



QUALITY ASSURANCE
TECHNICAL DELIVERY CONDITIONS FOR
ELECTRO FORGED FLOOR GRILLS & STEP TREADS

TDC : RTE : 204
REV. NO.: 01
DATE: 30.12.2014

TECHNICAL DELIVERY CONDITIONS
FOR
ELECTRO FORGED FLOOR GRILLS & STEP TREADS

PREPARED BY :

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APPROVED BY

Name (S/Shri)	Designation / Department	Signature
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 RANIPET	QUALITY ASSURANCE	TDC : RTE : 204
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1.0 SCOPE:

This Technical Delivery Condition specifies the quality requirements for Electro Forged Floor Grills and Step Treads with galvanizing. (For welded type floor grills and step treads refer TDC:RTE:261 Rev.01 Dtd.15.05.2002)

2.0 RAW MATERIALS:

- 2.1 Raw materials like Load Bearing Bar, Square Twisted Bar, Chequered Plate, Frame Bar and Band Bar – Chemical and Mechanical Properties, Physical Properties shall be verified 100% by BHEL / BHEL's AIA.
- 2.2 Materials shall be as per BHEL's Purchase Order / BHEL Drawing Specification.
- 2.4 Materials Lab Test Report / Test Certificate – Verification by BHEL / BHEL's AIA.
- 2.5 Raw Material items shall be witnessed by BHEL/BHEL's AIA for it's; Dimensions, Straightness and surface finish visually.
- 2.6 *Witness of Raw Material Testing as per BHEL's PO requirement, specification and drawing as per the following two options A & B ;*
- 2.6.1 **Option A:** 2 Samples for each specification shall be selected by BHEL / BHEL's AIA from the offered lot. These samples shall be tested in a NABL approved lab – No Need for physical witnessing by BHEL / BHEL's AIA. (Samples shall be selected by BHEL/BHEL's AIA before proceeding with electro forge activity – Supplier has to give a separate inspection call for this stage)
- 2.6.2 While selecting the samples as per 2.6.1, BHEL / BHEL's AIA has to certify that the square twisted bar confirming to IS: 1786 only are used as per BHEL drg / specification. This has to be reported in the respective dimensional report suitably for review by BHEL/QC, Ranipet.
- 2.6.3 **Option B:** Same as above - except testing shall be done at supplier's own lab in the presence of BHEL / BHEL's AIA.

3.0 MANUFACTURING AND WORKMANSHIP:

3.1 Checks on Electro Forge (EF) Weld Machines;

- 3.1.1 Weld Parameters
- 3.1.2 Weld Quality
- 3.1.3 Straightness of Bars
- 3.1.4 Mesh Size and other dimensions of grating

3.2 Type of checks for Electro Forged Floor Grills & Step Treads;

- 3.2.1 Machine Setting Measurement & Visual Checks for projection and fusion of weld - Quantum of Check will be 6 times per shift - These details have to be verified by BHEL / BHEL's AIA during the final inspection.
- 3.2.2 Square Twisted Bar of electro forged welding shall be verified for proper fusion with bearing bar.
- 3.2.3 WPS / PQR (ASME Sec-IX / AWS D1.1) / BHEL Drawing shall be verified for welding process.
- 3.2.4 Weld Strength - Load Test – Once per shift – By applying 20 Kg Pull load on weld joint. Log Book / Internal Inspection Report shall be maintained by supplier and the same has to be verified by BHEL/BHEL's AIA. – Random Test to be conducted in presence of BHEL / BHEL's AIA during the time of final inspection and has to be reported in the DR accordingly.
- 3.2.5 After Load Test check for deformation on the twisted bar and load bearing bar.
- 3.2.6 Pull out Test on EF Weld and Macro Etch Test - Test for strength – 1 No per PO – acceptance norms as per manufacturer practice or Lab Test Certificate – Test Shall be carried out at NABL Appd Lab / Manufacturer's own lab and will be witnessed by BHEL / BHEL's AIA.



