

**TAMIL NADU GENERATION & DISTRIBUTION
CORPORATION LIMITED**

**2 X 660MW ENNORE SEZ SUPER CRITICAL
THERMAL POWER**

**TECHNICAL SPECIFICATION FOR
CABLE TRAY & ACCESSORIES
BHEL DOC. NO. PE-TS-412-507-E021**

REVISION 00



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



TECHNICAL SPECIFICATION FOR CABLE TRAYS & ACCESSORIES

SPECIFICATION NO. PE-TS-412-507-E021

REVISION 00

DATE: 25.10.16

SHEET 1 OF 1

CONTENTS

Sl. No.	DESCRIPTION	NO. OF SHEETS
1.0	SECTION – I	
	COMPLIANCE SHEET	01
	SPECIFIC TECHNICAL REQUIREMENT	03
	TECHNICAL DATA SHEET	03
2.0	SECTION- 'II'	
	STANDARD TECHNICAL REQUIREMENTS	03
	QUALITY PLAN	05
	TYPICAL DETAILS OF CABLE TRAYS & ACCESSORIES	11
	TOTAL SHEETS INCLUDING COVER SHEET/CONTENT SHEET = 28	



TECHNICAL SPECIFICATION FOR CABLE TRAYS & ACCESSORIES

SPECIFICATION NO. PE-TS-412-507-E021

VOLUME II

SECTION I

REVISION 00

DATE: 25.10.16

SHEET OF

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 deviation 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
CABLE TRAYS & ACCESSORIES**

SPECIFICATION NO. PE-TS-412-507-E021

VOLUME II

SECTION I

REVISION 00

DATE: 25.10.2016

SHEET OF

SECTION – I

SPECIFIC TECHNICAL REQUIREMENTS



TECHNICAL SPECIFICATION FOR CABLE TRAYS & ACCESSORIES

SPECIFICATION NO. PE-TS-412-507-E021

VOLUME II

SECTION I

REVISION 00

DATE: 25.10.2016

SHEET OF

1.0 SCOPE

- 1.1 Manufacture, Inspection and Testing at Manufacturer's works, proper packing and delivery to site of Cable Trays & accessories conforming to this specification.
- 1.2 Technical requirements of Cable Trays & accessories are indicated in Data Sheet-A & Section-II.
- 1.3 The stipulation of Data Sheet-A shall prevail in case of any conflict between the stipulations of Data Sheet-A & Section-II.

2.0 BILL OF QUANTITIES

Quantity requirements shall be as per 'BOQ-cum-price schedule' as part of NIT.

3.0 SPECIFIC TECHNICAL REQUIREMENTS

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

4.0 DRAWINGS & DOCUMENTS TO BE SUBMITTED

4.1 Documents required along with Technical offer

Signed and Stamped copies of following documents:-

- a) Schedule of BOQ cum Price Schedule (Unpriced)
- b) Compliance certificate
- c) Schedule of deviations.

4.2 Documents required after award of LOI

Following documents/drawings shall be submitted after placement of order for BHEL & customer's approval:-

Sl. No.	Drawings / Document Description	Document Number	Submission Schedule
1	Quality Plan for Cable Trays & accessories	PE-V0- 412 -507-E904	Within one week of award of contract
2	Technical Data Sheet for Cable Trays & accessories	PE-V0-412-507-E031	Within one week of award of contract
3	GA drawings of Cable Trays & accessories	PE-V0- 412 -507-E032	Within one week of award of contract
4	BOQ of Coupler plates, Bolts, Washers & Nuts for lot wise ordered qty.	PE-V0- 412 -507-E033	Within one week of award of contract



TECHNICAL SPECIFICATION FOR CABLE TRAYS & ACCESSORIES

SPECIFICATION NO. PE-TS-412-507-E021

VOLUME II

SECTION I

REVISION 00

DATE: 25.10.2016

SHEET OF

Note:-

1. It may please be noted that successful bidder is not to make any fresh submittals at contract stage w.r.t. above mentioned drawings/documents except document against sl.no 04. Data Sheet-A, Standard Quality Plan & Typical details of Cable trays & Accessories as enclosed in the technical specification are to be appended with cover sheet bearing drawing/document number & description as stated above. The signed & stamped for the same shall be submitted by successful bidder to BHEL within one week of award of contract without making any changes in the contents of the drawing/document.
2. Document indicated at clause no. 4.2 above, shall be submitted through document management system (DMS).



TECHNICAL SPECIFICATION FOR CABLE TRAYS & ACCESSORIES

SPECIFICATION NO. PE-TS-412-507-E021

VOLUME II

SECTION I

REVISION 00

DATE: 25.10.2016

SHEET OF

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 zinc coating. |
| f) | IS: 6745 | For determining of mass of zinc coating. |
| g) | IS: 1367
(Part-XIII) | Galvanised Coating on threaded Fasteners. |
| h) | IS: 1852 | For Rolling and Cutting Tolerances of hot rolled steel products. |
| i) | IS: 9595 | For Thickness of Welding. |

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) | : | 600 450 300 150 (Ladder)
600 450 300 150 100 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 Thickness of the finished product shall not be less than 2.0 mm.

3.0 FITTINGS

- | | | |
|-----------------|---|--|
| End connections | : | Through Coupler plate
(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. |
| c) Width | : | Suitable for width of cable trays. |
| d) Tolerance in length/
Width / height | : | Same as cable trays. |



TECHNICAL SPECIFICATION FOR CABLE TRAYS & ACCESSORIES

SPECIFICATION NO. PE-TS-412-507-E021

VOLUME II

SECTION I

REVISION 00

DATE: 25.10.2016

SHEET OF

e) Thickness of the finished product shall not be less than 1.6 mm.

5.0 SHEET THICKNESS before Hot Dip Galvanisation

- a) For cable trays & Accessories : 2.0 mm
- b) For cable tray cover : 1.6 mm
- c) For Coupler plate : 3.0 mm
- d) Tolerance in Thickness : + /- 0.2mm As per IS: 1852
- e) Make : SAIL/TISCO/RINL/BHUSAN/JINDAL STEEL/JINDAL ISPAT/ESSAR/LLOYD/IISCO/ SAIL 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 : 86 microns (minimum) for 2.0 mm thick product & 1.6 mm thick product
- e) Min. weight of Zinc deposit : 610 grams per square meter for 2.0 mm thick product & 1.6 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.
Uniformity of coating – The coating of any article shall withstand four 1 minute dips in standard copper sulphate solution without the formation of an adherent red spot of metallic copper upon the basic metal.
 - (iv) Adhesion Test as per IS 2629.
 - (v) Visual inspection
The quality of cadmium/zinc plating on items with screw threads shall be inspected visually and shall be free from visible defects such as unplanted areas, blisters and modules.
 - (vi) In addition, the plating thickness shall be determined microscopically/chemically or electronically.



TECHNICAL SPECIFICATION FOR CABLE TRAYS & ACCESSORIES

SPECIFICATION NO. PE-TS-412-507-E021

VOLUME II

SECTION I

REVISION 00

DATE: 25.10.2016

SHEET OF

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.



