

**NTPC LTD.
3 X 800MW PATRATU THERMAL POWER PROJECT.**

VOLUME II

**TECHNICAL SPECIFICATION FOR
CABLE TRAYS & ACCESSORIES
BHEL DOC. NO. PE-TS-434-507-E021**

REVISION 00



**BHARAT HEAVY ELECTRICALS LIMITED
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
NOIDA (U.P), INDIA-201301**



TECHNICAL SPECIFICATION FOR CABLE TRAYS & ACCESSORIES

SPECIFICATION NO. PE-TS-434-507-E021

REVISION 00

DATE: 19.07.2022

SHEET 1 OF 1

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TOTAL SHEETS INCLUDING COVER SHEET, CONTENT/SEPARATOR SHEET = 31



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COMPLIANCE CERTIFICATE

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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



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SECTION – I

SPECIFIC TECHNICAL REQUIREMENTS



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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 Trays & Accessories** 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 Trays & Accessories 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.
- 2.2 Number of coupler plates, washers, nuts & bolts to be supplied by vendor shall be as per **Annexure-I**.

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

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.



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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.



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DATASHEET-A

1.0 APPLICABLE STANDARDS

- | | | |
|----|----------|--|
| a) | IS: 1079 | For hot rolled carbon steel sheet and strip. |
| b) | IS: 1730 | For dimensions for steel sheet and strip. |
| c) | IS: 1363 | Hexagon head bolts, screws and nuts. |
| d) | IS: 2629 | For hot dip galvanising of steel & surface pre treatment. |
| e) | IS: 2633 | For testing of uniformity of zinc coating. |
| f) | IS: 6745 | For determination of mass of zinc coating. |
| g) | IS: 1367 | Galvanised Coating on threaded Fasteners.
(Part-XIII) |
| h) | IS: 1852 | For Rolling and Cutting Tolerances of hot rolled steel products. |
| i) | IS: 9595 | For Thickness of Welding. |
| j) | IS: 4759 | For Hot Dip Zinc coating on structural steel and other allied products |

2.0 CABLE TRAYS & ACCESSORIES

- | | | | |
|-----|---|---|---|
| 2.1 | Material | : | Hot Rolled Mild Steel |
| 2.2 | Type | : | Ladder Type
Perforated Type |
| 2.3 | Standard Length of
Straight Length of
Cable Trays | : | 2.5 meters |
| 2.4 | Standard Width (mm) | : | 600 300 150 (Ladder)
600 300 150 100 50 (Perforated) |
| 2.5 | Construction | : | Conforming to enclosed drawing |
| 2.6 | Bending Radius
of Accessories (in mm) | : | 600 mm |
| 2.7 | Tolerance in length/
Width / Height | : | + 2 mm |
| 2.8 | Marking | : | Following shall be engraved/punched on each standard length
of cable tray at the centre of both side of runner: "PEM"
(length of letter shall be 90mm & height shall be 30mm) |

2.9 Thickness of the finished product shall not be less than 2.0 mm.

3.0 FITTINGS

- | | | |
|-----------------|---|---|
| End connections | : | Through Coupler plates
(Side Coupler Plates shall be provided as part of cable tray &
accessories supply with bolts, nuts, washers etc) |
|-----------------|---|---|

4.0 TRAY COVERS

- | | | |
|-------------|---|------------------------|
| a) Type | : | Non-Perforated type. |
| b) Material | : | Hot Rolled Mild Steel. |



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c) Width : Suitable for width of cable trays.

d) Tolerance in length/
Width / height : Same as cable trays.

e) Thickness of the finished product shall not be less than 1.7mm.

5.0 SHEET THICKNESS before Hot Dip Galvanisation

a) For cable trays &
Accessories : 2.0 mm

b) For cable tray cover : 1.7 mm

c) For Coupler plate : 3.0 mm

d) Tolerance in Thickness : As per IS: 1852

e) Make : SAIL / TISCO / RINL / BHUSAN / JINDAL STEEL /
JINDAL ISPAT / ESSAR / LLOYD / IISCO /
Authorized re-rollers of SAIL

6.0 SURFACE TREATMENT

a) Pre-treatment : IS 2629 before galvanisation

b) Type : Hot dip galvanisation

c) Applicable Standard : IS 2629

d) Minimum thickness : 75 microns (minimum), 86 microns (average) for 2.0 mm
thick product
55 microns (minimum), 65 microns (average) for 1.7 mm
thick product

e) Min. weight of
Zinc deposit : 610 grams per square meter for 2.0 mm thick product
460 grams per square meter for 1.7 mm thick product

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 Test as per IS 2629.



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7.0 NUMBER OF COUPLER PLATES, BOLTS, WASHERS & NUTS REQUIRED FOR EACH CABLE TRAY SECTION (2.5 MTRS)

Sl. No.	NAME OF ITEM	COUPLER PLATE (nos.)	NUTS (nos.)	WASHERS (nos.)	BOLTS (nos.)
1	Cable tray of standard length 2.5 meters	4	16	32	16

NOTE: - Based on above table, no. of coupler plates, bolts, washers & nuts shall be calculated for the offered lot. Over & above the calculated quantity, additional 5% coupler plates & 10% bolts, washers & nuts shall be supplied by the bidder.



**STANDARD TECHNICAL SPECIFICATION
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SECTION-II

STANDARD TECHNICAL REQUIREMENTS



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1.0 SCOPE OF ENQUIRY

- 1.1 This specification covers the design, manufacture, assembly, testing and inspection at vendor's/sub vendor's works, packing and despatch to site of **CABLE TRAYS & ACCESSORIES** as described in various sections of this specification.

2.0 CODES & STANDARDS

- 2.1 The material, constructional features and various processes involved in manufacture shall comply with latest revision of relevant Indian Standards.
- 2.2 The design, material, construction, manufacture, inspection, testing and performance of Cable Trays & Accessories shall conform to the latest revision of relevant standards and codes of practices mentioned in Data Sheet - A.
- 2.3 In case of conflict between the applicable reference standard and this specification, this specification shall govern.

3.0 DESIGN REQUIREMENTS AND CONSTRUCTIONAL FEATURES

- 3.1 All items listed in the BOQ –Cum-Price Schedule for Cable Trays & Accessories (Annexure - I of NIT) shall be manufactured as per Datasheet-A and project drawings enclosed with this specification. Minor fabrication detail changes which do not affect the material / dimensional aspect of the equipment, shall be to BHEL / owner's approval without any commercial implications.

3.2 **Cable Trays & Accessories, Tray Covers and Fittings:**

- 3.2.1 Cable trays & accessories shall be of two types, namely ladder type and perforated type as specified in Data Sheet-A and drawings enclosed with this specification.
- 3.2.2 Coupler plates shall be provided for connecting tray ends to other straight trays, horizontal elbows, vertical elbows, tees, cross, reducers etc. The number of coupler plates, washers, nuts & bolts to be supplied shall be as per Data Sheet-A.
- 3.2.3 Necessary fasteners shall be provided along with each length of cable tray as specified in drawings enclosed.
- 3.2.4 The width of the tray covers (where provided) shall be suitable for the width of trays. Suitable bolting arrangement shall be supplied for attaching the cover to the cable trays, elbows, reducers, tees etc. as per the drawing enclosed.
- 3.2.5 All welded joints shall be smooth enough to provide a good appearance and shall not cause any injury to working personnel or any damage to the cable laid directly on it. All welding work shall be done by skilled personnel.

4.0 QUALITY/INSPECTION

- 4.1 NTPC's Standard QP (QP NO. 0000-999-QOE-S-021, Rev-01) is enclosed for reference. However, at contract stage, the successful bidder shall submit the QP for BHEL/ ultimate customer's approval. In case bidder has reference QP 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 QP approval.



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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.

4.4 Load Test: -

A 2.5-meter straight section of each type of cable tray of width 600mm, 450mm, 300mm & 150mm shall be simply supported at the two ends. A uniformly distributed load of 100 kg per meter shall be applied along the length of tray. The maximum deflection at mid span shall not exceed 7 mm.

5.0 PACKING

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

6.0 DELIVERY

The delivery shall be as per NIT (Notice Inviting Tender).

7.0 DOCUMENTATION

7.1 Documents to be submitted by the bidder along with the bid.

- A copy of sheet "Contents" with bidder's signature & company stamp
- A copy of sheet "Compliance Sheet" with bidder's signature & company stamp.
- Unpriced copy of "Annexure-I (BOQ – Cum- Price Schedule for Cable Trays & Accessories)" with bidder's signature & company stamp.
- A copy of sheet "No Deviation Sheet" with bidder's signature & company stamp.
- Supporting documents of PQR.

No other documentation is required to be submitted as technical offer. Any information contained in other parts of the offer (e.g. covering letter, annexures, etc.) which is deviating from specification requirements in any way shall not be considered by BHEL as part of offer.

