

**TELANGANA STATE POWER GENERATION
CORPORATION LIMITED**

5X800MW YADADRI TPS

VOLUME II

**TECHNICAL SPECIFICATION
FOR
CABLE TRAYS & ACCESSORIES**

SPECIFICATION NO: PE-TS-417-507-E021, R00



**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

REVISION 00

DATE: 14.02.2022

SHEET 1 OF 1

CONTENTS

Sl. No.	DESCRIPTION	NO. OF SHEETS
1.0	TITLE SHEET	01
2.0	CONTENT	01
3.0	COMPLIANCE SHEET	01
4.0	SECTION – I	
4.1	SPECIFIC TECHNICAL REQUIREMENT	02
4.2	ANNEXURE-A (LIST OF DRAWINGS/DOCUMENTS TO BE SUBMITTED BY SUCCESSFUL BIDDER)	01
4.3	TECHNICAL DATA SHEET-A	02
5.0	SECTION- 'II'	
5.1	STANDARD TECHNICAL REQUIREMENTS	03
5.2	STANDADRQ QUALITY PLAN	06
6.0	TYPICAL DETAILS OF CABLE TRAYS & ACCESSORIES (DRAWING NO. PE-DG-417-507-E050)	17

TOTAL SHEETS INCLUDING COVER SHEET, CONTENT/SEPARATOR SHEET = 34

689475/2022/PS-PEM-EL


**TECHNICAL SPECIFICATION FOR
CABLE TRAYS & ACCESSORIES**

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

VOLUME-II

COMPLIANCE CERTIFICATE

REVISION 00

DATE: 14.02.2022

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

689475/2022/PS-PEM-EL

**TECHNICAL SPECIFICATION FOR
CABLE TRAYS & ACCESSORIES**

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

VOLUME-II

SECTION I

REVISION 00

DATE: 14.02.2022

SHEET 1 of 3

SECTION – I**SPECIFIC TECHNICAL REQUIREMENTS**



TECHNICAL SPECIFICATION FOR CABLE TRAYS & ACCESSORIES

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

VOLUME-II

SECTION I

REVISION 00 | DATE: 14.02.2022

SHEET 2 of 3

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	SQP's (PE-QP-999-507-E005, Rev-03) Remarks column at S.no. 3.1 (4) Rigidity	"600mm wide cable tray to be tested" shall be read as "600mm, 450mm, 300mm & 150mm wide cable trays shall be tested".

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.
- 3.3.3 Supplier to also give the following undertaking in the BOM:

"The BoM provided herewith completes the scope (in content and intent) of material supply under PO No. -----, dated -----.

Any additional material which may become necessary for the intended application of the supplied item(s)/package will be supplied free of cost in most reasonable time."

689475/2022/PS-PEM-EL



**TECHNICAL SPECIFICATION FOR
CABLE TRAYS & ACCESSORIES**

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

VOLUME-II

SECTION I

REVISION 00

DATE: 14.02.2022

SHEET 3 of 3

**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.



TECHNICAL SPECIFICATION FOR CABLE TRAYS & ACCESSORIES

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

VOLUME II

SECTION II

REVISION 00

DATE: 14.02.2022

SHEET 1 of 2

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) | : | 600 450 300 150 100 50 |
| 2.5 | Construction | : | Conforming to enclosed drawing [PE-DG-410-507-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 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. |
| c) Width | : | Suitable for width of cable trays. |



TECHNICAL SPECIFICATION FOR CABLE TRAYS & ACCESSORIES

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

VOLUME II

SECTION II

REVISION 00

DATE: 14.02.2022

SHEET 2 of 2

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

e) Thickness of the finished product shall not be less than 2 mm.

5.0 SHEET THICKNESS before Hot Dip Galvanisation

- 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 : (+/-0.2mm)
- e) Make : SAIL/TISCO/RINL/BHUSHAN/JINDAL
ISPAT/ESSAR/LLYOD/IISCO/Authorised re-roller 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
- e) Min. weight of Zinc deposit : 610 grams per square meter for 2.0 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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**STANDARD TECHNICAL SPECIFICATION
FOR CABLE TRAY & ACCESSORIES**

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

VOLUME II

SECTION II

REVISION 00

DATE: 14.02.2022

SECTION-II**STANDARD TECHNICAL REQUIREMENTS**



TECHNICAL SPECIFICATION FOR CABLE TRAY & ACCESSORIES

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

VOLUME II

SECTION II

REVISION 01

DATE: 14.02.2022

SHEET 1 of 2

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 BHEL's Standard QP (QP NO. PE-QP-999-507-E005, Rev-03) 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.



TECHNICAL SPECIFICATION FOR CABLE TRAY & ACCESSORIES

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

VOLUME II

SECTION II

REVISION 01

DATE: 14.02.2022

SHEET 2 of 2

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) A copy of sheet "Contents" with bidder's signature & company stamp
- b) A copy of sheet "Compliance Sheet" 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.
- d) A copy of sheet "No Deviation Sheet" with bidder's signature & company stamp.
- e) 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.

	MANUFACTURER/SUPPLIER NAME & ADDRESS INDUSTRIAL PERFORATION (I) PVT. LTD., 327, R.N. GUHA ROAD, DUMDUM, KOLKATA - 700028		MANUFACTURING QUALITY PLAN				SPEC. NO :		DATE:	
			CUSTOMER :				QP NO.:PE-MQP-999-507-E005, REV. 00		DATE: 03.09.2021	
			PROJECT:				PO NO.:		DATE:	
			ITEM: CABLE TRAYS & ACCESSORIES				Page 1 of 5			

SL NO.	COMPONENT /OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS
					6	7			8	9	*	**		
1	2	3	4	5	M	C/N	7	8	9	D	M	C	N	


1.0 RAW MATERIAL

1.1	HOT ROLLED CARBON STEEL SHEET	1.CHEMICAL & PHYSICAL PROPERTIES	MA	VERIFICATION OF TC'S	100%	100%	IS -1079	IS -1079	MILL TC	√	P/V	V	V	Steel shall be procured from SAIL/TISCO/RINL/BHUSAN/JINDAL ISPAT/ESSAR/LLOYD/JSICO/ authorised SAIL Re-Rollers.	
		2.DIMENSIONS	MA	MEASUREMENT	100%	-	IS-1730	IS-1730	QC RECORD		P	-	-		
		3.SURFACE FINISH	MA	VISUAL	100%	-	IS-1079	IS-1079	QC RECORD		P	-	-		
1.2	ZINC	CHEMICAL COMPOSITION	MA	CHEM TEST	EACH HEAT	EACH HEAT	IS-209	IS-209	TC	√	P/V	V	V		

TSGENCO approved vendors SAIL, TISCO, JINDAL

2.0 IN-PROCESS


2.1	FABRICATION	1.DIMENSIONS	MA	MEASUREMENT	100%	100%	BHEL APPD. DRAWING	BHEL APPD. DRAWING	QC RECORD	√	P	V	V	
		2.WELDING QUALITY	MA	VISUAL	100%	100%	ASME SEC. IX	ASME SEC. IX	QC RECORD	√	P	V	V	Welding is to be done by qualified welders in accordance with ASME SEC. IX article III. WPS, PQR & WPQ to be reviewed during inspection.
		3.SURFACE FINISH	MA	VISUAL	100%	100%	Free From Defects & Slag	Free From Defects & Slag	QC RECORD	√	P	V	V	

