

**TELANGANA STATE POWER GENERATION
CORPORATION LIMITED**

5X800MW YADADRI TPS

VOLUME – II

**TECHNICAL SPECIFICATION
FOR
*CABLE TRAYS & ACCESSORIES***

SPECIFICATION NO : *PE-TS-417-507-E021, R0*



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



TECHNICAL SPECIFICATION FOR
CABLE TRAYS & ACCESSORIES

SPECIFICATION NO. PE-TS- 417-507-E021

VOLUME II

SECTION I

REVISION 0

DATE: 18.06.2018

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	TOTAL NO. OF SHEETS	= 33



**TECHNICAL SPECIFICATION FOR
CABLE TRAY & ACC.**

SPECIFICATION NO. PE-TS-417-507-E021

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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 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



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SECTION – I

SPECIFIC TECHNICAL REQUIREMENTS



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1.0 SCOPE OF ENQUIRY

- 1.1 This enquiry covers the supply of Cable Trays & Accessories conforming to this specification.
- 1.2 General technical requirements of the Cable Trays & Accessories are indicated in Section-I. Project specific technical/ quality requirements / changes are listed in Section-II.
- 1.3 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 Data Sheet-A.

3.0 SPECIFIC REQUIREMENTS:

3.1 Technical:

S. No.	Reference clause No. of Section II (if any)	Specific Requirement/ Change
1	Clause no. 4.1	Quality plan number shall be read as PE-QP-999-507-E005 instead of PED-507-00-Q-005/04
2	Clause no. 4.4	Load test shall be carried out on 600mm, 450mm and 300mm width tray with same loading and deflection criteria
3	QP's (PE-QP-999-507-E005) Remarks column at S.no. 3.1 (3) Rigidity	"600MM wide cable tray to be tested" shall be read as "600mm, 450mm & 300mm wide cable trays shall be tested".

3.2 Quality/ Inspection:

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



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ANNEXURE – A

LIST OF DRAWINGS / DOCUMENTS
(REQUIRED TO BE FURNISHED BY SUCCESSFUL BIDDER AFTER AWARD OF CONTRACT)

Sl. No.	Drawings/Document Description	Drawings / Document Number	Submission Schedule
1.	Technical Data Sheet for Cable Trays & Accessories	PE-V0-417-507-E011	Within one week of award of contract
2.	GA drawings of Cable Trays & Accessories	PE-V0-417-507-E012	Within one week of award of contract
3.	Quality Plan for Cable Trays & Accessories	PE-V0-417-507-E902	Within one week of award of contract

Note:-

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. 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



**TECHNICAL SPECIFICATION FOR
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VOLUME NO. : II

SECTION : II

REV NO. : 0 DATE : 18.06.2018

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QUALITY PLAN

QUALITY PLAN		CUSTOMER : TSGENCO		PROJECT TITLE :5X800MW YADADRI TPS		SPECIFICATION NO. PE-TS-417-507-E021			
BIDDER/ VENDOR		PROJECT		STANDARD QP NO. : PE-QP-999-507-E005, REV. 0		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	REMARKS
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 TC'S	100%	IS1079	IS1079	MILL TC	Steel shall be procured from SAIL/TISCO/RINL/BHUSAN/JINDAL ISPAT/ESSAR/LLOYD/ IISCO/ authorised SAIL Re Rollers.
		2.DIMENSIONS	MA	MEASUREMENT	100%	IS-1730/ APPD. DATA SHEET IS-1079	IS-1730/ APPD. DATA SHEET IS-1079	QC RECORD	-
		3.SURFACE FINISH	MA	VISUAL	100%			QC RECORD	-
1.2	ZINC	CHEM.COMP.	MA	CHEM TEST	EACH HEAT	IS-209	IS-209	QC RECORD	1/2
2.0	IN-PROCESS								
2.1	FABRICATION	1.DIMENSIONS	MA	MEASUREMENT	100%	APPD.DRG.	APPD.DRG.	QC RECORD	1
		2.WELDING QUALITY	MA	VISUAL	100%	GOOD WELDING PRACTICE	FREE FROM DEFECTS & SLAG	QC RECORD	1
		3.SURFACE FINISH	MA	VISUAL	100%	APPD.DRG.	APPD.DRG.	QC RECORD	1
2.2	SURFACE PREPARATION	1.CLEANING PICKLING & FLUXING	MA	VISUAL	PERIODIC IN EACH SHIFT	IS:2629	IS:2629	QC RECORD	-
		2. SURFACE QUALITY	MA	VISUAL	100%	IS:2629	IS:2629	QC RECORD	-
BHEL									
PARTICULARS									
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 : TSGENCO		PROJECT TITLE :5X800MW YADADRI TPS		SPECIFICATION NO. PE-TS-417-507-E021							
		BIDDER/ VENDOR :		PROJECT		SPECIFICATION TITLE:							
		STANDARD QP NO. : PE-QP-999-507-E005, REV. 0											
SHEET 2 OF 2		SYSTEM CABLING		ITEM : CABLE TRAYS & ACCESSORIES		DOC. NO. :							
SL. NO.	COMPONENT/OPERATION	CAT.	TYPE/ METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD						
1	2	4	5	6	7	8	9						
2.3	3	MA	TEMPERATURE INDICATOR	CONTINUOUS	IS-2629	IS-2629	QC RECORD						
	1. TEMPERATURE OF ZINC BATH												
	2. DROSS	MA	VISUAL	PERIODIC	IS 2629	IS 2629	QC RECORD						
	3. RATE OF IMMERSION	MA	VISUAL	100%	IS 2629/ MFR'S PRACTICE	IS 2629/ MFR'S PRACTICE	QC RECORD						
	4. SURFACE QUALITY	MA	VISUAL	100%	IS 2629	FREE FROM BURRS, ROUGHNESS, SLAG FLUX, STAIN, ETC.	QC RECORD						
3.0	FINISHED ITEMS												
3.1	(CABLE TRAY, ACCESSORIES & HARDWARES)	MA	MEASUREMENT	IS-2500 (PART 1) LEVEL S-4	APPD. DRG	APPD. DRG	INSP. REPORT						
	1. DIMENSIONS												
	2. SURFACE FINISH	MA	VISUAL	IS-2500 (PART 1) LEVEL S-4	APPD. DRG	FREE FROM BURRS, SLAG, ROUGHNESS, FLUX, STAIN, ETC.	INSP. REPORT						
	3. RIGIDITY (FOR TRAYS)	MA	DEFLECTION TEST	2 No./ LOT/TYPE	APPD. DRG	APPD. DRG	INSP. REPORT						
	4. MASS OF ZINC COATING	MA	CHEM. TEST	IS-4759	IS-6745/ APPD. DATASHEET	APPD. DATASHEET	INSP. REPORT						
	5. UNIFORMITY OF ZINC COATING	MA	CHEM. TEST	IS-4759	IS-2633	IS-2633	INSP. REPORT						
	6. THICKNESS OF ZINC COATING	MA	ELCOMETER	IS-4759	APPD. DATASHEET	APPD. DATASHEET	INSP. REPORT						
	7. ADHESION	MA	MECH. TEST	IS-4759	IS-2629	IS-2629	INSP. REPORT						
BHEL													
PARTICULARS		BIDDER/VENDOR											
NAME													
SIGNATURE													
DATE													
LEGEND :		1 - BHEL/ CUSTOMER		2 - VENDOR		3 - SUB- VENDOR		P - PERFORM		W - WITNESS		BIDDERS/VENDORS COMPANY SEAL	
								V		- VERIFICATION			

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
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.

ANNEXURE – 1

INSTRUCTIONS FOR FILLING 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
- Column 11- 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.



STANDARD TECHNICAL SPECIFICATION
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SECTION 'II'

STANDARD TECHNICAL SPECIFICATION

	STANDARD TECHNICAL SPECIFICATION FOR CABLE TRAYS & ACCESSORIES	SPECIFICATION NO. PE-TS-417-507-E021	
		VOLUME II B	
		SECTION I	
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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.
- 3.2.3 Necessary fasteners shall be provided along with each length of cable tray as specified in drawings enclosed. The number of coupler plates, washers, nuts & bolts to be supplied shall be as per Data Sheet – A.
- 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 BHEL's Standard QP (QP NO. PED-507-00-Q-005/04) 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.
- 4.2 All materials shall be procured, manufactured, inspected and tested by vendor/ sub-vendor as per approved quality plan.