ITEM (MATERIAL, CLASS, GRADE, RATING, SIZE ETC.) GALVANIZED CABLE TRAYS (Perforated & Ladder type) & ACCESSORIES		STANDARD QUALITY PLAN CONFORMING TO CODE :					Q.P. NO. 0000-999-QOE-S-021 REV.: 1 DATE: 06.02.04 PAGE: 1 OF 1 VALID UPTO : 05.02.07			REVIEWED BY A.K. Sharma Rana Mohra O.P. Nirajan		APPROVED BY [Signature]		
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	FINISHED CABLE TRAYS & ACCESSORIES	3	4	5	6			7	8	9	D*	**	10	11
	a) In Black Condition	Weld Quality	Major	Visual	100%	Random	Manufacturer's Plant Std	Manufacturer's Plant Std	Inspection report	Inspection report		P	P	A) The cable trays shall be galvanised at NTPC approved sources only.
	b) Burs		Major	Visual	Random		IS-2629-1985	No Burs	-do-	-do-		P	P	B) The supplier to ensure procurement of steel from main producers like SAIL/TISCO, Rastriya Japat/Japat Ind. Jindal/Esar/Ljoyda/IS Co. and Zinc from Hindustan Zinc Ltd.
	2 After Galvanising		Major	Visual	IS-4759-1996	5 sample/lot	IS-2629-1985 IS-4759-1996	IS-2629-1985 IS-4759-1996	-do-	-do-		P	P	C) Welding shall be done by qualified welders as per supplier system.
	2.1 General Physical inspection including Galvanising Quality/ Defects, Dieromating, White rusting etc.		Major	Measurment	-do-	-do-	NTPC/Main Supplier Approved Drawing	NTPC/Main Supplier Approved Drawing	-do-	-do-		P	P	D) Pre-treatment of fabricated cable trays 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
	2.2 Dimensional check & Sheet Thickness		Major	Measurment	-do-	-do-	IS-4759-1996 IS-3203-1982	IS-4759-1996 Table-1	-do-	-do-		P	P	E) The process of pretreatment shall be verified by NTPC on surveillance basis during inspection of cable trays
	2.3 Galvanising tests		Critical	Measurment	-do-	-do-	IS-6745-1972 IS-2633-1986	IS-4759-1996 Table-1	-do-	-do-		P	P	*F* One piece each of 2.5 meter length size of cable tray of 300 mm & above shall be taken as sample from each offered lot for inspection. It shall be supported at both ends & loaded with uniformly distributed load of 76kg/meter along the length of cable tray. The maximum deflection at mid span of each sample shall not exceed 7mm.
	a) Coating thickness measurement survey by Elcometer		Critical	Measurment	-do-	-do-	IS-2629-1985 IS-2633-1986 IS-4759-1996	IS-4759-1996 cl. 9.3	-do-	-do-		P	P	
	b) Mass of zinc coating		Critical	Measurment	-do-	-do-	IS-2629-1985	IS-2629-1985	-do-	-do-		P	P	
	c) Uniformity of zinc coating/dip test		Critical	Measurment	-do-	-do-	*F*	*F*	-do-	-do-		P	P	
	d) Adhesion test		Critical	Visual	-do-	-do-			-do-	-do-		P	P	
	2.4 Deflection Test		Critical	Measurment	1 sample from each lot	1 sample from each lot			-do-	-do-		P	P	

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

FORMAT NO.: QS-01-QAL-P-10/F3-R0

1/1

ENGG DIV./QAI

ANNEXURE to Quality Plan**LIST OF NTPC APPROVED GALVANIZERS (FOR NTPC PROJECTS)**

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

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 WITHOUT ANY COMMERCIAL IMPLICATION TO BHEL.**

ANNEXURE-2A to Quality Plan



(LIST OF BHEL- PEM APPROVED GALVANIZERS)

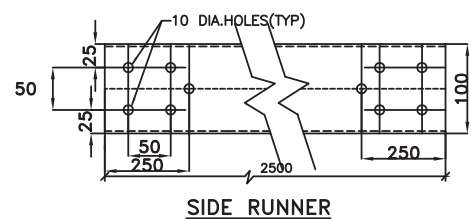
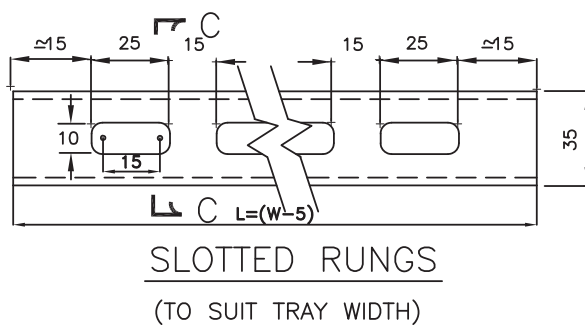
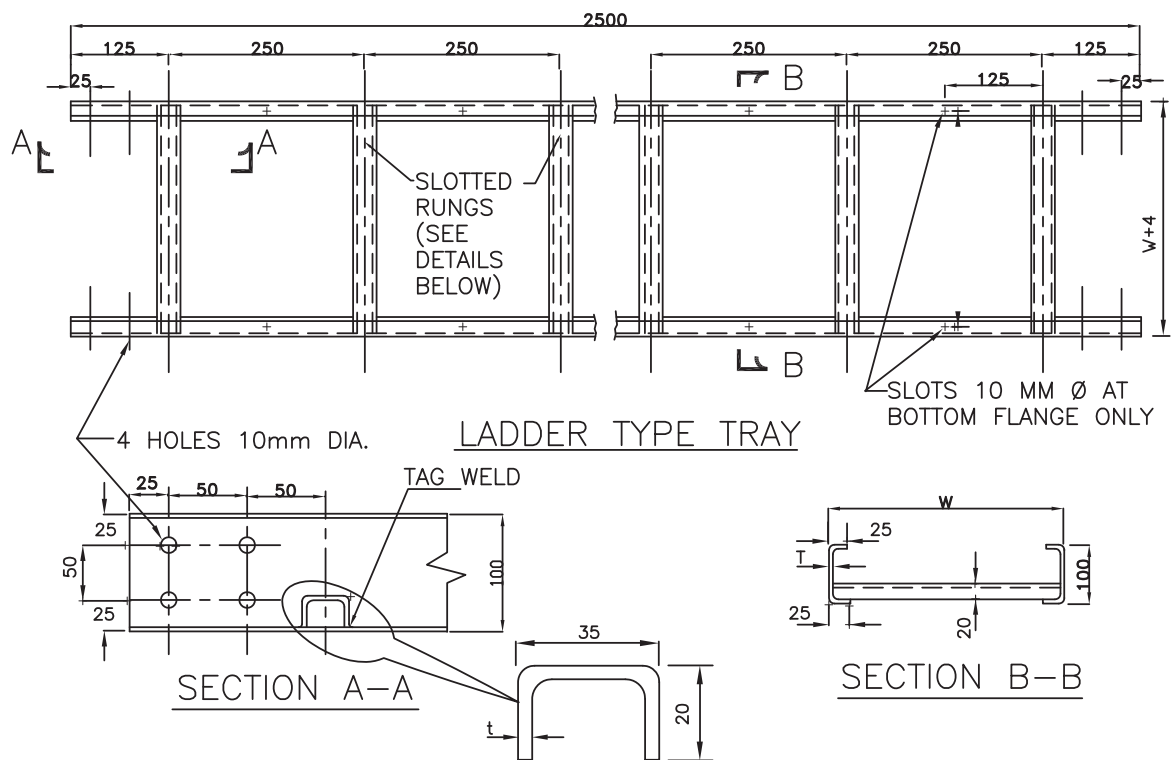
SL. NO.	ITEM	VENDOR NAME	ADDRESS
1	Galvanising	Jenco Industrial Corporation	Chincholi Bunder Khkar Road Near Link Road Devruwadi Malad (W) Mumbai 400064
2	Galvanising	National Galvanizing Company	66, Barrackpore Kamarhatt Trunck Road Calcutta-700058
3	Galvanising	Sigma Galvanising Pvt. Ltd.	Plot No.C-169, TTC, MIDC Ind Area Navin Mumbai-400705
4	Galvanising	B.P. Projects PVT LTD	167A, Vivekananda Road Kolkata-700006
5	Galvanising	Standard Galvanisers	Makardah Road, Kabar Para, Bankra, Howarah -711403
6	Galvanising	Steel Products	National Highway No. 6, Chamrail, Kona, Howrah-711114
7	Galvanising	Unitech Fabricators & Engineers Pvt. Ltd.	Village- Ajab Nagar, P.O. -Molla Simlla, P.S. - Singur, Dist - Hoogly, Pin-712223
8	Galvanising	Shivam Engineers & Fabricators	A0-282-284, Industrial Area, South Side of G.T. Road, Ghaziabad, U.P.
9	Galvanising	B.G. Shirke Construction Technology Pvt. Ltd	72-76, Mundhawa, Pune - 401 036
10	Galvanising	Galbro Ispat Galvanizers Pvt. Ltd.	GUT 11 AND 12, OPP. Kudus Steel,Rolling Mill, Wada, Thane , Mumbai
11	Galvanising	Eros Metals	G-97, MIDC, Bhutibori , Nagpur
12	Galvanising	Industrial Perforation (India) Pvt. Ltd.	Ganganagr, Katakhal, Kolkata-700132
13	Galvanising	Indmark Formtech Pvt. Ltd.	Phase - 3, E - 11 / 1, M. I. D. C., Chakan, Pune - 410 501, Maharashtra, India.
14	Galvanising	Namdhari Industrial Traders Pvt. Ltd.	Village Latton Dana, Chandigarh Road, Ludhiana
15	Galvanising	Neha Galvaniser	Jalan Industrial Estate, Gate No-1, 1st Right Choise Lane, Near N.G-6, Jangalpur, PO Domjur Howrah - 700071, West Bengal, India
16	Galvanising	Patny Systems (P) Ltd.	Unit-IV, Sy No. -228/9, Plot No. 6, IP Kuchavaram, Toopran(M) Dist.- Medak, Telegana - 502336
17	Galvanising	Parmar Metal Company	Survey No.207,Veraval (Shapar) Dist. Rajkot, India.
18	Galvanising	Passive Infra Projects Pvt. Ltd	8th KM Stone, Sampla Kharkhoda Road, Hassangarh, Rohtak, Haryana
19	Galvanising	Rukmani Electrical & Fabricators Pvt, Ltd.	Urla Industrial Area, Urla Sarora Road, Raipur- 493 221 (Chhattisgarh) Shankharidaha Baniyarah, Jalan Industrial Complex, Gate no.3, Lane no. 4, Domjur, Howrah , W.B .- 71141
20	Galvanising	DMP Projects Pvt.Ltd.	Dulagarh Industrial Park , PS-Sankrail , Howrah -711302
21	Galvanising	Vinfab Engineers India Private Limited	Gut no. 224/1 &2 Bhiwandi Wada State Highway, Village khupri, Dist. Thane, Maharashtra -421303
22	Galvanising	Saral Projects & Processors	B-1, Industrial Area, Site-II, Amawan Road Rae Bareli
23	Galvanising	Jamna Metal Company	D - 1513, DSIDC, Narela Industrial Area Delhi - 110040, India
24	Galvanising	Brahampuri Steels Limited	172 (F) Industrial Area, Jhotwara, Jaipur-302013
25	Galvanising	Indiana Gratings PVT. LTD	F-5, MIDC Jejuri, Pune-412 303

