	2X800MW LARA STPP	PE-PQ-508-507-E003
	PRE-QUALIFICATION REQUIREMENTS FOR CABLE TRAY SUPPORT SYSTEM-BOLTABLE	REVISION NO. 00 DATE 24/09/2024
		Page 1 of 2

ITEMS : Single channel, double channel, cantilever arms, clamps & fittings **SCOPE**: Supply: YES; Erection & Commissioning: NO;	
1	Availability of type test certificates as per GDCD standard.
2	Vendor should have in-house fabrication, manufacturing & testing facility (as per GDCD standard).
3	Capability of manufacturing channels & cantilever arms for 20km per month.
4	Vendor has his own galvanization plant. OR Galvanizers as mentioned in annexure-1 of quality plan, part of Technical Specification.
5	Manufactured & supplied at least 40 km of channels (SC1 & DC1) & cantilever arms in one or more orders and at least 20 km in a single order.
6	Minimum two (2) nos. purchase orders for cable tray support system - boltable type shall be submitted which should not be more than five (5) years old from the date of techno-commercial bid opening for establishing continuity in business.

Notes (General points of PQR):

1. Offers of the JV companies/ Joint Bidders/ bidders having collaboration/ licensing agreement/ MOU/ Indian subsidiaries shall be evaluated as follows:
   a. If bidder happens to be an Indian subsidiary of foreign OEM, then the credentials of the foreign OEM can also be considered for meeting PQR.
   b. If bidder happens to be the Joint Venture Company, then the credentials of any of JV partners can be also considered for meeting PQR.
   c. If bidder happens to bid jointly with their partner, then credentials of both the partners will be considered for meeting PQR as per distribution of the work. In all such cases, lead bidder as specified in bid documents shall be responsible for overall execution of the contract and all guarantee/ warranty.
   d. If bidder happens to be the having valid collaboration agreement/ MOU/ licensing agreement with some other company, then the credentials of collaborator/ MOU partner/ licensing company can also be considered for meeting PQR.

Note: If bidder(s) qualifies on the basis of credentials of his principal/ JV partner/ Collaborator/ joint bidder etc., then the principal/ JV partner/ Collaborator/ MOU partner/ joint bidder shall be responsible for overall design vetting and warranty/ guarantee of the package. The scope matrix clearly defining their respective roles including design vetting, manufacturing of critical component, E&C etc. etc. and warranty/ guarantee shall be submitted along with the offer.

PREPARED BY	CHECKED BY	CHECKED BY	REVIEWED BY	APPROVED BY
24.09.24	24/09/24	24.09.24	24/9/24	24/9/24
ANKUR (ENGINEER)	ASHIM K DAS (Sr. MANAGER)	N N JAJWARE (DGM)	PRAVEEN DUTTA (AGM)	DEBASISA RATH (GM-ELECTRICAL)

	2X800MW LARA STPP	PE-PQ-508-507-E003
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2. Bidder to note that the arrangement of bidding (joint bid partners/ collaborator/ MOU partner/ licensing company etc.) once offered to BHEL as a part of bidding documents cannot be changed till the execution of the project.

3. Consideration of offer shall be subject to customer's approval of bidders, if applicable

4. Bidder to submit all supporting documents in English. If documents submitted by bidder are in language other than English, a self- attested English translated document should also be submitted.

5. Notwithstanding anything stated above, BHEL reserves the right to assess the capabilities and capacity of the bidder to perform the contract, should the circumstances warrant such assessment in the overall interest of BHEL.

6. After satisfactory fulfilment of the above criteria/ requirement, offer shall be considered for further evaluation as per NIT and all the other terms of tender.

PREPARED BY	CHECKED BY	CHECKED BY	REVIEWED BY	APPROVED BY
24-09-24	24/09/24	24.09.24	24/9/24	24/9/24
ANKUR (ENGINEER)	ASHIM K DAS (Sr. MANAGER)	N N JAJWARE (DGM)	PRAVEEN DUTTA (AGM)	DEBASISA RATH (GM-ELECTRICAL)

CABLE TRAY SUPPORT SYSTEM UNPRICED SCHEDULE

2 X 800MW LARA STPP

Sl. No.	ITEM DESCRIPTION	UOM	TOTAL QTY	LOT-1 QTY. (50% OF TOTAL QTY.)	UNIT PRICE F.O.R	TOTAL PRICE F.O.R
1	90° ANGLE FITTING HL1	NOS	10300	5150		
2	90° ANGLE FITTING LA1	NOS	31000	15500		
3	BASE PLATE FOR DOUBLE CHANNEL BP2	NOS	10000	5000		
4	BASE PLATE FOR SINGLE CHANNEL BP1	NOS	10000	5000		
5	BEAM CLAMP BC1	NOS	4000	2000		
6	CLAMP FOR SINGLE CHANNEL CC1	NOS	18200	9100		
7	CLAMP FOR DOUBLE CHANNEL CC2	NOS	11500	5750		
8	DOUBLE CHANNEL DC1	MTR	23000	11500		
9	FLAT PLATE STRAIGHT FITTING PF2	NOS	5000	2500		
10	FLAT PLATE TEE FITTING PF1	NOS	3500	1750		
11	SINGLE CHANNEL SC1	MTR	30000	15000		
12	TRAY FIXING CLAMP TC1	NOS	54000	27000		
13	Cantilever arm-750mm(cable trays 600mm)	NOS	2200	1100		
14	Cantilever arm-620mm(cable trays 600mm)	NOS	24000	12000		
15	Cantilever arm-320mm(cable trays 300mm)	NOS	39000	19500		

	NOTES
1	The bidder shall indicate the unit price of each item listed as per the BOQ-Cum-Price Schedule enclosed with NIT. The unit prices shall apply for adjustment of variation in quantity as stipulated above.
2	Lot-1 Quantity indicated above shall be cleared for manufacturing along with LOI. However, manufacturing of the cable tray support shall be taken up by the successful bidder only after approval of technical and quality documentation. Subsequent lots shall be cleared for manufacturing based on progress of engineering and site requirements.
3	PVC is applicable for Cable Tray Support which shall be as per Annexure-C of Technical specification.
4	PVC ceiling limit shall be positive (+ve) 20% and negative (-ve) unlimited.

VOLUME-II

TECHNICAL SPECIFICATION

FOR

GALVANISED CABLE TRAY SUPPORT SYSTEM (BOLTABLE TYPE)

2X800 MW LARA STPP

SPECIFICATION NO: PE-TS-508-507-E013

REVISION: **00**

BHARAT HEAVY ELECTRICALS LIMITED
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
NOIDA, UP (INDIA) – 201301

613762/2024/PS-PEM-EL

BHEL	**TECHNICAL SPECIFICATION FOR CABLE TRAY SUPPORT SYSTEM (BOLTABLE TYPE)**	SPECIFICATION NO. PE-TS-508-507-E013
		REVISION 00 / DATE: 24.09.2024
		SHEET 1 OF 1

CONTENTS

TOTAL SHEETS INCLUDING COVER SHEET, CONTENT/SEPARATOR SHEET = 40

COMPLIANCE CERTIFICATE

The bidder shall confirm compliance to the following by signing/ stamping this compliance certificate and furnishing same with the offer.

1. The scope of supply, technical details, construction features, design parameters etc. shall be as per technical specification & there are no exclusion/ deviation with regard to same.

2. There are no deviations with respect to specification other than those furnished in the 'schedule of deviations'.

3. Only those technical submittals which are specifically asked for in NIT to be submitted at tender stage shall be considered as part of offer. Any other submission, even if made, shall not be considered as part of offer.

4. Any comments/ clarifications on technical/ inspection requirements furnished as part of bidder's covering letter shall not be considered by BHEL, and bidder's offer shall be construed to be in conformance with the specification.

5. Any changes made by the bidder in the price schedule with respect to the description/ quantities from those given in 'BOQ-Cum-Price schedule' of the specification shall not be considered (i.e., technical description & quantities as per the specification shall prevail).

BIDDER'S STAMP & SIGNATURE

	TECHNICAL SPECIFICATION FOR GALVANISED CABLE TRAY SUPPORT SYSTEM (BOLTABLE TYPE)	SPECIFICATION NO. PE-TS-508-507-E013
		VOLUME-II
		SECTION I
		REVISION 00 / DATE: 24.09.2024
		SHEET 1 of 3

SECTION – I

SPECIFIC TECHNICAL REQUIREMENTS

613762/2024/PS-PEM-EL

	TECHNICAL SPECIFICATION FOR GALVANISED CABLE TRAY SUPPORT SYSTEM (BOLTABLE TYPE)	SPECIFICATION NO. PE-TS-508-507-E013
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1.0 SCOPE OF ENQUIRY

1.1 This enquiry covers Manufacture, Inspection and Testing at Manufacturer's works, proper packing and delivery to site of **Cable Tray Support System (Boltable Type)** conforming to this specification.

1.2 It is not the intent to specify herein all the details of design & manufacture of material. However, the material shall, conform in all respects to high standard of design, engineering and workmanship and shall be capable of performing in continuous commercial operation at site conditions.

1.3 General technical requirements of the Cable Tray Support System (Boltable Type) are indicated in Section-I. Project specific technical/ quality requirements / changes are listed in Data Sheet-A & Section-II.

1.4 The stipulations of Section-I, followed by those of Data Sheet-A shall prevail in case of any conflict between the stipulations of Section-I, Data Sheet - A & Section-II.

2.0 BILL OF QUANTITIES:

2.1 Quantity requirements shall be as per **Annexure-I (Bill of Quantities (BOQ))** of NIT.

3.0 SPECIFIC REQUIREMENTS:

3.1 Technical:

Sr. No.	Reference Clause No. of Section II (if any)	Specific Requirement/ Change
1	NIL	NIL

3.2 Quality/ Inspection:

Sr. No.	Reference Clause No. of Section II (if any)	Specific Requirement/ Change
1	4.1	Clause No. 4.1 is to be read as: "Bidder shall confirm compliance with NTPC standard Quality plan (0000-999-QOE-S-38) as attached with the specification without any deviations. After issuance of purchase order for specific project , the successful bidder shall submit the Quality Plan for BHEL/ultimate customer's approval. There shall be no commercial implication to BHEL on account of minor changes in Quality Plan during contract stage.

3.3 Bill of Material & Packing List

3.3.1 Supplier to submit detailed 'Bill of Material' (BoM) at the time of drawing/document submission after placement of PO. Each item of the BoM to be uniquely identified with item code no. or item serial no.

3.3.2 Supplier to ensure that all items which will find separate mention in the packing list are covered in this detailed BoM.

3.3.3 Supplier to also give following undertaking in the BOM:

"The BOM provided herewith completes the scope(in content and intent) of material supply under PO No. ..... dated.....
Any additional material which may become necessary for the intended application of the supplied item(s)/package will be supplied free of cost in most reasonable time"

	TECHNICAL SPECIFICATION FOR GALVANISED CABLE TRAY SUPPORT SYSTEM (BOLTABLE TYPE)	SPECIFICATION NO. PE-TS-508-507-E013	
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ANNEXURE – A
LIST OF DRAWINGS / DOCUMENTS
(REQUIRED TO BE FURNISHED BY SUCCESSFUL BIDDER AFTER AWARD OF CONTRACT)

4.1 Drawings/ documents shall be submitted through Document Management System (DMS).

4.2 Drawing/Documents required to be submitted shall be as per NIT.

4.3 Bidder to submit drawing/document submission schedule at contract stage.

BHEL	**TECHNICAL SPECIFICATION FOR GALVANISED CABLE TRAY SUPPORT SYSTEM (BOLTABLE TYPE)**	SPECIFICATION NO. PE-TS-508-507-E013
		VOLUME II
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DATASHEET A

1.0 APPLICABLE STANDARDS:

a)	IS: 2062	For structural steel
b)	IS: 1079	For hot rolled carbon steel sheet and strip.
c)	IS: 513	For cold rolled low carbon steel sheet & strips
d)	IS: 1730	For dimensions for steel sheet and strip.
e)	IS: 1363	Hexagon head bolts, screws and nuts.
f)	IS: 5	For colours of paint.
g)	IS: 2629	For hot dip galvanising of steel & surface pre-treatment
h)	IS: 2633	For testing uniformity of zinc coating
i)	IS: 6745	For determination of mass of zinc coating
j)	IS: 1852	For rolling and cutting tolerances of hot rolled steel products
k)	IS: 4759	For Hot dip zinc coating on structural steel & other allied products

2.0 CABLE TRAY SUPPORT

a)	Tray support type:	Boltable type
b)	Material:	Hot/ Cold Rolled MS sheet steel for channel SC1/ DC1 and channel portion of cantilever arms
c)	Thickness:	2.5 mm
d)	Length:	Standard length of 6 meters
e)	Fabrication :	At works
f)	Construction:	Conforming to enclosed drg. [PE-DG-508-507-E006]

3.0 SURFACE TREATMENT:

Galvanizing:

a)	Pre-treatment:	As per IS 2629 prior to galvanisation
b)	Type	Hot dip galvanization
c)	Applicable Standard:	IS 2629
d)	Minimum thickness:	75 microns (minimum), 86 microns (average)
e)	Min. wt. of Zinc deposit:	610 gms. per square meter
f)	Tests for galvanizing:	i) Weight of zinc coating as per IS : 6745
		ii) Thickness of zinc coating as per IS : 4759
		iii) Uniformity of zinc coating as per IS : 2633
		iv) Adhesion as per IS: 2629

4.0 TYPE TEST, ROUTINE TEST AND ACCEPTANCE TEST

For details of routine test, acceptance test and type test, please refer to Annexure 4 (Type test procedure) and QP no. PED-507-00-Q-013/01.

	TECHNICAL SPECIFICATION FOR GALVANISED CABLE TRAY SUPPORT SYSTEM (BOLTABLE TYPE)	SPECIFICATION NO. PE-TS-508-507-E013
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SECTION-II

STANDARD TECHNICAL REQUIREMENTS

	TECHNICAL SPECIFICATION FOR GALVANISED CABLE TRAY SUPPORT SYSTEM (BOLTABLE TYPE)	SPECIFICATION NO. PE-TS-508-507-E013	
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1.0 CODES AND STANDARDS

2.1 The material shall comply with all currently applicable safety codes and statutory regulations of India as well as of the locality where the material is to be installed.