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- 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 equipments & 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 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) A copy of sheet "Contents" with bidder's signature & company stamp
- b) A copy of sheet "Instructions to bidders for preparing Technical offer" with bidder's signature & company stamp.
- c) Unpriced copy of "Annexure-I (BOQ – Cum- Price Schedule for Cable Trays & Accessories)" with bidder's signature & company stamp.

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.

7.2 Documents to be submitted by successful bidder after award of contract shall be as per Annexure-II.

7.3 Vendor drawing / document schedule for the project shall be as per Annexure – III.



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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 zinc coating.
- f) IS: 6745 For determining 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.

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) : 600 450 300 150 100 50
- 2.5 Construction : Conforming to enclosed drawing [PE-DG-417-507-E005]
- 2.6 Bending Radius
of Accessories(in mm) : As per drawing.
- 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 center of both sides of runner:
'PEM' (length of letter 90mm & height 30mm).

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.

5.0 SHEET THICKNESS

a) For cable trays &
Accessories : 2.0 mm

b) For cable tray cover : 2.0 mm

c) For Coupler plate : 2.0 mm

d) Tolerance in Thickness : (+/-0.2 mm)

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)

e) Min. weight of
Zinc deposit : 610 grams 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 Test as per IS 2629.

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

Based on a total no. of coupler plates bolts washers nuts shall be calculate for the offered lot. If a more the calculate quantity additional coupler plates bolts washers nuts shall be supplied by the supplier.

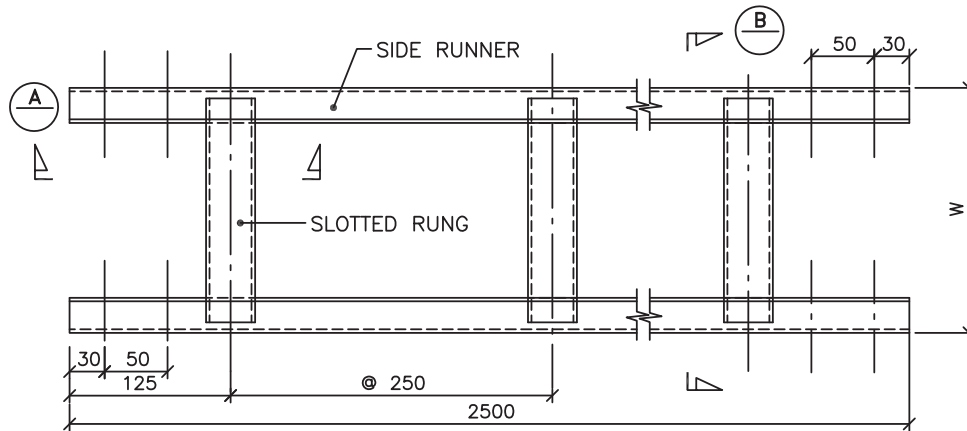
TYPICAL DETAILS OF CABLE TRAYS AND ACCESSORIES

"CERTIFIED THAT THIS DOCUMENT IS IDENTICAL AS APPROVED FOR 1 X 800 MW KOTHAGUDAM
STAGE-VII, UNIT # 12.
REFERENCE DOCUMENT NO. PE-DG-410-507-E005
APPROVED (CAT- 6) VIDE LETTER REFERENCE NO 0001 DT. 19.01.2015"

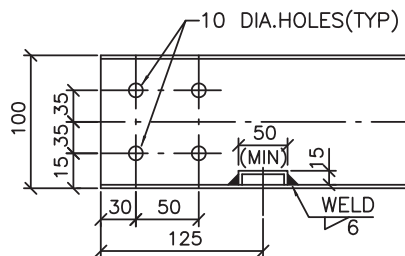
NOTE:-

1) DETAIL OF CABLE TROUGH 50mm
WIDE ADDED AT SHEET # 3.

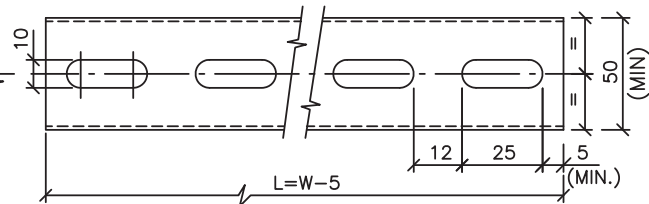
CUSTOMER:  OWNER'S CONSULTANT:  TELANGANA STATE POWER GENERATION CORPORATION LTD TELANGANA, INDIA 5 x 800 MW YADADRI TPS, NALGONDA BHARAT HEAVY ELECTRICALS LTD POWER SECTOR PROJECT ENGINEERING MANAGEMENT Noida										COPY RIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED it must not be used directly or indirectly in any way detrimental to the interest of the company.				DEPT CODE I		NAME AV NNJ PD		SIGN		DATE 07.12.17 07.12.17 07.12.17 07.12.17							
										JOB NO. 417 STATUS CONTRACT DISTRIBUTION										DRN DESN CHD APPD		AV AV NNJ PD		07.12.17 07.12.17 07.12.17 07.12.17			
										REV. DATE ALTD CHD APPD										REV. DATE ALTD CHD APPD		TITLE TYPICAL DETAILS OF CABLE TRAYS AND ACCESSORIES		DEPT. SCALE SIGN		DRAWING NO. PE-DG-417-507-E005	
										REV. DATE ALTD CHD APPD										REV. DATE ALTD CHD APPD		SHEET 1 OF 1		REV. 00			



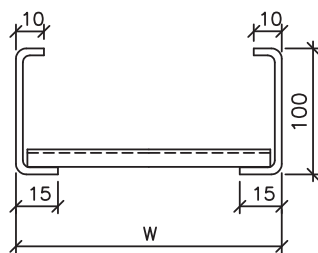
LADDER TYPE CABLE TRAY



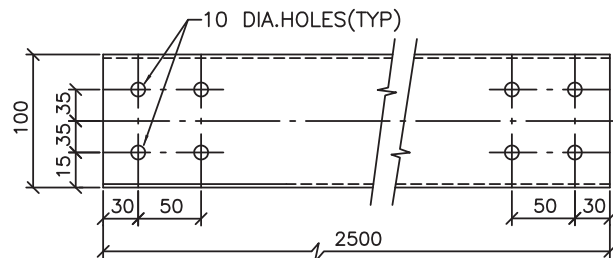
SEC - A



SLOTTED RUNG



SEC - B



SIDE RUNNER

MATERIAL : M.S. SHEET 14 SWG.(2mm.THK.)
FINISH : HOT DIP GALVANISED

W	300	450	600
L	295	445	595

NOTE :-

1. ALL DIMENSIONS ARE IN MM.

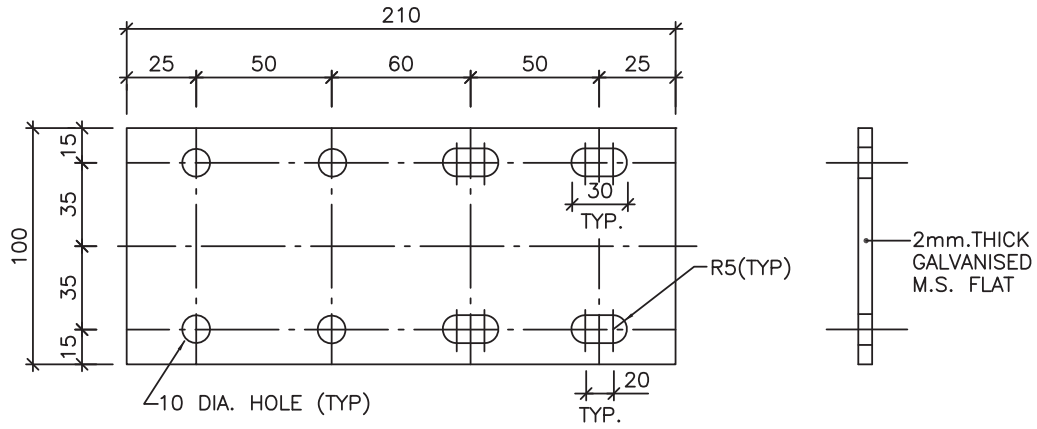
TYPICAL DETAILS OF CABLE TRAYS AND
ACCESSORIES



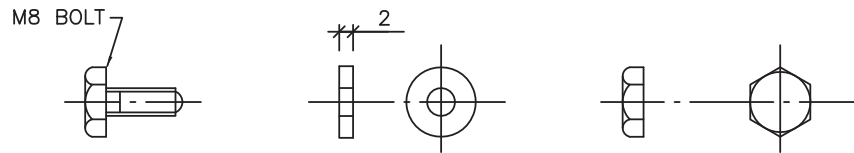
DWG. NO.