**TECHNICAL SPECIFICATION FOR
CABLE TRAY & ACCESSORIES**

SPECIFICATION NO. PE-TS-412-507-E021

VOLUME II

SECTION II

REVISION 00

DATE:25.10.16

SECTION-II

STANDARD TECHNICAL REQUIREMENTS



TECHNICAL SPECIFICATION FOR CABLE TRAY & ACCESSORIES

SPECIFICATION NO. PE-TS-412-507-E021

VOLUME II

SECTION II

REVISION 00

DATE: 25.10.2016

Sheet 1 of 2

1.0 INTENT OF SPECIFICATION

The intent of specification is not to specify all details of design & construction of material. The material shall, however, conform in all aspects to high standard of design, engineering and workmanship and be capable of performing in continuous operation up to & after bidder's guarantee period in manner acceptable to purchaser who will interpret the drawings & specification and shall have power to reject any work or material which in his judgement is not in full accordance with this specification.

2.0 CODES & 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 Trays & Accessories shall conform to the latest revision of relevant standards and codes of practices as per data sheet-A
- 2.3 In case of conflict between the applicable reference standard and this specification, this specification shall govern.

3.0 TECHNICAL REQUIREMENTS

- 3.1 Cable trays & accessories shall be of two types, namely ladder type and perforated type. Technical particulars are specified in data Sheet-A and drawings enclosed with this specification. Minor fabrication detail changes which do not affect the material /dimensional aspect of the equipment, shall be subject to BHEL/owner's approval without any commercial implication.
- 3.2 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.
- 3.3 Necessary fasteners shall be provided along with each length of cable tray as specified in drawings enclosed.
- 3.4 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.
- 3.5 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 ASSURANCE, TESTING AND INSPECTION

- 4.1 Bidder shall confirm compliance with BHEL'S standard Quality plan as attached with the specification. 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.
- 4.2 All materials shall be procured, manufactured, inspected and tested by vendor/ sub-vendor as per approved quality plan.



TECHNICAL SPECIFICATION FOR CABLE TRAY & ACCESSORIES

SPECIFICATION NO. PE-TS-412-507-E021

VOLUME II

SECTION II

REVISION 00

DATE: 25.10.2016

Sheet 2 of 2

- 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.

5.0 PACKING

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



**TECHNICAL SPECIFICATION FOR
CABLE TRAY AND ACCESSORIES**

SPECIFICATION NO. PE-RC-999-507-E021

VOLUME II

SECTION II

REVISION 01

DATE: 25.10.16

STANDARD QUALITY PLAN

		QUALITY PLAN		CUSTOMER :			PROJECT TITLE :			SPECIFICATION NO. : PE-TS-412-507-E021		
				BIDDER/ VENDOR :			STANDARD QP NO. : PE-QP-999-507-E005, REV. 01			SPECIFICATION TITLE:		
		SHEET 1 OF 2		SYSTEM CABLING			ITEM : CABLE TRAYS & ACCESSORIES			DOC. NO. :		
SL. NO.	COMPONENT/OPERATION	CHARACTERISTIC CHECK	CAT.	TYPE/ METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD	AGENCY			REMARKS
									P	W	V	
1	2	3	4	5	6	7	8	9	10			11
1.0	RAW MATERIAL											
1.1	ROLLED SHEET	1.CHEM.& PHY. PROPERTIES	MA	VERIFICATION OF TCS	100%	IS1079	IS1079	MILL TC	3/2	-	1/2	Steel shall be procured from SAIL/TISCO/RINL/BHUSAN/JINDAL STEEL/JINDAL ISPAT/ESSAR/ LOYD/ISCO / authorised SAIL Re Rollers.
		2.DIMENSIONS	MA	MEASUREMENT	100%	IS-1730/ APPD. DATA SHEET	IS-1730/ APPD. DATA SHEET	QC RECORD	3/2	-	-	
		3.SURFACE FINISH	MA	VISUAL	100%	IS-1079	IS-1079	QC RECORD	3/2	-	-	
1.2	ZINC	CHEM.COMP.	MA	CHEM TEST	EACH HEAT	IS-209	IS-209	TC	3/2	-	1/2	
2.0	IN-PROCESS											
2.1	FABRICATION	1.DIMENSIONS	MA	MEASUREMENT	100%	APPD.DRG.	APPD.DRG.	QC RECORD	2	-	1	Welding is to be done by qualified welders in accordance with ASME SEC. IX article III. WPS , PQR & WPQ to be reviewed during inspection.
		2.WELDING QUALITY	MA	VISUAL	100%	GOOD WELDING PRACTICE	FREE FROM DEFECTS & SLAG	QC RECORD	2	-	1	
		3.SURFACE FINISH	MA	VISUAL	100%	APPD.DRG.	APPD.DRG.	QC RECORD	2	-	1	
2.2	SURFACE PREPARATION	1.CLEANING PICKLING & RINSING & FLUXING	MA	VISUAL	PERIODIC IN EACH SHIFT	IS:2629	IS:2629	QC RECORD	2	-	-	
		2. SURFACE QUALITY	MA	VISUAL	100%	IS:2629	IS:2629	QC RECORD	2	-	-	
BHEL			PARTICULARS			BIDDER/VENDOR						
			NAME									
			SIGNATURE									
			DATE						BIDDER'S/VENDORS COMPANY SEAL			

LEGEND : 1 - BHEL/ CUSTOMER 2 - VENDOR 3 - SUB- VENDOR P - PERFORM W - WITNESS V - VERIFICATION

		QUALITY PLAN		CUSTOMER :			PROJECT TITLE :			SPECIFICATION NO. : PE-TS-412-507-E021		
				BIDDER/ VENDOR :			STANDARD QP NO. : PE-QP-999-507-E005, REV. 01			SPECIFICATION TITLE:		
		SHEET 2 OF 2		SYSTEM CABLING			ITEM : CABLE TRAYS & ACCESSORIES			DOC. NO. :		
SL. NO.	COMPONENT/OPERATION	CHARACTERISTIC CHECK	CAT.	TYPE/ METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD	AGENCY			REMARKS
									P	W	V	
1	2	3	4	5	6	7	8	9	10			11
2.3	GALVANISING	1.TEMPERATURE OF ZINC BATH 2.DROSS 3.RATE OF IMMERSION 4.SURFACE QUALITY	MA MA MA MA	TEMPERATURE INDICATOR VISUAL VISUAL VISUAL	CONTINUOUS PERIODIC 100% 100%	IS-2629 IS 2629 IS 2629/ MFR'S PRACTICE IS 2629	IS-2629 IS 2629 IS2629/ MFR'S PRACTICE FREE FROM BURRS, ROUGHNESS, SLAG FLUX, STAIN, ETC.	QC RECORD QC RECORD QC RECORD QC RECORD	2/3 2/3 2/3 2/3	- - - -	- - 2 -	Galvanization is to be done at galvanisation plant listed in annexure-2 to quality plan. Overall thickness of finished product shall not be less than the thickness of cable tray & accessories defined in technical datasheet. Following shall be engraved/ punched on each standard length of cable tray at the center of both sides of runner:"PEM" (length of letter 90mm & height 30mm). Fasteners shall be of good quality as per IS 1363 600MM wide cable tray to be tested. Maximum deflection shall not exceed 7MM on mid span on uniform loading of 100KG/M.
3.0	FINISHED ITEMS											
3.1	(CABLE TRAY, ACCESSORIES & HARDWARES)	1.DIMENSIONS 2.SURFACE FINISH 3.RIGIDITY (FOR TRAYS) 4.MASS OF ZINC COATING 5.UNIFORMITY OF ZINC COATING 6.THICKNESS OF ZINC COATING 7.ADHESION	MA MA MA MA MA MA	MEASUREMENT VISUAL DEFLECTION TEST CHEM. TEST CHEM. TEST ELCOMETER MECH.TEST	IS-2500 (PART 1) LEVEL S-4 IS-2500 (PART 1) LEVEL S-4 2 No./ LOT/TYPE IS-4759 IS-4759 IS-4759 IS-4759	APPD. DRG APPD. DRG APPD. DRG IS-6745 IS-2633 86 MICRONS (minimum) for 2.0mm & 1.6mm thick product IS-2629	APPD. DRG FREE FROM BURRS, SLAG, ROUGHNESS, FLUX, STAIN, ETC. APPD. DRG 610 gms/ Sq m (for 2.0mm thick product) 610 gms/ Sq m (for 1.6 mm thick product) IS-2633 86 MICRONS (minimum) for 2.0mm & 1.6mm thick product IS-2629	INSP.REPORT INSP.REPORT INSP.REPORT INSP.REPORT INSP.REPORT INSP.REPORT	2 2 2 2 2 2	1 1 1 1 1 1	- - - - - -	
BHEL			PARTICULARS			BIDDER/VENDOR						
			NAME									
			SIGNATURE									
			DATE						BIDDER'S/VENDORS COMPANY SEAL			