2.2 The design, material, construction, manufacture, inspection, testing and performance of cable tray support system (boltable type) shall conform to the latest revision of relevant standards as per Datasheet-A.

2.3 In case of conflict between the applicable reference standard and this specification, this specification shall govern.

2.0 TECHNICAL REQUIREMENTS

3.1 Cable Trays Support (boltable type) shall be supplied as per technical particulars specified in Data Sheet – A.

3.3 All finished galvanised MS structural members for cable tray supports shall be free from sharp edges, corners, burs & unevenness.

3.4 Necessary fasteners shall be provided with each cable tray support accessory as specified in enclosed drawings.

3.5 All welded joints of cable tray support accessories shall be smooth enough to provide a good appearance & shall not cause any injury to working personnel. All welding work shall be done by skilled personnel.

4.0 QUALITY ASSURANCE, TESTING & INSPECTION

4.1 Bidder shall confirm compliance with the BHEL's Standard Quality Plan (PE-QP-999-507-E007, Rev. 0) as attached with the specification without any deviations. After issuance of purchase order for specific project, the successful bidder shall submit the Quality Plan for BHEL/ ultimate customer's approval. In case bidder has reference Quality Plan agreed with ultimate customer, same can be submitted for specific project after award of contract for BHEL/ ultimate customer's approval. There shall be no commercial implication to BHEL on account of minor changes in Quality Plan during contract stage.

4.2 All materials shall be procured, manufactured, inspected and tested by vendor/ sub-vendor as per approved quality plan.

4.3 The supplier shall perform all tests necessary to ensure that the material and workmanship conform to the relevant standards and comply with the requirements of the specification. Charges for all these tests for all the equipment & components shall be deemed to be included in the bid price.

	TECHNICAL SPECIFICATION FOR GALVANISED CABLE TRAY SUPPORT SYSTEM (BOLTABLE TYPE)	SPECIFICATION NO. PE-TS-508-507-E013	
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5.0 **TESTING:**

The tests shall be in accordance with appropriate Indian Standards. The extent of the tests to be performed by the supplier shall include but not be limited to the following:

5.1 Type tests :

Cable tray support system (Boltable Type) shall be of proven type & type tested design conforming to type tests as under:

a) Load test for Main support channel with cantilever arm fixed on one side

b) Load test for Main support channel with cantilever arm fixed on both sides

c) Load test for Channel fixed on Beam/Floor

d) Load test for channel supported on wall with Cantilever arm

e) Channel insert test

f) Channel nut slip characteristics (wherever applicable)

g) Weld integrity test

h) Test for galvanizing: Weight, thickness and uniformity of zinc coating shall be determined in accordance with IS: 6745 and IS: 2633 for the values indicated in Data Sheet- A.

Type testing shall be carried out for tests listed at “(a) through (g)” above in line with Type test procedure and drawings attached in Annexure-4. The final type test procedure shall be subjected to BHEL/customer approval.

Type tests listed at (a) through (g) shall be conducted once. However, type test listed at (h) shall be conducted on each lot offered for inspection.

5.2 Routine Tests:

a) Dimension checks

5.3 Acceptance Test:

a) Dimension checks

b) Tests for galvanizing

6.0 **PACKING**

The material shall be packed to ensure protection against damage during transit, storage for prolonged periods and handling. Refer Annexure-II

2X800 LARA STPP

	TECHNICAL SPECIFICATION CABLE TRAY SUPPORT SYSTEM -BOLTABLE **ANNEXURE-II**	Issue No: 01 Rev. No. 00 Date :24.09.2024

PACKING REQUIREMENT

Sl.no	DESCRIPTION
1	**Type of Packing:**
1.1	The material shall be packed to ensure protection against damage during transit, storage for prolonged periods and handling.
1.2	Similar type and size of Channels/Cantilever arm shall be grouped together and stacked.
1.3	At bottom of each stack wooden block shall be provided.Channels/Cantilever arm in each stack shall be tied with with steel wires / strips for convenient handling. At top of stack rubber or any material to be provided below wire/strip to avoid damage in galvanization.
1.4	Items other than Channels & Cantilever arms including Nuts, bolts & washer shall be packed in wooden box.
1.5	The following details shall be marked on the packing/each stack (above): i) Name and address of the consignee ii) Purchase Order No: iii) Name of supplier iv) Description of material v) Quantity of iems (in numbers and weight) vi) Gross weight
2	**Quality of wood:**
2.1	**Quality of wood:** Wood used for packing box shall be Pinewood, Rubber wood, Mango wood, Fir wood, Silver Oak wood or other as per availability with moisture content not exceeding 30%.
3	**Cushioning material and moisture absorber:**
3.1	Suitable cushioning shall be provided by rubberized coir/ thermocol / expanded soft polyethylene foam.
3.2	Adequate quantity of packed desiccant shall be suitably placed inside the packing box.
4	**Packing slip & holder:**
4.1	Packing slip kept in polyethylene bag shall be placed inside the wooden box at appropriate place.
4.2	One copy of packing slip wrapped in polyethylene bag covered in galvanized iron tin sheet/ aluminium packing slip holder shall be fixed on the external surface the packing box.

QUALITY PLAN

एनटीपीसी NTPC	ITEM: (MATERIAL, CLASS, GRADE, RATING, SIZE ETC.) GALVANISED FLEXIBLE CABLE TRAYS SUPPORT SYSTEM	STANDARD QUALITY PLAN CONFORMING TO CODE: Design as per NTPC Specification	QP NO. 0000-999-QOE-S-38 REV.:00 DATE : 01.09.04 PAGE 1 OF 2 VALID UPTO:31.08.07	REVIEWED BY S.D.SINGH O.P.NIRANJAN I.J.SINGH	APPROVED BY ANIL GUPTA

SL. NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS
					M	C/N					M	C	N	
1.	2.	3.	4.	5.	6.		7	8	9	D*	**	10		11
	Flexible cable trays Support Structure	1. In Black Condition a) Weld Quality	Major	Visual	100%	Random	Manufacturer's Plant Std	Manufacturer's Plant Std	Inspection Report		P	V	V	o
		b) Burs	Major	Visual	Rando m	-	No Burs	No Burs	-do-		P		-	
2.	Finished Galvarized	2. After Galvanising												
		2.1 General physical inspection including Galvanizing Quality/Defects, Dicromating, White Rusting etc.	Major	Visual	100%	5 Sample/L ot	IS-2629-1985 IS-4759-1996	IS-2629-1985 IS-4759-1996	-do-		P	W	W	
		2.2 Dimensional Check & Thickness Check	Major	Measurem ent	-do-	-do-	NTPC/Main Supplier Approved Drg.	NTPC/Main Supplier Approved Drg.	-do-		P	W	W	
		2.3 Galvanizing Tests												
		a) Coating thickness measurement survey by Elcometer	Critical	Measurem ent	IS-4759-1996	-do-	IS-4759-1996 IS-3203-1982	IS-4759-1996 IS-3203-1982	-do-		P	W	W	
		b) Mass of zinc coating	Critical	Measurem ent	-do-	1 coupon sample of each thickness	IS-6745-1972 IS-4759-1996	IS-6745-1972 IS-4759-1996	-do-		P	W	W	
		c) Uniformity of zinc coating/dip test	Critical	Measurem ent	-do-	-do-	IS-2633-1986 IS-4759-1996	IS-2633-1986 IS-4759-1996	-do-		P	W	W	
		d) Adhesion Test	Critical	Visual	-do-	-do-	IS-2629-1985	IS-2629-1985	-do-		P	W	W	

LEGEND: RECORDS IDENTIFIED WITH "TICK" SHALL BE ESSENTIALLY INCLUDED BY THE CONTRACTOR IN QA DOCUMENTATION

M: MANUFACTURER/SUB-SUPPLIER, C: **Main Supplier: NTPC, N: NTPC. INDICATE "P" PERFORM "W" WITNESS AND "V" VERIFICATION AS APPROPRIATE "CHP" BY NTPC SHALL BE IDENTIFIED IN COLUMN "N" AS "W"

एनटीपीसी NTPC	ITEM: (MATERIAL, CLASS, GRADE, RATING, SIZE ETC.)	STANDARD QUALITY PLAN CONFORMING TO CODE: Design as per NTPC Specification	QP NO. 0000-999-QOE-S-38 REV.:00 DATE : 01.09.04 PAGE 2 OF 2 VALID UPTO: 31.08.07	REVIEWED BY S.D.SINGH O.P.NIRANJAN I.J.SINGH	APPROVED BY ANIL GUPTA QUALITY ASSURANCE APPROVED NTPC, New Delhi

SL. NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY		
					M	C/N					M	C	N
1.	2.	3.	4.	5.	6.		7	8	9	D*	**	10	
		Proof Load Test as per note 6 Followed by Die Penetration Test (For 600 mm and above cable tray support system)	A	Meas/Visual	One Sample from each offered lot	One Sample from each offered lot	NTPC Technical Specification/ No visible cracks should develop on the weld part	NTPC Technical Specification/ No visible cracks should develop on the weld part	Inspection Report		P	W	W

Note :

1. The supplier to ensure procurement of steel from main producers like SAIL/TISCO, Rastriya Ispat/Ispat Ind. Jindal/Esser/Lloyds/IIS Co. and Zinc from Hindustan Zinc Ltd.
2. Welding shall be done by qualified welders as per supplier system.
3. Material shall be galvanized at NTPC approved sources only.
4. Pre-treatment of cable trays support system shall be carried out in seven tank process as per IS-2629. All the process parameters e.g. Concentration, temperature, density etc. to be maintained and recorded by the galvaniser.
5. The process of pre-treatment shall be verified by NTPC on surveillance basis during inspection of Galvanised Flexible Cable Trays support system.
6. (i) Test on Main support Channel shal be done if only CI channel are in scope of supply and cantilever arms shall be fitted on one side. This test shall be same as test 4 of type test as per tech. Spec.

   (ii) Test on Main Support Channel shall be done with C2 Channel and cantilever arms fitted on both sides, if C2 channels are in scope of supply. This test shall be same as test 2 A of type tests. Then test at (i) above shall not be repeated.

   (iii) Nut slip characteristic test (It shall support minimum load of 350 Kg. Before Nut Slips with bolt torque of 65 NM). This test shall be same as test 5 B of type tests.

   (iv) The procedure for carrying out above test shall be as per details given in Type Tests Specification.

LEGEND: RECORDS IDENTIFIED WITH "TICK" SHALL BE ESSENTIALLY INCLUDED BY THE CONTRACTOR IN QA DOCUMENTATION
M: MANUFACTURER/SUB-SUPPLIER, C: **Main Supplier, N: NTPC. INDICATE "P" PERFORM "W" WITNESS AND "V" VERIFICATION AS APPROPRIATE
"CHP" BY NTPC SHALL BE IDENTIFIED IN COLUMN "N" AS "W"

ANNEXURE TO QUALITY PLAN

QUALITY PLAN FOR CABLE TRAY SUPPORT SYSTEM-BOLTABLE

NOTES:
1. BHEL reserves the right for conducting repeat test, if required.
2. The latest revisions/year of issue of all the Standards indicated in the QP shall be referred at the time of inspection.

ANNEXURE TO QUALITY PLAN

INSTRUCTIONS FOR QUALITY PLAN

The Quality Plan shall include all the Quality Control Measures and Checks adopted by the Vendor to ensure that the material/component/assembly/services supplied by him meet/will meet the requirements as per specifications and good practices. They shall include all stages of operation such as materials, processes, manufacture, assembly, packing and despatch. The following guide lines may be noted:

Column 1- Serial Number

Column 2- Component/Operation- The component and/or operation being checked shall be given here.

Column 3- Characteristics check- The characteristics being checked shall be given here, e.g., chemical composition, mechanical properties, leak tightness, surface defects etc..

Column 4- Category -'CR' stands for critical characteristic - affecting safety of equipment and personnel
'MA' stands for major Characteristic - affecting safety of equipment and personnel
'MI' stands for minor characteristic - affecting appearance etc.

Column 5- Type/Method of check e.g. chemical analysis tensile testing, hydraulic test, visual examination radiography etc.

Column 6- Extent of check, such as, 100, 10, 1 percent etc.

Column 7- Reference Documents - Documents, such as technical specification, drawings, standard specifications (IS, BS ETC.) procedure, etc. according to which check is done.

Column 8- Acceptance Norms - Standards etc. according to which acceptability or otherwise of the characteristics being checked is decided.

Column 9- Format of Record - Formats, log shets, reports, etc. in which the observations are recorded. Standard log sheets, reports, formats etc. of the Vendors shall be numbered and such reference numbers shall be included here.

Column 10- Agency - The agency which performs the test/instruction shall be written in sub-column 'W'
The agency which verifies test certificates/inspection records and carries out audit check of the components/operation shall be written in sub-column 'V'

The agencies are codified as 1,2 & 3

'1' stands for (BHEL)

'1' * means the operation shall be cleared by BHEL before the start of the next operation.

'2' Stands for Vendor

'3' stands for sub-Vendor of the Vendor and so on.

Example :

Entry '3' in column 'P' means test./inspection to be performed by sub-Vendor's QC

Entry '2' in column 'W' means test./inspection to be witnessed by Vendor's QC

Entry '1' in column 'V' means verification shall be done by BHEL and next stage to be started only after the hold point is cleared by BHEL

Column11I- Remarks - Any special remarks shall be given here.

NOTES :

1. In absence of correlation with the test certificate(s) (e.g. material identification) samples shall be drawn bgy BHEL and all tests as per relevent specifications shall be carried out in their presence or in recognized Government Laboratory.
2. When materials and components are initially identified and stamped by BHEL QS engineer, the identification marks shall be presserved till despatch. Wherever this is not possible, the identification mark shall be transferred to the components in the presence of BHEL QS Engineer unless other wise agreed.
3. For castings and forgings integral test specimens shall be provided, When this is not possible for casting, they shall be poured in the presence of BHEL QS Engineer unless otherwise, if witnessing of test by BHEL is called for.
4. When welders qualified by reputed inspection agencies or statutory bodies are not available, qualification tests shall be conducted in the presence of BHEL QS Engineer.
5. This Quality Plan is liable to be modified as per the requirements of approved drawings and changes in technical specifications/drawings. If there are contradictions in respect of column 7 & 8 between this Quality Plan and the approved drawings specifications, the latter shall prevail.
6. Wherever inspection by BHELs Purchaser/Third Party/Statutory authorities are mandatory, this shall be compiled with.
7. Inspection reports, log sheets, test reports/certificate. etc. shall be furnished to BHEL at the approproate stages or at the time of final inspection, as required.
8. This Quality Plan is also applicable to spares, if any, under scope of supply of Vendor.
9. The quality plan shall be submitted in minimum 4 copies with a soft copy of the same or in line with contract requirements.