PE-DG-417-507-E005

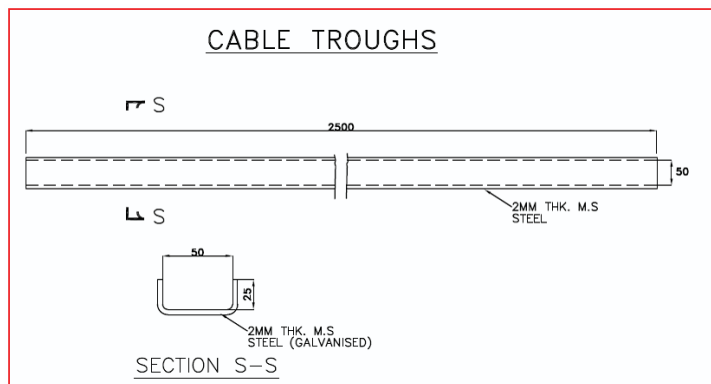
REV. 00 SHT. 02 OF 17



SIDE COUPLER PLATE



M8 BOLT, WASHER & NUT
(FOR CABLE TRAY JOINT)



NOTE :-

1. ALL DIMENSIONS ARE IN MM.

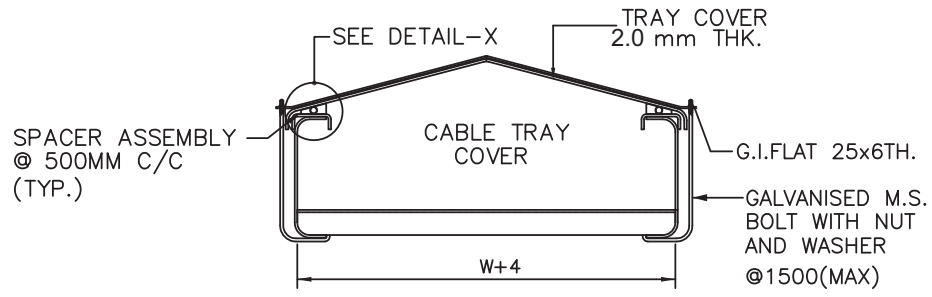
TYPICAL DETAILS OF CABLE TRAYS AND
ACCESSORIES



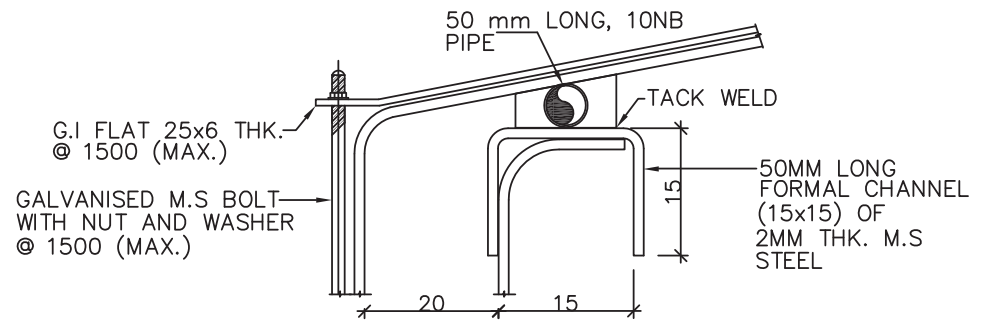
DWG. NO.

PE-DG-417 -507-E005

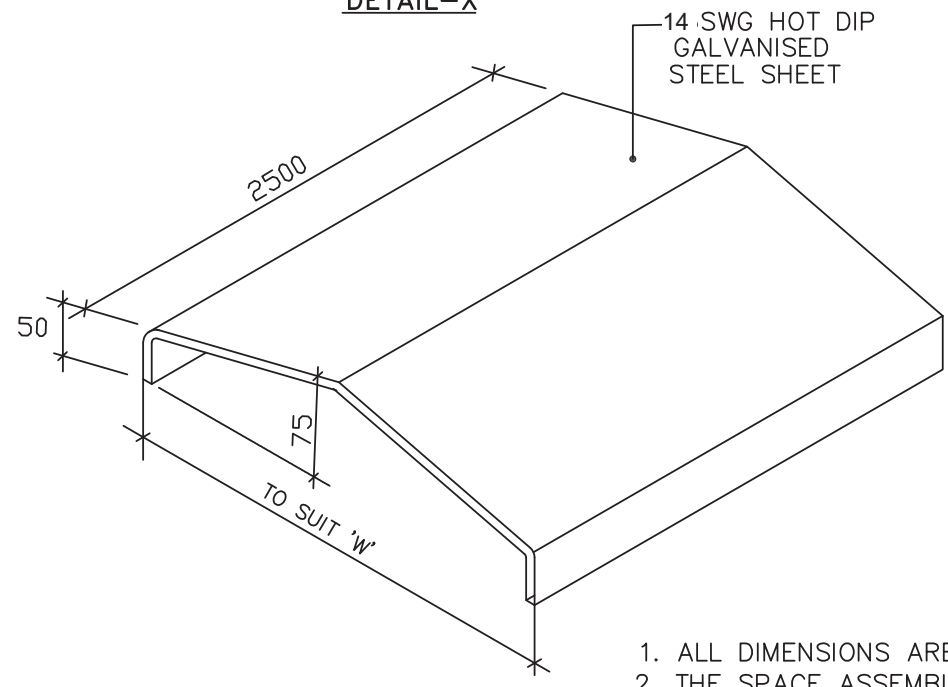
REV. 00 SHT. 03 OF 17



COVER FIXING (TYP.)