LEGEND : 1 - BHEL/ CUSTOMER 2 - VENDOR 3 - SUB- VENDOR P - PERFORM W - WITNESS V - VERIFICATION

ANNEXURE-1

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 sheets, 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
Column11-	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 by BHEL and all tests as per relevant 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 preserved till despatch. Wherever this is not possible, the identification mark shall be transferred to the components in the presence of BHEL QS Engineer unless otherwise 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 complied with.
7. Inspection reports, log sheets, test reports/certificate. etc. shall be furnished to BHEL at the appropriate 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-2 to Quality Plan

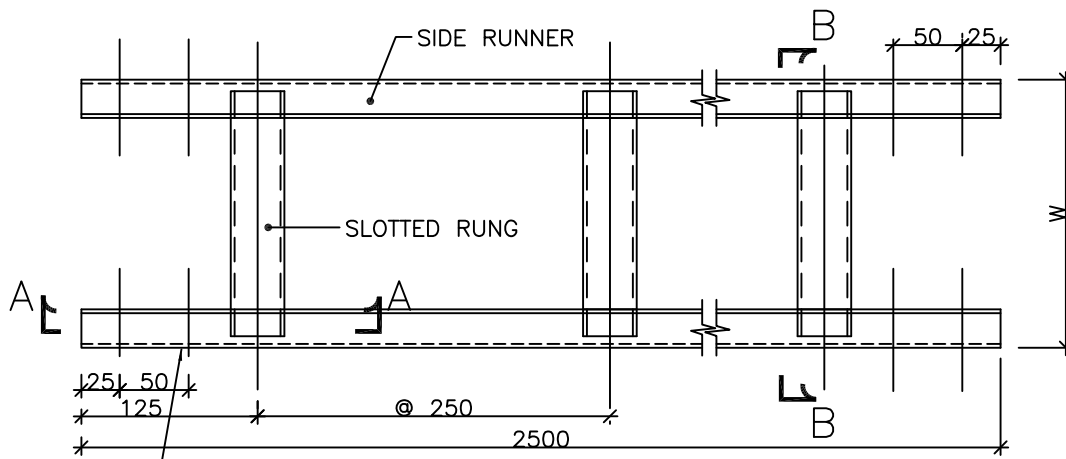
(LIST OF BHEL- PEM APPROVED GALVANIZERS)

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

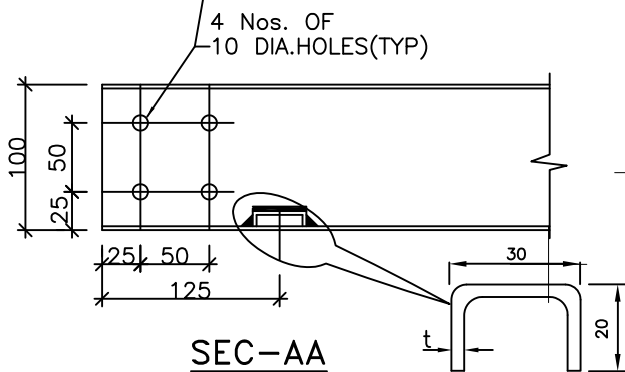
NOTES:

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.

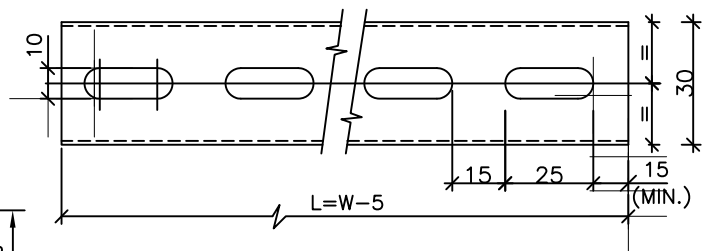
										PROJECT 2X660MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT AT ASH DYKE OF NCTPS,CHENNAI									
										OWNER TAMIL NADU GENERATION & DISTRIBUTION CORPORATION LIMITED									
										OWNER'S CONSULTANT DESEIN PRIVATE LIMITED, DESEIN HOUSE,NEW DELHI									
										EPC CONTRACTOR BHARAT HEAVY ELECTRICALS LIMITED POWER SECTOR PROJECT ENGINEERING MANAGEMENT NOIDA(U.P) INDIA									
REV DATE DRN CHD APPD.					REV DATE DRN CHD APPD.														
04 19.5.15 AAT SL RG					03 14.5.15 AAT SL RG														
REVISED DRAWING TO INCORPORATE 50MM WIDE PERFORATED TRAY.					REVISED DRAWING AS PER CUSTOMER COMMENTS DATE ON 11.05.2015.														
REV DATE DRN CHD APPD.					REV DATE DRN CHD APPD.					DOCUMENT TITLE:									
02 13.4.15 AAT SL RG					01 17.3.15 AAT SL RG					TYPICAL DETAILS OF CABLE TRAYS AND ACCESSORIES									
REVISED DRAWING AS PER CUSTOMER COMMENTS DATE ON 07.04.2015.					REVISED DRAWING AS PER CUSTOMER COMMENTS DATE ON 13.2.2015.					DPT CODE-E									
										DRN AAT -SD- 13.3.15									
										CHD SL -SD- 13.3.15									
										APP RG -SD- 13.3.15									
										DOCUMENT NO:									
										PE-DG-412-507-E005									
										SHT. 01 OF 11									
										REV.04									