ANNEXURE TO QUALITY PLAN

LIST OF NTPC APPROVED GALVANIZERS (FOR NTPC PROJECTS)

S. NO.	ITEM	VENDOR NAME
1	Galvanising	MJ Engg., Delhi
2	Galvanising	A.V. Engg., Kolkata
3	Galvanising	Inar Profiles, Vishakapatnam
4	Galvanising	Anand Udyog, Mumbai
5	Galvanising	Techno Engg., Chandigarh
6	Galvanising	Steelite Engg., Mumbai
7	Galvanising	National Galvanizer, Kolkata
8	Galvanising	Unistar Galvanizer, Kolkata
9	Galvanising	B.P. Projects, Kolkata
10	Galvanising	Bajaj, Pune
11	Galvanising	Electrocare Industries, Mumbai
12	Galvanising	B.G. Shirke, Pune
13	Galvanising	Gurpreet Galvanizer, Hyderabad
14	Galvanising	Sigma, Mumbai
15	Galvanising	Radhakrishnan Shetty, Chennai
16	Galvanising	Karamtara, Mumbai
17	Galvanising	Poona Galvanizers, Pune
18	Galvanising	Neha Galvanizer, Kolkata
19	Galvanising	Unitech Fabricators & Galvanizers, Hoogly

NOTES:

1 ***ANY CHANGE IN THE ABOVE LIST SHALL BE INFORMED AT THE TIME OF SPECIFIC PROJECT REQUIREMENT AND NO COMMERCIAL IMPLICATION SHALL BE ALLOWED ON THIS ACCOUNT.***

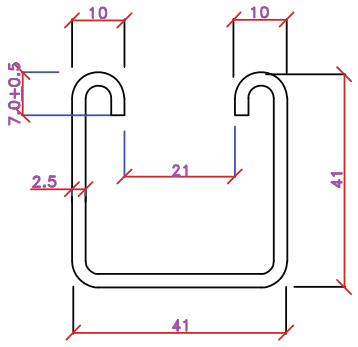
2 ***IT SHALL BE THE RESPONSIBILITY OF THE VENDOR TO GET THE MATERIAL GALVANIZED FROM THE ABOVE LIST WITHUT ANY COMMERCIAL IMPLICATION TO BHEL.***

This document is similar to approved document "Design Philosophy for 'Electrical Equipment Layout" of 2 X 660MW TALCHER TPP, STAGE III (EPC) Document No. 4540-001-215-PVE-C-046, vide transmittal No. CC-ENGG-4540-001-215-PVE-C-046 Dated 17.01.2023.

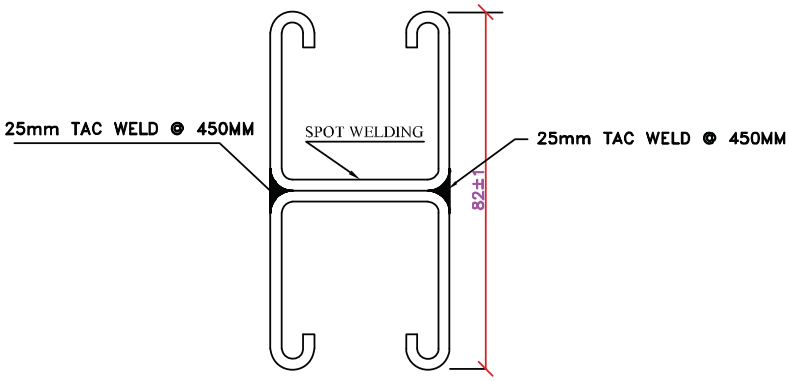
ANNEXURE - 3

TYPICAL INSTALLATION DETAILS FOR CABLE TRAY SUPPORT SYSTEM

NTPC DOCUMENT NO: 9587-001-215-PVE-C-046						
CUSTOMER	एन टी पी सी NTPC — एन टी पी सी लिमिटेड N T P C LIMITED					
PROJECT	2X800MW LARA STPP(STAGE-II)					
JOB NO. 508	BHARAT HEAVY ELECTRICALS LIMITED POWER SECTOR PROJECT ENGINEERING MANAGEMENT NOIDA(U.P) INDIA	DPT CODE-E	DRN	NAME ANK	SIGN –sd–	DATE 28.11.23
			DSN	ANK	–sd–	28.11.23
			CHD	ABHI	–sd–	28.11.23
			APP	PD	–sd–	28.11.23
		DWG. NO. PE-DG-508-507-E006				
		SHT. 01 OF 37				REV.01



SINGLE CHANNEL SC1



DOUBLE CHANNEL DC1

TWO LENGTHS OF SINGLE CHANNEL

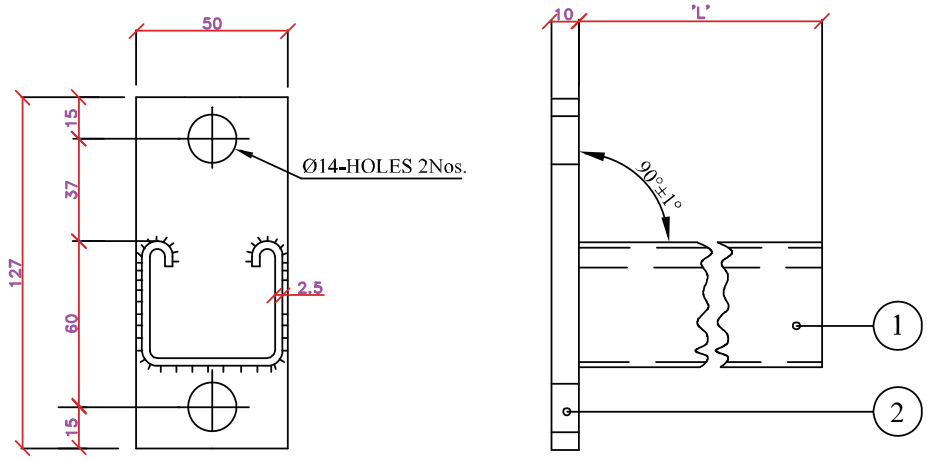
SPOT WELDED BACK TO BACK

AT 75MM C/C

NOTE:

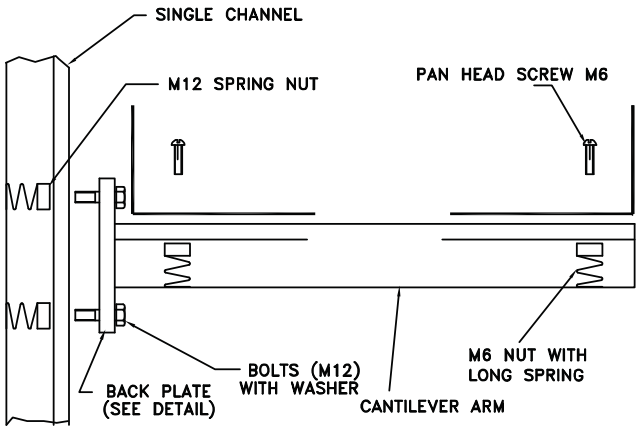
1. ALL DIMENSIONS ARE IN mm.
2. MATERIAL : 2.5MM THICK HOT/ COLD ROLLED M.S. AS PER IS:1079.
3. FINISH : HOT DIP GALVANISED AS PER IS 2629
4. TOLERANCE ON THICKNESS IS AS PER IS 1852
5. ALL FABRICATION TOLERANCE AS PER RELEVANT IS.
6. ZINC COATING SHALL BE MIN. 75 MICRONS/ 610 G/SQ. M.

बी एच ई एल BHEL	TITLE: TYPICAL INSTALLATION DETAILS FOR CABLE TRAY SUPPORT SYSTEM	NTPC DOC. NO: 9587-001-215-PVE-C-046
		BHEL DRWG NO: PE-DG-508-507-E006
		REV.01 SH 02 OF 37



CANTILEVER ARMS

TRAY WIDTH IN MM	CANTILEVER ARM LENGTH (L) IN MM
150	170 (FOR OVERHEAD TRAYS)
300	320 (FOR OVERHEAD TRAYS
600	620 (FOR OVERHEAD TRAYS)
600	750 (FOR TRENCH)



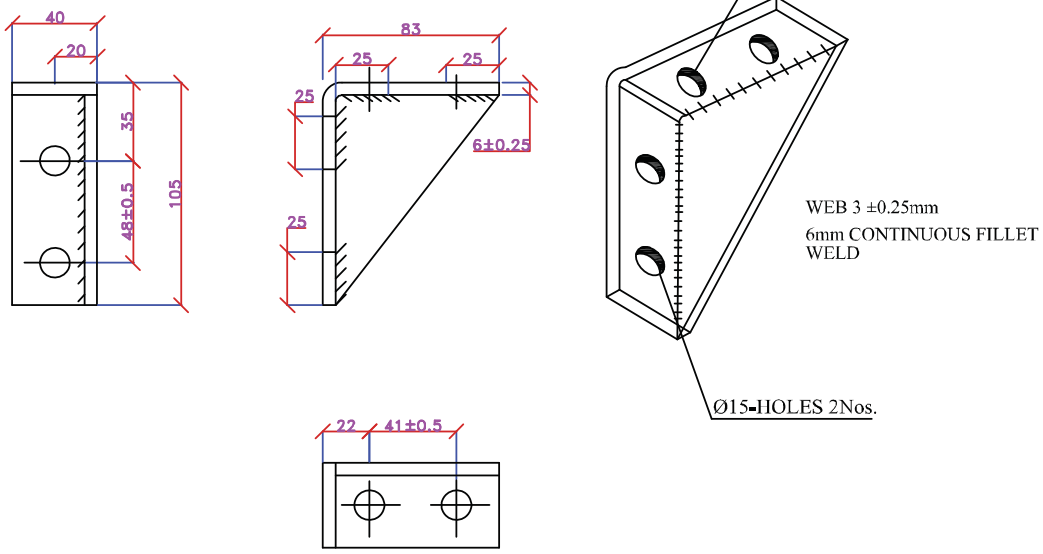
TYPICAL ASSEMBLY OF CHANNEL SUPPORTS AND CABLE TRAY

M12 HEX BOLT & WASHER–2NOs.
M12 SPRING NUTS–2NOs.
M6 PAN HEAD SCREWS & WASHER–2NOs.
M6 SPRING NUTS–2NOs.

NOTES :

1. ALL DIMENSIONS ARE IN mm.
2. ITEM NO.1 MATERIAL : HOT/ COLD ROLLED M.S. AS PER RELEVANT IS.
3. ITEM NO.2 MATERIAL : M.S AS PER IS-2062
4. FINISH : HOT DIP GALVANISED AS PER IS:2629
5. TOLERANCE ON THICKNESS IS AS PER IS:1852
6. ALL FABRICATION TOLERANCE AS PER RELEVANT IS.
7. ZINC COATING SHALL BE MIN. 75 MICRONS/ 610 G/SQ. M.

TITLE:	TYPICAL INSTALLATION DETAILS FOR CABLE TRAY SUPPORT SYSTEM	NTPC DOC. NO: 9587-001-215-PVE-C-046
		BHEL DRWG NO: PE-DG-508-507-E006
		REV.01 / SH 03 OF 37



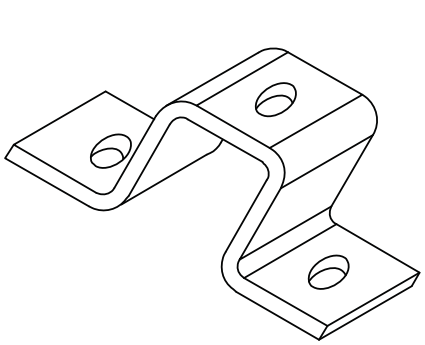
90 ANGLE FITTING HL1 (HEAVY DUTY TYPE)

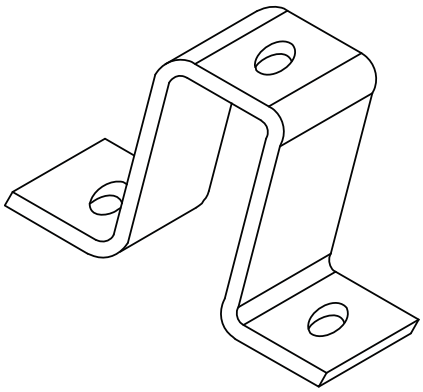
ANCHOR FASTENER–2NOs.
SPRING NUT & WASHER–2NOs.

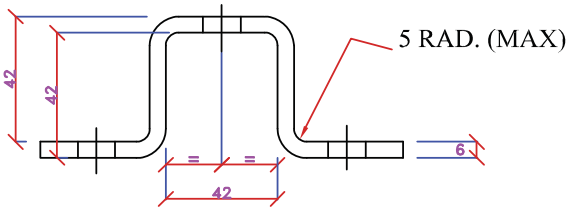
NOTES :

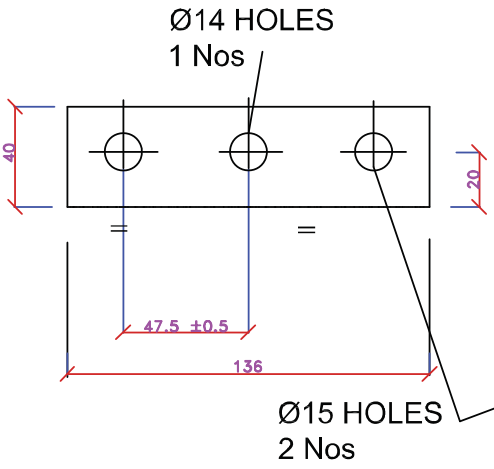
1. ALL DIMENSIONS ARE IN mm.
2. MATERIAL :MILD STEEL AS PER IS-2062
3. FINISH : HOT DIP GALVANISED AS PER IS:2629
4. TOLERANCE ON THICKNESS AS PER IS:1852
5. ALL FABRICATION TOLERANCE AS PER RELEVANT IS.
6. ZINC COATING SHALL BE MIN. 75 MICRONS/ 610 G/SQ. M.

