

## MANUFACTURING QUALITY PLAN

<b>Manufacturer's Details:</b> BLUE RIDGE, Ghaziabad, UP India 201002	<b>Customer:</b>	<b>Vendor's Code:</b>	<b>Item:</b> Galvanized Lattice Type Structures	<b>Q P No: BR-001</b> <b>Rev. No: 01</b> <b>Date:13-02-2026</b>	<b>Valid From: 1-2-2026</b> <b>Valid to: 31-1-2027</b> Page <b>1</b> of <b>22</b>
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### INSTRUCTIONS FOR CODE ALLOCATION

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

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### A. Raw Material 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	
1.	<b>RAW MATERIALS</b>												
1.1	Structural Steel (Angle Sections, Plates and sheets)												
1.1.1	<b>Mechanical Properties</b>												
(a)		Test For Ultimate Tensile Strength	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	IS 2062 Grade A/B	410 N/mm <sup>2</sup> (Min.)		B	K	U	Z	-	Y	Steel to be procured from approved Sources. For re-rollers specific approval of QC/QA is to be ensured/ CIP for every lot at re-roller's work.  CIP at re roller's works

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							1	2	3	4	5	6	
(b)		Test For Yield Stress	2 - Samples for cast/heat 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	IS 2062 Grade. A/B	<20mm thick 250 N/mm <sup>2</sup> min 20to40 mm thick 240 N/mm <sup>2</sup> Min. >40mm thick 230 N/mm <sup>2</sup> min.		B	K	U	Z	-	Y	CIP at reroller's works
©		Percentage Elongation test	-do-	-do-	23% Min.		B	K	U	Z	-	Y	CIP at reroller's works
(d)		Bend Test	1 Sample for 50 MT per Section per cast or Part thereof as per IS 2062	IS 2062 – Grade A/B	Piece at room temp. Shall with stand bending through 180 degree to an internal dia not greater for Grade A –3t Grade B-2t for ≤ 25 mm, 3t for > 25 mm, with both side parallel, without cracking.		B	K	U	Z	-	Y	CIP at reroller's works

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							1	2	3	4	5	6	
1.1.2	Chemical Composition	Chemical Analysis	1 Sample for every 50 MT per heat per Section per lot or part there of	IS 2062		TPL Reports	B / D	K / L	U / V	Z	-	Y	CIP at reroller's works
1.1.3	Visual Inspection	Visual	IS 2500, Level II, AQL-1.5 as per Table 1 on page 28	IS 2062	Material to be free from surface defects like laminations, rough/jagged and imperfect edges, cracks, rounded apex, deep roll marks, pipy and any harmful defects		B	K	U	Z	-	Y	CIP at re-roller's works

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1.1.4	Dimensional Inspection	Measurement	IS 2500, Level II, AQL-1.5 as per Table 1 on page 28	IS 808/ IS 1730 / IS 1852 &			B	K	U	Z	-	Y	CIP at re-roller's works
1.1.5	Tolerances For Leg Length Of Angles Equal / Un Equal		IS 2500, Level II, AQL-1.5 as per Table 1 on page 28	IS 1852/ IS 808	(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) ±1°		B	K	U	Z	-	Y	CIP at re-roller's works
1.1.6	Out of Square ness	Measurement	IS 2500,Level II, AQL-1.5 as per Table 1 on page 28	IS 1852			B	K	U	Z	-	Y	CIP at re-roller's works