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 WITHOUT ANY COMMERCIAL IMPLICATION TO BHEL.

TYPICAL DETAILS OF CABLE TRAYS AND ACCESSORIES

					NTPC DOCUMENT NO: 9585-001-215-PVE-B-003			
					 NTPC Limited (A GOVERNMENT OF INDIA ENTERPRISE)			
					PROJECT PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE - I (3 X 800 MW)			
REV 01	DATE 11.07.18	ALTD MMM	CHK HK	APD PD	JOB NO.	BHARAT HEAVY ELECTRICALS LIMITED POWER SECTOR PROJECT ENGINEERING MANAGEMENT NOIDA(U.P) INDIA		DPT CODE-E DRN DSN CHD APP NAME MMM HK PD SIGN -sd- -sd- -sd- -sd- DATE 09.04.18 09.04.18 09.04.18 09.04.18
THE DOCUMENT IS REVISED INLINE WITH THE NTPC COMMENTS RECEIVED VIDE TRANSMITTAL DTD. 08.05.18.							DWG. NO. PE-DG-434-507-E005 SHT. 01 OF 13 REV. 01	



W	150	300	450	600
L	145	295	445	595
T	2	2	2	2
t	2	2	2	2

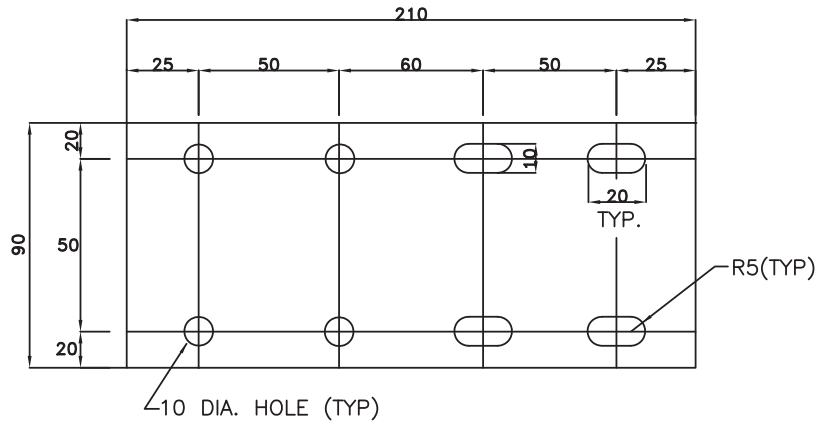
FOR GENERAL NOTES REFER SHEET 14 OF 34



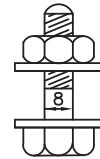
TYPICAL DETAILS OF CABLE TRAYS AND
ACCESSORIES (TYPE-A)

DWG. NO.
PE-DG-999-507-E005

SHT. 02 OF 14 REV. 0



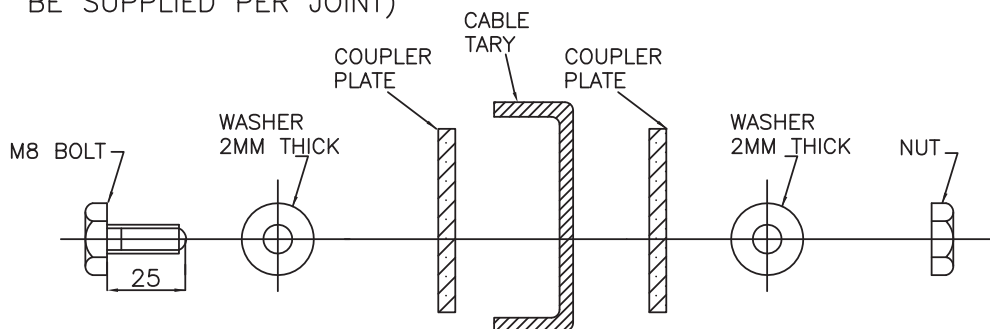
**SIDE COUPLER PLATE FOR
LADDER/PERFORATED TYPE TRAYS**
(600/450/300/150W TRAYS)
QTY. REQUIRED/TRAY SECTION : 4 NOS.



QTY. REQD/TRAY SECTION

- A) 16 NOS. M8 BOLTS
- B) 16 NOS. NUTS
- C) 32 NOS. WASHERS

(2 NOS. COUPLER PLATES
OF 3 MM THICKNESS TO
BE SUPPLIED PER JOINT)



SEQUENCE OF M8 BOLT, WASHER, NUT, COUPLER PLATE & CABLE TRAY
FOR TYPICAL CABLE TRAY JOINT

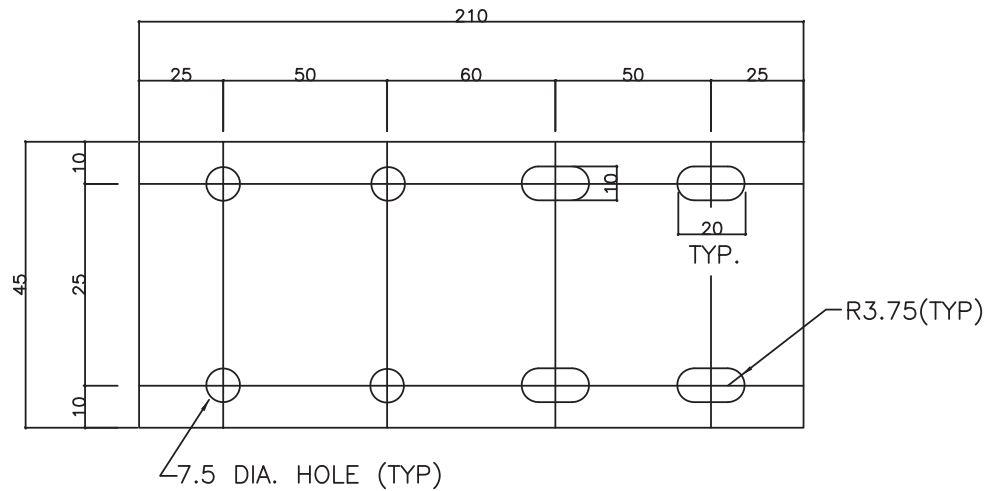
FOR GENERAL NOTES REFER SHEET 14 OF 34



**TYPICAL DETAILS OF CABLE TRAYS AND
ACCESSORIES (TYPE-A)**

DWG. NO.
PE-DG-999-507-E005

SHT. 03 OF 14 REV. 0

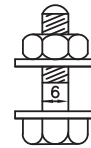


SIDE COUPLER PLATE FOR PERFORATED TYPE TRAYS (100/50W TRAYS)

QTY. REQUIRED/TRAY SECTION : 4 NOS.