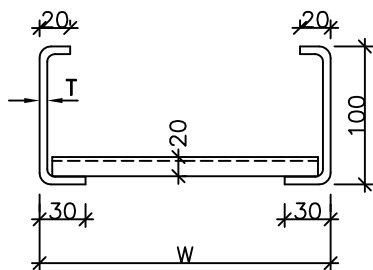
LADDER TYPE CABLE TRAY



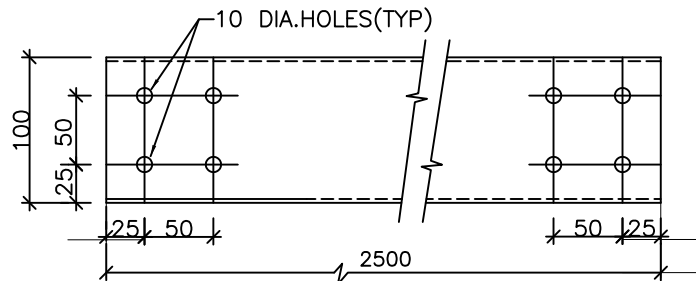
SEC-AA



SLOTTED RUNG



SEC-BB



SIDE RUNNER

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

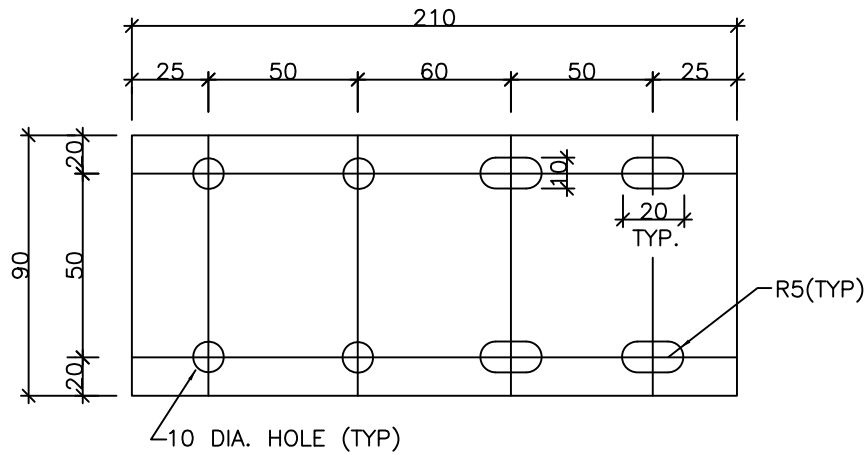
FOR GENERAL NOTES REFER SHEET 11 OF 11



TYPICAL DETAILS OF CABLE TRAYS AND ACCESSORIES

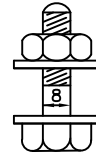
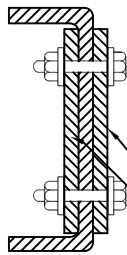
DWG. NO.
PE-DG-412-507-E005

SHT. 02 OF 11 REV.04



**SIDE COUPLER PLATE FOR
LADDER/PERFORATED TYPE TRAYS**
(600/450/300/150W TRAYS)

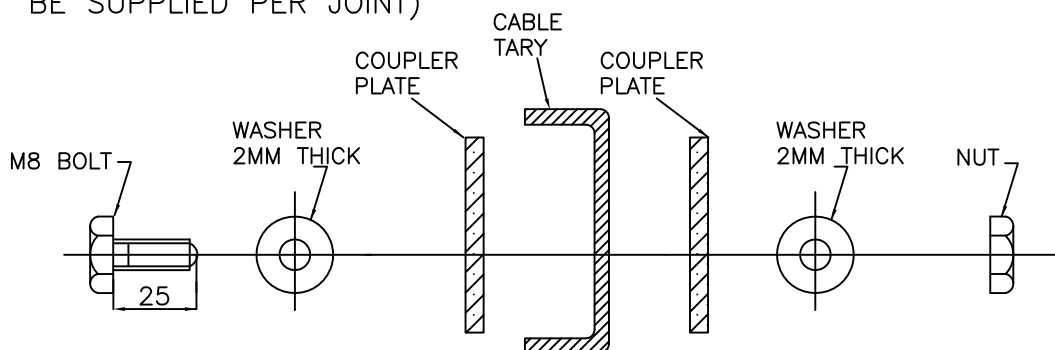
QTY. REQUIRED/TRAY SECTION : 4 NOS.



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 11 OF 11

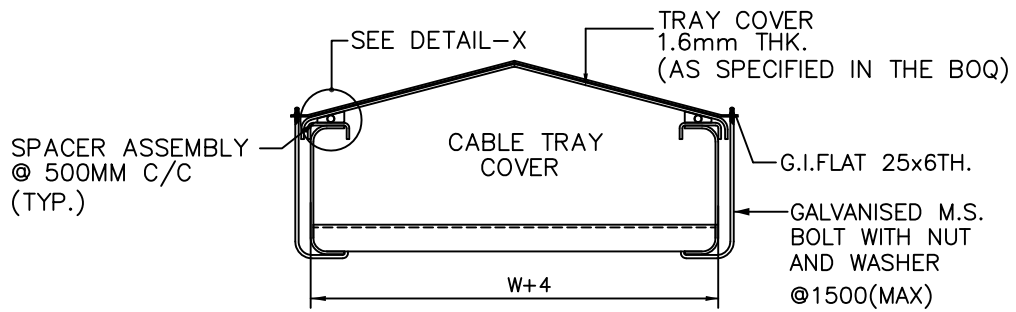


**TYPICAL DETAILS OF CABLE TRAYS AND
ACCESSORIES**

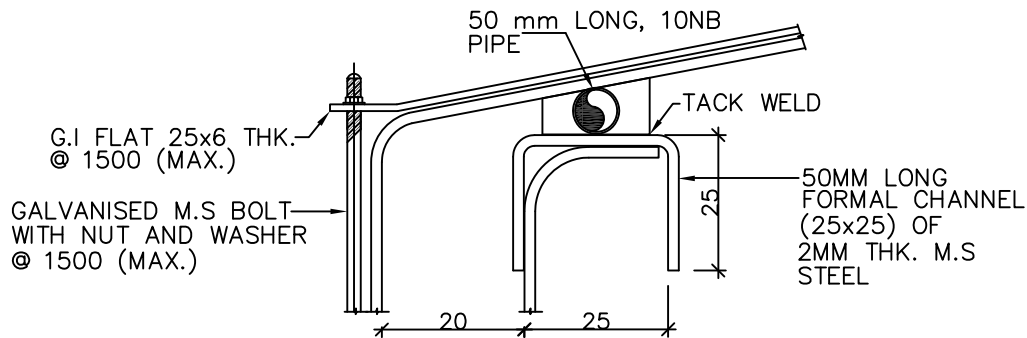
DWG. NO.
PE-DG-412-507-E005

SHT. 03 OF 11

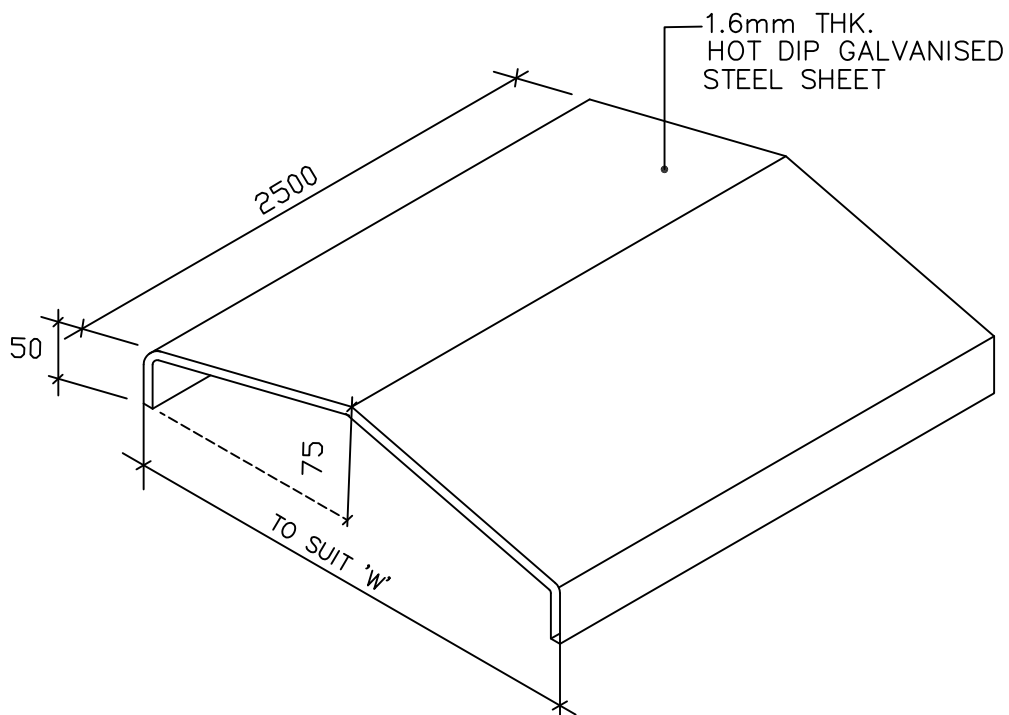
REV.04



COVER FIXING (TYP.)