SUPPLIER		BHEL		FOR CUSTOMER REVIEW & APPROVAL	
QUALITY ASSURANCE		QUALITY		Doc No:	
Prepared by:	Sign & Date	Reviewed by:	Sign & Date	Approved by:	Sign & Date
					


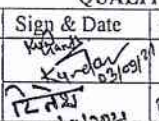
EMES


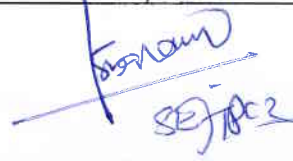

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	CUSTOMER :			PROJECT:			PO NO.:		DATE:	
	ITEM: CABLE TRAYS & ACCESSORIES									
									Page 2 of 5	


SL NO.	COMPONENT /OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS	
					6	7			8	9	*	**			
												M	C/N		D
2.2	SURFACE PREPARATION	1.CLEANING, PICKLING & RINSING & FLUXING	MA	VISUAL	100%	-	IS:2629	IS:2629	QC RECORD		P	-	-		
		2. SURFACE FINISH	MA	VISUAL	100%	-	IS:2629	IS:2629	QC RECORD		P	-	-		
2.3	GALVANISING	1.TEMPERATURE OF ZINC BATH	MA	MEASUREMENT	CONTINUOUS	-	IS-2629	IS-2629	QC RECORD		P	-	-	Galvanization is to be done at BHEL-PEM approved galvanization plant	
		2.DROSS	MA	VISUAL	PERIODIC	-	IS-2629	IS-2629	QC RECORD		P	-	-		
		3.RATE OF IMMERSION	MA	VISUAL	100%	-	IS 2629	IS 2629	QC RECORD		P/V	-	-		
		4. SURFACE FINISH	MA	VISUAL	100%	-	IS 2629	Free From Burrs, Roughness, Slag Flux, Stain Etc.	QC RECORD		P	-	-		
3.0 FINISHED ITEMS															
3.1	CABLE TRAY, ACCESSORIES & HARDWARES	1. DIMENSIONS	MA	MEASUREMENT	IS-2500 (Part 1) Level S-4	IS-2500 (Part 1) Level S-4	BHEL APPD. DRAWING	BHEL APPD. DRAWING	IR	√	P	W	W	Overall thickness of finished product shall not be less than the thickness of cable tray & accessories defined in technical datasheet.	

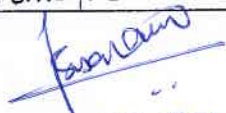
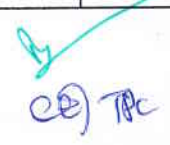
SUPPLIER		BHEL		FOR CUSTOMER REVIEW & APPROVAL	
QUALITY ASSURANCE		QUALITY		Doc No:	
Prepared by:	Sign & Date	Sign & Date	Name	Sign & Date	Name
Reviewed by:			KUNAL GANBHI Kunal Prasad	Approved by:	
			RITESH KUMAR JAISWAL		






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	PROJECT:		PO NO.:	DATE:
	ITEM: CABLE TRAYS & ACCESSORIES		Page 3 of 5	


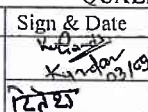
SL NO.	COMPONENT /OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY				REMARKS
					6	7			8	9	*	**			
1	2	3	4	5	M	C/N	7	8	9	D	M	C	N		
		2. SURFACE FINISH	MA	VISUAL	IS-2500 (Part 1) Level S-4	IS-2500 (Part 1) Level S-4	BHEL APPD. DRAWING	Free From Burrs, Slag, Roughness, Flux, Stain Etc.	IR	√	P	W	W	Fasteners shall be of good quality as per IS 1363	
		3. MARKING	MA	VISUAL	IS-2500 (Part 1) Level S-4	IS-2500 (Part 1) Level S-4	BHEL APPD. DRAWING	BHEL APPD. DRAWING	IR	√	P	W	W	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). and 450mm	
		4. RIGIDITY (FOR TRAYS)	MA	DEFLECTION TEST	2 No./ LOT/ TYPE	2 No./ LOT/ TYPE	BHEL APPD. DRAWING	BHEL APPD. DRAWING	IR	√	P	W	W	600MM wide cable tray to be tested. Maximum deflection shall not exceed 7MM on mid span on uniform loading of 100KG/M.	
		5. MASS OF ZINC COATING	MA	CHEMICAL TEST	IS-4759	IS-4759	IS-6745	610 gms/ Sq m (for 2.0mm thick product) 460 gms/ Sq m (for 1.6 mm thick product)	IR	√	P	W	W		
		6. UNIFORMITY OF ZINC COATING	MA	CHEMICAL TEST	IS-4759	IS-4759	IS-2633	IS-2633	IR	√	P	W	W		

SUPPLIER		BHEL		FOR CUSTOMER REVIEW & APPROVAL			
QUALITY ASSURANCE		QUALITY		Doc No:			
Sign & Date	Name	Sign & Date	Name	Sign & Date		Name	
Prepared by:		Reviewed by:	KUNDAN PRASAD 03/09/2021	Approved by:			
Reviewed by:			RITESH KUMAR JAISWAL 03/09/2021				


 CONVER
 SD/TPC

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	PROJECT:		PO NO.:	DATE:
	ITEM: CABLE TRAYS & ACCESSORIES		Page 4 of 5	


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											M	C/N	D	
	7.THICKNESS OF ZINC COATING	MA	PHYSICAL TEST	IS-4759	IS-4759	75 MICRONS (minimum), 86 MICRONS (average) for 2.0mm thick product.	75 MICRONS (minimum), 86 MICRONS (average) for 2.0mm thick product.	IR	√	P	W	W		
	8.ADHESION	MA	MECH.TEST	IS-4759	IS-4759	IS-2629	IS-2629	IR	√	P	W	W		
	9. COUPLER PLATE	MA	VISUAL	100%	100%	BHEL APPD. DOCUMENT	BHEL APPD. DOCUMENT	IR	√	P	W	W	Inspector to mention the total number of gunny bags/bundles of coupler plates, nuts, bolts & washer in the inspection report.	
	10. NUT & BOLT	MA	VISUAL	100%	100%	BHEL APPD. DOCUMENT	BHEL APPD. DOCUMENT	IR	√	P	W	W		
	11. WASHER	MA	VISUAL	100%	100%	BHEL APPD. DOCUMENT	BHEL APPD. DOCUMENT	IR	√	P	W	W	Further manufacturer shall attach the detail of total number of gunny bags/bundles of the respective items with packing list.	
	12. PACKING	MA	VISUAL	100%	100%	BHEL APPD. DOCUMENT	BHEL APPD. DOCUMENT	IR	√	P	-	-	Refer Note - 2	

SUPPLIER			BHEL			FOR CUSTOMER REVIEW & APPROVAL		
QUALITY ASSURANCE			QUALITY			Doc No:		
Prepared by:	Signature	Date	Sign & Date	Name		Sign & Date	Name	
Reviewed by:				KUNAL GANDHI Kundan Prasad				
				RITESH KUMAR JAISWAL				