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3.3 Checks on Manual Welds in Floor Grills & Step Treads;

- 3.3.1 Weld Parameters
- 3.3.2 Weld Size & Quality
- 3.3.3 100% Visual Inspection for Weld defects
- 3.3.4 100% Checking by supplier and 2% of offered lot checking by BHEL/BHEL's AIA for Stitch weld of chequered plate nosing as per drawing for step treads
- 3.3.5 100% Checking by supplier and 2% of offered lot checking by BHEL/BHEL's AIA for fillet welds on both sides of frame and load bearing bar as per drawing note for floor grills.
- 3.3.6 Documents to be verified for this will be WPS / PQR (ASME Sec-IX) / AWS D1.1 / BHEL Drawing / All Weld shall be free from defects.
- 3.3.7 Log book has to be maintained by supplier and the same shall be verified by BHEL / BHEL's AIA.

3.4 Dimensional Checks;

- 3.4.1 Dimensions physical measurement 100% has to be maintained by supplier as per the BHEL Purchase Order (PO) / BHEL Approved drawing.
- 3.4.2 Witness by BHEL / BHEL's AIA – 2% per Size / per lot
- 3.4.3 **BHEL / BHEL's AIA has to certify clearly in the DR that supplier has envisaged only square twisted bar as per BHEL drg / Specification.**

4.0 TESTS :

- 4.1 Deflection Load Test (Before Galvanizing) - Measure the deflection using dial gauge / physical gauge – 1 No / Per Size / per PO as per the BHEL PO / BHEL Approved drawing.
- 4.2 Deflection shall be measured with a dial gauge by applying a Uniformly Distributed Load – 1000 Kg per Sq. Meter. Deflection should be within 4mm - Refer Load Test details attached along with this TDC as annexure.
- 4.3 **Checks for Galvanizing;**
 - 4.3.1 Visual
 - 4.3.2 Mass of Zinc
 - 4.3.3 Adhesion
 - 4.3.4 Preece Test for Uniformity of Zinc Coating
 - 4.3.5 Coating Thickness
 - 4.3.6 Type of Check & Quantum of Check: Visual, Lab Test & Measurement – shall be as per the following Indian Standards and BHEL PO / Approved drawing.
 - a) IS: 2629 Recommended practice for hot dip-galvanizing of Iron and Steel.
 - b) IS: 4759 Hot-Dip Zinc coatings on structural steel and allied products – Specification
 - c) IS: 2633 Method for testing uniformity of coating on Zinc coated articles
 - d) IS: 6745 Methods for determination of mass of Zinc coating on Zinc coated iron and steel articles
 - 4.3.7 Immediately after hot dip galvanizing, the floor grills and step treads should be passivized by dichromatization to minimize white rusting – This point supplier has to take note of it and BHEL/BHEL's AIA has to verify and check for any white rusting on the floor grills / step treads.
 - 4.3.8 Supplier has to maintain the log book / Internal Inspection Report for the above and the same will be verified during the final inspection by BHEL / BHEL's AIA.
 - 4.3.9 Witness of testing on one sample per lot / per size identified by BHEL / BHEL's AIA.

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4.4 Weighing of any one bundle of floor grills and step treads to be checked for unit weight as per BHEL drawing as applicable for the offered lot – size wise. Weight variation shall be within limits of + 5.00% and – 2.5% of drawing weight.

5.0 PACKING, CRATING AND IDENTIFICATION:

5.1 Bundling shall be made with steel strip / compact packing for easy handling during storage at BHEL stores.

5.2 BHEL PO / Size of item / No. of pieces shall be stenciled on each package and also on the metal tag to be tied on both ends of the bundle.