TITLE:	TYPICAL INSTALLATION DETAILS FOR CABLE TRAY SUPPORT SYSTEM	NTPC DOC. NO: 9587-001-215-PVE-C-046
		BHEL DRWG NO: PE-DG-508-507-E006
		REV.01 / SH 04 OF 37

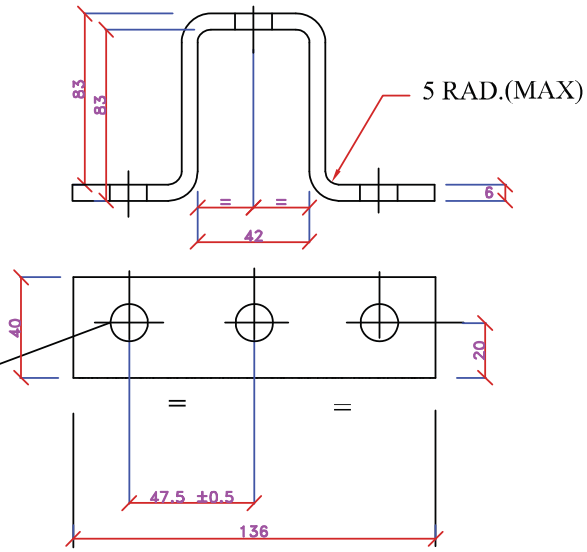








CLAMP FOR SINGLE CHANNEL CC1



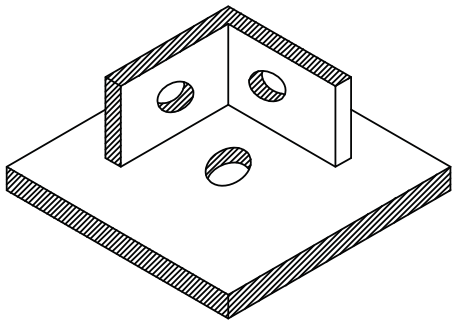
CLAMP FOR DOUBLE CHANNEL CC2

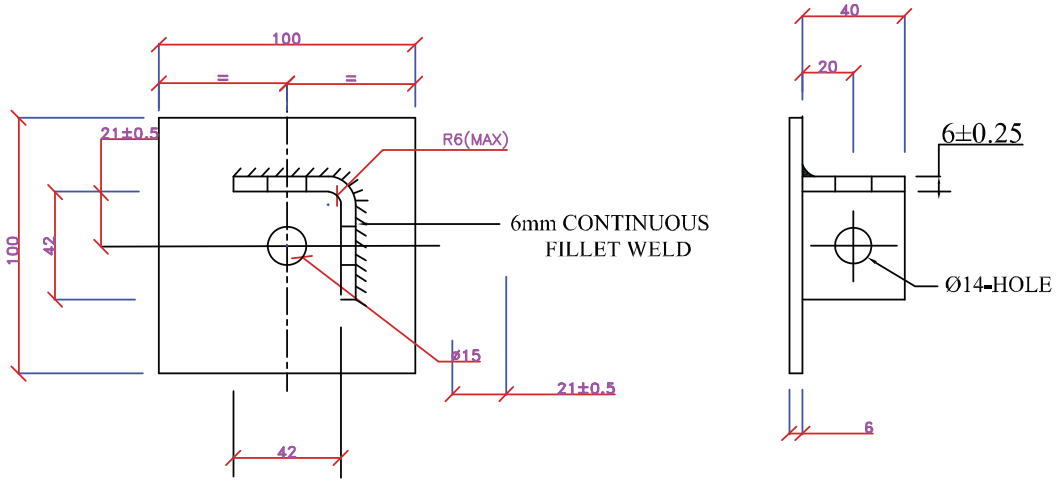
NOTES

1. ALL DIMENSIONS ARE IN mm.
2. MATERIAL :MILD STEEL AS PER IS-2062
3. FINISH : HOT DIP GALVANISED AS PER IS:2629
4. TOLERANCE ON THICKNESS AS PER IS:1852
5. ALL FABRICATION TOLERANCE AS PER RELEVANT IS.
6. ZINC COATING SHALL BE MIN. 75 MICRONS/ 610 G/SQ. M.

ANCHOR FASTENER–2NOs.
SPRING NUT & WASHER–1NO.

BHEL	TITLE: TYPICAL INSTALLATION DETAILS FOR CABLE TRAY SUPPORT SYSTEM	NTPC DOC. NO: 9587-001-215-PVE-C-046
		BHEL DRWG NO: PE-DG-508-507-E006
		REV.01 SH 05 OF 37





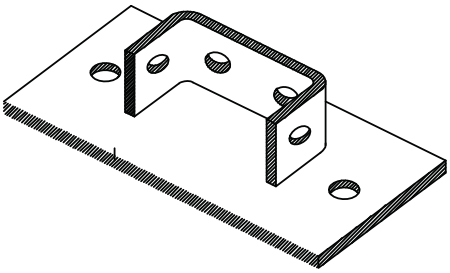
BASE PLATE FOR SINGLE CHANNEL BP1

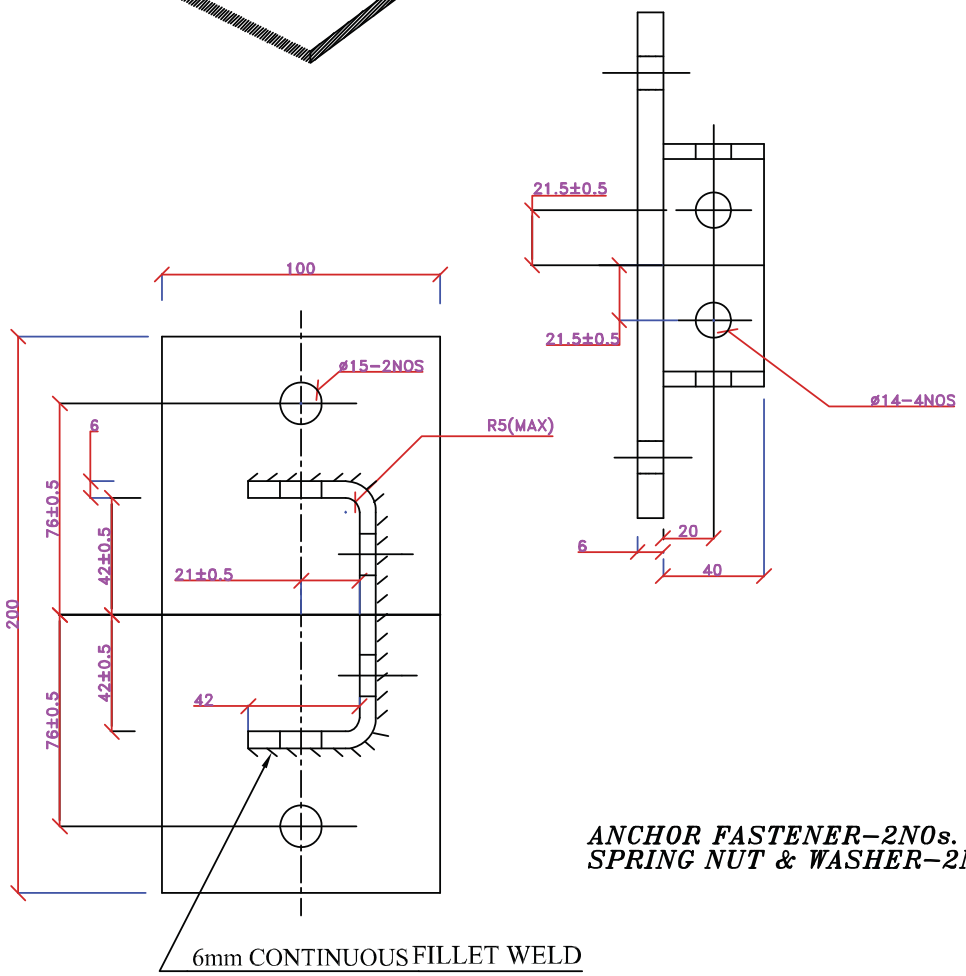
NOTE

ANCHOR FASTENER–1NO.
SPRING NUT & WASHER–1NO.

1. ALL DIMENSIONS ARE IN mm.
2. MATERIAL :MILD STEEL AS PER IS-2062
3. FINISH : HOT DIP GALVANISED AS PER IS:2629
4. TOLERANCE ON THICKNESS AS PER IS:1852
5. ALL FABRICATION TOLERANCE AS PER RELEVANT IS.
6. ZINC COATING SHALL BE MIN. 75 MICRONS/ 610 G/SQ. M.

BHEL	TITLE: TYPICAL INSTALLATION DETAILS FOR CABLE TRAY SUPPORT SYSTEM	NTPC DOC. NO: 9587-001-215-PVE-C-046
		BHEL DRWG NO: PE-DG-508-507-E006
		REV.01 / SH 06 OF 37





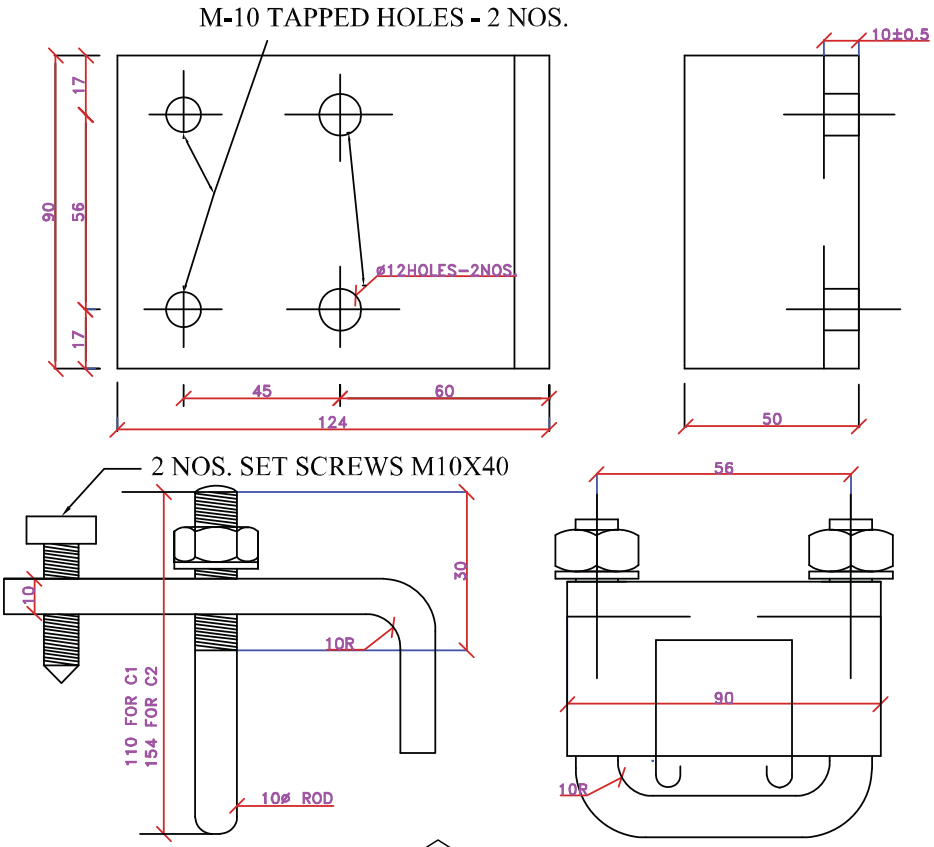
ANCHOR FASTENER–2NOs.
SPRING NUT & WASHER–2NOs.

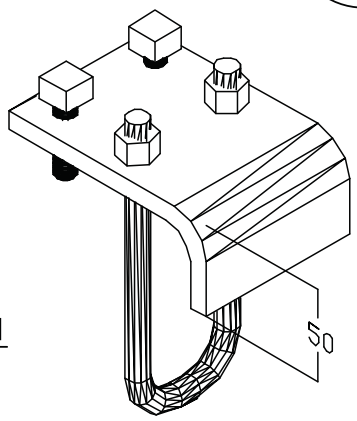
BASE PLATE FOR DOUBLE CHANNEL BP2

NOTE

1. ALL DIMENSIONS ARE IN mm.
2. MATERIAL :MILD STEEL AS PER IS-2062
3. FINISH : HOT DIP GALVANISED AS PER IS:2629
4. TOLERANCE ON THICKNESS AS PER IS:1852
5. ALL FABRICATION TOLERANCE AS PER RELEVANT IS.
6. ZINC COATING SHALL BE MIN. 75 MICRONS/ 610 G/SQ. M.

BHEL	TITLE: TYPICAL INSTALLATION DETAILS FOR CABLE TRAY SUPPORT SYSTEM	NTPC DOC. NO: 9587-001-215-PVE-C-046
		BHEL DRWG NO: PE-DG-508-507-E006
		REV.01 / SH 07 OF 37





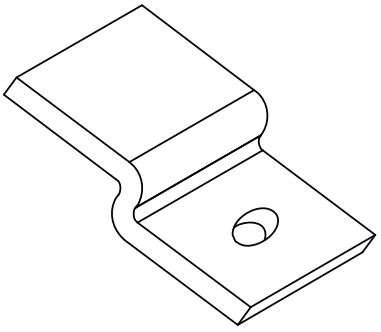
BEAM CLAMP - BC1

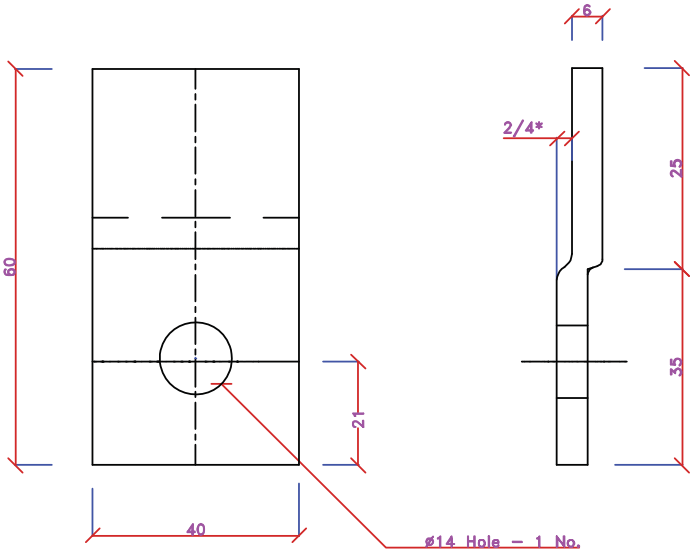
M–10 U–BOLT WITH
2Nos PLAIN WASHERS & NUTS
110 mm FOR SC 1
154 mm FOR DC1
2 NOs. SET SCREWS M10X40

NOTES

1. ALL DIMENSIONS ARE IN mm.
2. MATERIAL :MILD STEEL AS PER IS-2062
3. FINISH : HOT DIP GALVANISED AS PER IS:2629
4. TOLERANCE ON THICKNESS AS PER IS:1852
5. ALL FABRICATION TOLERANCE AS PER RELEVANT IS.
6. ZINC COATING SHALL BE MIN. 75 MICRONS/ 610 G/SQ. M.