DETAIL-X



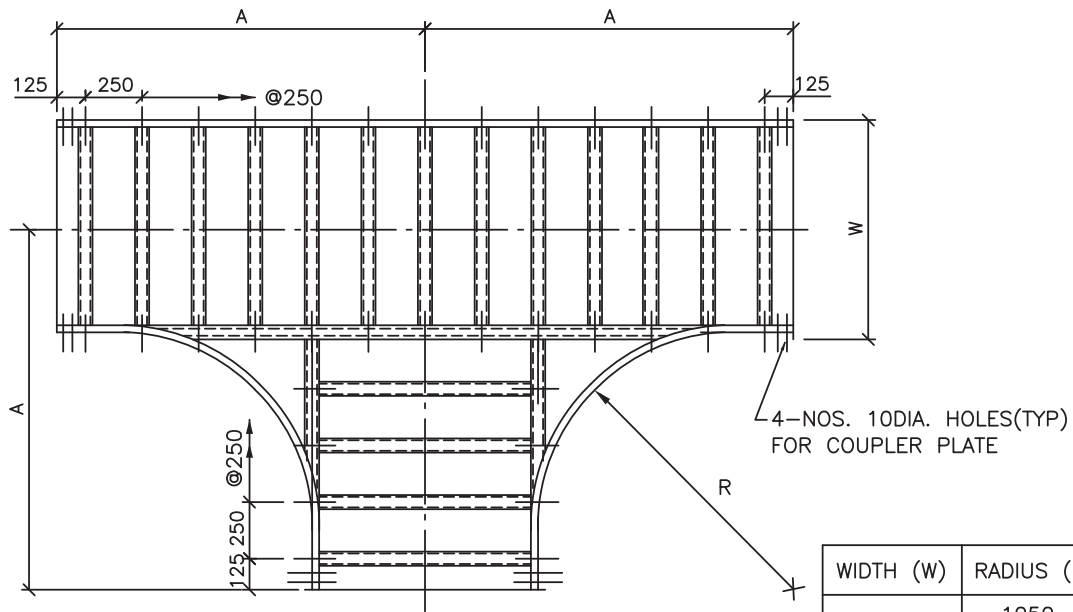
1. ALL DIMENSIONS ARE IN MM.
2. THE SPACE ASSEMBLY SHALL BE HOT DIP GALVANISED

CABLE TRAY COVER

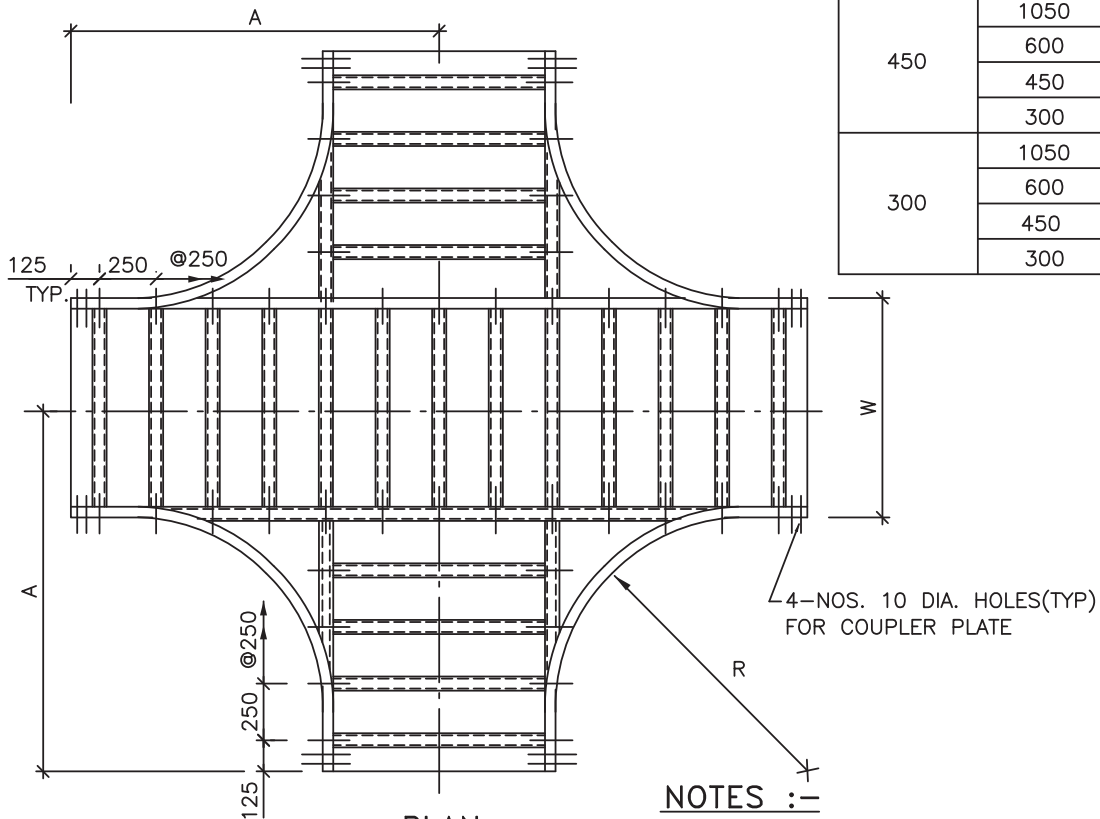


TYPICAL DETAILS OF CABLE TRAYS AND ACCESSORIES

DWG. NO.
PE-DG-417-507-E005
REV. 00 SHT. 04 OF 17



**PLAN
HORIZONTAL TEE**



**PLAN
HORIZONTAL CROSS**

WIDTH (W)	RADIUS (R)	A
600	1050	1475
	600	1025
	450	875
	300	725
450	1050	1400
	600	950
	450	800
	300	650
300	1050	1325
	600	875
	450	725
	300	575

NOTES :-

1. ALL DIMENSIONS ARE IN MM.
2. FOR MULTITIER CABLE TRAY, THE BENDING RADIUS AT THE BENDS SHALL BE SAME FOR ALL TRAYS AND THIS RADIUS SHALL BE AS PER THE RECOMMENDED BENDING RADIUS OF LARGEST CABLE IN THE ROUTE.

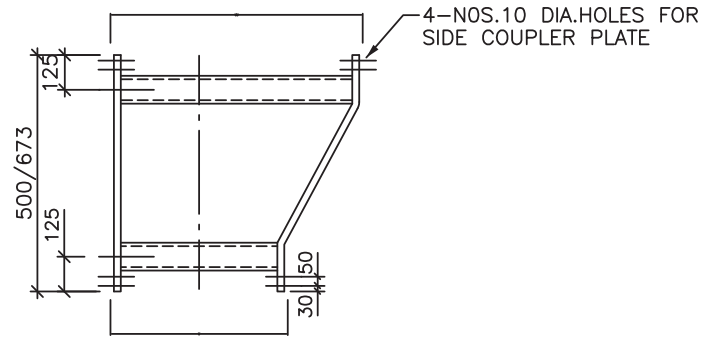
**TYPICAL DETAILS OF CABLE TRAYS AND
ACCESSORIES**



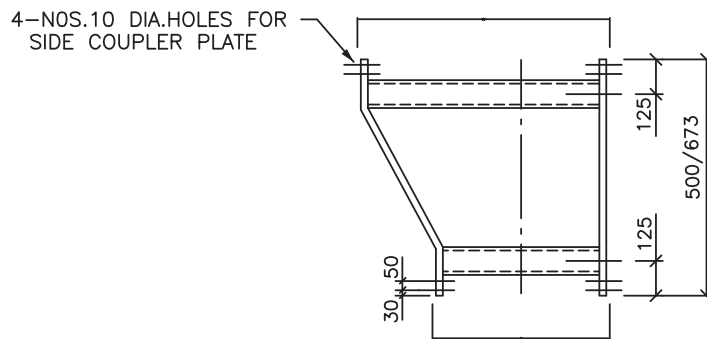
DWG. NO.

PE-DG-417 -507-E005

REV. 00 SHT. 05 OF 17



PLAN
LEFT HAND REDUCER



PLAN
RIGHT HAND REDUCER

WIDTH	WW	600	600	450
	W	450	300	300

NOTE :-

1. ALL DIMENSIONS ARE IN MM.



TYPICAL DETAILS OF CABLE TRAYS AND
ACCESSORIES

DWG. NO.

PE-DG-417 -507-E005

REV. 00 SHT. 06 OF 17



NOTE :-

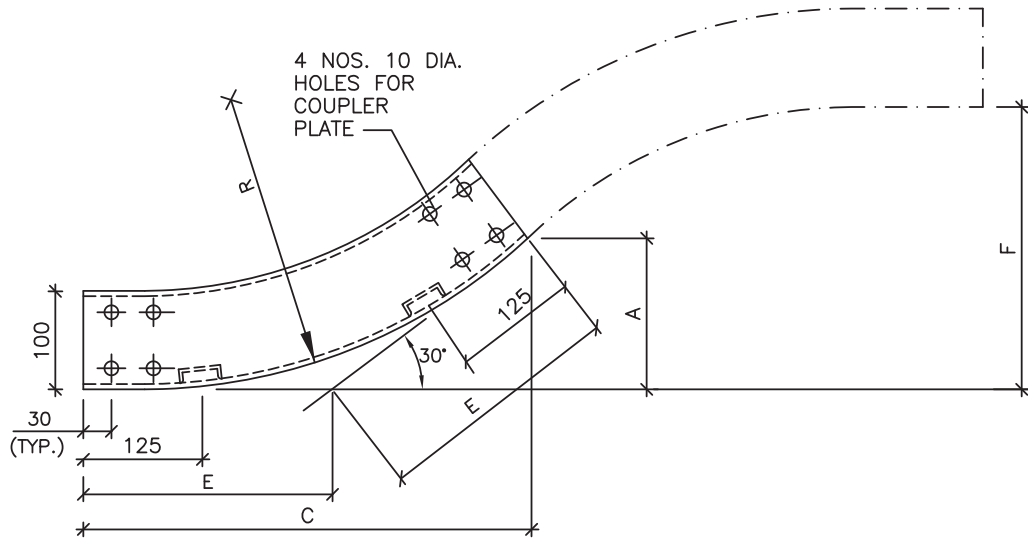
TYPICAL DETAILS OF CABLE TRAYS AND ACCESSORIES



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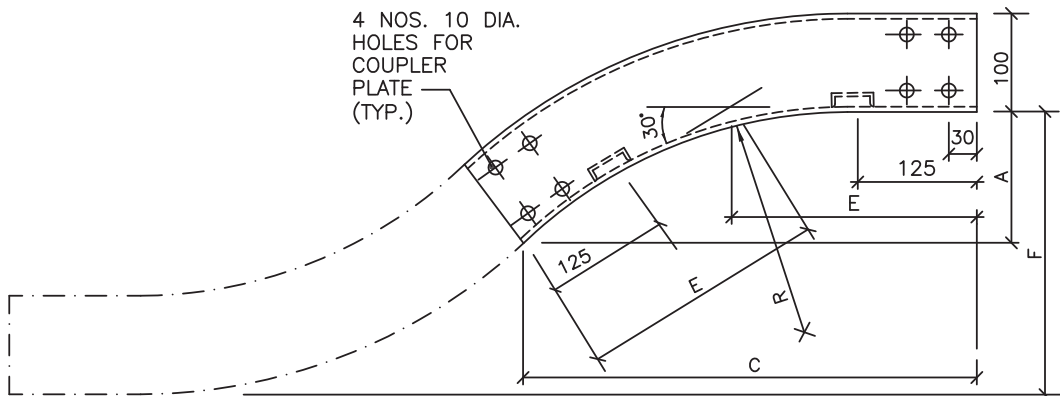
PE-DG-4171-507-E005