DETAIL-X



CABLE TRAY COVER

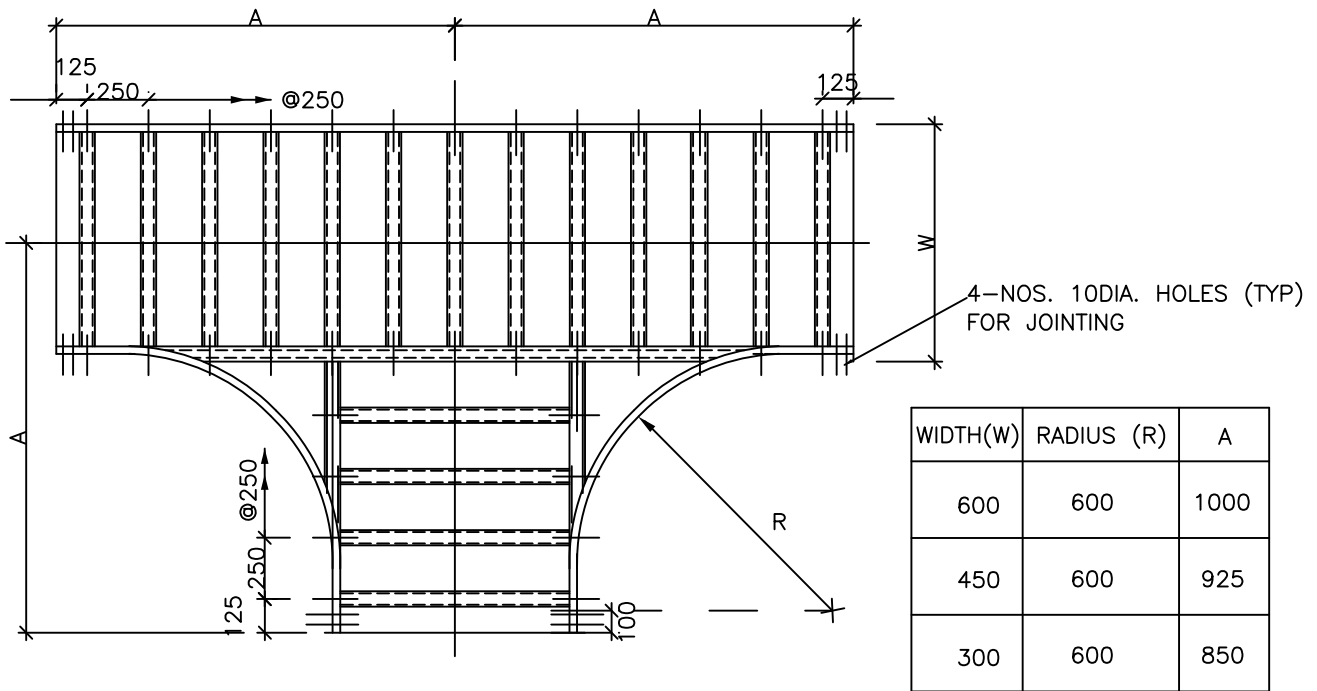
FOR GENERAL NOTES REFER SHEET 11 OF 11



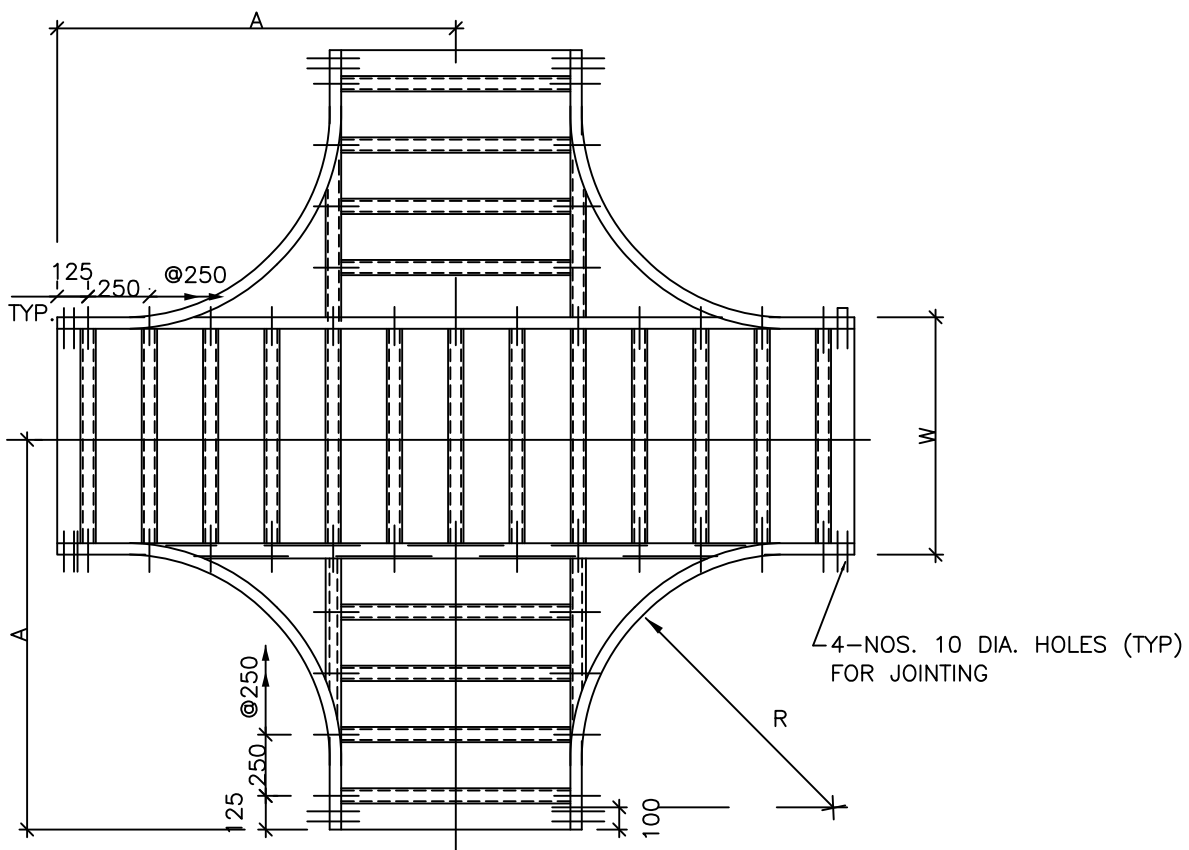
TYPICAL DETAILS OF CABLE TRAYS AND ACCESSORIES

