required in case welding is involved at any stage of fabrication/erection.
- (4) All bent pieces shall be checked at the process of bending by a bend gauge made as per bend ratio/degree shown in the sketch of the item/mark no. On the stand one piece is thoroughly checked with bend gauge and all other pieces are checked by comparison method and pieces are cleared for further process. If the holes are to be made near the bend line the same shall be done after bending.
- (5) The sample pieces consumed in a testing shall be replenished by the manufacturer at the time of dispatch. If the offered material meets the quality requirements, Dispatch Instructions shall be issued for total quantity offered without deducting the weight of materials consumed in testing.
- (6) BSPTCL Specification means BSPTCL Technical Specification, Approved Drawing, Approved Technical data sheet and LOA provisions applicable for the specific contract.
- (7) **Grades of steel used and the standards to which they conform shall be as approved by BSPTCL Engineering for the specific contract and shall be indicated in approved Drawings/ BOM/offer list at the time of inspection.**
- (8) Steel plates below 6 mm used for packing plates/Packing washers shall be as per BSPTCL specification/ approved drawings BSPTCL, Produced as per IS 1079 1994 (Grade-O) are also acceptable however if below 6 mm thickness plates are used as load bearing plates viz. gusset plates, Joint splices etc. same shall confirm to IS 2062 or equivalent standard.
- (10) The manufacturer shall maintain proper co-relation of test certificate with respect to the material from raw material stage to finished material stage (whether procured from main producer or BSPTCL approved re-rollers)
- (11) The manufacturer shall strip off galvanizing of rejected material before re-galvanizing in case rejection is due to galvanizing defects.
- (12) The manufacturer shall dispose off entire section rejected in physical testing by gas cutting or by machine cutting from any end of rejected mark number.
- (13) In case of any contradiction between Technical Specification / Approved Drawing and MQP, the details mentioned in the Technical Specification / Approved Drawing shall be final.
- (14) The manufacturer should progressively align their Quality System and sub-vendors Quality System to the requirements of ISO 9000 series Quality Standards and in due course of time should get their quality system certified to ISO 9001.
- (15) The manufacturer to ensure that all measuring & testing equipments is having valid calibration certificate issued by NABL accredited testing agency only.



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- (16) Inspection of angle sections at black stage for galvanized tower structures/parts, irrespective of specific contract can be followed as detailed hereunder.
- (a) The manufacturer may raise inspection call for angle section at black stage at re-roller's work against any one of the ongoing Contract.
 - (b) The manufacturer may fabricate the raw material cleared Dispatch Instructions for a particular contractor, for any of your projects under execution. Your fabricator may do so against specific instruction from you in this regard.
 - (c) The fabricator (i.e. you) will maintain a separate register indicating splitting and swapping of material between different Projects awarded to same contractor, which can be reviewed by BSPTCL inspection engineer, separate register for each Contractor is to be maintained if the fabricator is executing jobs for different contractor.
 - (d) The fabricator as a contractor on whom BSPTCL has placed the contract, will only be allowed to split and swap materials in black stage only between your different ongoing contracts with BSPTCL, without any obligation to BSPTCL.
 - (e) The final inspection after fabrication and galvanizing, however, will continue to be contract wise and Dispatch Instructions will be issued for each contract only.
- (17) Pieces of light sections to be wire bundled & of heavy sections to be supplied loose. Stacking to have proper ventilation and kept inclined. Damage to galvanization coating to be avoided while handling. The fabricator to ensure sequential supplies and other details as per BSPTCL Technical Specification
- (18) Prior approval of BSPTCL is required to be taken for any activity or process that is out sourced.
- (19) In case tower part to be used at sub zero temperature, we may carry out Impact testing at -20° C during final inspection in line with IS/ BSPTCL TS.
- (20) All relevant IS standards shall be read along with the latest amendments.
- (21) Dispatch of the inspected towers shall be done with each tower / panel wise bundling in order to ensure availability of complete tower parts without missing of any member at site.