REV. 00 SHT. 07 OF 17



ELEVATION
30° VERTICAL ELBOW (INSIDE)

WIDTH(W)	RADIUS(R)	A	C	E	F
600	1050	205	760	410	410
450	600	145	535	290	290
&	450	125	460	250	250
300	300	105	385	210	210



ELEVATION
30° VERTICAL ELBOW (OUTSIDE)

NOTE :-

1. ALL DIMENSIONS ARE IN MM.

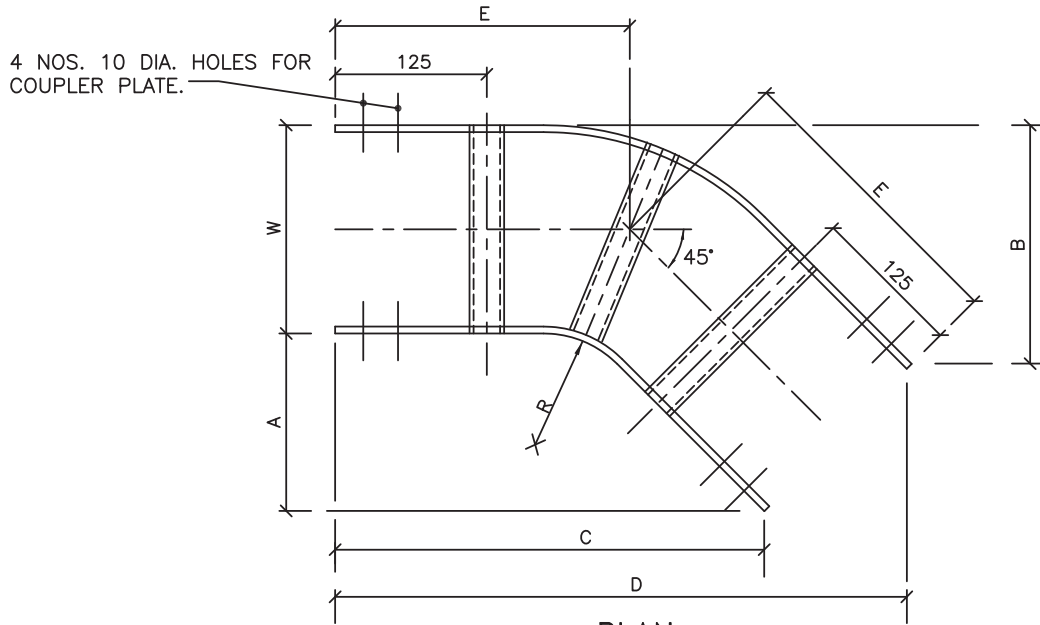
TYPICAL DETAILS OF CABLE TRAYS AND
ACCESSORIES



DWG. NO.

PE-DG-417-507-E005

REV. 00 SHT. 08 OF 17



PLAN
45° HORIZONTAL ELBOW

WIDTH (W)	RADIUS (R)	A	B	C	D	E
600	1050	395	570	955	1380	685
	600	265	440	640	1065	535
	450	220	395	530	955	470
	300	175	350	425	850	410
450	1050	395	530	955	1275	690
	600	265	395	640	955	500
	450	220	350	530	850	440
	300	175	310	425	745	390
300	1050	395	485	955	1165	655
	600	265	350	640	850	470
	450	220	310	530	745	410
	300	175	265	425	635	345

NOTE :-

1. ALL DIMENSIONS ARE IN MM.

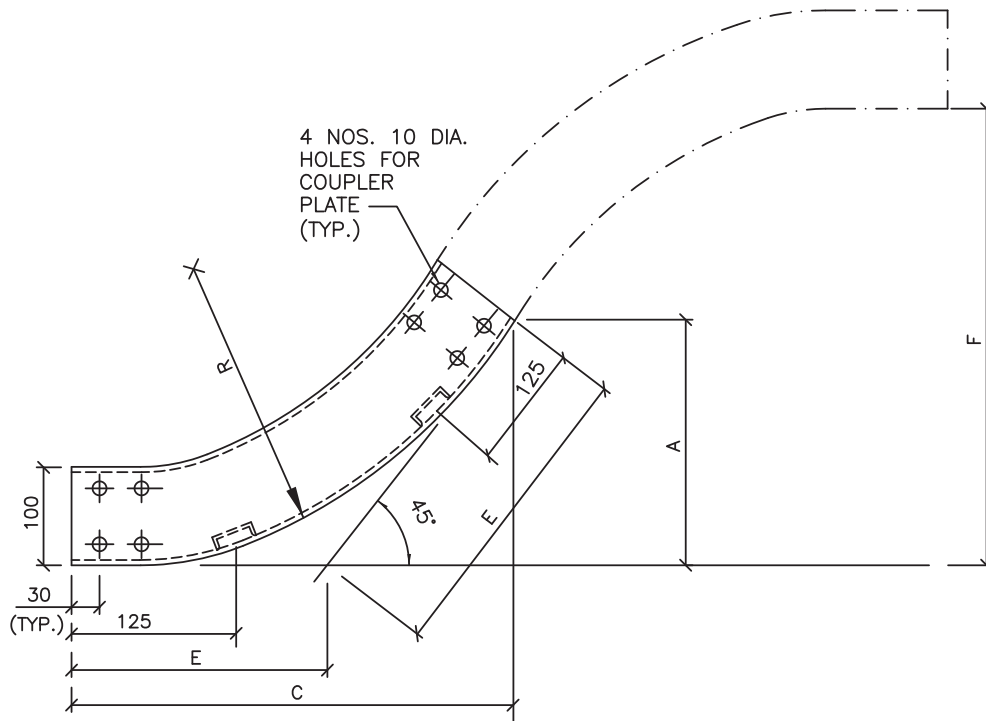


TYPICAL DETAILS OF CABLE TRAYS AND
ACCESSORIES

DWG. NO.

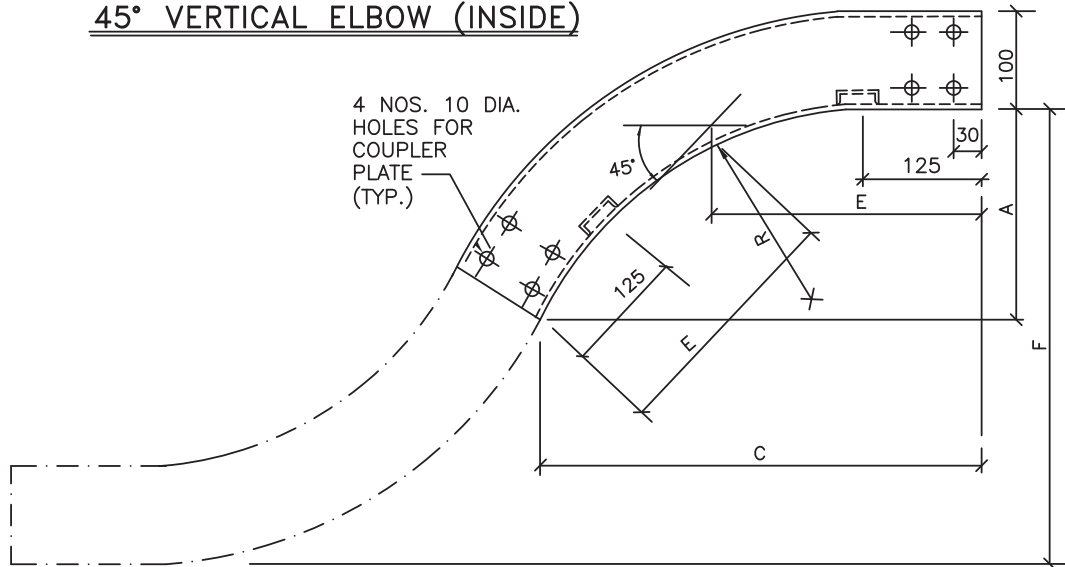
PE-DG-417 -507-E005

REV. 00 SHT. 09 OF 17



ELEVATION

45° VERTICAL ELBOW (INSIDE)