08/9/2021

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	MANUFACTURER/SUPPLIER NAME & ADDRESS INDUSTRIAL PERFORATION (I) PVT. LTD., 327. R.N. GUHA ROAD, DUMDUM, KOI.KATA - 700028		MANUFACTURING QUALITY PLAN		SPEC. NO :	DATE:
	CUSTOMER :		PROJECT:		QP NO.:PE-MQP-999-507-E005, REV. 00	DATE: 03.09.2021
	ITEM: CABLE TRAYS & ACCESSORIES		PO NO.:		DATE:	
					Page 5 of 5	


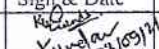
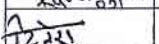
SL NO.	COMPONENT /OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY	REMARKS
					M	C/N				*		
1	2	3	4	5			7	8	9	D	M C N	

NOTES:

1. BHEL reserves the right for conducting repeat test, if required.
2. For export job, packing shall be as per BHEL seaworthy packing specification. Seaworthy Packing shall be suitable in order to avoid damage during transit and also during storage at site in tropical climate conditions.
3. Latest revision/ year of issue of all the standards (IS/ ASME/ IEC etc.) indicated in QP shall be referred at the time of approval of documents.
4. List of BHEL-PEM approved galvanization plant is as per Annexure-A.

LEGENDS:

*RECORDS, IDENTIFIED WITH "TICK"(✓) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION,
 D: DOCUMENTATION
 ** M: SUPPLIER/ MANUFACTURER/ SUB-SUPPLIER, C: BHEL/ THIRD PARTY INSPECTION AGENCY, N: CUSTOMER,
 P: PERFORM, W: WITNESS, V: VERIFICATION, AS APPROPRIATE
 MA: MAJOR, MI: MINOR, CR: CRITICAL,
 IR: INSPECTION REPORT, TC: TEST CERTIFICATE, QC RECORD: MANUFACTURER QUALITY CONTROL RECORD

SUPPLIER		BHEL		FOR CUSTOMER REVIEW & APPROVAL		
QUALITY ASSURANCE		QUALITY		Doc No:		
	Name	Sign & Date	Name		Sign & Date	Name
Prepared by:			KUNDAN PRASAD	Approved by:		
Reviewed by:			RITESH KUMAR JAISWAL			

Handwritten signatures and initials: *Prasad*, *Ritesh*, *CE/TC*

ANNEXURE-2 to Quality Plan
(LIST OF BHEL- PEM APPROVED GALVANIZERS)

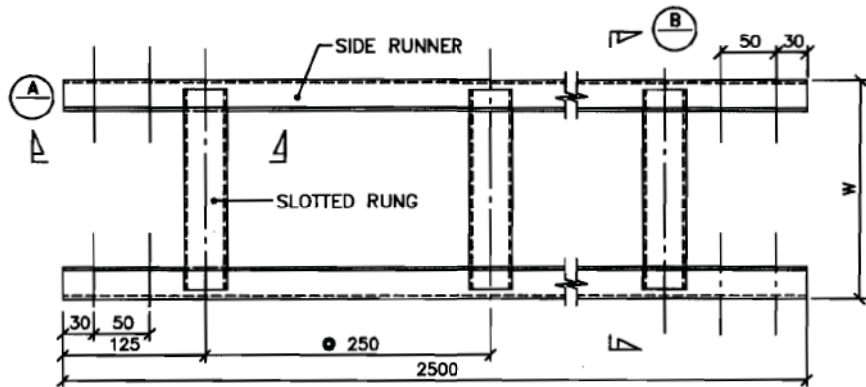
SL. NO.	ITEM	VENDOR NAME	ADDRESS
1	Galvanising	Jenco Industrial Corporation	Chincholi Bunder Khkar Road Near Link Road Devruwadi Malad (W) Mumbai 400064
2	Galvanising	National Galvanizing Company	66, Barrackpore Kamarhatt Trunck Road Calcutta-700058
3	Galvanising	Sigma Galvanising Pvt. Ltd.	Plot No.C-169, 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, Howrah -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	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
19	Galvanising	DMP Projects Pvt.Ltd.	Dulagarh Industrial Park , PS-Sankrail , Howrah -711302
20	Galvanising	Vinfab Engineers India Private Limited	Gut no. 224/1 &2 Bhiwandi Wada State Highway, Village khupri, Dist. Thane,
21	Galvanising	Saral Projects & Processors	B-1, Industrial Area, Site-II, Amawan Road Rae Bareli
22	Galvanising	Brahampuri Steels Limited	172 (F) Industrial Area, Jhotwara, Jaipur-302013
23	Galvanising	Indiana Gratings PVT. LTD	F-5, MIDC Jejuri, Pune-412 303
24	Galvanising	M/s AVAIDS TECHNOVATORS PVT. LTD.	131, MATSYA INDUSTRIAL AREA, ALWAR RAJASTHAN

NOTES:

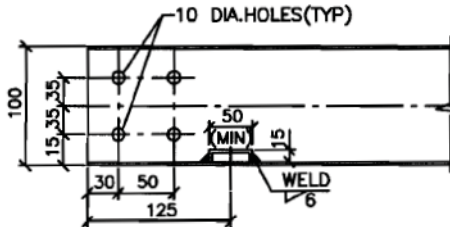
1. IT SHALL BE THE RESPONSIBILITY OF THE VENDOR TO GET THE MATERIAL GALVANIZED FROM THE ABOVE LIST WITHOUT ANY COMMERCIAL IMPLICATION TO BHEL

TYPICAL DETAILS OF CABLE TRAYS AND ACCESSORIES

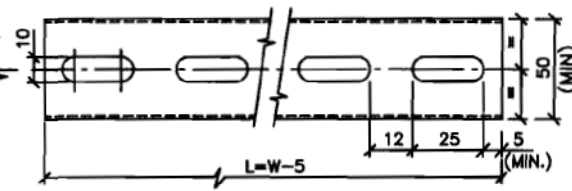
										CUSTOMER: TELANGANA STATE POWER GENERATION CORPORATION LTD TELANGANA, INDIA 5 x 800 MW YADADRI TPS.			
										OWNER'S CONSULTANT: TATA CONSULTING ENGINEERS LIMITED BANGALORE INDIA			
JOB NO. 417										BHARAT HEAVY ELECTRICALS LTD POWER SECTOR PROJECT ENGINEERING MANAGEMENT NOIDA			
STATUS CONTRACT													
DISTRIBUTION										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.			
REV.	DATE	ALTD	CHD	APPD	REV.	DATE	ALTD	CHD	APPD	DEPT CODE	NAME	SIGN	DATE
										1	DRN AV		17.07.18
											DESN AV		17.07.18
											CHD NNI		17.07.18
											APPD PD		17.07.18
										TITLE			
										TYPICAL DETAILS OF CABLE TRAYS AND ACCESSORIES			
										DEPT.	SCALE	DRAWING NO.	
										SIGN		PE-DG-417-507-E005	
												SHEET 1 OF 17	REV. 2