DWG. NO.
PE-DG-412-507-E005

SHT. 04 OF 11 REV.04



HORIZONTAL TEE-PLAN



HORIZONTAL CROSS-PLAN

LADDER TYPE ACCESSORIES

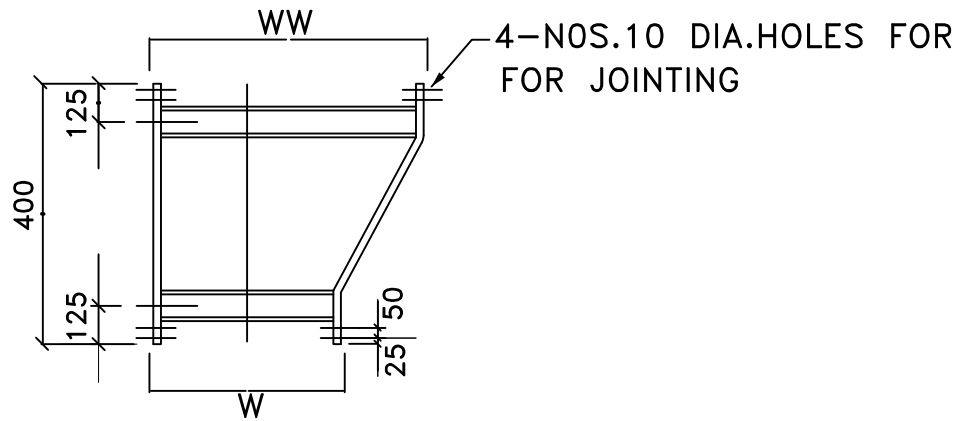
FOR GENERAL NOTES REFER SHEET 11 OF 11



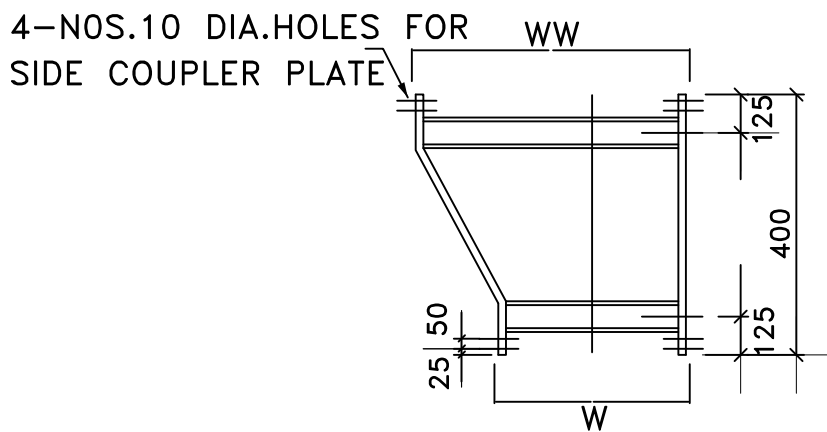
TYPICAL DETAILS OF CABLE TRAYS AND
ACCESSORIES

DWG. NO.
PE-DG-412-507-E005

SHT. 05 OF 11 REV. 04



LEFT HAND REDUCER-PLAN



RIGHT HAND REDUCER-PLAN

WIDTH	WW	600	600	450
	W	450	300	300

LADDER TYPE ACCESSORIES

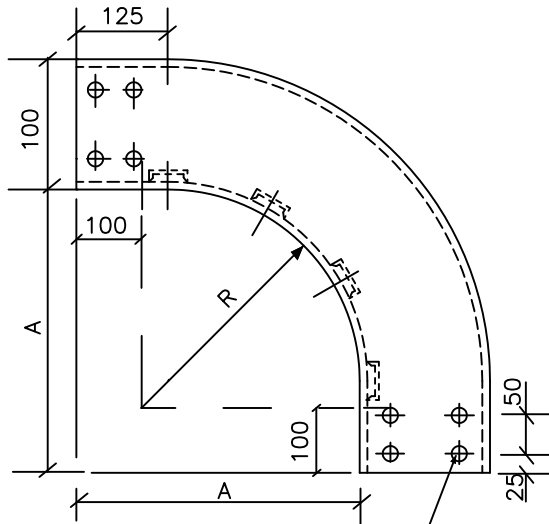
FOR GENERAL NOTES REFER SHEET 11 OF 11



TYPICAL DETAILS OF CABLE TRAYS AND
ACCESSORIES

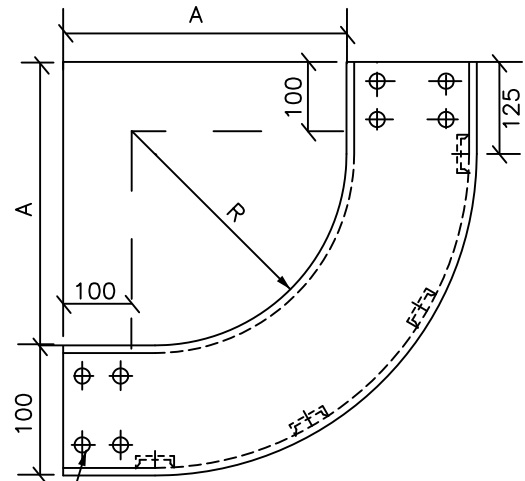
DWG. NO.
PE-DG-412-507-E005

SHT. 06 OF 11 REV. 04



ELEVATION
90° VERTICAL BEND
(OUTSIDE)

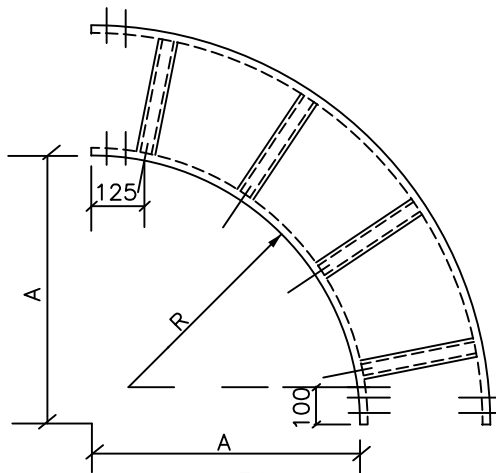
4 NOS. 10 DIA. HOLES
FOR JOINTING



ELEVATION
90° VERTICAL BEND
(INSIDE)

LADDER TYPE TRAYS

WIDTH(W)	RADIUS (R)	A
600	600	700
450	600	700
300	600	700



PLAN
90° HORIZONTAL BEND

LADDER TYPE ACCESSORIES

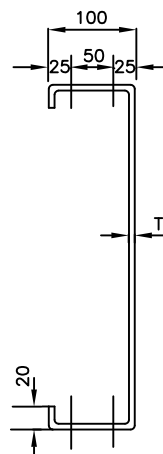
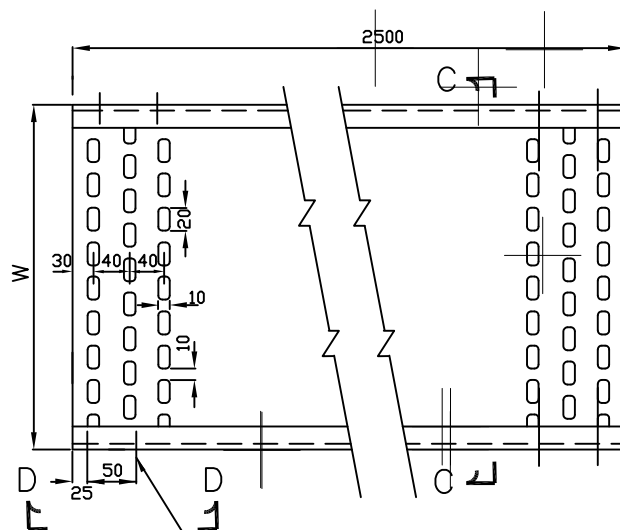
FOR GENERAL NOTES REFER SHEET 11 OF 11