ELEVATION

45° VERTICAL ELBOW (OUTSIDE)

WIDTH(W)	RADIUS(R)	A	C	E	F
600	1050	395	955	560	790
450	600	265	640	375	530
&	450	220	530	310	440
300	300	175	425	250	350

NOTE :-

1. ALL DIMENSIONS ARE IN MM.

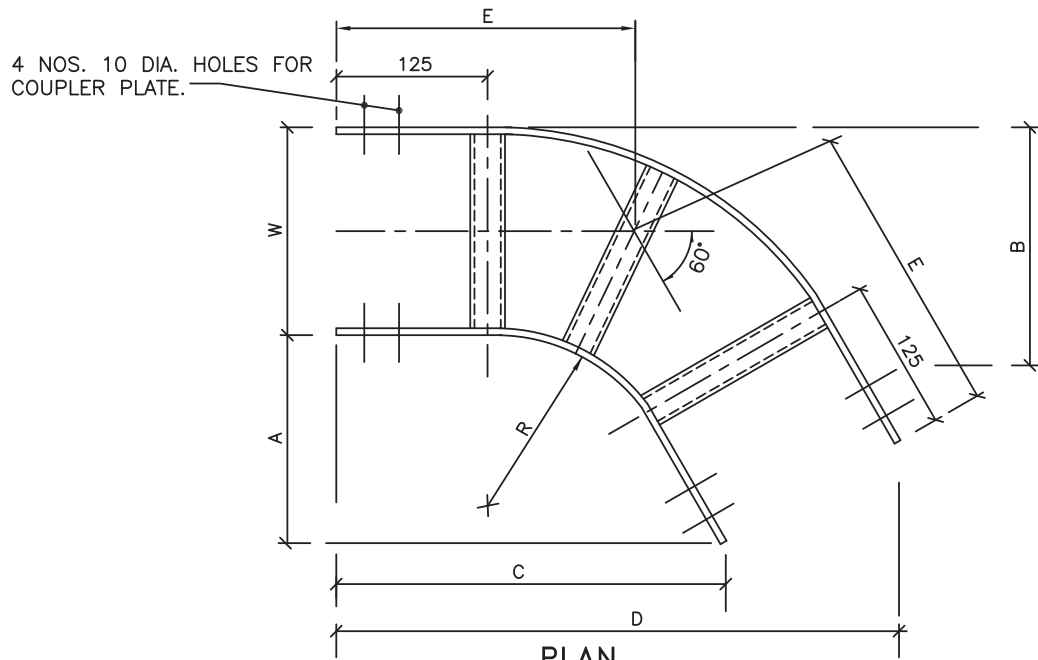
TYPICAL DETAILS OF CABLE TRAYS AND ACCESSORIES



DWG. NO.

PE-DG-417-507-E005

REV. 00 SHT. 10 OF 17



PLAN
60° HORIZONTAL ELBOW

WIDTH (W)	RADIUS (R)	A	B	C	D	E
600	1050	635	935	1095	1615	905
	600	410	710	705	1225	645
	450	335	635	575	1095	560
	300	250	550	450	965	470
450	1050	635	860	1095	1485	860
	600	410	635	705	1095	600
	450	335	550	575	965	515
	300	250	485	450	835	425
300	1050	635	785	1095	1355	815
	600	410	560	705	965	555
	450	335	485	575	835	470
	300	250	410	450	705	385

NOTE :-

1. ALL DIMENSIONS ARE IN MM.

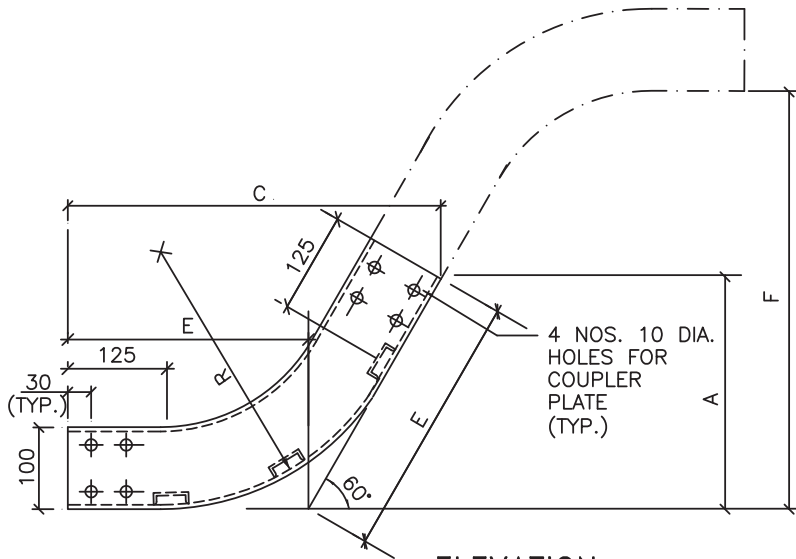
TYPICAL DETAILS OF CABLE TRAYS AND
ACCESSORIES



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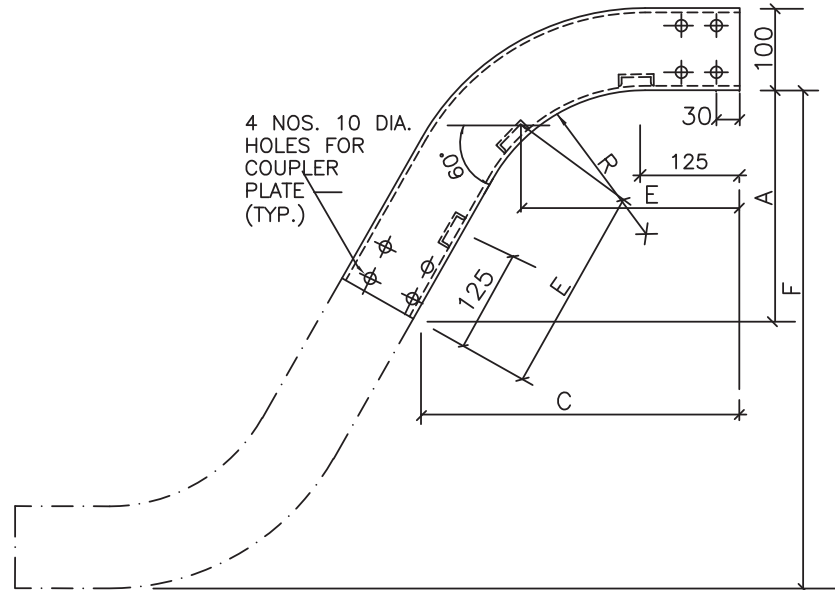
PE-DG-417 -507-E005

REV. 00 SHT. 11 OF 17



ELEVATION

60° VERTICAL ELBOW (INSIDE)



ELEVATION

60° VERTICAL ELBOW (OUTSIDE)

WIDTH(W)	RADIUS(R)	A	C	E	F
600	1050	635	1095	730	1270
450	600	410	705	470	820
&	450	335	575	385	670
300	300	260	450	300	520

NOTE :-

1. ALL DIMENSIONS ARE IN MM.

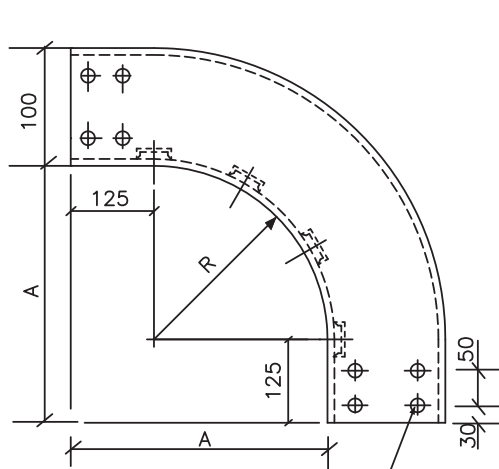
TYPICAL DETAILS OF CABLE TRAYS AND
ACCESSORIES



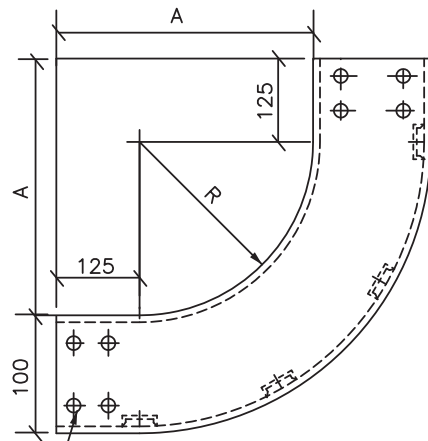
DWG. NO.