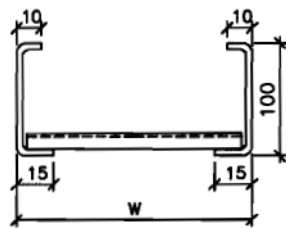
LADDER TYPE CABLE TRAY



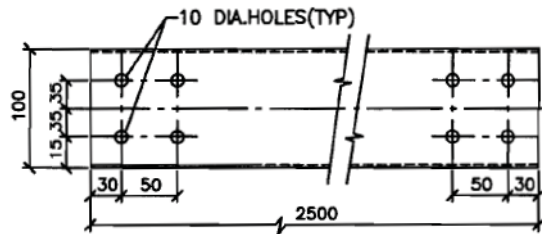
SEC - A



SLOTTED RUNG



SEC - B



SIDE RUNNER

W	300	450	600	150
L	295	445	595	145

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

NOTE :-

1. ALL DIMENSIONS ARE IN MM.

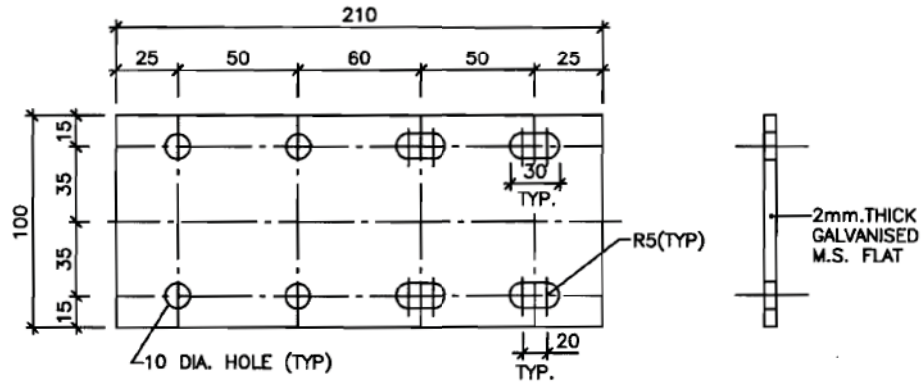
TYPICAL DETAILS OF CABLE TRAYS AND ACCESSORIES



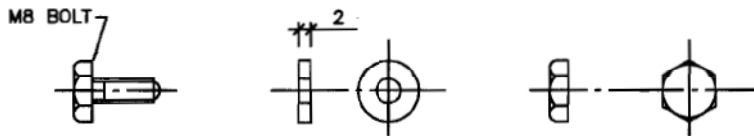
DWG. NO.

PE-DG-417-507-E005

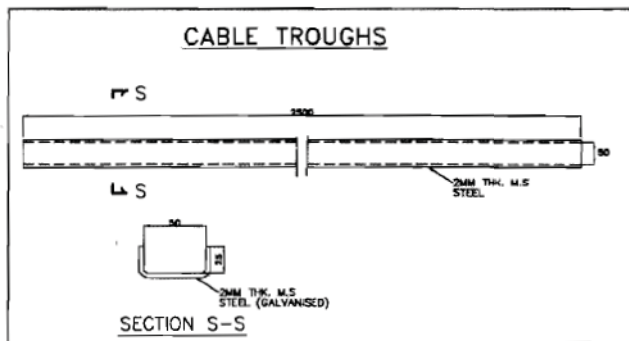
REV. 2 | SHT. 02 OF 17



SIDE COUPLER PLATE
(TWO COUPLER PLATE FOR EACH JOINT) ⚠



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

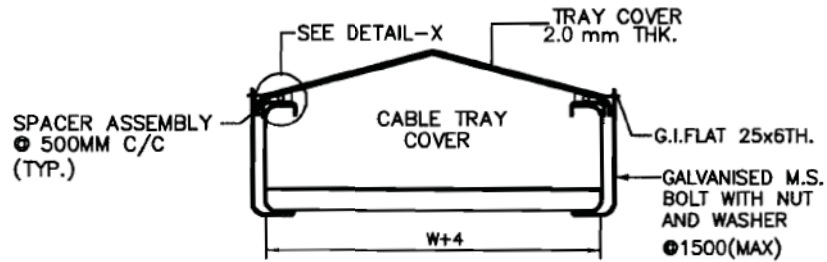


NOTE :-
1. ALL DIMENSIONS ARE IN MM.

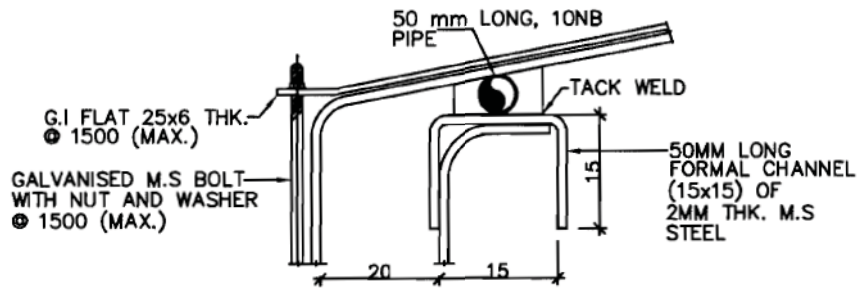
TYPICAL DETAILS OF CABLE TRAYS AND ACCESSORIES



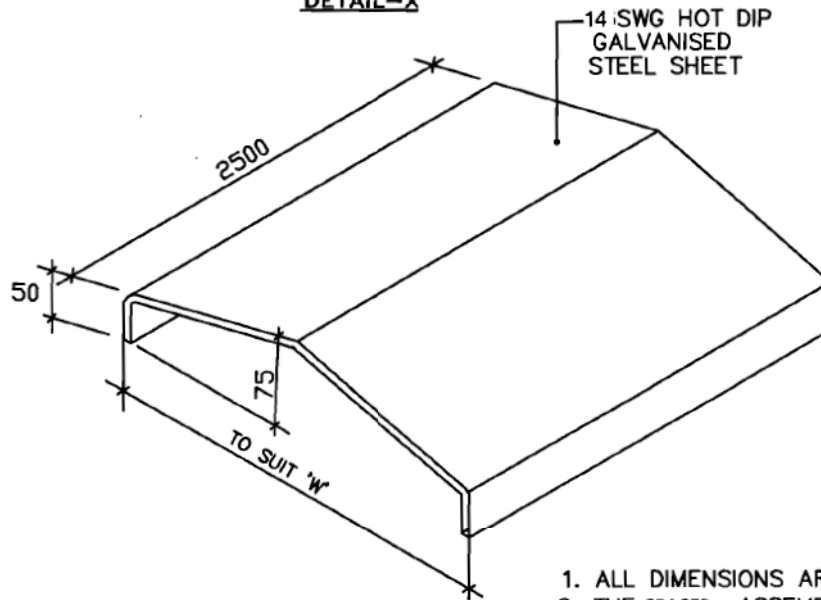
DWG. NO.
PE-DG-417-507-E005
REV. 2 SHT. 03 OF 17



COVER FIXING (TYP.)