TITLE:	TYPICAL INSTALLATION DETAILS FOR CABLE TRAY SUPPORT SYSTEM	NTPC DOC. NO: 9587-001-215-PVE-C-046
		BHEL DRWG NO: PE-DG-508-507-E006
		REV.01 / SH 08 OF 37





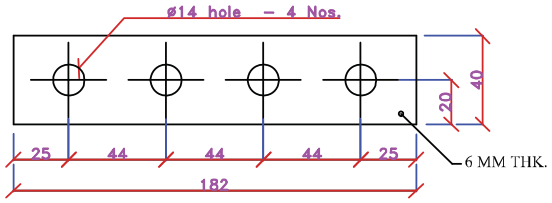
TRAY FIXING CLAMP - TC1

SPRING NUT & WASHER–1NO.
** :–2MM FOR TRAY FIXING CLAMP TC1*
4MM FOR FRP–TRAY FIXING CLAMP

NOTES

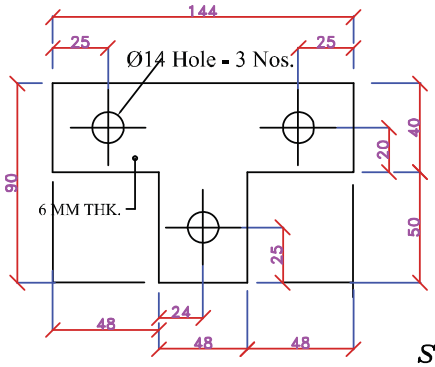
1. ALL DIMENSIONS ARE IN mm.
2. MATERIAL :MILD STEEL AS PER IS-2062
3. FINISH : HOT DIP GALVANISED AS PER IS:2629
4. TOLERANCE ON THICKNESS AS PER IS:1852
5. ALL FABRICATION TOLERANCE AS PER RELEVANT IS.
6. ZINC COATING SHALL BE MIN. 75 MICRONS/ 610 G/SQ. M.

भेल BHEL	TITLE: TYPICAL INSTALLATION DETAILS FOR CABLE TRAY SUPPORT SYSTEM	NTPC DOC. NO: 9587-001-215-PVE-C-046
		BHEL DRWG NO: PE-DG-508-507-E006
		REV.01 SH 09 OF 37



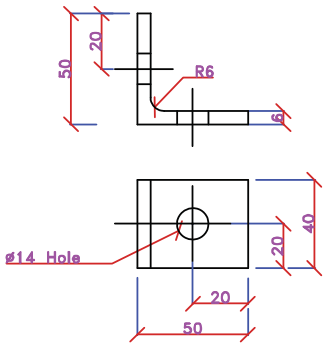
SPRING NUT & WASHER–4NOs.

FLAT PLATE STRAIGHT FITTING PF2



SPRING NUT & WASHER–3NOs.

FLAT PLATE TEE FITTING PF1



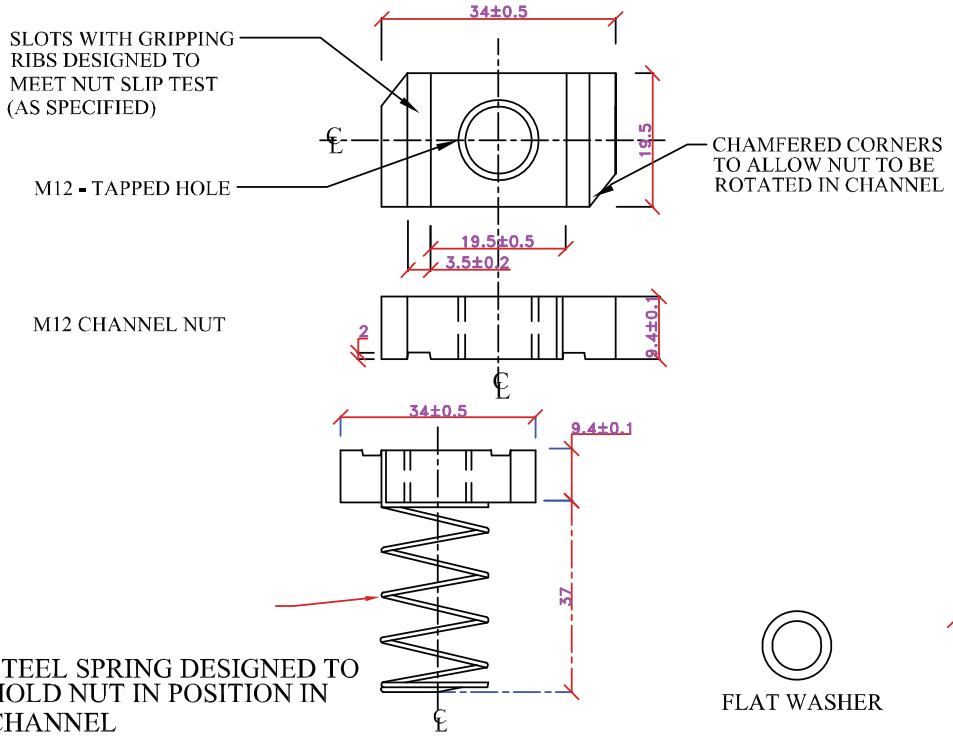
SPRING NUT & WASHER–2NOs.

90^0 ANGLE FITTING LA1

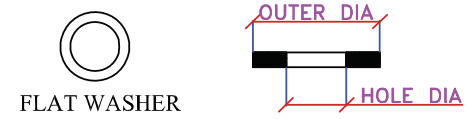
NOTES

1. ALL DIMENSIONS ARE IN mm.
2. MATERIAL :MILD STEEL AS PER IS-2062
3. FINISH : HOT DIP GALVANISED AS PER IS:2629
4. TOLERANCE ON THICKNESS AS PER IS:1852
5. ALL FABRICATION TOLERANCE AS PER RELEVANT IS.
6. ZINC COATING SHALL BE MIN. 75 MICRONS/ 610 G/SQ. M.

भेल BHEL	TITLE: TYPICAL INSTALLATION DETAILS FOR CABLE TRAY SUPPORT SYSTEM	NTPC DOC. NO: 9587-001-215-PVE-C-046
		BHEL DRWG NO: PE-DG-508-507-E006
		REV.01 SH 10 OF 37



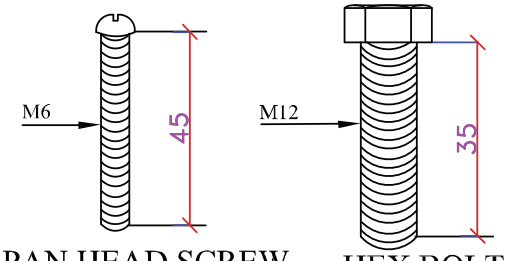
SPRING NUT ASSEMBLY



TYPICAL DETAILS OF WASHER

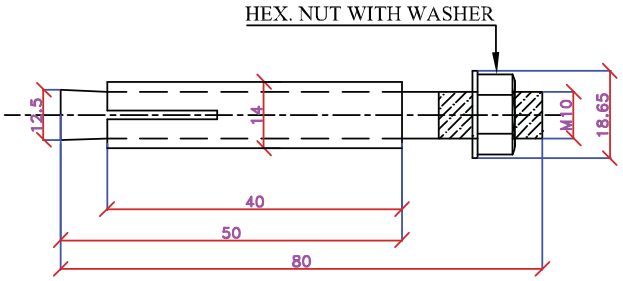
WASHER SIZE DETAILS

Sl.No.	BOLT/SCREW SIZE	HOLE DIA (IN MM)	OUTER DIA (IN MM)	WAHER THICKNESS (IN MM)
1	M6 PAN HEAD SCREW	6.4	12	1.6
2	M12 HEXA BOLT	13	24	2.5



PAN HEAD SCREW

HEX BOLT

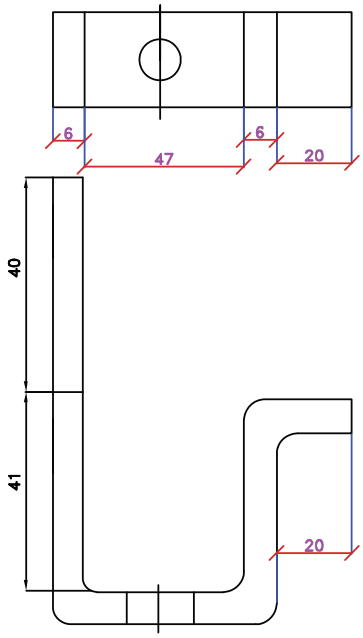


ANCHOR BOLT M10

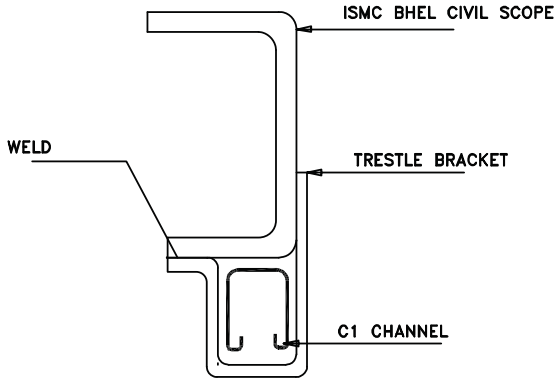
NOTES:

1. MATERIAL - MS AS PER IS - 2062.
2. M6 CHANNEL NUT DIMENSIONAL SIMILAR TO M12. EXCEPT HOLE DRILLED AND TAPPED TO M6 PAN HEAD SCREWS.
3. TAPPED HOLE THREADING TO MATCH WITH THREADING OF BOLTS.
4. SURFACE PROTECTION ELECTROGALVANISED / CADMIUM PLATED.
5. ALL DIMENSIONS ARE IN MM.
6. ZINC COATING SHALL BE MIN. 75 MICRONS/ 610 G/SQ. M.

TITLE:	TYPICAL INSTALLATION DETAILS FOR CABLE TRAY SUPPORT SYSTEM	NTPC DOC. NO: 9587-001-215-PVE-C-046
		BHEL DRWG NO: PE-DG-508-507-E006
		REV.01 / SH 11 OF 37



TRESTLE BRAKET



FIXING ARRANGMENT OF TRESTLE BRACKET

NOTES

1. ALL DIMENSIONS ARE IN mm.
2. MATERIAL :MILD STEEL AS PER IS-2062
3. FINISH : HOT DIP GALVANISED AS PER IS:2629
4. TOLERANCE ON THICKNESS AS PER IS:1852
5. ALL FABRICATION TOLERANCE AS PER RELEVANT IS.
6. ZINC COATING SHALL BE MIN. 75 MICRONS/ 610 G/SQ. M.

TITLE:	TYPICAL INSTALLATION DETAILS FOR CABLE TRAY SUPPORT SYSTEM	NTPC DOC. NO: 9587-001-215-PVE-C-046
		BHEL DRWG NO: PE-DG-508-507-E006
		REV.01 / SH 12 OF 37

ANNEXURE - 4

TYPICAL DETAILS OF TYPE TEST PROCEDURE/ TEST ARRANGEMENT

REVISIONS				
		NAME	DATE	

TITLE:	TYPICAL DETAILS OF TYPE TEST ARRANGEMENT	DRAWN	NAME	DATE
		DSGN		
DRG. NO.	PE-DG-999-507-E114	CHKD		
		APPD		

BHARAT HEAVY ELECTRICALS LTD.
PROJECT ENGINEERING MANAGEMENT
NOIDA

SH 1 OF 10

TYPE TEST PROCEDURE FOR CABLE TRAY SUPPORT SYSTEM [BOLTABLE TYPE]

1.0 Type tests on Support System for Cable Trays

1.1 **TEST 1 A**

On main support channel type-DC1 for cantilever arms fixed on one side only. A 3.5 metre length of main support channel shall be fixed vertically at each end to a rigid structure as per the fixing arrangement as shown in the enclosed drawing PE-DG-999-507-E114 (Sheet 05 of 10). Eight (8) nos. 750/650 mm cantilever arms shall be fixed to the main channel and arm 1 & 2 of shall be uniformly loaded to a working load of 100 kg over the outboard 600mm. Subsequently a point load of 100 kg shall be applied on arm 2. A uniform proof load on all the arms equal to twice the working load shall be then be applied. Deflections shall be measured at the points shown in the enclosed drawings and at the following load intervals:

i) Working load
ii) Working load + point load
iii) Off load
iv) Proof load + point load
v) Off load

The deflection measured at working loads shall not exceed 16mm. The permanent deflection after removing the combination of working load and point load shall not exceed 10 mm at the arm tips and 6 mm on the channel. No collapse of the structure shall occur with a combination of proof load and point load applied.

1.2 **TEST 1 B**

Test 1 A shall be repeated with Eight Cantilever arms uniformly loaded and with the same point load on arm 2.

2.0 TEST 2

On Main support channel type – DC1 for cantilever arms fixed on both sides

2.1 **TEST 2 A**

A 3.5 m length of main support channel DC1 for cantilever arms fixing on both sides shall be fixed at each end to rigid structure as per the fixing arrangement as shown in the enclosed drawing PE-DG-999-507-E114(Sheet 06 of 10). Six (6) nos. 750/650 mm cantilever arms shall be attached to each sides and each arm uniformly loaded to a working load of 100 kg over the outboard 600 mm. A point load of 100 kg shall then be applied to arm 2, followed by a uniform proof load of twice the working load on all the arms, deflection shall be measured at points shown in the enclosed drawings at the following load intervals.

i) Working load

ii) Working load + point load

iii) Offload

iv) Proof load + point load

v) Offload

The deflection measured at working loads shall not exceed 16mm. The permanent deflection after removing the combination of working load and point load shall not exceed 10 mm at the arm tips and 6 mm on the channel. No collapse of the structure shall occur with a combination of proof load and point load applied.