PE-DG-417-507-E005

REV.00 SHT. 12 OF 17



ELEVATION
90° VERTICAL ELBOW
(OUTSIDE)

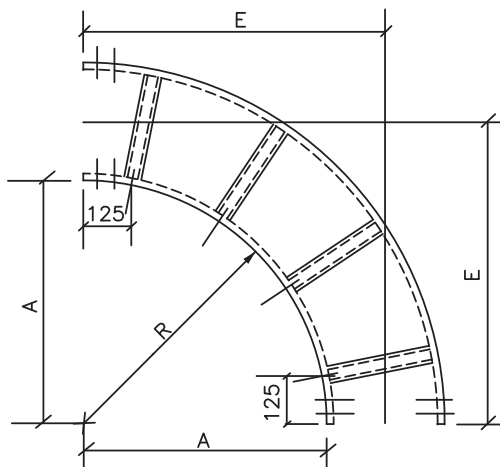


ELEVATION
90° VERTICAL ELBOW
(INSIDE)

4 NOS. 10 DIA. HOLES
FOR COUPLER PLATE

VERTICAL ELBOW		
WIDTH (W)	RADIUS (R)	A
600 450 & 300	1050	1175
		725
	450	575
		425

HORIZONTAL ELBOW			
WIDTH (W)	RADIUS (R)	A	E
600	1050	1175	1475
	600	725	1025
	450	575	875
	300	425	725
450	1050	1175	1400
	600	725	950
	450	575	800
	300	425	650
300	1050	1175	1325
	600	725	875
	450	575	725
	300	425	575



PLAN
90° HORIZONTAL ELBOW

NOTES :-

1. ALL DIMENSIONS ARE IN MM.
2. FOR MULTITIER CABLE TRAY, THE BENDING RADIUS AT THE BENDS SHALL BE SAME FOR ALL TRAYS AND THIS RADIUS SHALL BE AS PER THE RECOMMENDED BENDING RADIUS OF LARGEST CABLE IN THE ROUTE

TYPICAL DETAILS OF CABLE TRAYS AND
ACCESSORIES

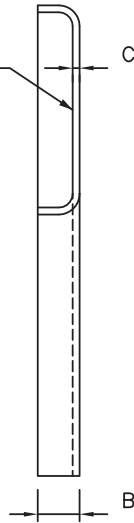


DWG. NO.

PE-DG-417-507-E005

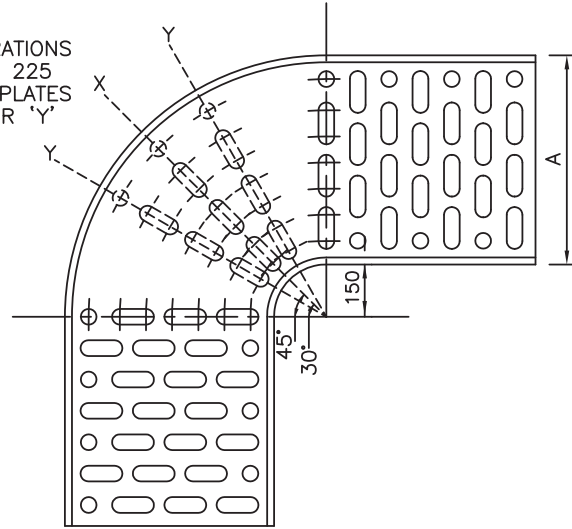
REV. 00 SHT. 13 OF 17

PERFORATION
PUNCHED FROM
THIS SIDE



END ELEVATION

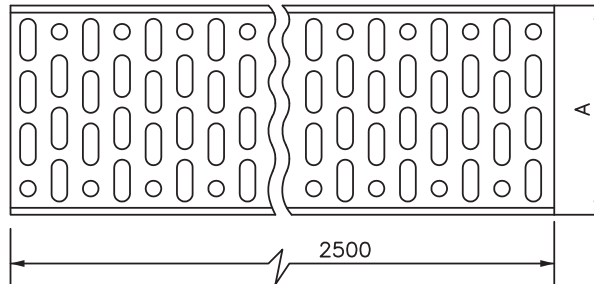
ADDITIONAL PERFORATIONS
REQUIRED ON 100, 225
& 300 MM WIDTH PLATES
ALONG LINES 'X' OR 'Y'



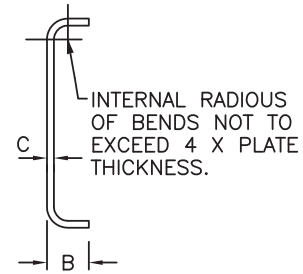
PLAN

DIMENSIONS IN MM	
WIDTH-A	DEPTH-B
100	50
150	
300	100
450	100
600	100

90° HORIZONTAL ELBOW



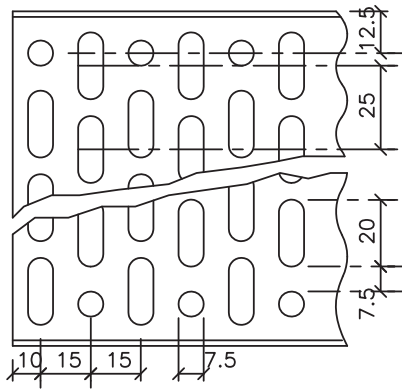
PLAN



END ELEVATION

INTERNAL RADIUS
OF BENDS NOT TO
EXCEED 4 X PLATE
THICKNESS.

STRAIGHT LENGTH



DETAILS OF PERFORATION

NOTES :

1. ALL CUTTING & FORMING OPERATIONS TO BE COMPLETED PRIOR TO GALVANIZING.
2. FINISHED TRAYS TO BE FREE FROM BURRS AND SHARP EDGES.
3. ALL DIMENSIONS ARE IN MM.

PERFORATED TYPE CABLE TRAY

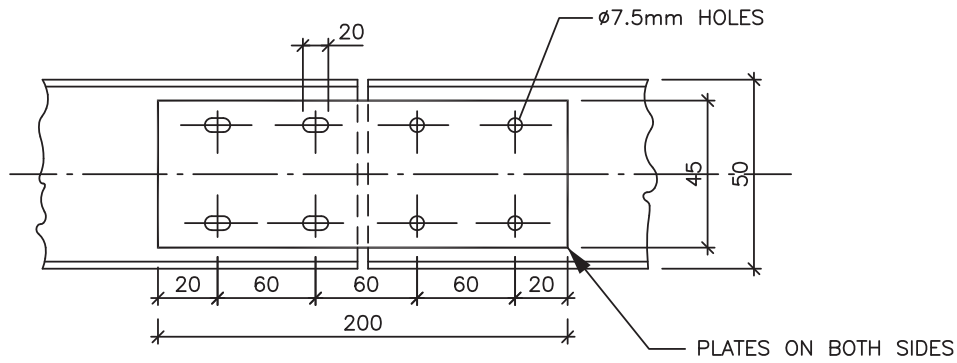
TYPICAL DETAILS OF CABLE TRAYS AND
ACCESSORIES



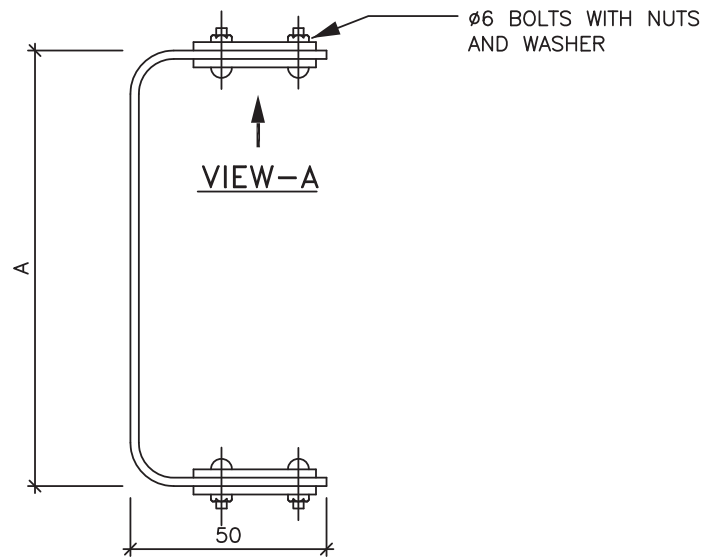
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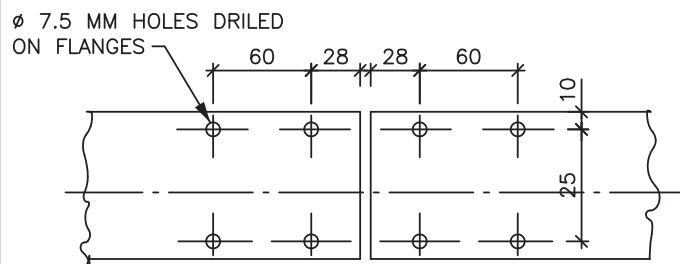
REV. 00 SHT. 14 OF 17