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1.1.7	Camber	Measurement	IS 2500,Level II, AQL-1.5 as per Table 1 on page 28	IS 1852	(i) For Flange Less than 100 mm Reasonably Straight (ii) For Flange 100 mm & above Max 0.2% of length		B	K	U	Z	-	Y	CIP at re-roller's works.
1.1.8	Weight Tolerance For Angle Sections	Unit Weight Test	One sample for 20 MT / Section or Part Thereof	IS 1852 / IS 808	Up to 3 mm thick $\pm 5\%$ > 3 mm thick + 5%, - 3 % over weights specified in IS 808		B	K	U	Z	-	Y	CIP at re-roller's works.
1.1.9	Weight Tolerances For Plates	Unit Weight Test	One sample for 20 MT / Section or part thereof	IS 1852 / IS 1730	+5%, -2.5% over weights specified in IS 1730		B	K	P	Z	-	Y	
1.1.10	Thickness Tolerance For Plates	Measurement	IS 2500,Level II, AQL-1.5 as per Table 1 on page 28	IS 2062/ IS 8500, IS 1730 / IS 1852	< 8 mm thick + 12.5 %, - 5 % 8 mm - 12 mm + 7.5 %, - 5 % over 12 mm $\pm 5\%$		B	K	P	Z	-	Y	

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							1	2	3	4	5	6	
1.2	<b>Zinc</b> To be procured from Hindustan Zinc Ltd. or Imported through MMTC or sources approved by Client												
1.2.1	Chemical Composition	Chemical Analysis	One sample for 50 MT or Part thereof	IS 209 (Grade 99.95%)	The molten metal in galvanizing bath shall not contain less than 98.5% by mass of zinc	TPL Reports	D	L	V	Z	N	-	

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### ANNEXURE – I

#### Chemical Composition (Ladle Analysis) INDIGENOUS

Elements	C % max.	Mn % max	S % max	P % max.	Si % max.	CE max
<b>Grades</b>						
IS 2062						
Grade A – (Fe 410 WA)	0.23	1.50	0.050	0.050	0.40	0.42
Grade B - (Fe 410 WB)	0.22	1.50	0.045	0.045	0.40	0.41
* Denotes the maximum limit for structural at the top and flat products at the bottom.						
<b>Permissible Variation as per product Analysis</b>						
Elements	C % max.	Mn % max.	S % max.	P % max.	Si % max.	CE max
<b>Grades</b>						
IS 2062	0.02	0.05	0.005	0.005	0.03	--

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### B. In Process Inspection

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							1	2	3	4	5	6	
<b>2.0</b>	<b>INPROCESS INSPECTION</b> Fabrication of Tower Parts												
(a)	Straightening	Visual	100%	IS 802 Part II/ IS 7215/ Client approved Drwg., Shop Sketches	Length Tolerance ± 2 mm The cut surface to be clean, reasonable square & free from distortion Letter size as per Specifications and norms.								
(b)	Cropping (Cutting)	Dimensional	Ist Piece and every 50th Piece			A	J	S	Z	-	N		
(c)	Stamping	Visual	Ist Piece and every 50th Piece			A	J	S	Z	-	N		
(d)	Punching / Drilling	Dimensional	Ist Piece and every 50th Piece			A	J	S	Z	-	N		
					Punching to be done for thickness up to 12 mm and drilling to be done for thickness more than 12 mm. Holes near bends to be punched/drilled after bending. Hole should be perpendicular to surface and Difference in dia on both sides of flange should not be more than 0.8 mm								

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							1	2	3	4	5	6	
(e)	Edge Security	Dimensional	Ist Piece and every 50th Piece	IS 802 Part II/ IS 7215/ Client approved Dwg., Shop Sketches			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		I <sup>st</sup> Piece and every 50th Piece		Tolerance cumulative and between consecutive hole shall be within $\pm 2$ mm and $\pm 1$ mm respectively		A	J	S	Z	-	N	
(g)	Notching Flange Cut Corner Cut Bevel Cut		I <sup>st</sup> 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		A	J	S	Z	-	N	

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							1	2	3	4	5	6	
(h)	Heel Cutting	Dimensional	1 <sup>st</sup> Piece and every 50th Piece	Approved Drwgs./ Shop Sketches	for members > 12mm thick gas cutting to be adopted followed by grinding/Machine cutting. Tolerance on heel cutting length +10mm		A	J	S	Z	-	N	
(i)	Bending		100% Pieces	IS 802( Part II)/ IS 7215/ Client Approved Drawing / Shop Sketches	MS Section  Cold – Section upto 75X75X6 - Angle Upto 10° Cold – Section upto 100X100X8 – Angle Upto 5° Hot - Section above 75X75X6 – Angle Above 10° Hot - Section above 100X100X8 – Angle Above 5°  M. S. Plates Cold Upto 12 mm thick Upto 15°  Hot - Others		A	J	S	Z	-	N	