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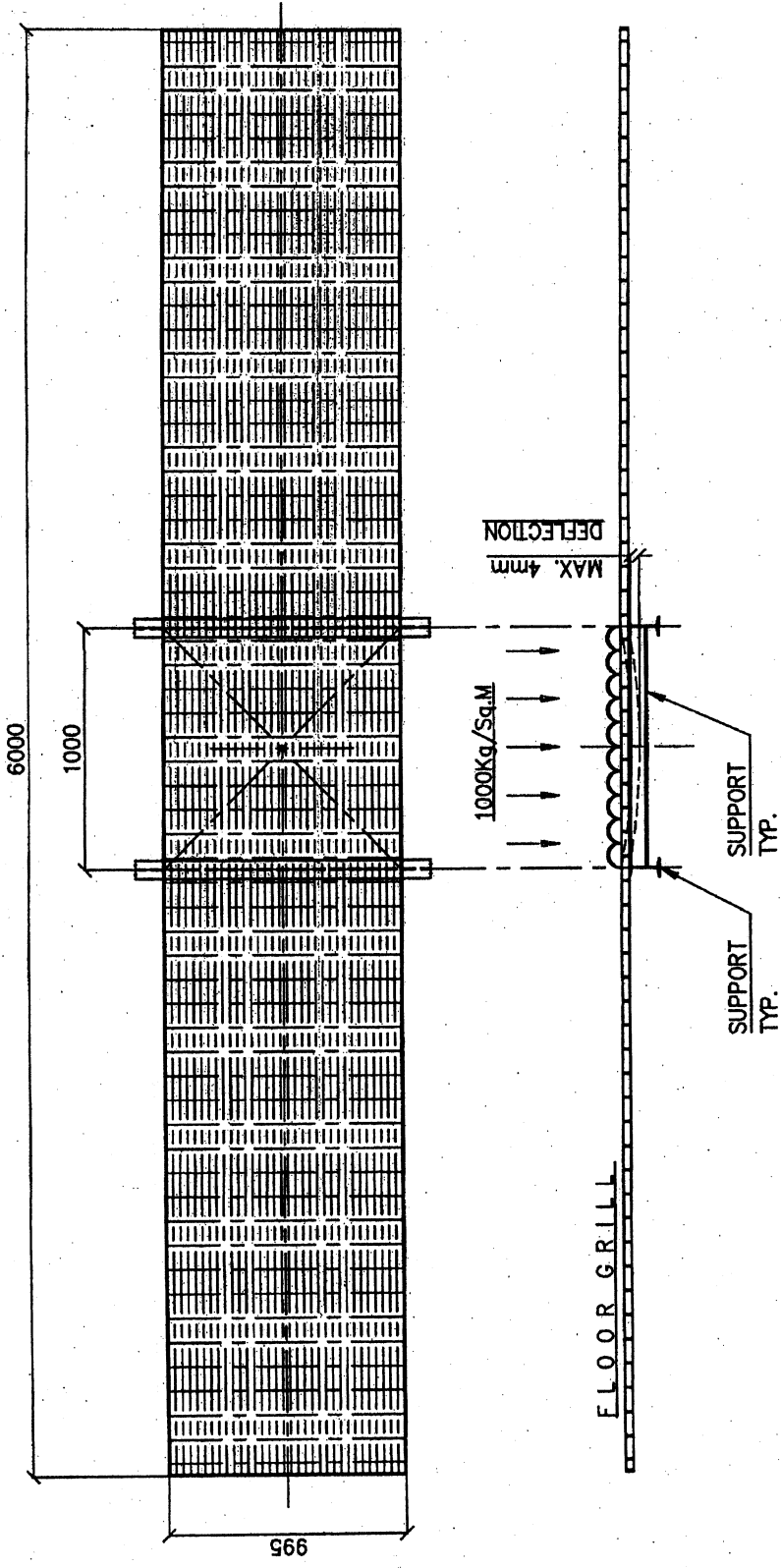
RECORD OF REVISION

REV. NO.	DATE	REVISION DETAILS
00	03.05.2014	Original Issue – Fresh release of TDC for Electro Forge Floor Grills and Step Treads based on BHEL Trichy SQP:CQP:4731 Rev. 00 Dtd.21.06.2012
01	30.12.2014	Revised based on the feedback received from Purchase Dept.