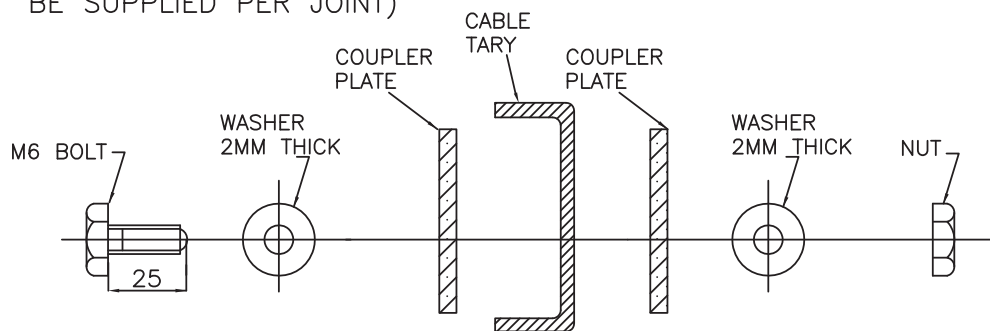


(2 NOS. COUPLER PLATES
OF 3 MM THICKNESS TO
BE SUPPLIED PER JOINT)



QTY. REQD/TRAY SECTION

- A) 16 NOS. M6 BOLTS
- B) 16 NOS. NUTS
- C) 32 NOS. WASHERS



SEQUENCE OF M6 BOLT, WASHER, NUT, COUPLER PLATE & CABLE TRAY
FOR TYPICAL CABLE TRAY JOINT

FOR GENERAL NOTES REFER SHEET 14 OF 34



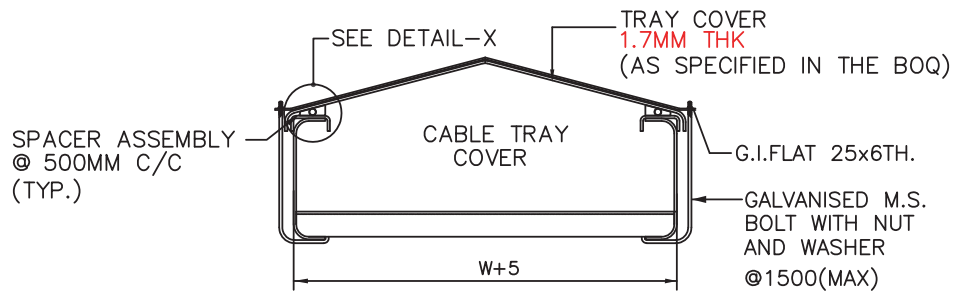
TYPICAL DETAILS OF CABLE TRAYS AND
ACCESSORIES (TYPE-A)

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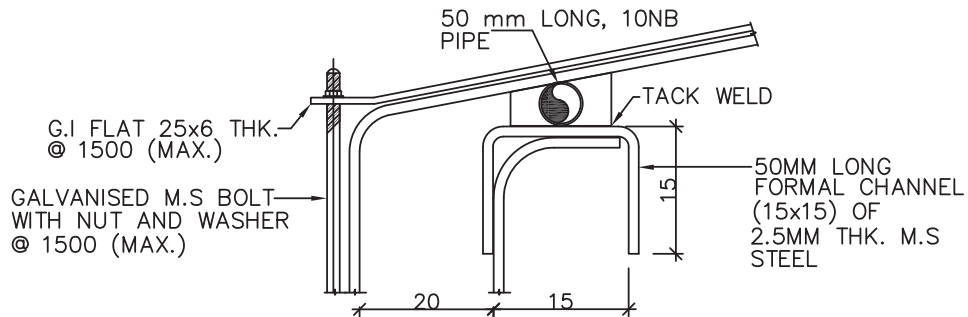
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SHT. 04 OF 14

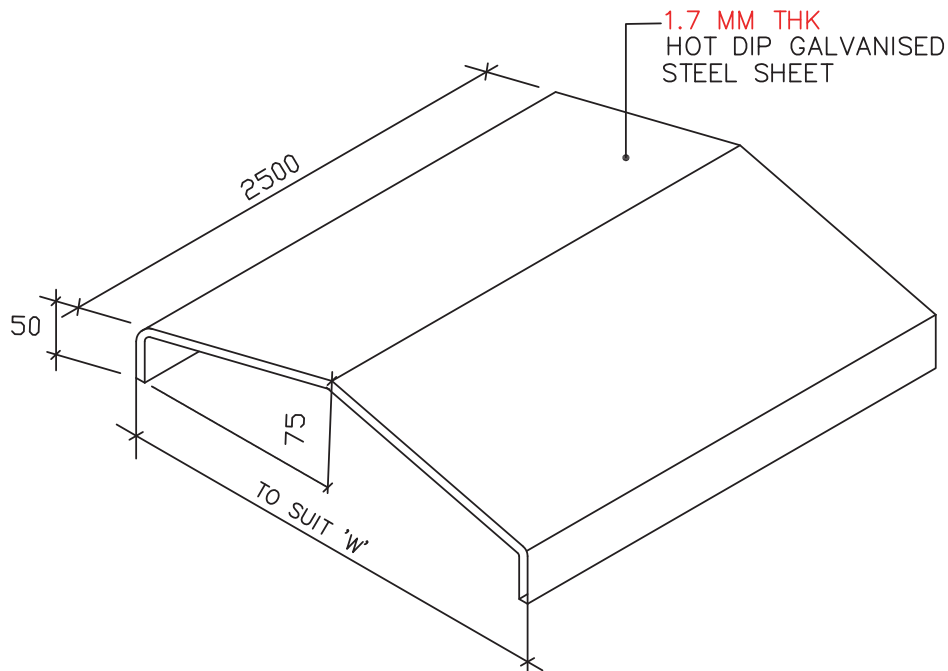
REV. 0



COVER FIXING (TYP.)



DETAIL-X



CABLE TRAY COVER

FOR GENERAL NOTES REFER SHEET 14 OF 34



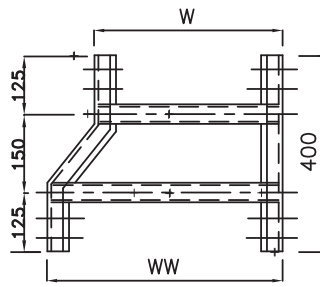
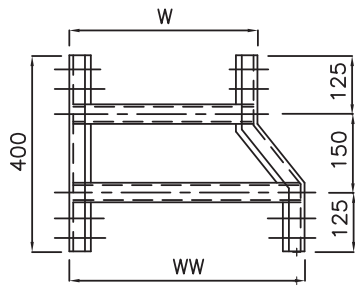
TYPICAL DETAILS OF CABLE TRAYS AND ACCESSORIES (TYPE-A)

DWG. NO.