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							1	2	3	4	5	6	
(j)	Welding	(a) WPS Approval (b) PQR Approval		As per IS Code/Technical specn./approved Drg./Client approved Welding procedure & Welder`s qualification			A	J	S	Z	-	N	CIP
(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.			A	J	S	Z	-	N	
(L)	<b>Foundation Bolts</b>												
(a)	Cutting & Shearing	Physical	1 <sup>st</sup> piece & every 50 <sup>th</sup> piece	IS 802/ Technical specn./approved Drg.			A	J	S	Z	-	N	
(b)	Chamfering	Physical	-do-	-do-									
©	Threading	Physical	-do-	-do-									
	<b>PROTO</b> (Model Assembly as per requirements of Client)	Dimensional	One structure of each type	Client approved Drawing, BOM – Assembled proto to be checked for dimensions, angle size and interchangeability of members			A	J	T	Z	-	N	Record review at the time of final inspection, CIP to be witnessed by the turn key contractor and obtain proto corrected drawings and BOM approved from Client

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<b>4.0</b>	<b>GALVANIZING</b> (Surface Preparation Procedure)													
4.1	<b>Processing</b> Degreasing in DE-OIL Solution. It is Acid base degreasing solution at room temperature which dose not require water rinsing	Chemical	One sample daily	IS 2629	Strength of soln between 5 to 7 point as per manufacture recommendati-on. Acid concentration 50 to 210 Gm/ltr. Iron contents 100 to 120 gram/litre. Max pH Value 5 to 6		A	J	S	Z	-	N		
(a)														
(b)	<b>Pickling</b> Pickling is done in Hydrochloric acid at room temperature.	Chemical	One sample daily	IS 2629										
(c)	<b>Rinsing</b> After pickling the material is washed in water tank with continuous water arrangement (Only in absence of Auto neutralization Pre Flux Solution.)	Chemical	One sample daily	IS 2629										

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(d)	<b>Pre Fluxing</b> After water rinsing the material is fluxed by dipping in Zinc Chloride and Amonium Chloride solution./ any suitable patent fluxing reagent.	Chemical	One sample daily	IS 2629	The Specification of solution are kept as mentioned below : 1. Temp- Room to 80°C 2. Density – 36 to 44 Be. 3. Ph Value – 2-3 4. Iron Content – 50 Gms/Litre Max		A	J	S	Z	-	N	
(e)	<b>Pre-heating</b> After material is taken out of flux bath framing & hooking activity is done & prior to dipping the material is passed through Hot Chamber before dipping to zinc bath through conveyer.	Measurement	One check per day	Norms	The Temp is kept between 120°C to 150°C (Hot Chamber Temp 230°C to 330°C)		A	J	S	Z	-	N	

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4.2	<b>Dipping</b> After drying is over the material is dipped in molten zinc. Following parameters are controlled												
(a)	<b>Zinc bath temperature</b> Recording is done by graphical manner or actual verification by thermometer.		Hourly check	IS 2629	445° to 465° C.		A	J	S	Z	-	N	
(b)	<b>Immersion &amp; Withdrawal time.</b> Degree of immersion and withdrawal time is decided based on thickness and length of material.			IS 2629	Articles to be immersed till reaction takes place which is indicated by stoppage of bubbling, withdrawal to be controlled so that Zinc drains freely		A	J	S	Z	-	N	
(c)	<b>Quenching in Running Water:</b> After dipping the material is quenched in running water												
(d)	<b>Dichromating :</b> After quenching, material is dipped in sodium dichromatic solution to avoid the white rust. (Proprietary Chemicals.)		One Sample daily	IS 2629 / Power Grid Specn./ norms	strength of the solution to be maintained between 0.2 to 1% Sodium Dichromate to 0.5% H <sub>2</sub> SO <sub>4</sub> . Temperature of solution should be less than 65°C		A	J	S	Z	-	N	