ELECTROFORGED FLOOR GRILL LOAD TEST DETAILS

ANNEXURE TO IDC: RTE: 204



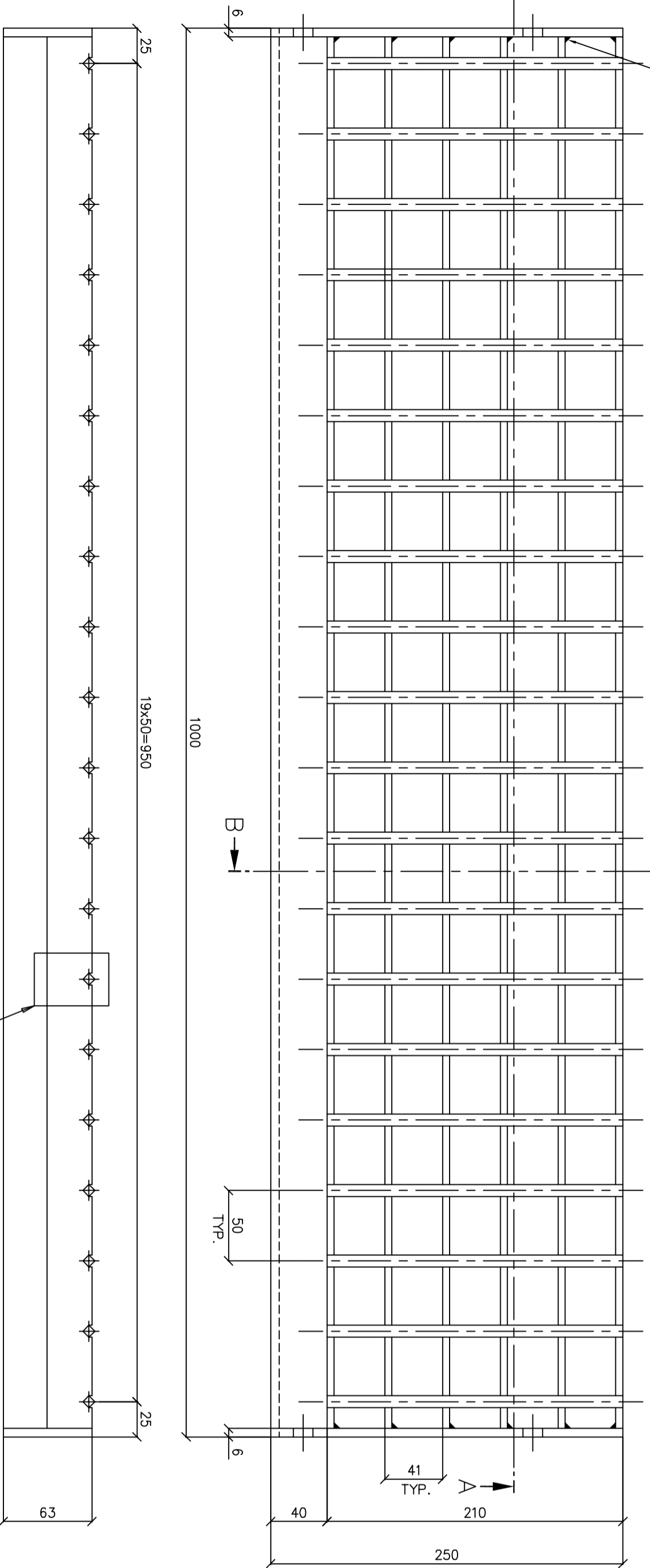
NOTES

01. FLOOR GRILL SHALL BE CLAMPED AT FOUR LOCATION AT EACH SUPPORT.
02. APPLY UNIFORM AREA LOAD OF 1000kg. BETWEEN TWO SUPPORTS
03. DEFLECTION SHOULD BE WITHIN 4mm.