DETAIL-X



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

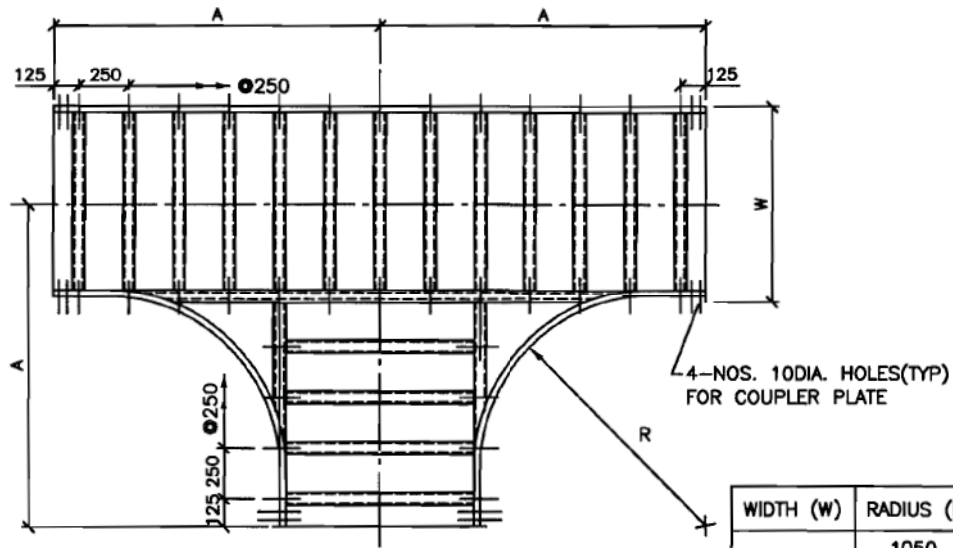
CABLE TRAY COVER



TYPICAL DETAILS OF CABLE TRAYS AND ACCESSORIES

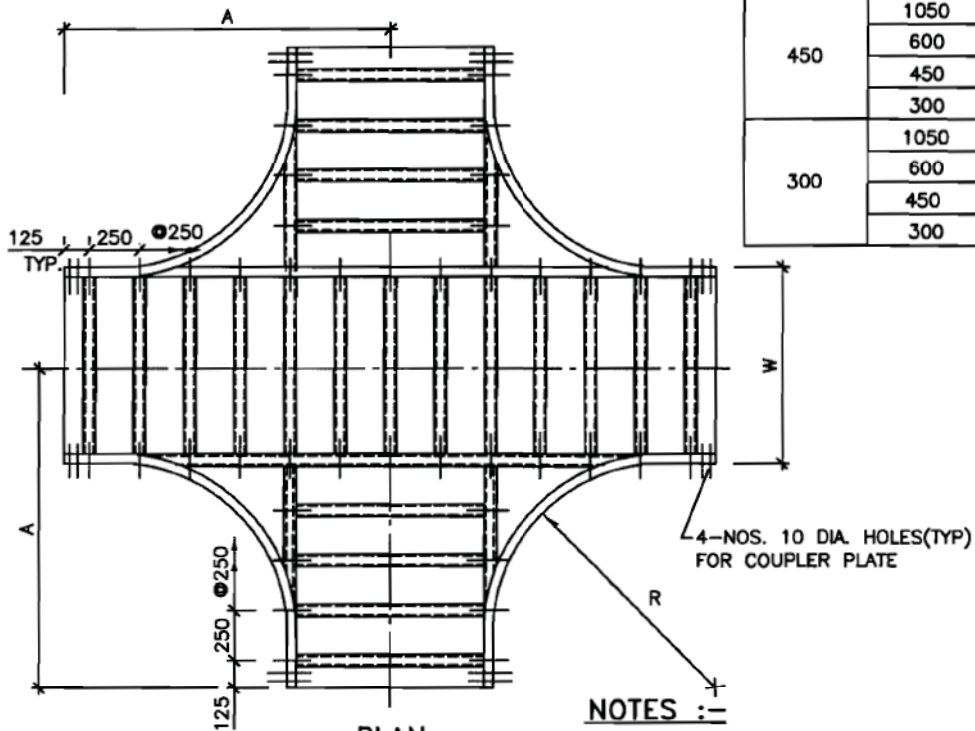
DWG. NO.
PE-DG-417-507-E005

REV. 2 SHT. 04 OF 17



**PLAN
HORIZONTAL TEE**

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



**PLAN
HORIZONTAL CROSS**

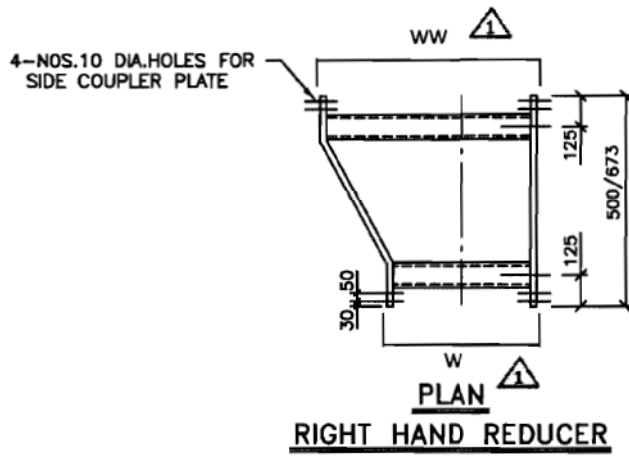
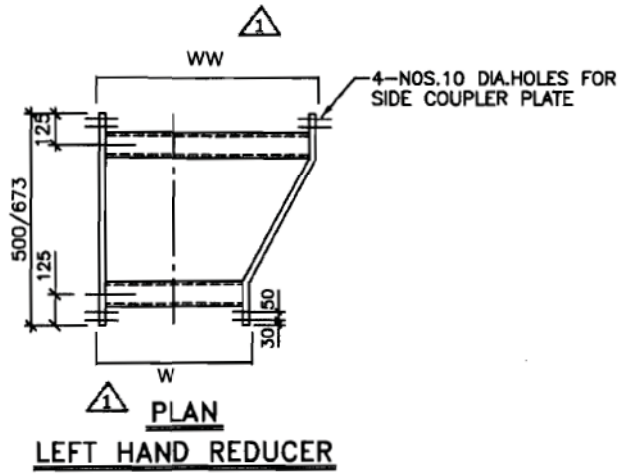
NOTES :-