PE-DG-999-507-E005

SHT. 05 OF 14

REV. 0

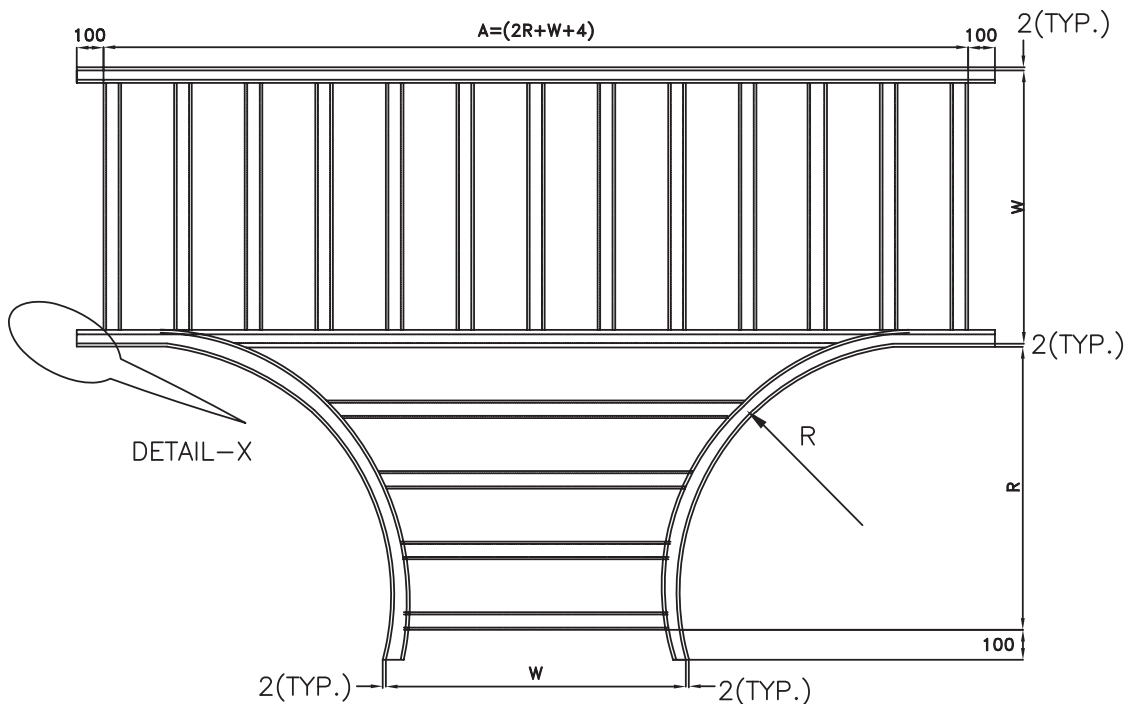


WW	W	DEPTH
600	450	100
600	300	100
600	150	100
450	300	100
300	150	100

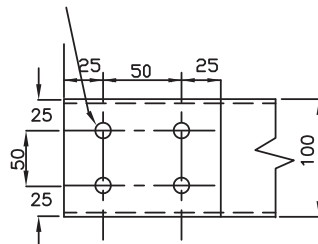
LEFT HAND REDUCER

RIGHT HAND REDUCER

LADDER TYPE



10mm DIA. HOLES



WIDTH W	BENDING RADIUS R	DEPTH	A			
			W			
			150	300	450	600
150, 300, 450 & 600	600	100	1354	1504	1654	1804

LADDER TYPE

FOR GENERAL NOTES REFER SHEET 14 OF 34



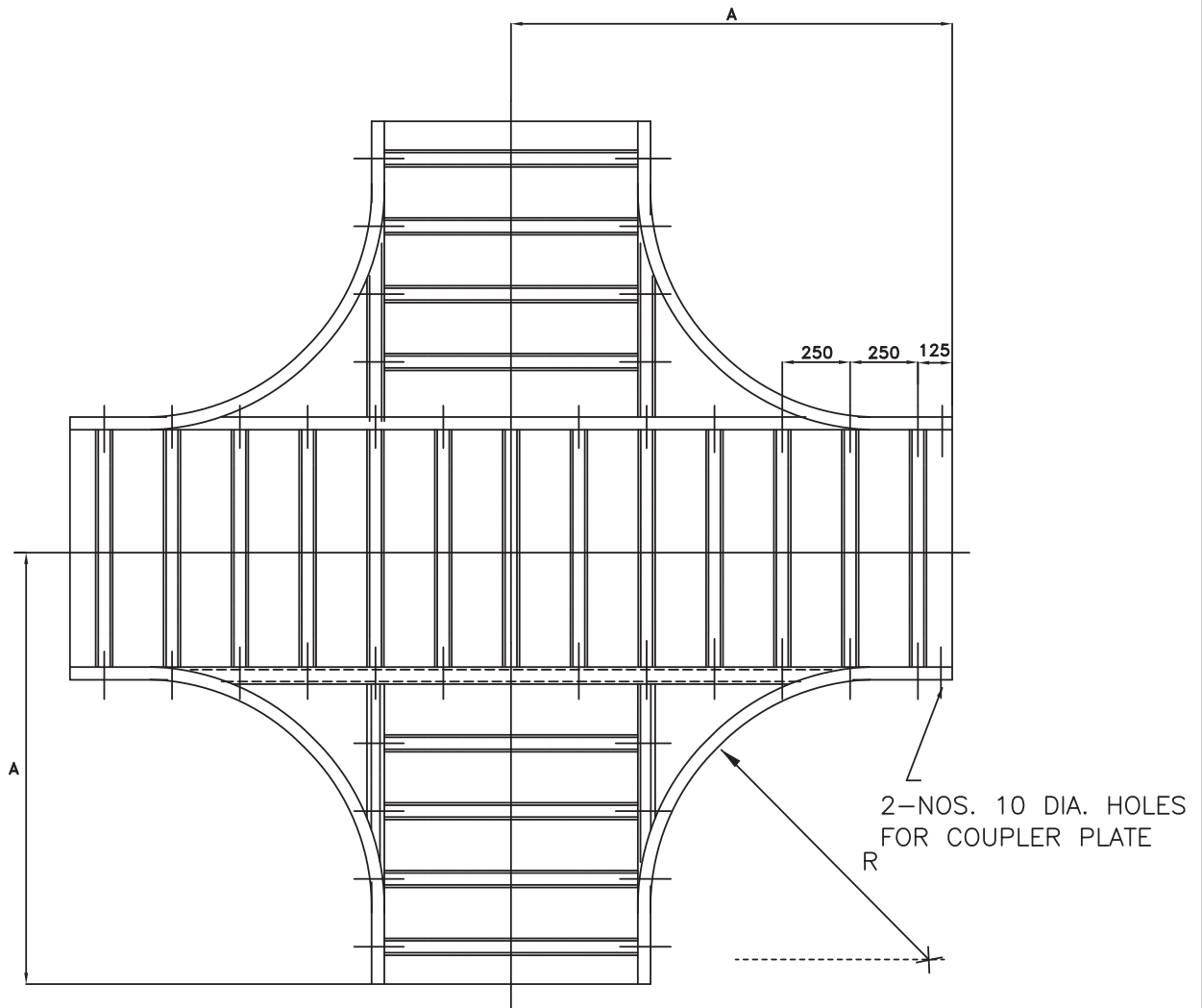
TYPICAL DETAILS OF CABLE TRAYS AND
ACCESSORIES (TYPE-A)

DWG. NO.

PE-DG-999-507-E005

SHT. 06 OF 14

REV. 0



HORIZONTAL CROSS-PLAN

WIDTH W	BENDING RADIUS R	$A=R+W/2+100$
600	600	1000
450	600	925
300	600	850

FOR GENERAL NOTES REFER SHEET 14 OF 34

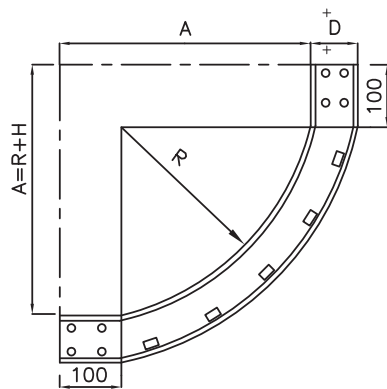


**TYPICAL DETAILS OF CABLE TRAYS AND
ACCESSORIES (TYPE-A)**

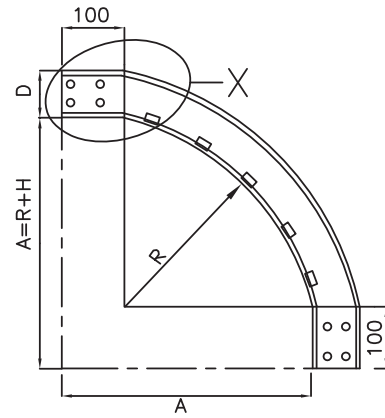
DWG. NO.
PE-DG-999-507-E005

SHT. 07 OF 14

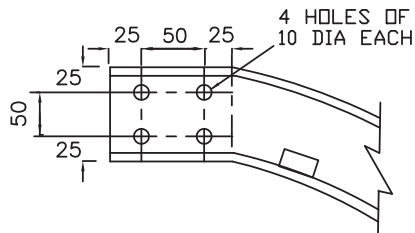
REV. 0



INSIDE TYPE



OUTSIDE TYPE

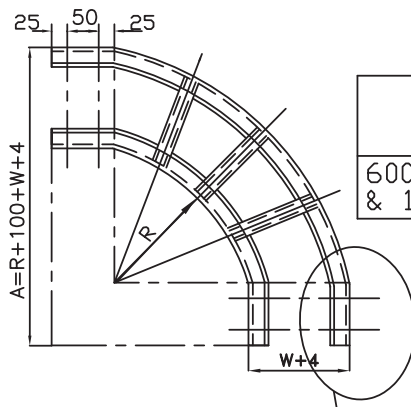


ENLARGED VIEW OF "X"

VERTICAL ELBOW 90 DEG UP/DOWN

INSIDE WIDTH W	BENDING RADIUS R	DEPTH	A
600, 450, 300 & 150	600	100	700

90° VERTICAL BEND - LADDER TYPE



LADDER TYPE

X (AS ABOVE)