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<b>4.3</b>	<b>Galvanizing Checking</b>												
(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		A	J	S	Z	-	N	
(b)	Thickness of Zinc coating	Measurement	8 samples / shift	IS 4759	Minimum Average Coating thickness 86microns		A	J	S	Z	-	N	
(c)	Weight of Zinc Coating	Measurement	3 samples / shift	IS 4759 / IS 6745	Minimum Average Mass of Coating 610 (g/m2)]		A	J	S	Z	-	N	
(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		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		A	J	S	Z	-	N	

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### C. Final Inspection & Testing

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	
5.0  (a)	<b>FINAL INSPECTION &amp; TESTING</b> (Inspection Engineer to Check/ensure compliance to notes/General Requirements of MQP.  MECHANICAL PROPERTIES	(i) UTS Test (ii) Yield Stress Test (iii) Percentage Elongation Test	One sample for Every 50 MT/ section/Lot or part thereof	Please Refer Cl. No. 1.1.1(a), 1.1.1(b) & 1.1.1(c)			A	J	U	Z	-	Y	CIP
		(iv) Bend Test	One Sample for 50 MT/ section/lot or part thereof	Please refer Cl. No. 1.1.1(d)									

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### C. Final Inspection & Testing

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	
(b)	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 As per Table 2		Please refer Cl. 4.3 (b) to 4.3 (e)		A	J	U	Z	-	Y	CIP
(c)	VISUAL & DIMENSIONAL INSPECTION For Fabrication (as per approved dwg.) & Galvanizing				Please refer Cl. No 2(a) to 2(j) & Cl. No. 4.3 (a)		A	J	U	Z	-	Y	CIP
(6)	<b>Packing, Storing, Bundling and Handling</b>		100%		IS802/ As specn./Packing list to be submitted along with dispatch documents								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 Client technical specification.

# MANUFACTURING QUALITY PLAN

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**TABLE I**

**Sampling Plan For  
Visual & Dimensional Characteristics of Structural Steel  
FOR RAW MATERIAL ONLY  
Sampling Plan as per IS 2500, Level - II, AQL 1.5**

**NUMBER OF PIECES**

<b>LOT SIZE</b>	<b>SAMPLE SIZE</b>	<b>ACCEPTANCE NO.</b>	<b>REJECTION NO.</b>
2 to 8	100% Inspection	0	0
9 -15	8	0	1
16 - 25	8	0	1
26 - 50	8	0	1
51 - 90	8	0	1
91 - 150	32	1	2
151 - 280	32	1	2
281 - 500	50	2	3
501 - 1200	80	3	4
1201 - 3200	125	5	6
3201 - 10000	200	7	8
10001 - 35000	315	10	11
35001 - 150000	500	14	15
150001 and above	800	21	22

## MANUFACTURING QUALITY PLAN

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**TABLE 2**  
**Sampling Plan For**  
**Visual & Dimensional Characteristics of Structural Steel**  
**for final Inspection (Dimension Checks)**  
**(Refer Para 5 (c) Final Inspection & Testing)**

**Sampling Plan as per IS 2500, Level - II, AQL 1.5**  
**NUMBER OF PIECES**

LOT SIZE	SAMPLE SIZE	ACCEPTANCE NO.	REJECTION NO.	SORTED OUT AND RE-OFFERED
2 to 8	100% Inspection	0	0	0
9 -15	8	0	1	0
16 - 25	8	0	1	0
26 - 50	8	0	1	0
51 - 90	8	0	1	0
91 - 150	32	0	2	1
151 - 280	32	0	2	1
281 - 500	50	0	3	2
501 - 1200	80	0	4	3
1201 - 3200	125	0	6	5
3201 - 10000	200	0	8	7
10001 - 35000	315	0	11	10
35001 - 150000	500	0	15	14
150001 and above	800	0	22	21
NOTE : Basis for sampling is total Mark Nos offered irrespective of No of pieces in each Mark Nos / lot.				