VIEW-A



END ELEVATION



COUPLING PLATE

PERFORATED TRAY JOINING BY
COUPLING PLATES

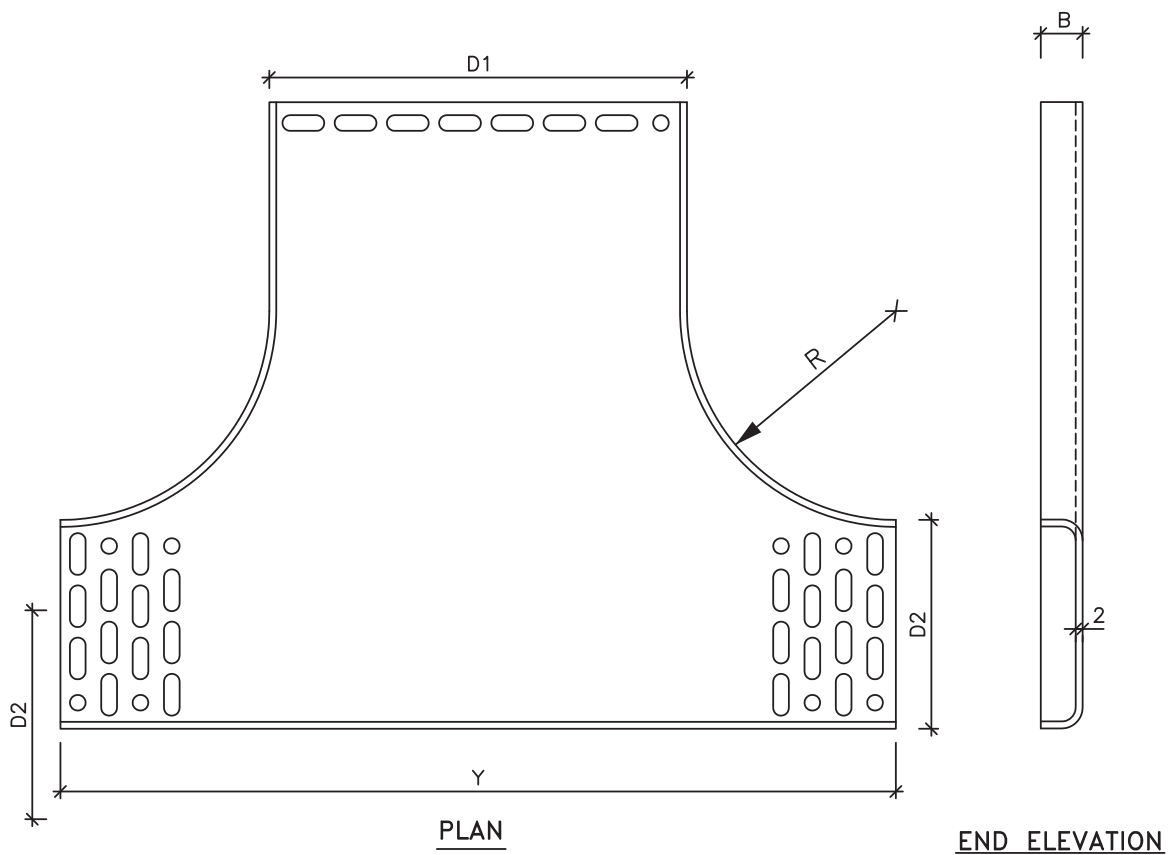
NOTES:-

1. COUPLING PLATES 2 MM THICK M.S.
2. ALL DIMENSIONS ARE IN MM.

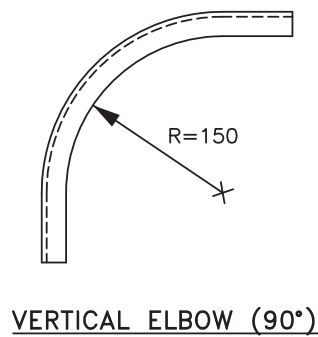
TYPICAL DETAILS OF CABLE TRAYS AND
ACCESSORIES



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REV.00 SHT. 15 OF 17



HORIZONTAL TEE



TYPE	DIMENSIONS IN MM				
	D1	D2	B	R	Y
A	225	100	50	150	500
B	300	150	50	200	600

PERFORATED TRAY FITTINGS

TYPICAL DETAILS OF CABLE TRAYS AND
ACCESSORIES



DWG. NO.
PE-DG-417 -507-E005
REV. 00 SHT. 16 OF 17

NOTES:-

1. THE LADDER AND PERFORATED TYPE CABLE TRAYS AND ACCESSORIES (INCLUDING SIDE RUNNERS OF LADDER TYPE CABLE TRAYS), SIDE COUPLER PLATE AND CABLE TRAY COVER SHALL BE MADE OF HOT DIP GALVANISED AS PER IS 1079. THICKNESS OF CABLE TRAYS & ACCESSORIES, SIDE COUPLER PLATE AND TRAY COVERS SHALL BE 2MM, 2MM AND 2.0 MM RESPECTIVELY.
2. THE CABLE TRAYS ACCESSORIES AND TRY COVERS SHALL BE SHALL BE HOT DIP AS PER IS 2629. GALVANIZATION SHALL BE UNIFORM & THICKNESS OF GALVANIZATION SHALL NOT BE LESS THAN 610 GRAMS/ SQ.MTR. ALSO ZINC DEPOSIT THICKNESS AT ANY POINT SHALL NOT BE LESS THAN 75 MICRONS.
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. THE DIMENSIONS OF ALL BENDS, TEES, CROSSES, ETC. FOR PERFORATED CABLE TRAYS SHALL BE THE SAME AS FOR LADDER TYPE TRAY FITTINGS.
7. SIDE CHANNELS OF PERFORATED TRAY ACCESSORIES SHALL BE WELDED WITH THE PERFORATED SHEET AT INTERVALS OF 100mm.
8. LENGTH OF WELDING SHALL NOT BE LESS THAN 25mm.
9. ALL TRAY CORNERS SHALL BE SMOOTH AND FREE OF SHARP EDGES.
10. THE DEPTH, WIDTH AND LENGTH OF TRAYS SHALL BE WITHIN A TOLERANCE OF (+/-) 2 mm. THE THICKNESS TOLERANCE IS OF (+/-) 0.2 mm. AS PER IS:1852
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 PART XIII FOR SIZES 12 MM & ABOVE AND ELECTROPLATED/ZINC PASSIVATED FOR SIZES BELOW 12 MM.
13. ALL CUTTING & FORMING OPERATIONS SHALL BE COMPLETED PRIOR TO GALVANIZING.
14. FINISHED TRAYS SHALL BE FREE FROM BURRS AND SHARP EDGES.
15. ALL DIMENSIONS ARE IN MM UNLESS NOTED OTHERWISE.
16. TOP MOST CABLE TRAY OF A HORIZONTAL RUN AND FRONT CABLE TRAY OF A VERTICAL RUN IN ALL OUTDOOR AREAS SHALL BE PROVIDED WITH REMOVABLE TRAY COVER.
17. THE PORTION OF GALVANIZED STEEL, WHICH, IF REQUIRED, UNDERGOES ANY WELDING AT SITE, SHALL BE COATED WITH TWO COATS OF COLD GALVANIZING ANTI-CORROSIVE PAINT AFTER WELDING.
18. 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
 - c) CABLE TROUGH 50W (FOR DETAIL REFER SHEET 3)
19. THE DEPTH OF 600W, 450W & 300W TRAYS & ACCESSORIES SHALL BE 100MM AND DEPTH OF 150W, 100W TRAY SHALL BE 50MM.



TYPICAL DETAILS OF CABLE TRAYS AND ACCESSORIES

DWG. NO.

PE-DG-417-507-E005

REV. 00 SHT. 17 OF 17