HORIZONTAL ELBOW 90 DEG

INSIDE WIDTH W	BENDING RADIUS R	DEPTH	A			
			W			
			150	300	450	600
600, 450, 300 & 150	600	100	854	1004	1154	1304

90° HORIZONTAL BEND - LADDER TYPE

LADDER TYPE ACCESSORIES

FOR GENERAL NOTES REFER SHEET 14 OF 34



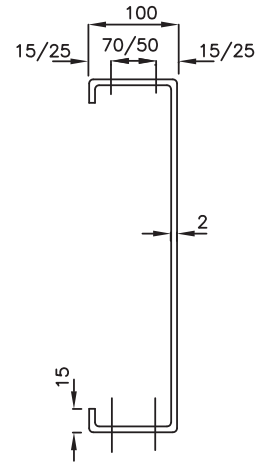
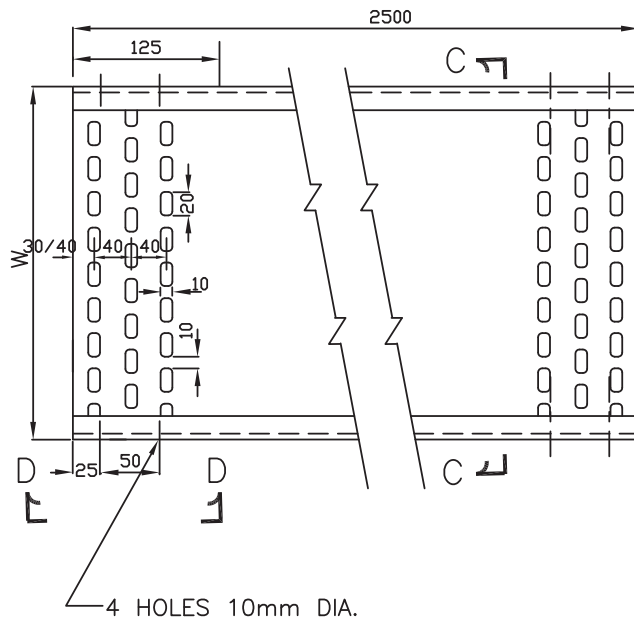
TYPICAL DETAILS OF CABLE TRAYS AND
ACCESSORIES (TYPE-A)

DWG. NO.

PE-DG-999-507-E005

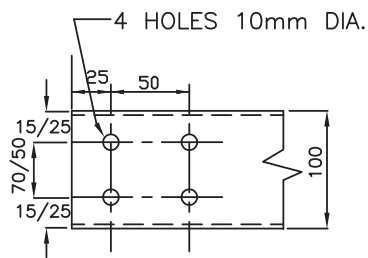
SHT. 08 OF 14

REV. 0



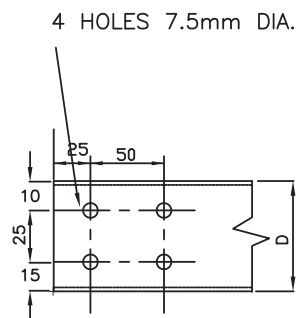
SECTION-CC

600/450/300/150 TRAYS



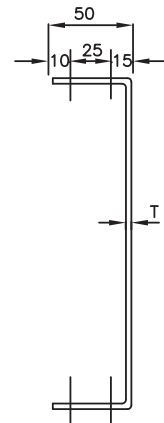
SECTION-DD

600/450/300/150 TRAYS



SECTION-DD

100/50 TRAYS



SECTION-CC

(100/50 TRAYS)

TRAY WIDTH W (mm)	600	450	300	150	100	50
TRAY DEPTH D (mm)	100	100	100	100	50	50
T (mm)	2	2	2	2	2	2

PERFORATED TYPE TRAY

FOR GENERAL NOTES REFER SHEET 14 OF 34



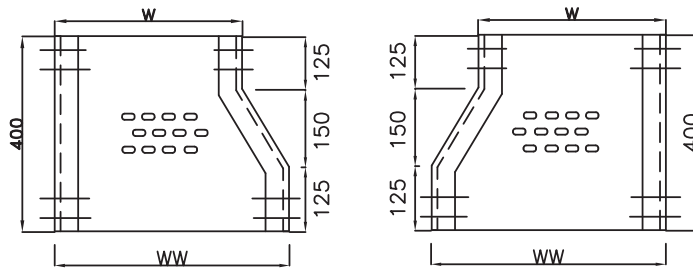
TYPICAL DETAILS OF CABLE TRAYS AND
ACCESSORIES (TYPE-A)

DWG. NO.