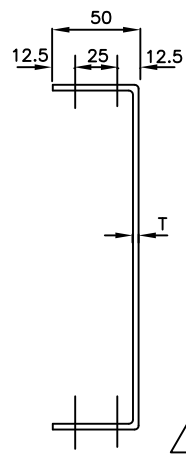
TYPICAL DETAILS OF CABLE TRAYS AND
ACCESSORIES

DWG. NO.
PE-DG-412-507-E005

SHT. 07 OF 11 REV. 04



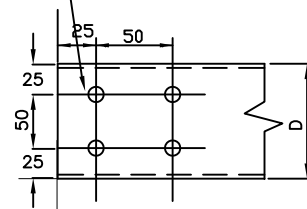
SECTION-CC
(600/450/300/150
TRAYS)



SECTION-CC
(100/50 TRAYS)

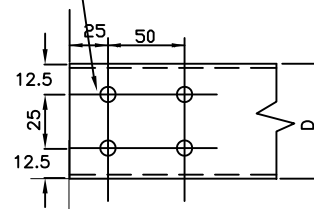
REV
04A

4 HOLES 10mm DIA.

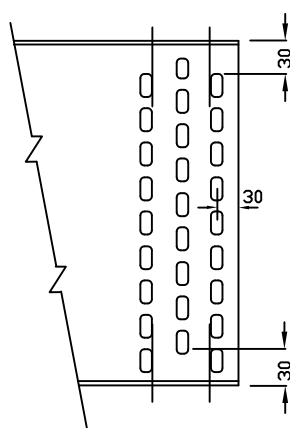


VIEW-DD
(600/450/300/
150W TRAYS)

4 HOLES 10mm DIA.



VIEW-DD
(100/50W
TRAYS)



ARRANGEMENT OF
PERFORATIONS

REV
04

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

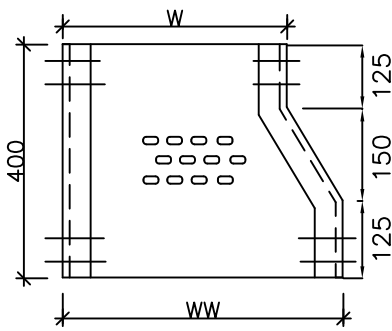
FOR GENERAL NOTES REFER SHEET 11 OF 11



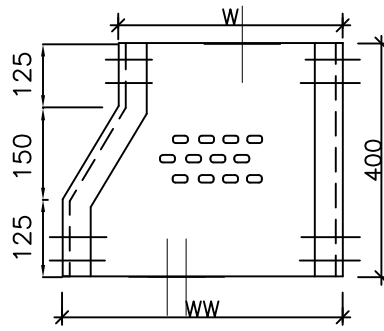
TYPICAL DETAILS OF CABLE TRAYS AND
ACCESSORIES