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### NOTES/GENERAL REQUIREMENTS TO BE CHECKED/ENSURED

- (1) In case Steel sections are purchased by Fabricator from the main producers, or Fabricator is purchasing the steel sections directly from the re-rollers, the following conditions shall be fulfilled:
  - (a) The Re-rollers have to be approved by SAIL/POWERGRID/NTPC/IR/IOL/EIL. Component manufacturer (re-roller) shall ensure that the materials bear the identification marks of the re-rollers and embossing for MS re-rolled section. Copy of MQP shall be available at re-roller's works.
  - (b) Fabricator shall ensure that the billets to be procured from the Billet producer like SAIL, RINL, TISCO, IISCO, SISCON and Jindal. For other parties' approval will be obtained.
  - (c) Fabricator shall offer the Steel sections rolled out of indigenous / imported billets at re-roller's works for inspection to Client (if required) and inform at least one week before proposed inspection date. This shall be a CIP in such cases for tests specified in clause 1.1 of MQP are to be carried out. The rolled angle section shall be duly co-related with corresponding billets, Client shall have the option of establishing the co-relation by review of records or by conducting chemical analysis on rolled products.
  - (d) All section shall be offered for inspection as per relevant standard at the re-roller's works. The grade of the billets should be suitably selected to meet the raw material requirements.
- (2) Nuts & Bolts and Step Bolts & Nuts & other bought out items to be procured from Power Grid/NTPC/IR approved sources and CIP at manufacturer's works
- (3) Welding procedure and Welder's performance qualification approval by CLIENT 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) Fabricator confirms that sample pieces consumed in a testing shall be replenished by them at the time of despatch. If the materials meet the quality requirements CIP/MICC shall be issued for total quantity offered without deducting the weight of materials consumed in testing.
- (6) Client Specification means Client Technical Specification, Approved Drawing, Approved Technical data sheet and LOA provisions applicable for the specific contract. Wherever such documents are absent, relevant IS codes shall apply.
- (7) Fabricator shall furnish all the concerned calibration certificates for testing machines/measuring equipments for review at the time of final inspection.
- (8)** Grades of steel used and the standards to which they conform shall be as approved by Client's Engineering for the specific contract and shall be indicated in approved Drawings/ BOM/offer list at the time of inspection.
- (9) Steel plates below 6 mm used for packing plates/Packing washers shall be as per specification/ approved drawings by Engineering Department, Produced as per IS 1079 1994 (Grade-O) are also acceptable however if below 6 mm thickness plates are used as load bearing plates, gusset, splices etc. same shall confirm to IS 2062 or equivalent standard.

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- (10) Fabricator shall maintain proper co-relation of test certificate with respect to the material from raw material stage to finished material stage.
- (11) Fabricator shall strip off galvanizing of rejected material before re-galvanizing in case rejection is due to galvanizing testing/ defects.
- (12) Fabricator 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) Fabricator 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. The quality Manual should also be available to Client QC/QA.
- (15) Fabricator shall ensure that the material bears the embossing of re-rollers identification.
- (16) Fabricator to ensure that Universal-testing machine is having valid calibration certificate Issued by NABL accredited testing agency 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. Fabricator to ensure sequential supplies and other details as per Client Technical Specification.
- (18) Inspection of angle sections at Black stage of irrespective of specific contract can be followed as Detailed hereunder.
  - (a) Contractor may raise inspection call for angle section at black stage at Re-roller's work against any one of the ongoing Contract.
  - (b) Under specific instruction from the contractor, other shop may fabricate the raw material cleared under CAT –A CIP for a particular contract, for any of your project under execution.
  - (c) Equipment manufacturer (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 Client inspection engineer. Separate register for each Contractor is to be maintained if the equipment manufacturer is executing jobs for different contractor.
  - (d) The final inspection after fabrication and galvanizing, however, will continue to be contract – wise and CIPs will be issued for each contract only.

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