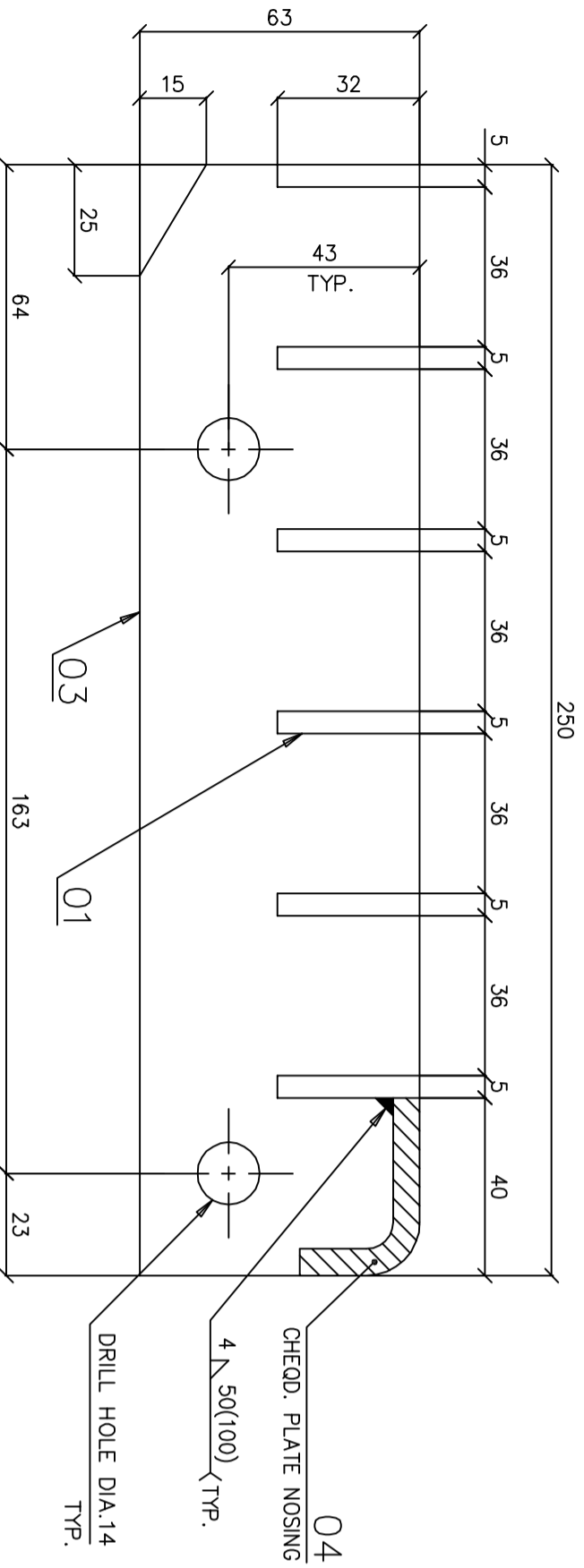
PREPARED	NAME	SIGNATURE	DATE
	Sulaxana	<i>Sulaxana</i>	
CHECKED	K.B.Padhi	<i>K.B.Padhi</i>	
APPROVED	C.Ganesh	<i>C.Ganesh</i>	