2.2 **TEST 2 B**

Test 2 A shall be repeated with the assembly but with an asymmetrical load on the DC1 column and point load applied to arm 8 as shown in the enclosed drawing PE-DG-999-507-E114 (Sheet 07 of 10). The 100 kg and 200 kg uniformly distributed loads shall be applied to the upper three arms on one side and the lower three arms on the opposite side.

3.0 TEST 3

Tests on Channel Fixed on Beam/Floor
A length of main support channel section shall be fixed to steel structure/ floor and have loads applied as shown in the drawing no. PE-DG-999-507-E114 (sheet 08 of 10) enclosed and as detailed below:

3.1 **TEST 3 A**

A length of steel structure shall be rigidly supported. It should be fitted on a metre length of channel section using beam clamps welded/bolted. A point load of 1200 kg shall be applied to the centre point via two brackets. No distortion or pulling of the components shall take place.

3.2 **TEST 3 B**

With the components assembled in Test 3A, two perpendicular point loads of 600 kg shall be simultaneously applied at positions 150 mm either side of the centre line, no distortion or pulling of the components shall take place.

3.3 **TEST 3 C**

With the components assembled as in Test 3 A, a perpendicular point load of shall be applied at a point 150 mm on one side of the centre line.

The load shall be gradually increased to the maximum value that can be applied without causing distortion or pulling of the components. This value shall be recorded.

4.0 TEST 4: CHANNEL INSERT (If applicable)

2.5 metre of SC1 Channel fixed to the concrete wall / steel structure as per actual site installation conditions. 6 nos. of 750/650 mm cantilever arms shall be fixed to the SC1 Channel as shown in enclosed drawing PE-DG-999-507-E114 (sheet 09 of 10). Each arm uniformly loaded to a working load of 100 kg over the out board 600 mm. A point load of 100 kg shall then be applied to arm 2, followed by a uniform proof load of twice the working load on all the arms; deflection shall be measured at points shown in the enclosed drawing at the following load intervals:

i) Working load
ii) Working load + point load
iii) Offload
iv) Proof load + point load
v) Offload

The deflection measured at working loads shall not exceed 16mm. The permanent deflection after removing the combination of working load and point load shall not exceed 10 mm at the arm tips and 6 mm on the channel. No collapse of the structure shall occur with a combination of proof load and point load applied.

5.0 TEST 5:

Channel nut slip characteristics (If applicable)

TEST 5 A1, 5 A2, and 5 A3:
A length of channel SC1 section 200 mm long shall have fitted brackets with the two bolts fixing as shown in enclosed drawing PE-DG-999-507-E114 (sheet 10 of 10).
With loads applied at the position shown in drawing enclosed nut slip shall be determined with bolt torque of 30 NM, 50 NM and 65 NM. No fewer than three measurements shall be made for each torque setting.

A minimum loading of 720 kg shall be obtained before nut slip with bolt torque of 65 NM.

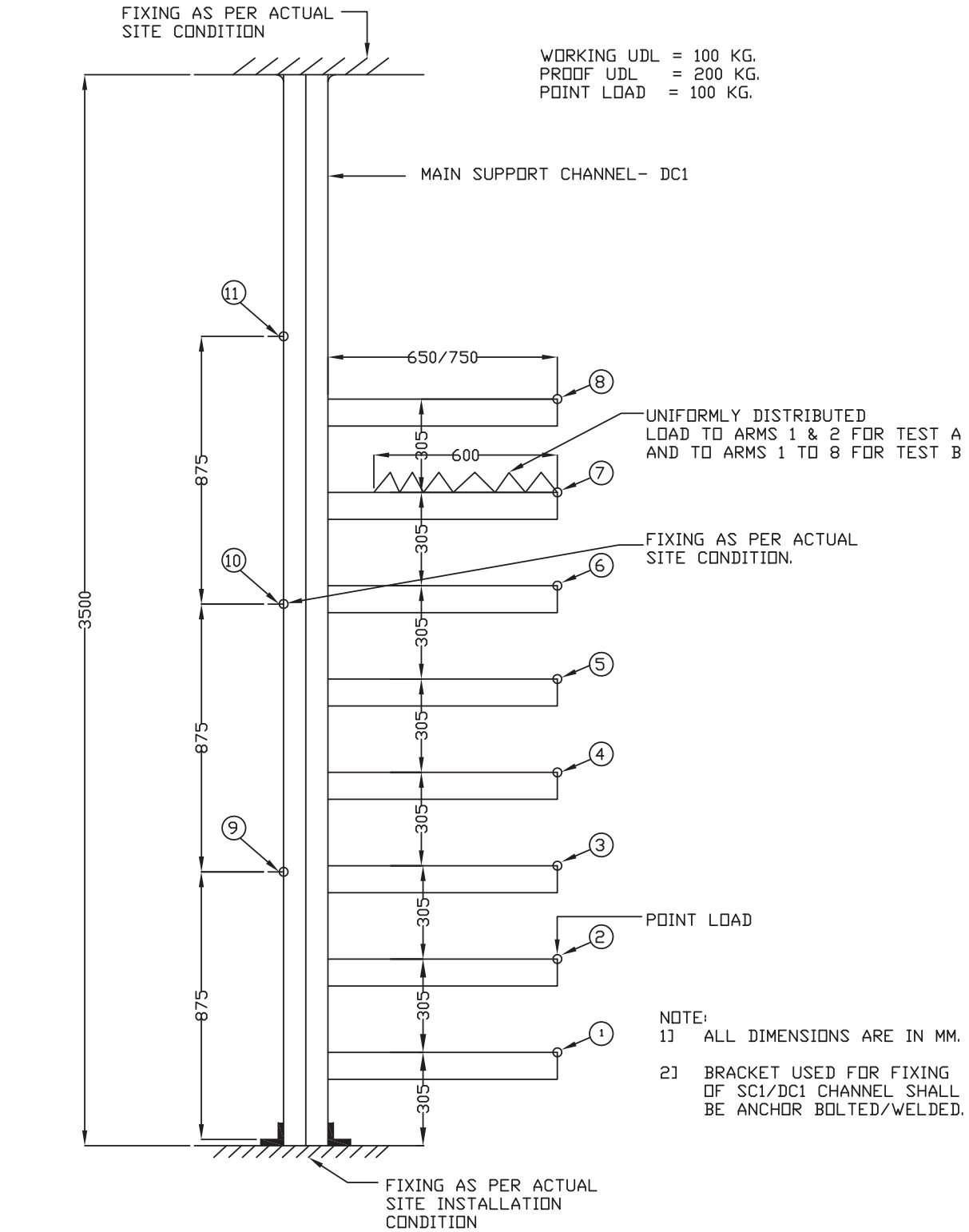
TEST 5 B1, 5 B2, and 5 B3:
The length of channel SC1 section 200 mm long shall have fitted bracket with the one bolt fixing as shown in enclosed drawing PE-DG-999-507-E114 (sheet 10 of 10).
With loads applied at the position shown in drawing enclosed nut slip shall be determined with bolt torque of 30 NM, 50 NM and 65 NM. No fewer than three measurements shall be made for each torque setting.

A minimum loading of 350 kg shall be obtained before nut slip with a bolt torque of 65 NM.

6.0 TEST 6:

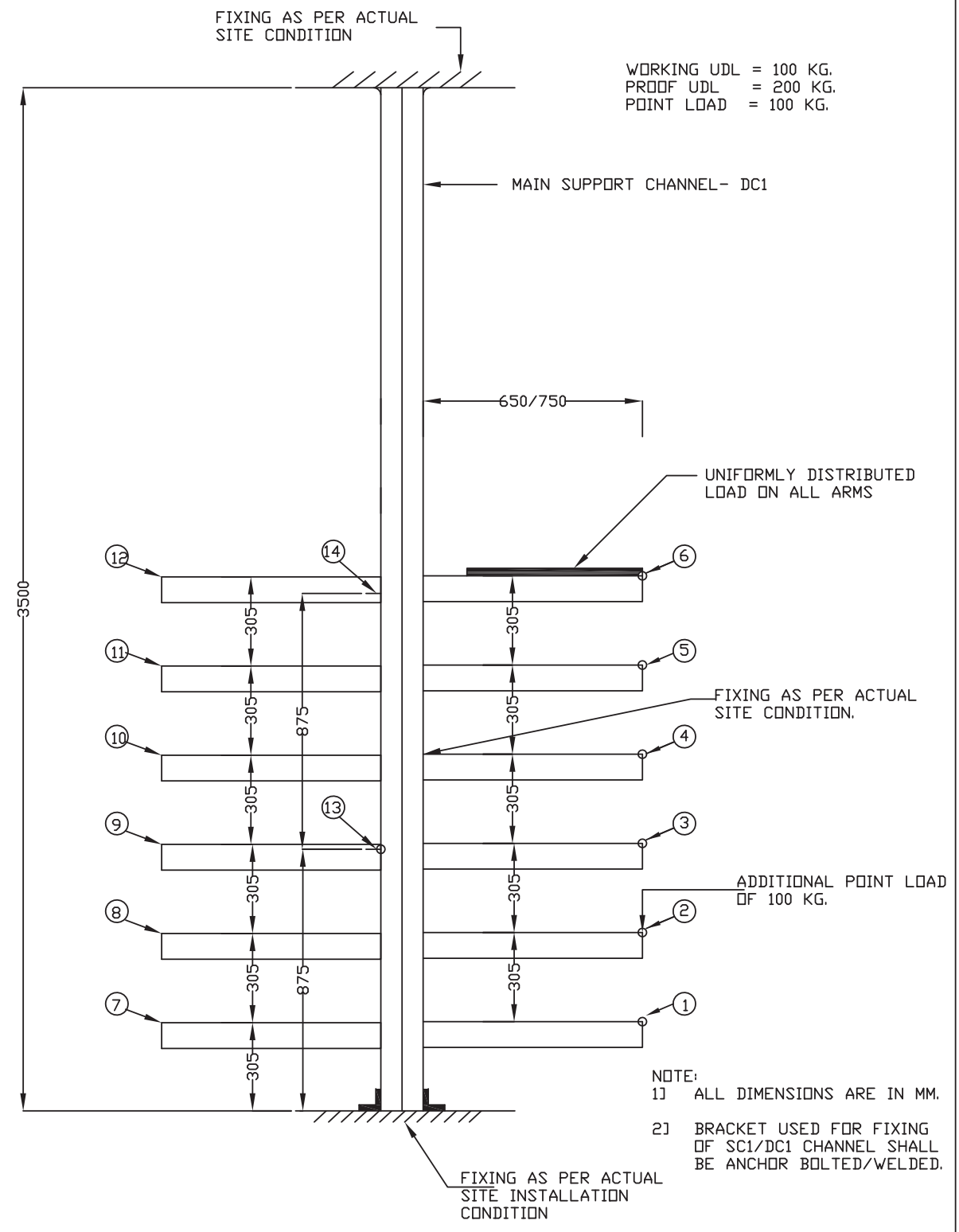
Weld Integrity Test

After the deflection test as per test 1A, 1B, 2A, 2B and 4 above weld integrity shall be checked by magnetic particle inspection to detect sub- surface cracks developed, if any.



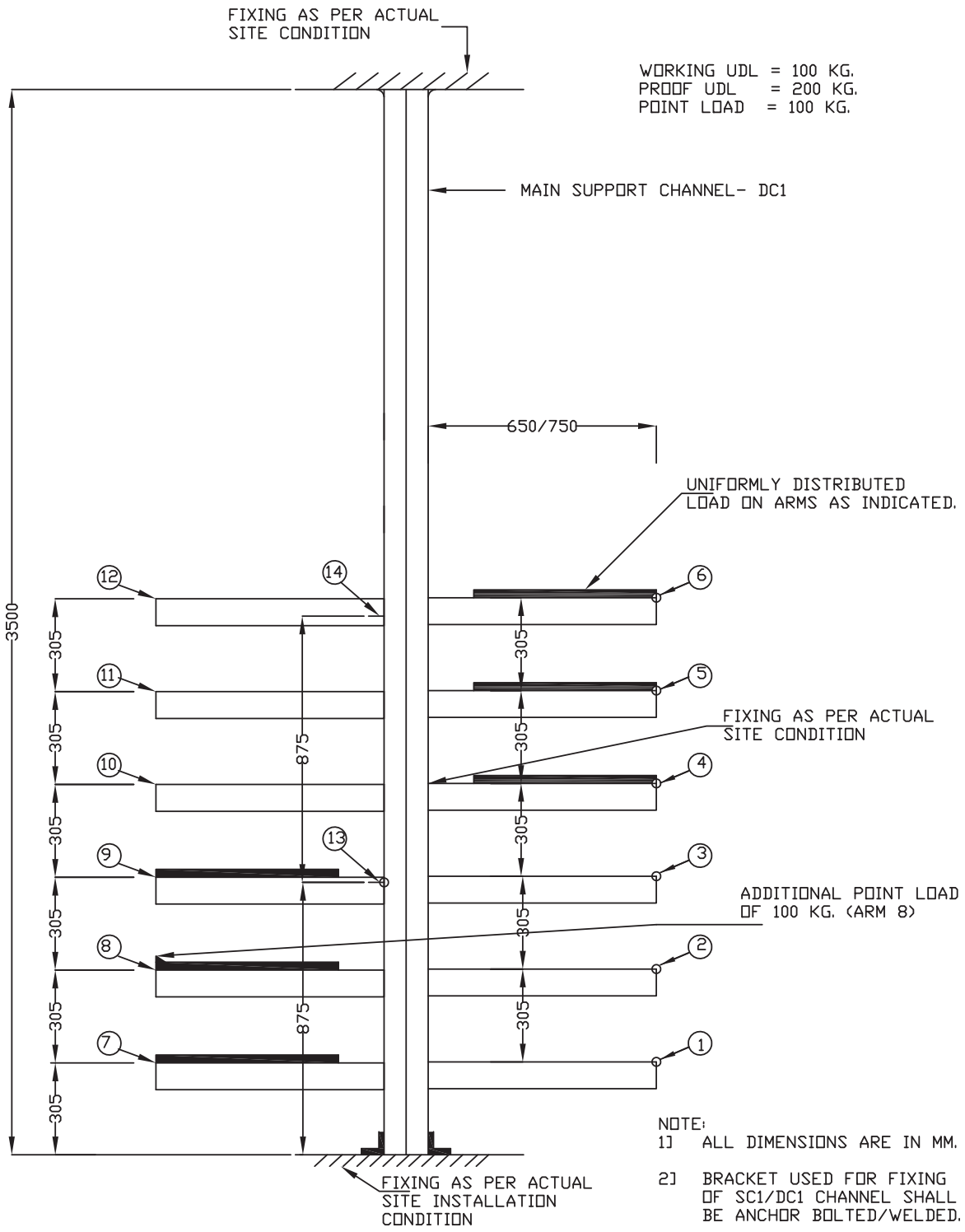
TEST : 1A & 1B: MAIN SUPPORT CHANNEL (CANTILEVER ARM ON ONE SIDE)