PE-DG-999-507-E005

SHT. 09 OF 14

REV. 0

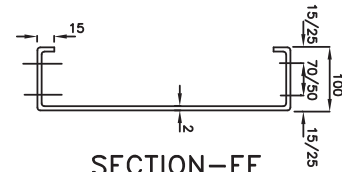


WW	W	DEPTH
600	450	100
600	300	100
600	150	100
450	300	100
300	150	100

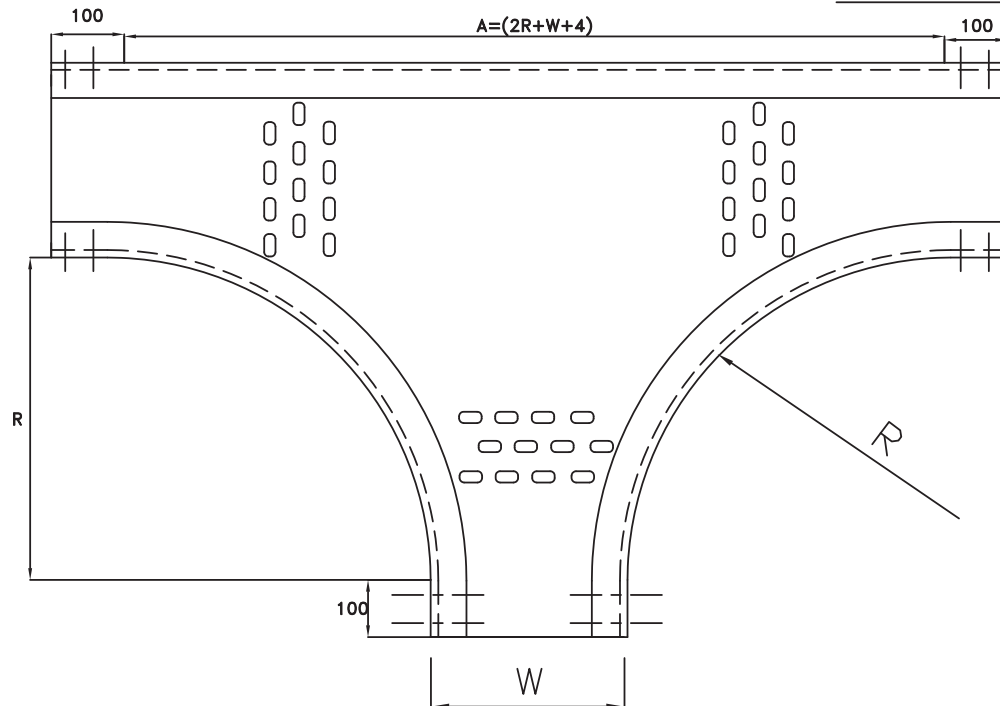
LEFT HAND REDUCER

RIGHT HAND REDUCER

PERFORATED TYPE



SECTION-EE



TEE

WIDTH W	BENDING RADIUS R	DEPTH	A			
			W			
			150	300	450	600
150, 300, 450 & 600	600	100	1354	1504	1654	1804

PERFORATED TYPE

FOR GENERAL NOTES REFER SHEET 14 OF 34



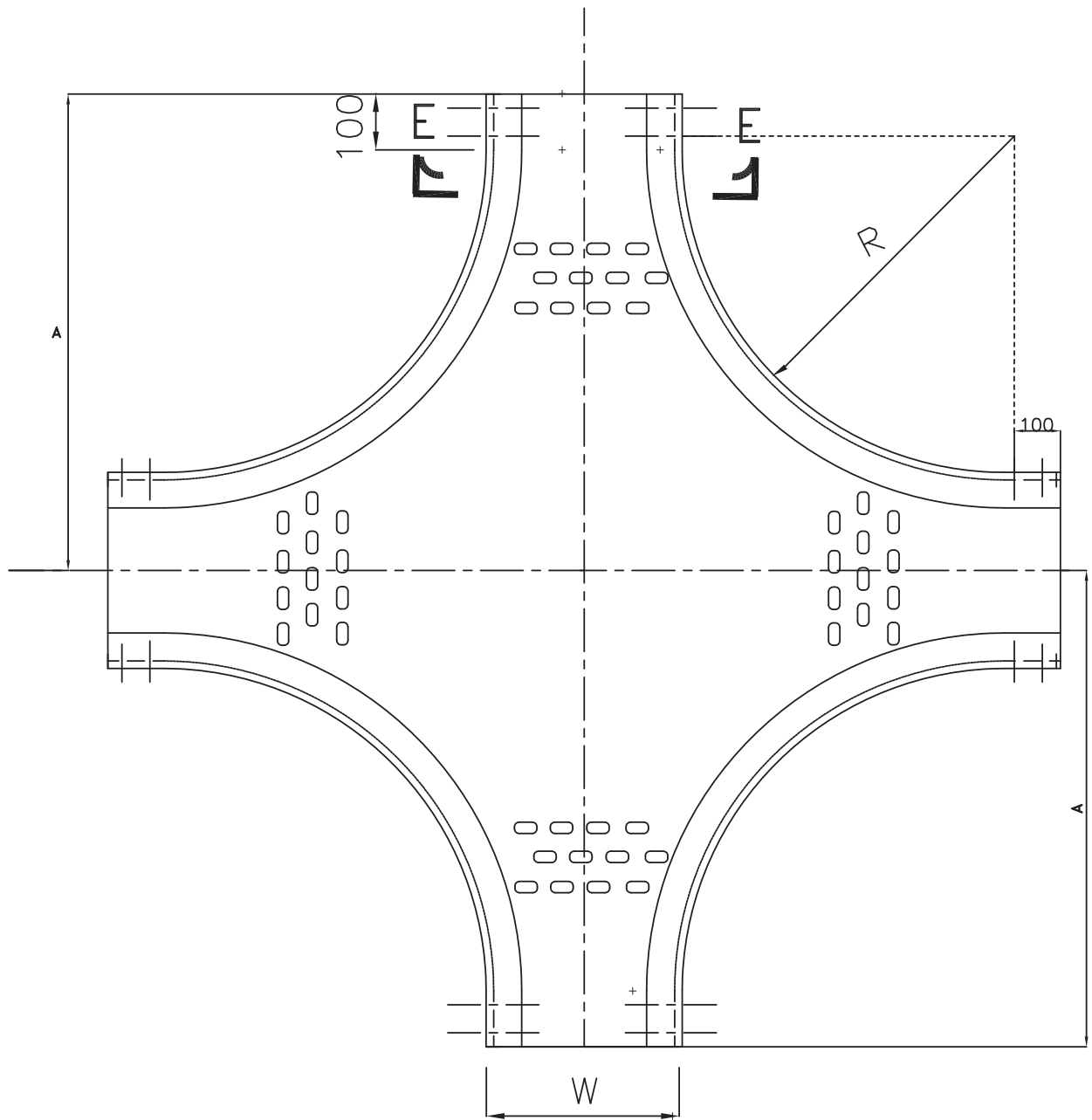
TYPICAL DETAILS OF CABLE TRAYS AND
ACCESSORIES (TYPE-A)

DWG. NO.

PE-DG-999-507-E005

SHT. 10 OF 14

REV. 0



CROSS

WIDTH W	BENDING RADIUS R	$A=R+W/2+100$
600	600	1000
450	600	925
300	600	850

FOR GENERAL NOTES REFER SHEET 14 OF 34



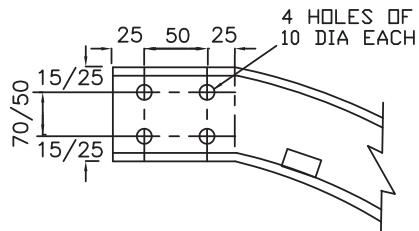
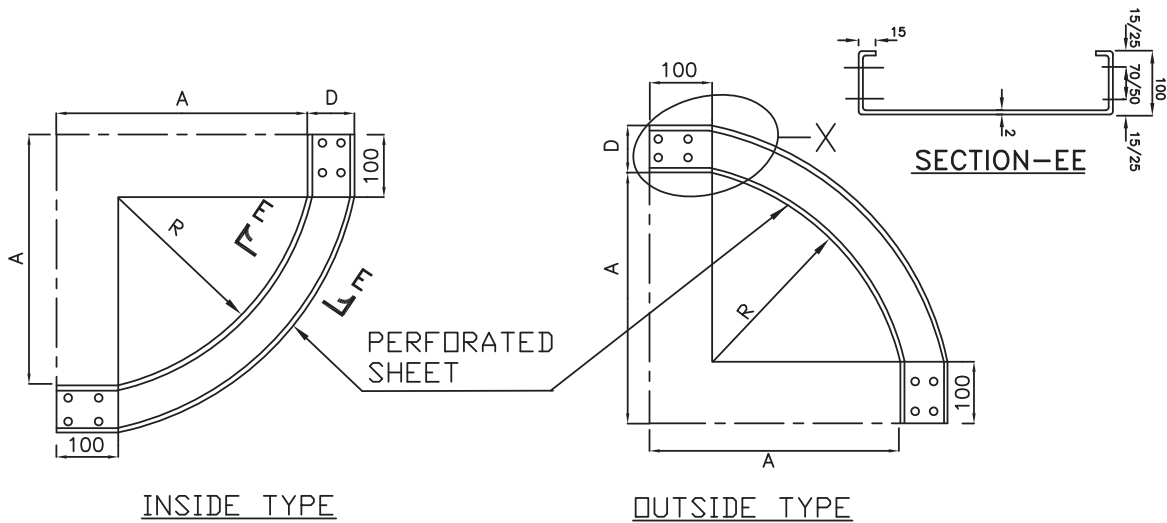
TYPICAL DETAILS OF CABLE TRAYS AND
ACCESSORIES (TYPE-A)

DWG. NO.

PE-DG-999-507-E005

SHT. 11 OF 14

REV. 0



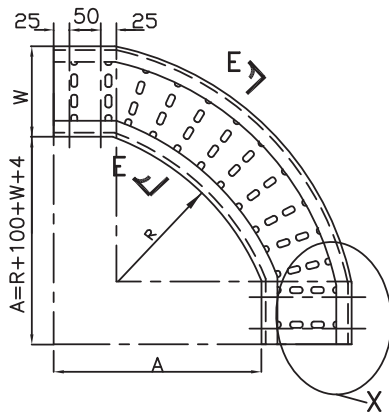
ENLARGED VIEW OF "X"

VERTICAL ELBOW 90 DEG UP/DOWN

INSIDE WIDTH W	BENDING RADIUS R	DEPTH	A
600, 450, 300 & 150	600	100	700

90° VERTICAL BEND - PERFORATED TYPE

HORIZONTAL ELBOW 90 DEG



INSIDE WIDTH W	BENDING RADIUS R	DEPTH	A			
			W			
150, 300, 450 & 600	600	100	150	300	450	600
			854	1004	1154	1304

90° HORIZONTAL BEND - PERFORATED TYPE

FOR GENERAL NOTES REFER SHEET 14 OF 34



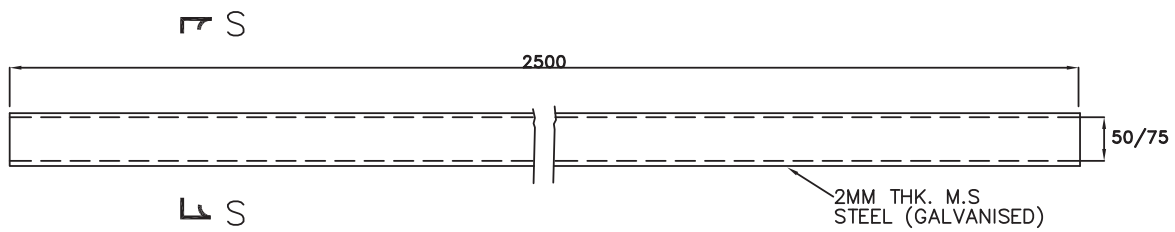
TYPICAL DETAILS OF CABLE TRAYS AND ACCESSORIES (TYPE-A)

DWG. NO.

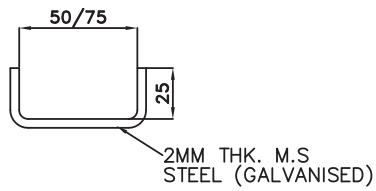
PE-DG-999-507-E005

SHT. 12 OF 14

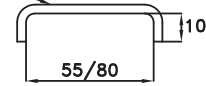
REV. 0



S S



2MM THK. M.S STEEL (GALVANISED)



CABLE TROUGHS

FOR GENERAL NOTES REFER SHEET 14 OF 34



TYPICAL DETAILS OF CABLE TRAYS AND
ACCESSORIES (TYPE-A)

DWG. NO.