ON GINWARD

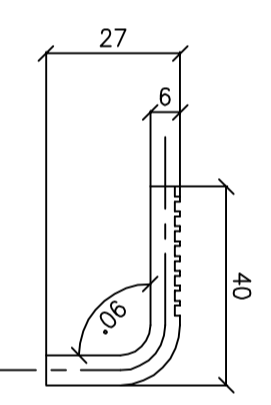
4mm FILLET WELD FROM ONE SIDE



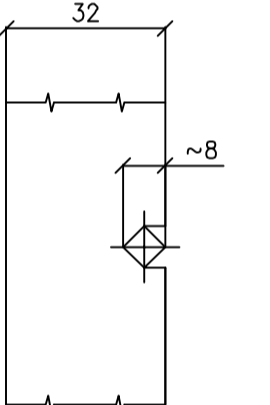
SECTION - A A



SECTION - B B

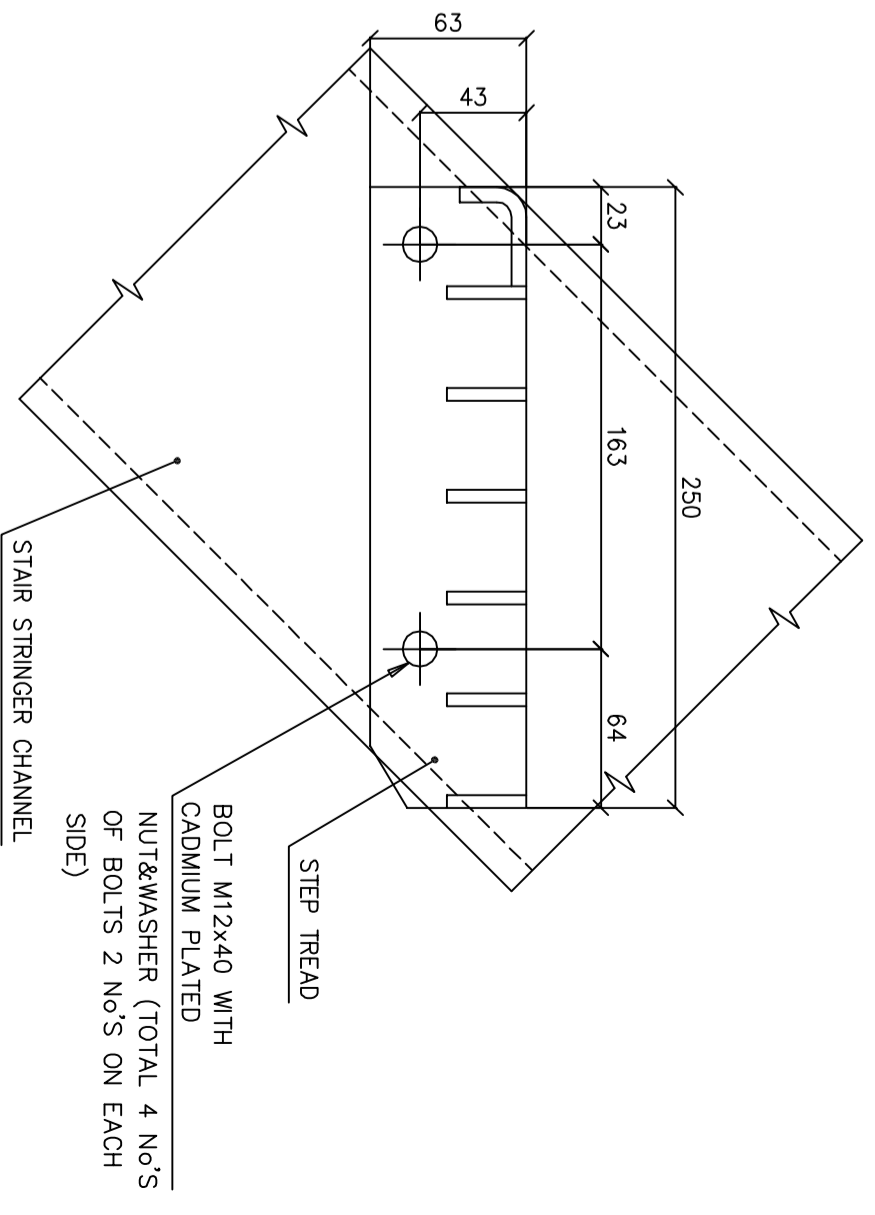


DETAIL OF CHEQD PLATE NOSING



DETAIL - C

TYPE & SIZE OF WELD	TYPE OF ELECTRODE
4 ∇	E-7018



FIXING ARRANGEMENT OF STEP TREAD WITH STRINGER BEAM

VARIANT NO	ITEM NO	DESCRIPTION	QTY	DRAWING NO.	ITEM NO VAR NO	MATL. CODE	MATL. SPEC	A	B	C	D	UNIT WT.	QTY	NO. OF
	04	CHEQD. PLATE 6x67x990				IS 2062 Gr-A	150116660000					3.469	1	
	03	FLAT 6x63x250				IS 2062 Gr-A	150110920000					0.742	2	
	02	SQ. TWISTED BAR 6mmx210				IS 2062 Gr-A	150110920000					0.030	20	
	01	FLAT 5x32x990				IS 2062 Gr-A	150110290000					1.243	6	

NOTES :-

- STEP TREADS (ITEM No.01 TO 04) ARE TO BE GALVANISED BY THE HOT DIP PROCESS MINIMUM WEIGHT OF ZINC COATING SHALL BE 610 Gram./Sq.METRE
- M.S. MATERIALS CONFORMING TO SPECIFICATION IS:2062 Gr.A ARE TO BE USED.
- GALVANIZING TO BE DONE AFTER ALL WORKS ARE COMPLETED.
- ITEM No.01&02 ARE TO BE ELECTRO FORGE WELDED.
- ITEM No.03&04 ARE TO BE WELDED AS PER DETAILS SHOWN.
- ALL STEP TREADS ARE DESIGNED FOR A LIVE LOAD OF 1000 Kg./Sq.M
- ALL MANUFACTURING TOLERANCE SHALL BE AS PER BS:4592 PART 1:1987
- ALL DIMENSION ARE IN mm.

REV	DATE	ALTERED
CHECKED		

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TYPE OF PRODUCT
OR NAME OF
CUSTOMER/PROJECT
BPS. MATERIAL CODE - 96 150 801 0250

BHARAT HEAVY ELECTRICALS LTD.
UNIT: BOILER AUXILIARIES PLANT.
RANIPET - 632 406.

DEPT: ACOCS
GRADE OF UNTO. DIM: PR. QA: 500
SCALE: N.T.S.
WEIGHT (KG): 13.011

DRAWING NO. 6172-0213

REV	DATE	NO. OF
04	27.02.10	