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. 2 SHT. 05 OF 17



WIDTH	WW	600	600	450
	W	450	300	300

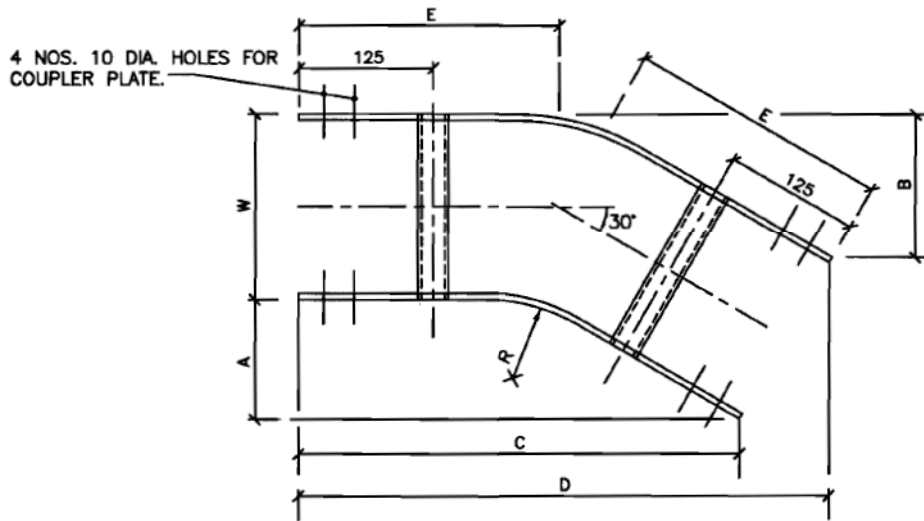
NOTE :-

1. ALL DIMENSIONS ARE IN MM.



TYPICAL DETAILS OF CABLE TRAYS AND ACCESSORIES

DWG. NO.
PE-DG-417-507-E005
REV. 2 SHT. 06 OF 17



PLAN
30° HORIZONTAL ELBOW

WIDTH (W)	RADIUS (R)	A	B	C	D	E
600	1050	205	285	755	1055	485
	600	145	225	530	830	365
	450	125	205	455	755	325
	300	105	185	380	680	285
450	1050	205	265	755	980	465
	600	145	205	530	755	345
	450	125	185	455	680	305
	300	105	165	380	605	265
300	1050	205	245	755	905	445
	600	145	185	530	680	325
	450	125	165	455	605	285
	300	105	145	380	530	245

NOTE :-

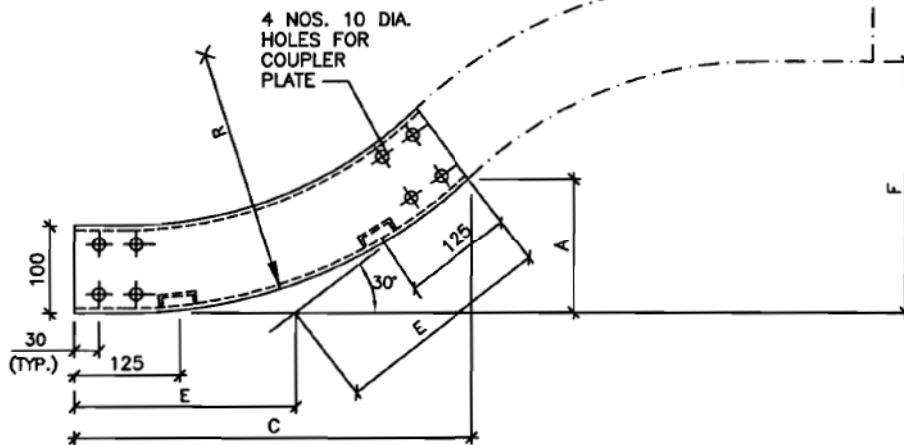
1. ALL DIMENSIONS ARE IN MM.

TYPICAL DETAILS OF CABLE TRAYS AND ACCESSORIES



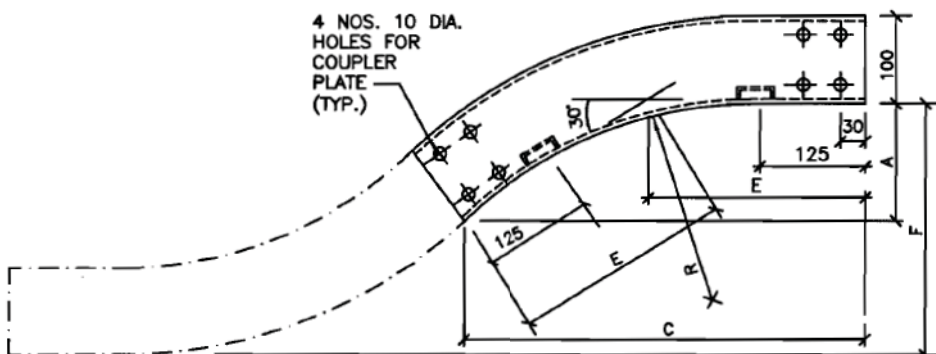
DWG. NO.
PE-DG-417-507-E005

REV. 2 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 :-

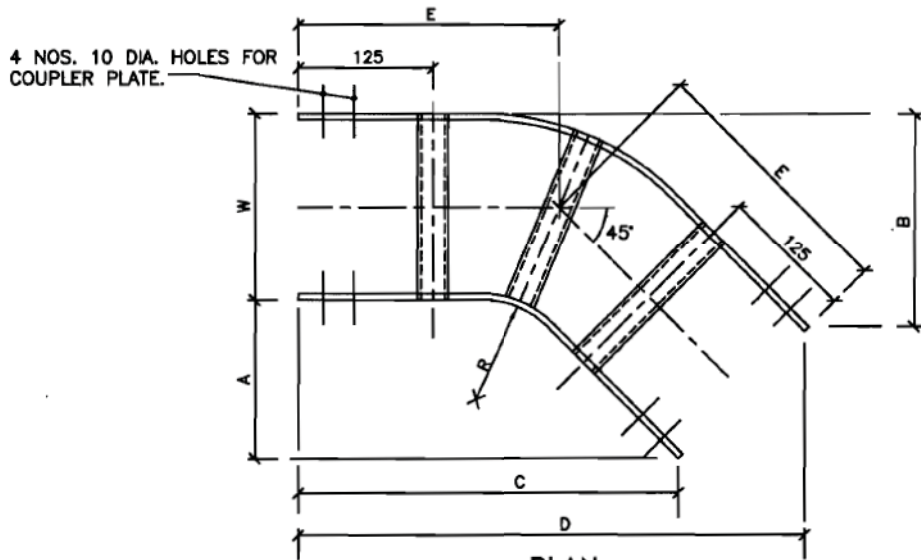
1. ALL DIMENSIONS ARE IN MM.

TYPICAL DETAILS OF CABLE TRAYS AND ACCESSORIES



DWG. NO.
PE-DG-417-507-E005

REV. 2 | 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.