DWG. NO.
PE-DG-412-507-E005

SHT. 08 OF 11 REV. 04



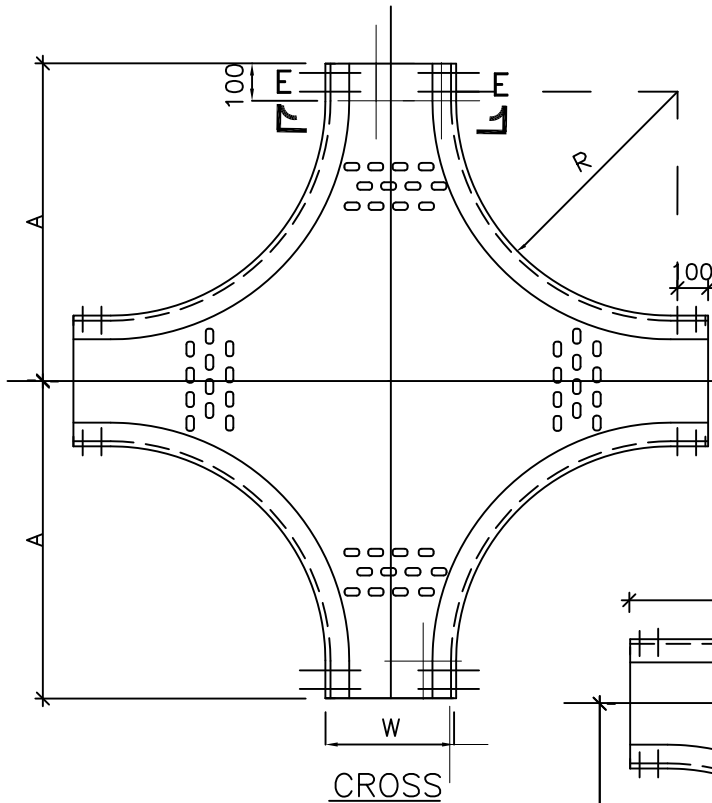
LEFT HAND REDUCER



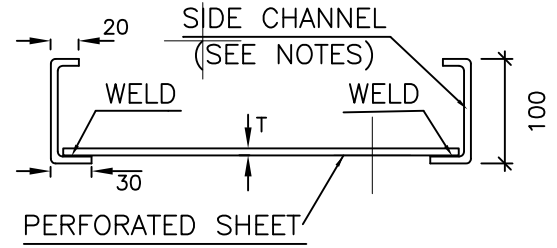
RIGHT HAND REDUCER

WW	W	DEPTH	THICKNESS
600	450	100	2
600	300	100	2
450	300	100	2

PERFORATED TYPE



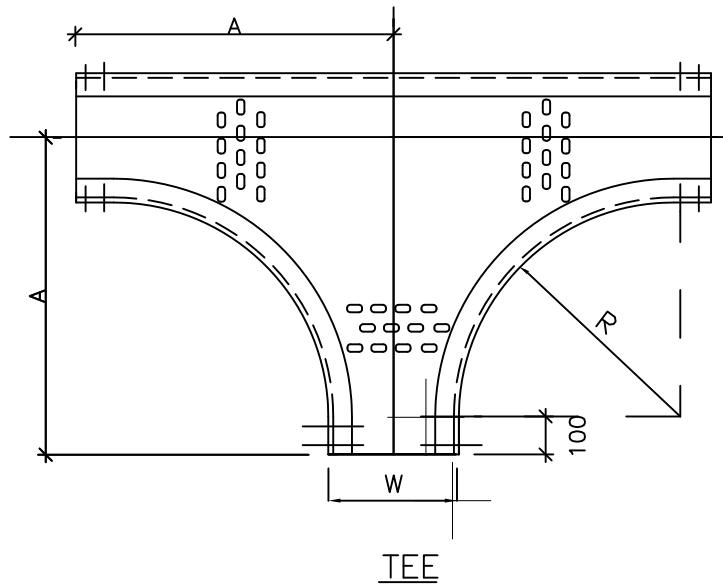
CROSS



SECTION-EE

PERFORATED TYPE

WIDTH(W)	RADIUS (R)	A	T
600	600	1000	2
450	600	925	2
300	600	850	2



TEE

PERFORATED TYPE ACCESSORIES

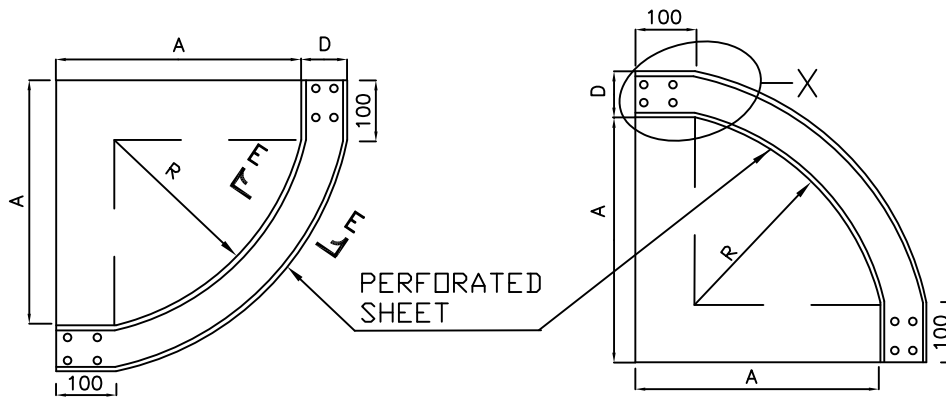
FOR GENERAL NOTES REFER SHEET 11 OF 11



TYPICAL DETAILS OF CABLE TRAYS AND ACCESSORIES

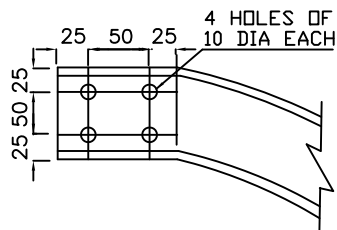
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PE-DG-412-507-E005

SHT. 09 OF 11 REV. 04

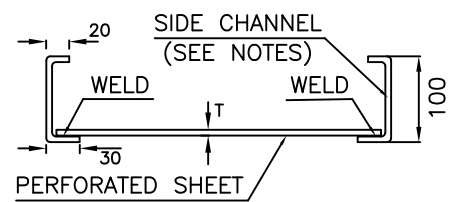


INSIDE TYPE

OUTSIDE TYPE

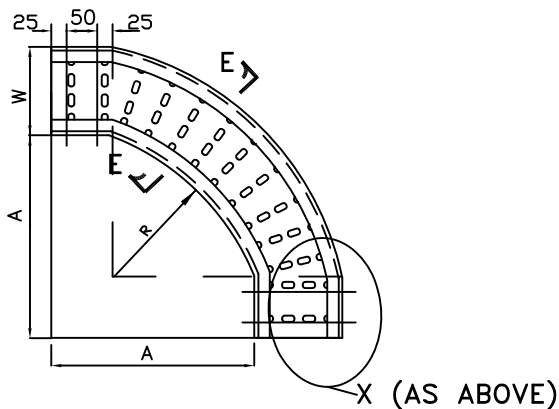


ENLARGED VIEW OF "X"



SECTION-EE

90° VERTICAL BEND - PERFORATED TYPE



90° HORIZONTAL BEND - PERFORATED TYPE

WIDTH(W)	RADIUS (R)	A	T
600	600	700	2
450	600	700	2
300	600	700	2

PERFORATED TYPE ACCESSORIES

FOR GENERAL NOTES REFER SHEET 11 OF 11



TYPICAL DETAILS OF CABLE TRAYS AND
ACCESSORIES

DWG. NO.
PE-DG-412-507-E005

SHT. 10 OF 11 REV. 04

NOTES:-

1. THE LADDER AND PERFORATED TYPE CABLE TRAYS AND ACCESSORIES (INCLUDING SIDE RUNNERS OF LADDER TYPE TRAYS & ACCESSORIES) SHALL BE MADE OF 2MM HOT ROLLED M.S. SHEET. ALL THE COUPLER PLATE SHALL BE 3 MM THICK. THESE TRAYS SHALL BE USED IN ALL AREAS OF POWER HOUSE EXCEPT FOR AREAS LIKE INTAKE RAW WATER PUMP HOUSE, DESALINATION PLANT, CHP, BATTERY ROOM, NDCT, ESP AREA AND CHEMICAL HOUSE WHERE FRP CABLE TRAYS SHALL BE USED. 03
2. THE CABLE TRAYS & ACCESSORIES SHALL BE HOT DIP GALVANISED AS PER IS 2629. THE MASS OF ZINC COATING SHALL NOT BE LESS THAN 610 gm/m² AND THICKNESS SHALL BE 86 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. STANDARD TRAY ACCESSORIES SHALL BE WITH THE RADIUS INDICATED IN THIS DRAWING.
6. SIDE CHANNELS OF PERFORATED TYPE CABLE TRAY ACCESSORIES SHALL BE WELDED WITH THE PERFORATED SHEET AT INTERVALS OF 100mm.
7. LENGTH OF WELDING SHALL NOT BE LESS THAN 25mm FOR CABLE TRAYS. THE THICKNESS OF WELDING SHALL BE AS PER IS 9595.
8. ALL TRAY CORNERS SHALL BE SMOOTH AND FREE OF SHARP EDGES.
9. THE CABLE TRAY COVER SHALL BE OF 1.6MM THICK MS SHEET AND SHALL BE HOT DIP GALVANISED.
10. THE DEPTH, WIDTH AND LENGTH OF TRAYS & TRAY COVERS SHALL BE WITHIN A TOLERANCE OF (+/-) 2 mm. THE THICKNESS TOLERANCE IS OF (+/-) 0.2 mm AS PER IS 1852.
11. THE THICKNESS OF THE FINISHED GALVANISED PRODUCT SHALL NOT BE LESS THAN 2MM.
12. TO FACILITATE ASSEMBLY, ALL ACCESSORIES AT ENDS SHALL HAVE 100mm STRAIGHT PORTION.
13. ALL NUTS, BOLTS, WASHERS ETC., SHALL BE HOT DIP GALVANISED AS PER IS:1367 PART XIII FOR SIZES 12 MM & ABOVE, AND ELECTROPLATED/ZINC PASSIVATED FOR SIZES UPTO 12 MM.
14. ALL CUTTING & FORMING OPERATIONS SHALL BE COMPLETED PRIOR TO GALVANIZING.
15. FINISHED TRAYS SHALL BE FREE FROM BURRS AND SHARP EDGES.
16. ALL DIMENSIONS ARE IN mm UNLESS NOTED OTHERWISE.
17. WIDTH OF CABLE TRAYS PROPOSED TO BE USED FOR THE PROJECT ARE AS UNDER:
A) LADDER TYPE: 600W, 450W, 300W, 150W.
B) PERFORATED TYPE: 600W, 450W, 300W, 150W, 100W, 50W. 04
18. THE DEPTH OF 600W, 450W, 300W, 150W TRAYS & ACCESSORIES SHALL BE 100MM. THE DEPTH OF 100W, 50W TRAYS & ACCESSORIES SHALL BE 50MM. 04
19. 600MM WIDE TYPE CABLE TRAYS SHALL BE SUITABLE FOR A CABLE WEIGHT OF 100 Kg PER METRE (INCLUDING LIVE LOAD) OF RUNNING LENGTH OF TRAY.
20. PEM SHALL BE MARKED ON SIDE RUNNER OF EACH TRAY SECTION.



TYPICAL DETAILS OF CABLE TRAYS AND ACCESSORIES

DWG. NO.
PE-DG-412-507-E005

SHT. 11 OF 11 REV.04