PE-DG-999-507-E005

SHT. 13 OF 14

REV. 0

NOTES:—

1. THE CABLE TRAYS AND ACCESSORIES SHALL BE MADE OF 2mm HOT ROLLED M.S.SHEET CONFIRMING TO IS:1079. ALL THE COUPLER PLATE SHALL BE OF 3 MM THICK.
2. THE CABLE TRAYS AND ACCESSORIES SHALL BE HOT DIP GALVANISED AS PER IS 2629. THE MASS OF ZINC COATING SHALL BE 610 gm/m AND THICKNESS SHALL BE 75 MICRONS (MINIMUM).
3. FOR LADDER TYPE CABLE TRAYS AND ACCESSORIES, ALL RUNGS SHALL BE SLOTTED.
4. PERFORATED TRAYS SHALL BE FABRICATED OUT OF A SINGLE M.S. SHEET.
5. THE DIMENSIONS OF ALL BENDS, TEES, CROSSES, ETC. FOR PERFORATED CABLE TRAYS SHALL BE THE SAME AS FOR LADDER TYPE TRAY FITTINGS.
6. SIDE CHANNELS OF PERFORATED TRAY ACCESSORIES SHALL BE WELDED WITH THE PERFORATED SHEET AT INTERVALS OF 100mm.
7. LENGTH OF WELDING SHALL NOT BE LESS THAN 25mm. WELDING SHALL BE AS PER IS 9595.
8. PREFERABLY SINGLE MS PERFORATED SHEET SHALL BE USED AS BASE OF ALL PERFORATED TYPE TRAY ACCESSORIES. HOWEVER, IF USE OF PIECES OF PERFORATED SHEET IS UNAVIODABLE FOR BASE, PIECES SHALL BE WELDED WITH EACH OTHER IN LINE WITH THE ABOVE.
9. ALL TRAY CORNERS SHALL BE FREE OF SHARP EDGES & SMOOTH.
10. THE DEPTH, WIDTH AND LENGTH OF TRAYS AND ACCESSORIES SHALL BE WITHIN A TOLERANCE AS PER RELEVANT IS
11. TO FACILITATE ASSEMBLY, ALL ACCESSORIES AT ENDS SHALL HAVE 100mm STRAIGHT PORTION.
12. ALL NUTS, BOLTS, WASHERS ETC., SHALL BE HOT DIP GALVANISED AS PER IS 1367 FOR SIZES ABOVE 12MM AND ELECTROPLATED/ELECTROGALVANISED FROM SIZE BELOW 12MM.
13. ALL DIMENSIONS ARE IN mm UNLESS NOTED OTHERWISE.
14. TRAY ACCESSORIES SHOWN IN THIS DRAWING SHALL BE FACTORY FABRICATED FOR USE AT SITE AS PER APPROVED LAYOUT DRAWINGS. FOR SPECIFIC SITE REQUIREMENTS (E.G. IRREGULAR ANGLE BENDS SUCH AS 30°/60° BENDS, ETC) AS PER SITE LAYOUT CONDITIONS, TRAY ACCESSORIES SHALL BE FABRICATED AT SITE FROM THE STRAIGHT LENGTH OF RESPECTIVE SIZES AS REQUIRED. GALVANISATION DAMAGED DURING CUTTING/WELDING OPEARTIONS SHALL BE BRUSHED AND RED LEAD PRIMER, OIL PRIMER AND ALUMINIUM PAINT SHALL BE APPLIED BEFORE INSTALLATION OF THE ACCESSORIES.
15. WIDTH OF CABLE TRAYS PROPOSED TO BE USED FOR PROJECT ARE AS UNDER :
LADDER TYPE CABLE TRAY (MM) : 600,450,300 & 150.
PERFORATED TYPE CABLE TRAY (MM) : 600,450,300,150,100 & 50.
16. 600MM WIDE CABLE TRAY SHALL BE SUITABLE FOR WEIGHT OF 100KG/M INCLUDING LIVE LOAD OF RUNNING LENGTH OF CABLE TRAY.
17. CABLE TROUGHS SHALL BE USED FOR BRANCHING OUT FEW CABLES FROM MAIN CABLE ROUTE.
18. MAKE OF ALL ITEMS SHALL BE AS PER BHEL/CUSTOMER APPROVAL.
19. CABLE TROUGHS OR 50/100MM WIDE PERFORATED TYPE TRAY SHALL BE USED FOR LOCAL CABLING/BRANCHING OUT FEW CABLES FROM MAIN ROUTE.



TYPICAL DETAILS OF CABLE TRAYS AND ACCESSORIES (TYPE-A)

DWG. NO.
PE-DG-999-507-E005

SHT. 14 OF 14 REV. 0



Price Variation Formulae

ANNEXURE-B

Prices shall be variable as per following PVC formulae: -

Cable Trays & Accessories	
$P = P_o/100 (20 + 58 (SBIR/SBIR_o) + 7 (Zn/Zn_o) + 15 (W/W_o))$	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.

P_o = Price quoted/confirmed.

SBIR_o = 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.

Zn_o = 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.

W_o = 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 the 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-B

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.

	PATRATU TPS (3X800 MW)	PE-PQ-434-507-E001
	PRE-QUALIFICATION REQUIREMENTS FOR CABLE TRAYS & ACCESSORIES	REVISION NO. 00 DATE 17/07/2024
		Page 1 of 2

ITEMS: Cable trays & Accessories

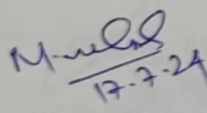
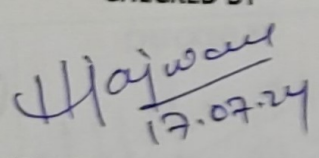
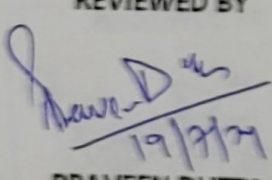
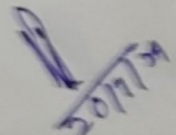
SCOPE: Supply: YES; Erection & Commissioning: NO;

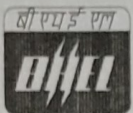
1	Vendor should have in-house fabrication & manufacturing facility.
2	Capability of manufacturing cable trays & accessories for 5 km per month.
3	Vendor has his own galvanization plant. OR Vendor should get galvanization of cable trays & accessories to be done from any of the BHEL-PEM approved galvanizers.
4	Manufactured & supplied at least 20 km of cable trays & accessories in one or more orders and at least 10 km in a single order.
5	Minimum two (2) nos. purchase orders for cable trays & accessories shall be submitted which should not be more than five (5) years old from date of techno-commercial bid opening for establishing continuity in business.

Notes (General points of PQR):

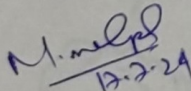
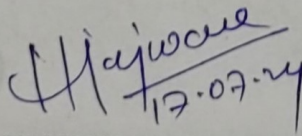
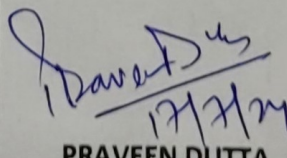
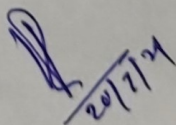
1. Offers of the JV companies/ Joint Bidders/ bidders having collaboration/ licensing agreement/ MOU/ Indian subsidiaries shall be evaluated as follows:
 - a. If bidder happens to be an Indian subsidiaries of foreign OEM, then the credentials of the foreign OEM can also be considered for meeting PQR.
 - 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  MANMOHAN MAHAPATRA (SR. MANAGER)	CHECKED BY  NARENDRANATH JAJWARE (DGM)	REVIEWED BY  PRAVEEN DUTTA AGM (SH)	APPROVED BY  DEBASISA RATH GM (DH)
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	PATRATU TPS (3X800 MW)	PE-PQ-434-507-E001
	PRE-QUALIFICATION REQUIREMENTS FOR	REVISION NO. 00 DATE 17/07/2024
	CABLE TRAYS & ACCESSORIES	Page 2 of 2

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	REVIEWED BY	APPROVED BY
 MANMOHAN MAHAPATRA (SR. MANAGER)	 NARENDRANATH JAJWARE (DGM)	 PRAVEEN DUTTA AGM (SH)	 DEBASISA RATH GM (DH)

**3 x 800 MW PVUNL PATRATU TPP PHASE-I
CABLE TRAYS & ACC.
BOQ CUM UNPRICED FORMAT**

Sl.No.	Item Code	Item Description	UOM	Order Quantity	Unit Price (Ex-Works) (Quote/Unquote)	Total Price (Ex-Works) (Quote/Unquote)	Freight @ % of total EX-Works Price (Quote/Unquote)	GST @ 18% in INR (Quote/Unquote)	Total Price Including Freight & GST (Quote/Unquote)
HOT DIP GALVANISED PERFORATED TYPE CABLE TRAY COMPLETE WITH COUPLER PLATES, FASTENERS, CLAMPS AND FIXING HARDWARES ETC.									
1	507-0210005-00-A	CABLE TRAY 2 MM THICK-PERFORATED TYPE 100 W	MTR	9130					
2	507-0210204-00-A	CABLE TRAY 2 MM THICK-PERFORATED TYPE 50 W	MTR	10580					
3	507-0210939-00-A	COUPLER PLATE	NOS	34690	Note: Bidders must supply these items, as well as items at sl. nos. 1 and 2, listed above. Bidders to include the prices of these items in Sl. Nos. 1 and 2 above.				
4	507-0210940-00-A	NUT	NOS	138760					
5	507-0210941-00-A	BOLT	NOS	138760					
6	507-0210942-00-A	WASHER	NOS	277520					
Grand total				609440					