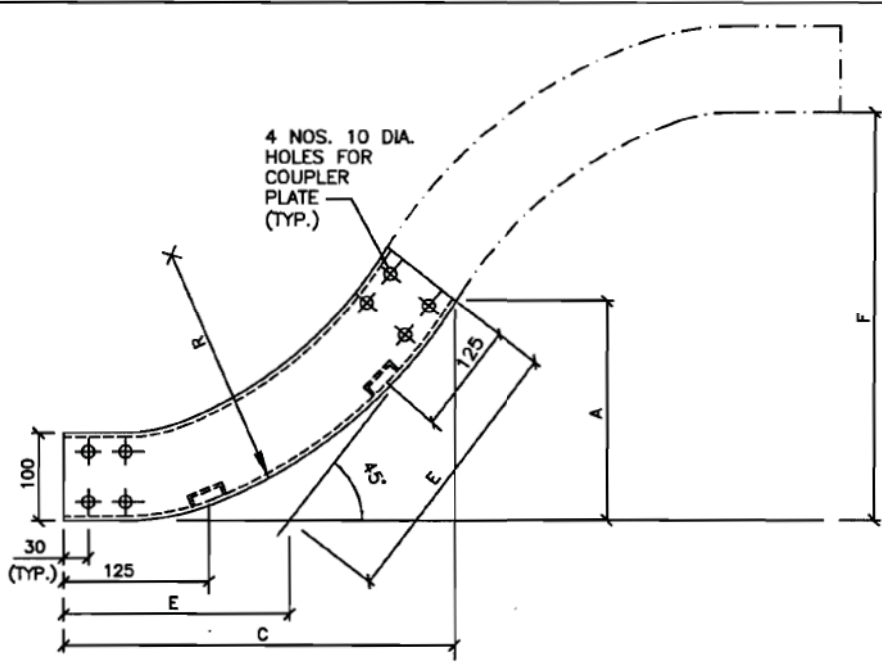
TYPICAL DETAILS OF CABLE TRAYS AND ACCESSORIES



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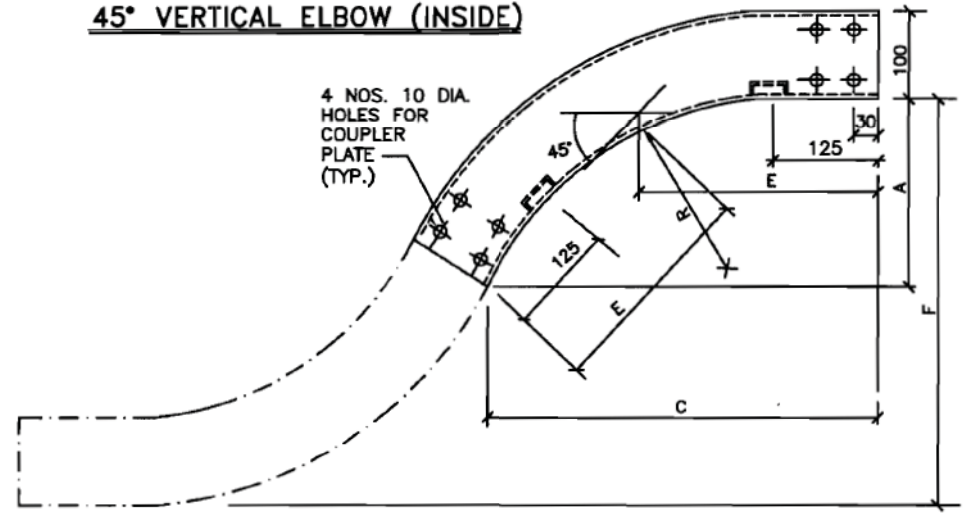
PE-DG-417-507-E005

REV. 2 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
& 300	450	220	530	310	440
	300	175	425	250	350

NOTE :-

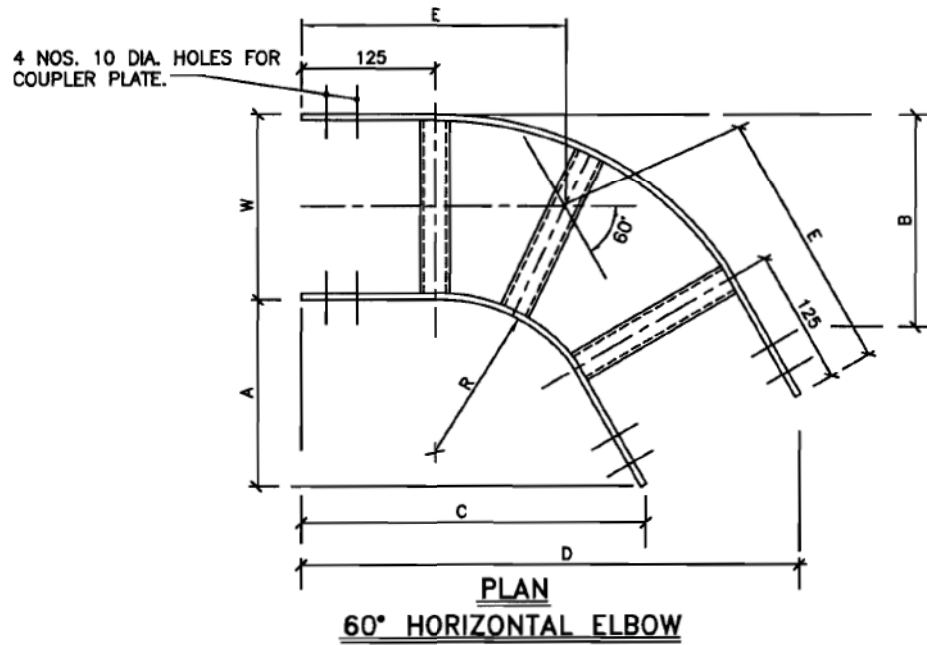
1. ALL DIMENSIONS ARE IN MM.

TYPICAL DETAILS OF CABLE TRAYS AND ACCESSORIES



DWG. NO.
PE-DG-417-507-E005

REV. 2 | SHT. 10 OF 17



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.

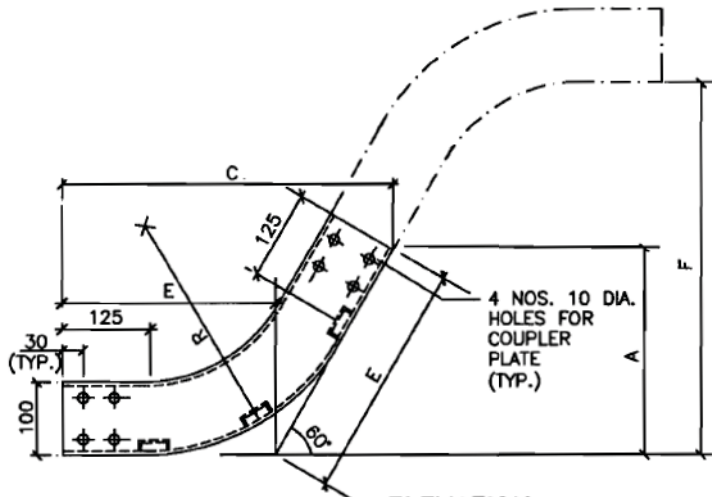
TYPICAL DETAILS OF CABLE TRAYS AND ACCESSORIES



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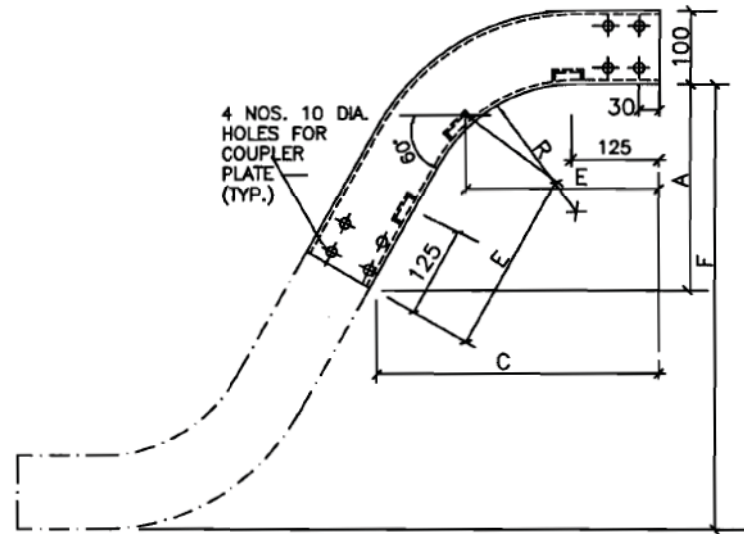
PE-DG-417-507-E005