भेल BHEL	TITLE: TYPICAL DETAILS OF TYPE TEST ARRANGEMENT	DRG. NO. PE-DG-999-507-E114
		SH 5 OF 10



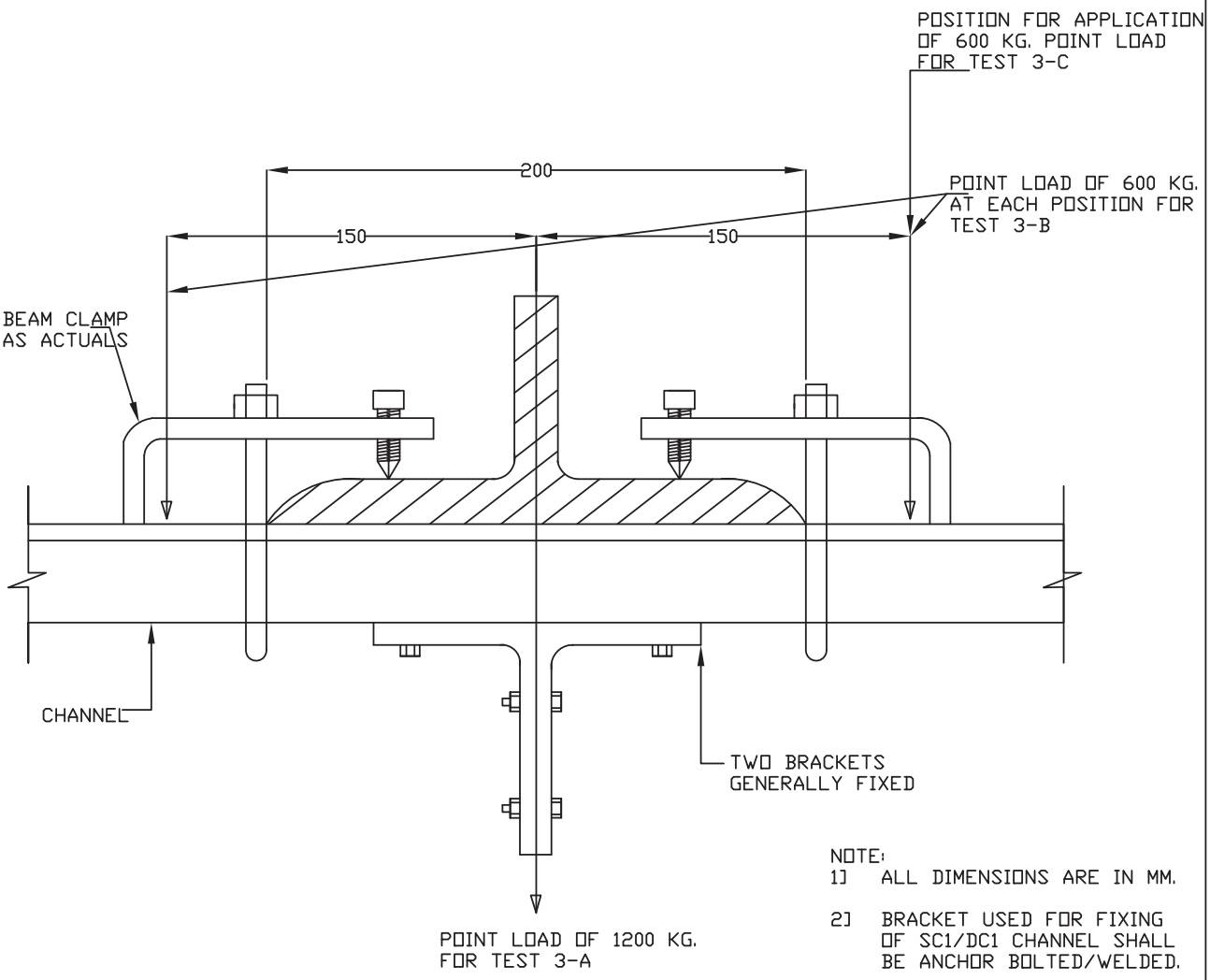
TEST : 2A: MAIN SUPPORT CHANNEL (CANTILEVER ARM ON BOTH SIDES)

BHEL	TITLE: TYPICAL DETAILS OF TYPE TEST ARRANGEMENT	DRG. NO. PE-DG-999-507-E114
		SH 6 OF 10



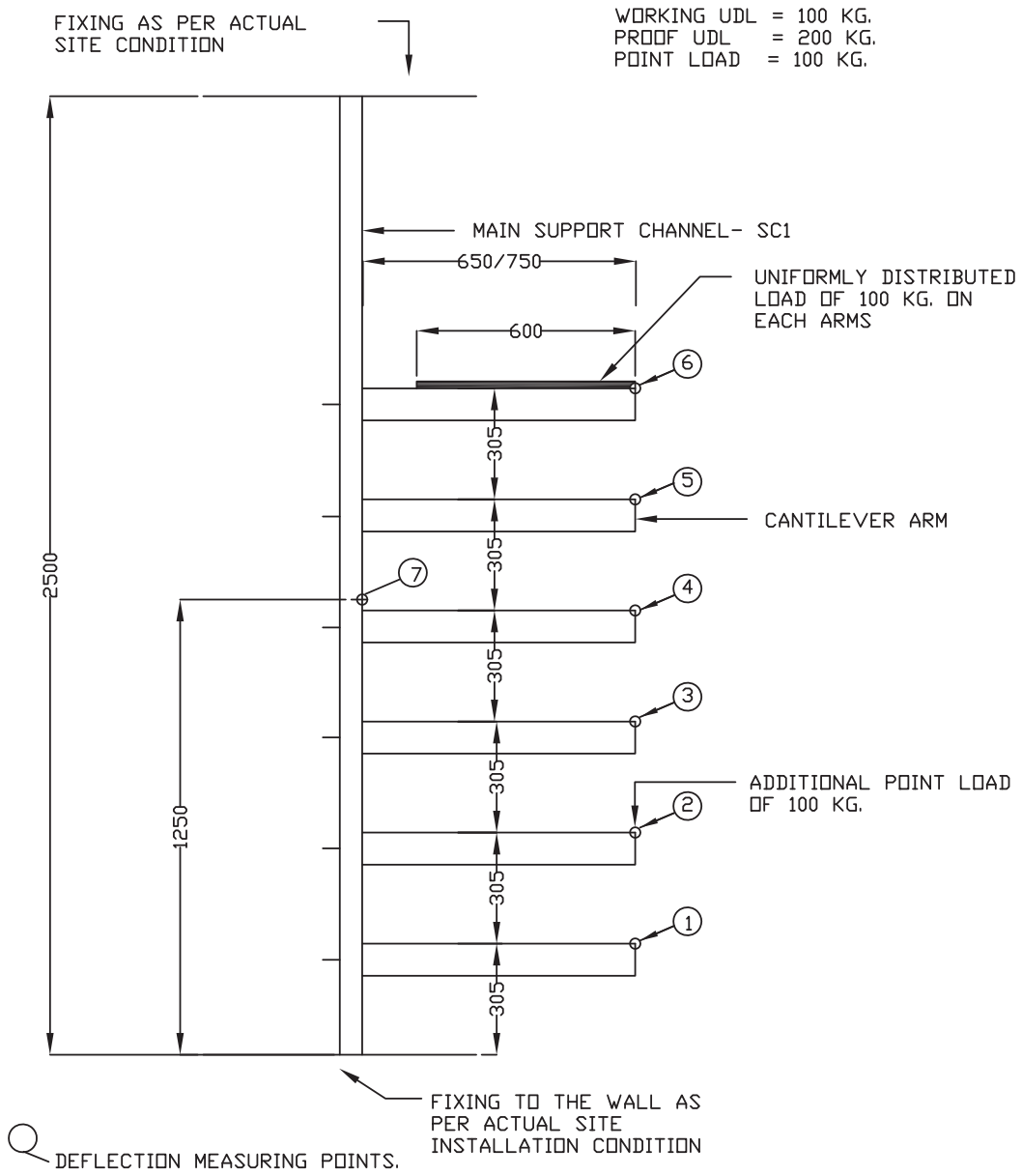
TEST : 2B: MAIN SUPPORT CHANNEL (ASYMMETRIC LOADING)

BHEL	TITLE: TYPICAL DETAILS OF TYPE TEST ARRANGEMENT	DRG. NO. PE-DG-999-507-E114
		SH 7 OF 10



TEST : 3A, 3B, 3C: CHANNEL FIXED ON BEAM/FLOOR.

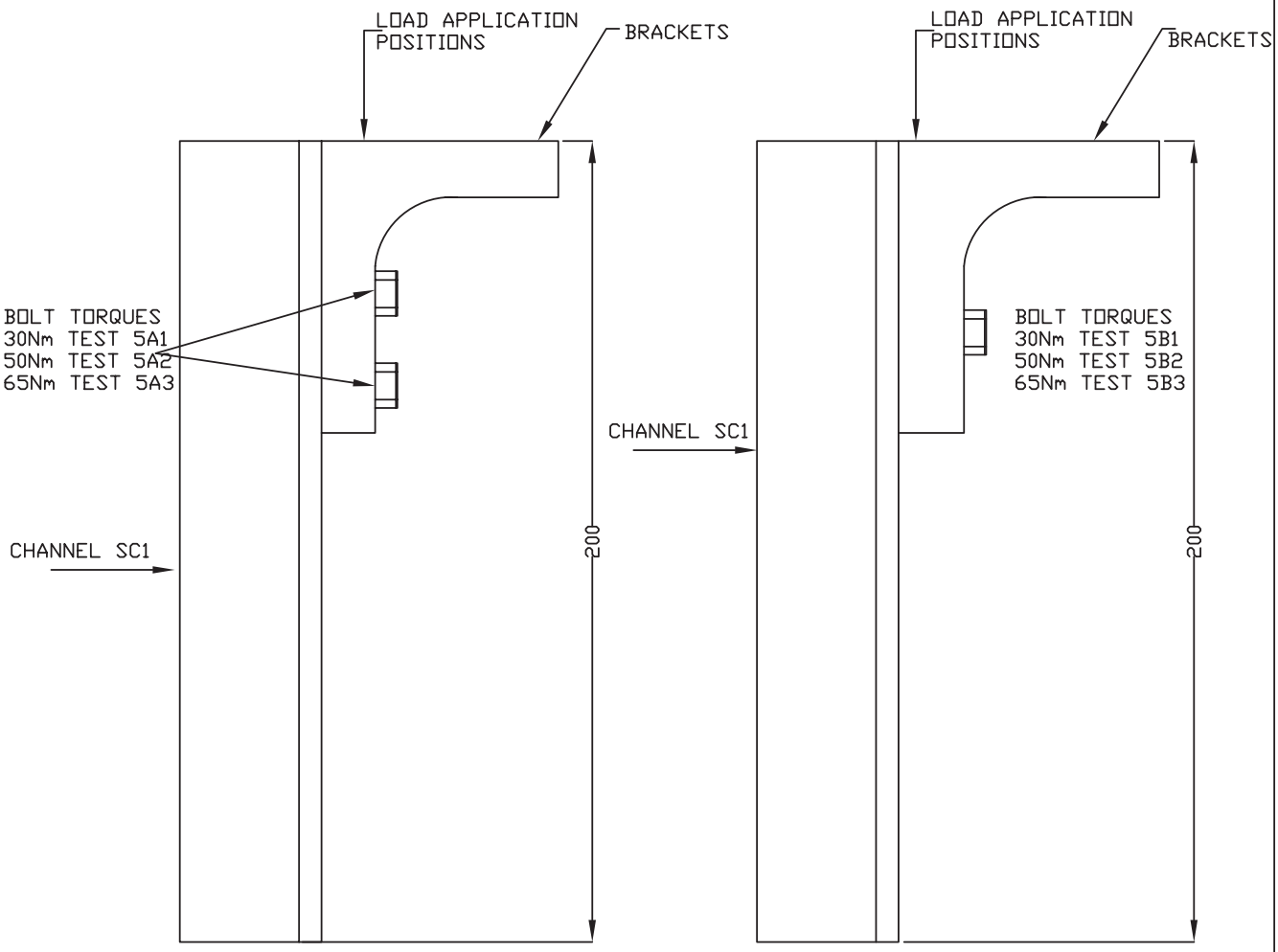
BHEL	TITLE: TYPICAL DETAILS OF TYPE TEST ARRANGEMENT	DRG. NO. PE-DG-999-507-E114
		SH 8 OF 10



NOTE:
1] ALL DIMENSIONS ARE IN MM.

TEST : 4: CHANNEL INSERT

BHEL	TITLE: TYPICAL DETAILS OF TYPE TEST ARRANGEMENT	DRG. NO. PE-DG-999-507-E114
		SH 9 OF 10



ASSEMBLY USING M12 X 25MM LONG HEX. HD. SCREWS LOCK WASHER AND M12 CHANNEL NUT WITH SPRING

TEST : 5A1, 5A2, 5A3:
CHANNEL NUT SLIP CHARACTERISTIC

ASSEMBLY USING M12 X 25MM LONG HEX. HD. SCREWS LOCK WASHER AND M12 CHANNEL NUT WITH SPRING

TEST : 5B1, 5B2, 5B3:
CHANNEL NUT SLIP CHARACTERISTIC

NOTE:
1] ALL DIMENSIONS ARE IN MM.

भेल BHEL	TITLE: TYPICAL DETAILS OF TYPE TEST ARRANGEMENT	DRG. NO. PE-DG-999-507-E114
		SH 10 OF 10

ANNEXURE - C

BHEL	**Price Variation Formulae**	**ANNEXURE-C**

Prices shall be variable as per following PVC formulae: -

Cable tray Support System-Boltable	
P = Po/100 (20 + 58 (SBIR/SBIRo) + 7 (Zn/Zno) +15 (W/ Wo))	Indices to be taken from IEEMA Circular (IEEMA(PVC)/TLA&H(R-3)/_/_) for the applicable month.

Wherein,

P = Price payable as adjusted in accordance with the above formula.

Po = Price quoted/confirmed.

SBIRo = Price of Steel Billets- Retail (refer notes)
This price is as applicable on the 1st working day of the month, one month prior to the date of tendering.

Zno = Price of Electrolytic high grade zinc (refer notes)
This price is as applicable on the 1st working day of the month, one month prior to the date of tendering.

Wo = All India average consumer price index number for industrial workers, as published by the Labour Bureau, Ministry of Labour, Govt. of India (Base: 2016 = 100) (Refer notes)
This index number is as applicable on the first working day of the month, **three months** prior to the date of tendering.

SBIR = Price of Steel Billets-Retail (refer notes)
This price is as applicable on the 1st working day of the month, two 'months prior to the date of delivery.

Zn = Price of Electrolytic high grade zinc (refer notes)
This price is as applicable on the 1st working day of the month, two months prior to the date of delivery.

W = All India average consumer price index number for industrial workers, as published by the Labour Bureau, Ministry of Labour, Govt. of India (Base: 2016 = 100) (refer notes)
This index number is as applicable on the first working day of the month, **four months** prior to the date of delivery.

The date of delivery is the date on which materials are notified as being ready for inspection/dispatch (in the absence of such notification, the date of manufacturer's dispatch note is to be considered as the date of delivery) or the contracted delivery date (including any agreed extension thereto), whichever is earlier.

	Price Variation Formulae	**ANNEXURE-C**

Notes:

(a) All prices of raw materials are exclusive of modvatable excise/CV duty amount and exclusive of any other central, state or local taxes; octroi etc.

(b) All prices are as on first working day of the month.

(c) PVC ceiling limit shall be positive (+ve) 20% and negative (-ve) unlimited.

Annexure-1

INTEGRITY PACT

Between

Bharat Heavy Electricals Ltd. (BHEL), a company registered under the Companies Act 1956 and having its registered office at "BHEL House", Siri Fort, New Delhi - 110049 (India) hereinafter referred to as "The Principal", which expression unless repugnant to the context or meaning hereof shall include its successors or assigns of the ONE PART

and

_____, (description of the party along with address), hereinafter referred to as "The Bidder/ Contractor" which expression unless repugnant to the context or meaning hereof shall include its successors or assigns of the OTHER PART

Preamble

The Principal intends to award, under laid-down organizational procedures, contract/s for _ supply of __
CABLE TRAY SUPPORT SYSTEM -BOLTABLE FOR 2 X 800 MW NTPC LARA STPS STAGE-II
_____ (hereinafter referred to as "Contract"). The Principal values full compliance with all relevant laws of the land, rules and regulations, and the principles of economic use of resources, and of fairness and transparency in its relations with its Bidder(s)/ Contractor(s).

In order to achieve these goals, the Principal will appoint panel of Independent External Monitor(s) (IEMs), who will monitor the tender process and the execution of the contract for compliance with the principles mentioned above.

Section 1- Commitments of the Principal

1.1 The Principal commits itself to take all measures necessary to prevent corruption and to observe the following principles: -

1.1.1 No employee of the Principal, personally or through family members, will in connection with the tender for, or the execution of a contract, demand, take a promise for or accept, for self or third person, any material or immaterial benefit which the person is not legally entitled to.

1.1.2 The Principal will, during the tender process treat all Bidder(s) with equity and reason. The Principal will in particular, before and during the tender process, provide to all Bidder(s) the same information and will not provide to any Bidder(s) confidential/ additional information through which the Bidder(s) could obtain an advantage in relation to the tender process or the contract execution.

1.1.3 The Principal will exclude from the process all known prejudiced persons.

1.2 If the Principal obtains information on the conduct of any of its employees which is a penal offence under the Indian Penal Code 1860 and Prevention of Corruption Act 1988 or any other statutory penal enactment, or if there be a substantive suspicion in this regard, the Principal will inform its Vigilance Office and in addition can initiate disciplinary actions.

Section 2 - Commitments of the Bidder(s)/ Contractor(s)

2.1 The Bidder(s)/ Contractor(s) commit himself to take all measures necessary to prevent corruption. The Bidder(s)/ Contractor(s) commits himself to observe the following principles during participation in the tender process and during the contract execution.

2.1.1 The Bidder(s)/ Contractor(s) will not, directly or through any other person or firm, offer, promise or give to the Principal or to any of the Principal's employees involved in the tender process or the execution of the contract or to any third person any material, immaterial or any other benefit which he/ she is not legally entitled to, in order to obtain in exchange any advantage of any kind whatsoever during the tender process or during the execution of the contract.

2.1.2 The Bidder(s)/ Contractor(s) will not enter with other Bidder(s) into any illegal or undisclosed agreement or understanding, whether formal or informal. This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or non-submission of bids or any other actions to restrict competitiveness or to introduce cartelization in the bidding process.

2.1.3 The Bidder(s)/ Contractor(s) will not commit any penal offence under the relevant Indian Penal Code (IPC) and Prevention of Corruption Act; further the Bidder(s)/ Contractor(s) will not use improperly, for purposes of competition or personal gain, or pass on to others, any information or document provided by the Principal as part of the business relationship, regarding plans, technical proposals and business details, including information contained or transmitted electronically.

2.1.4 Foreign Bidder(s)/ Contractor(s) shall disclose the name and address of agents and representatives in India and Indian Bidder(s)/ Contractor(s) to disclose their foreign principals or associates. The Bidder(s)/ Contractor(s) will, when presenting his bid, disclose any and all payments he has made, and is committed to or intends to make to agents, brokers or any other intermediaries in connection with the award of the contract.

2.2 The Bidder(s)/ Contractor(s) will not instigate third persons to commit offences outlined above or be an accessory to such offences.

2.3 The Bidder(s)/ Contractor(s) shall not approach the Courts while representing the matters to IEMs and shall await their decision in the matter.

Section 3 - Disqualification from tender process and exclusion from future contracts

If the Bidder(s)/ Contractor(s), before award or during execution has committed a transgression through a violation of Section 2 above, or acts in any other manner such as to put his reliability or credibility in question, the Principal is entitled to disqualify the Bidder(s)/ Contractor(s) from the tender process , terminate the contract, if already awarded, exclude from future business dealings and/ or take action as per the separate "Guidelines on Banning of Business dealings with Suppliers/ Contractors", framed by the Principal.

Section 4 - **Compensation for Damages**

4.1 If the Principal has disqualified the Bidder (s) from the tender process before award / order acceptance according to Section 3, the Principal is entitled to demand and recover the damages equivalent to Earnest Money Deposit/ Bid Security.

4.2 If the Principal is entitled to terminate the Contract according to Section 3, or terminates the Contract in application of Section 3 above , the Bidder(s)/ Cotractor (s) transgression through a violation of Section 2 above shall be construed breach of contract and the Principal shall be entitled to demand and recover from the Contractor an amount equal to 5% of the contract value or the amount equivalent to Security Deposit/ Performance Bank Guarantee , whichever is higher, as damages, in addition to and without prejudice to its right to demand and recover compensation for any other loss or damages specified elsewhere in the contract.

Section 5 - Previous Transgression

5.1 The Bidder declares that no previous transgressions occurred in the last 3 (three) years with any other company in any country conforming to the anti-corruption approach or with any other Public Sector Enterprise in India that could justify his exclusion from the tender process.

5.2 If the Bidder makes incorrect statement on this subject, he can be disqualified from the tender process or the contract, if already awarded, can be terminated for such reason or action can be taken as per the separate "Guidelines on Banning of Business dealings with Suppliers/ Contractors", framed by the Principal.

Section 6 - Equal treatment of all Bidder (s)/ Contractor (s) / Sub-contractor (s)

6.1 The Principal will enter into Integrity Pacts with identical conditions as this Integrity Pact with all Bidders and Contractors.

6.2 In case of Sub-contracting, the Principal Contractor shall take the responsibility of the adoption of Integrity Pact by the Sub-contractor(s) and ensure that all Sub-contractors also sign the Integrity Pact.

6.3 The Principal will disqualify from the tender process all Bidders who do not sign this Integrity Pact or violate its provisions.

Section 7 - Criminal Charges against violating Bidders/ Contractors /Subcontractors

If the Principal obtains knowledge of conduct of a Bidder, Contractor or Subcontractor, or of an employee or a representative or an associate of a Bidder, Contractor or Subcontractor which constitutes corruption, or if the Principal has substantive suspicion in this regard, the Principal will inform the Vigilance Office.

Section 8 -Independent External Monitor(s)

8.1 The Principal appoints competent and credible panel of Independent External Monitor (s) (IEMs) for this Integrity Pact. The task of the IEMs is to review independently and objectively, whether and to what extent the parties comply with the obligations under this Integrity Pact.

8.2 The IEMs are not subject to instructions by the representatives of the parties and performs his functions neutrally and independently. He reports to the CMD, BHEL.

8.3 The IEMs shall be provided access to all documents/ records pertaining to the Contract, for which a complaint or issue is raised before them as and when warranted. However, the documents/records/information having National Security implications and those documents which have been classified as Secret/Top Secret are not to be disclosed.

8.4 The Principal will provide to the IEMs sufficient information about all meetings among the parties related to the Contract provided such meetings could have an impact on the contractual relations between the Principal and the Contractor. The parties offer to the IEMs the option to participate in such meetings.

8.5 The advisory role of IEMs is envisaged as that of a friend, philosopher and guide. The advice of IEMs would not be legally binding and it is restricted to resolving issues raised by a Bidder regarding any aspect of the tender which allegedly restricts competition or bias towards some Bidders. At the same time, it must be understood that IEMs are not consultants to the Management. Their role is independent in nature and the advice once tendered would not be subject to review at the request of the organization.

8.6 For ensuring the desired transparency and objectivity in dealing with the complaints arising out of any tendering process or during execution of Contract, the matter should be examined by the full panel of IEMs jointly, who would look into the records, conduct an investigation, and submit their joint recommendations to the Management.

8.7 The IEMs would examine all complaints received by them and give their recommendations/ views to the CMD, BHEL at the earliest. They may also send their report directly to the CVO, in case of suspicion of serious irregularities requiring legal/ administrative action. Only in case of very serious issue having a specific, verifiable Vigilance angle, the matter should be reported directly to the Commission. IEMs will tender their advice on the complaints within 30 days.

8.8 The CMD, BHEL shall decide the compensation to be paid to the IEMs and its terms and conditions.

8.9 IEMs should examine the process integrity, they are not expected to concern themselves with fixing of responsibility of officers. Complaints alleging mala fide on the part of any officer of the Prinicpal should be looked into by the CVO of the Principal.

8.10 If the IEMs have reported to the CMD, BHEL, a substantiated suspicion of an offence under relevant Indian Penal Code / Prevention of Corruption Act, and the CMD, BHEL has not, within reasonable time, taken visible action to proceed against such offence or reported it to the Vigilance Office, the IEMs may also transmit this information directly to the Central Vigilance Commissioner, Government of India.

8.11 After award of work, the IEMs shall look into any issue relating to execution of Contract, if specifically raised before them. As an illustrative example, if a Contractor who has been awarded the Contract, during the execution of Contract, raises issue of delayed payment etc. before the IEMs, the same shall be examined by the panel of IEMs. Issues like warranty/ guarantee etc. shall be outside the purview of IEMs.

8.12 However, the IEMs may suggest systemic improvements to the management of the Principal, if considered necessary, to bring about transparency, equity and fairness in the system of procurement.

8.13 The word `Monitor' would include both singular and plural.

Section 9 - Pact Duration

9.1 This Integrity Pact shall be operative from the date this Integrity Pact is signed by both the parties till the final completion of contract for successful Bidder, and for all other Bidders 6 months after the Contract has been awarded. Any violation of the same would entail disqualification of the bidders and exclusion from future business dealings.

9.2 If any claim is made/ lodged during currency of this Integrity Pact, the same shall be binding and continue to be valid despite the lapse of this Pact as specified above, unless it is discharged/ determined by the CMD, BHEL.

Section 10 - Other Provisions

10.1 This Integrity Pact is subject to Indian Laws and exclusive jurisdiction shall be of the competent Courts as indicated in the Tender or Contract, as the case may be.

10.2 Changes and supplements as well as termination notices need to be made in writing.

10.3 If the Bidder(s)/ Contractor(s) is a partnership or a consortium or a joint venture, this Integrity Pact shall be signed by all partners of the partnership or joint venture or all consortium members.

10.4 Should one or several provisions of this Integrity Pact turn out to be invalid, the remainder of this Integrity Pact remains valid. In this case, the parties will strive to come to an agreement to their original intentions.

10.5 Only those bidders / contractors who have entered into this Integrity Pact with the Principal would be competent to participate in the bidding. In other words, entering into this Integrity Pact would be a preliminary qualification.

10.6 In the event of any dispute between the Principal and Bidder(s)/ Contractor(s) relating to the Contract, in case, both the parties are agreeable, they may try to settle dispute through Mediation before the panel of IEMs in a time bound manner. In case, the dispute remains unresolved even after mediation by the panel of IEMs, either party may take further action as the terms & conditions of the Contract. The fees/expenses on dispute resolution through mediation shall be shared by both the parties. Further, the mediation proceedings shall be confidential in nature and the parties shall keep confidential all matters relating to the mediation proceedings including any settlement agreement arrived at between the parties as outcome of mediation. Any views expressed, suggestions, admissions or proposals etc. made by either party in the course of mediation shall not be relied upon or introduced as evidence in any further arbitral or judicial proceedings, whether or not such proceedings relate to the dispute that is the subject of mediation proceedings. Neither of the parties shall present IEMs as witness in any Alternative Dispute Resolution or judicial proceedings in respect of the dispute that was subject of mediation.

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For & On behalf of the Principal
(Office Seal)

For & On behalf of the Bidder/ Contractor
(Office Seal)

Place _____
Date _____

Witness:_____
(Name & Address) _____
_____

Witness:_____
(Name & Address) _____
_____