REV. 2 | 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

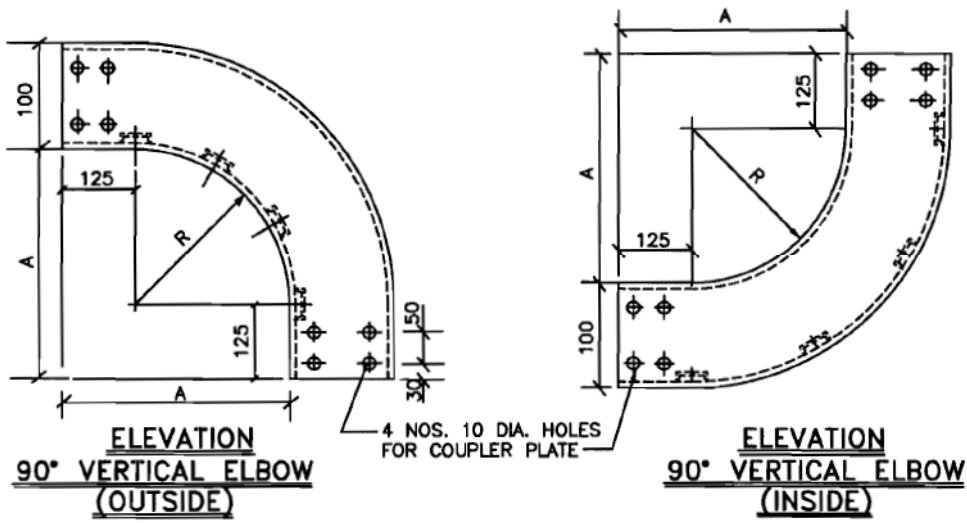
NOTE :-

1. ALL DIMENSIONS ARE IN MM.

TYPICAL DETAILS OF CABLE TRAYS AND ACCESSORIES

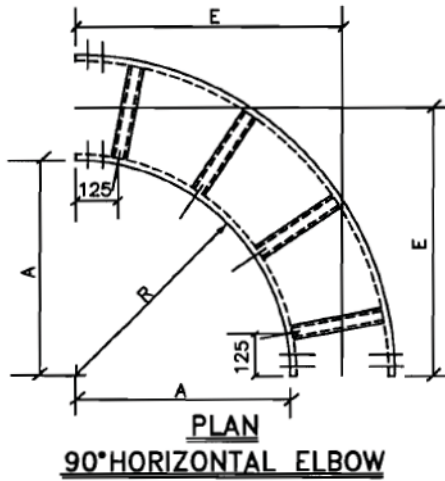


DWG. NO.
PE-DG-417-507-E005
REV. 2 | SHT. 12 OF 17



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



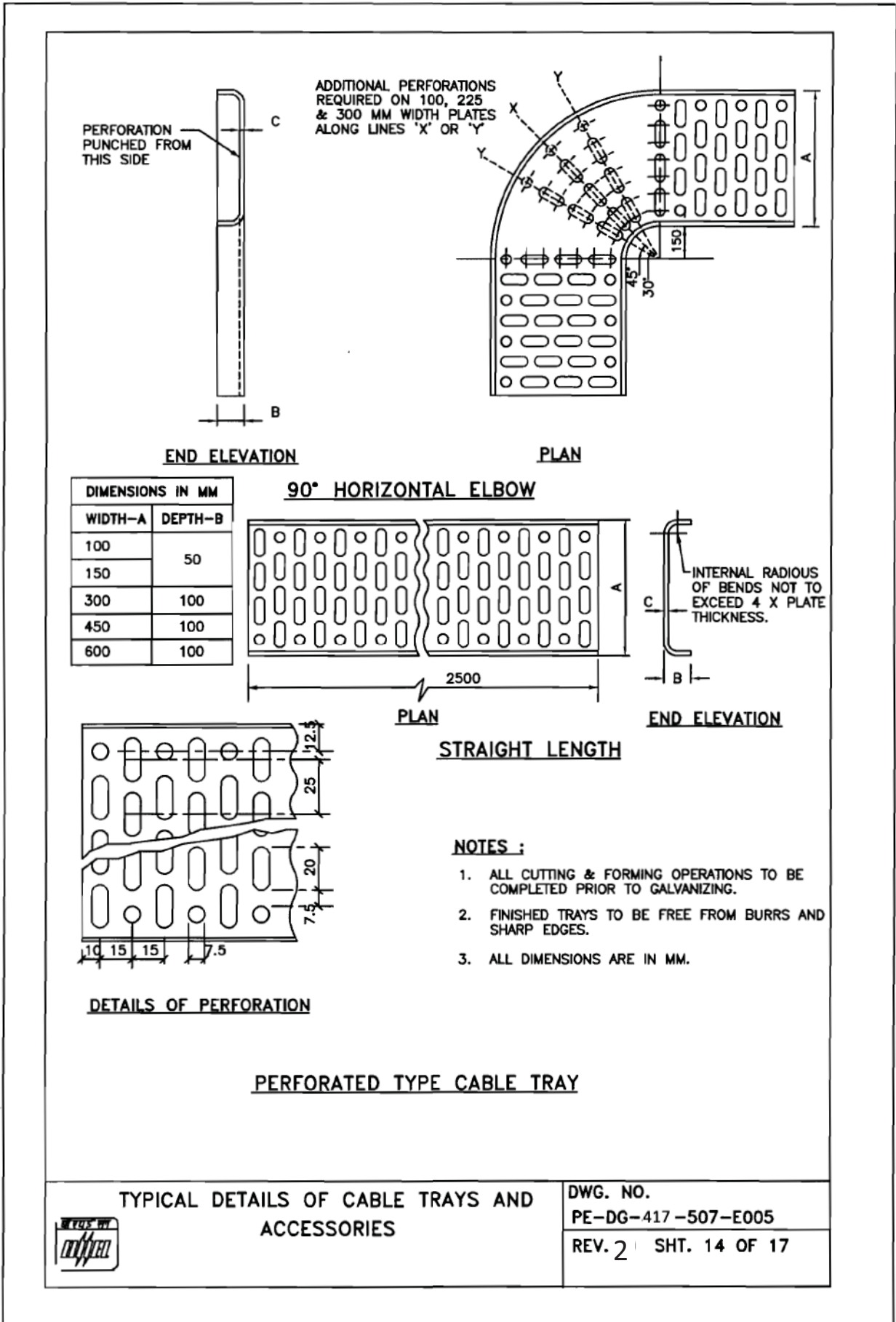
NOTES :-

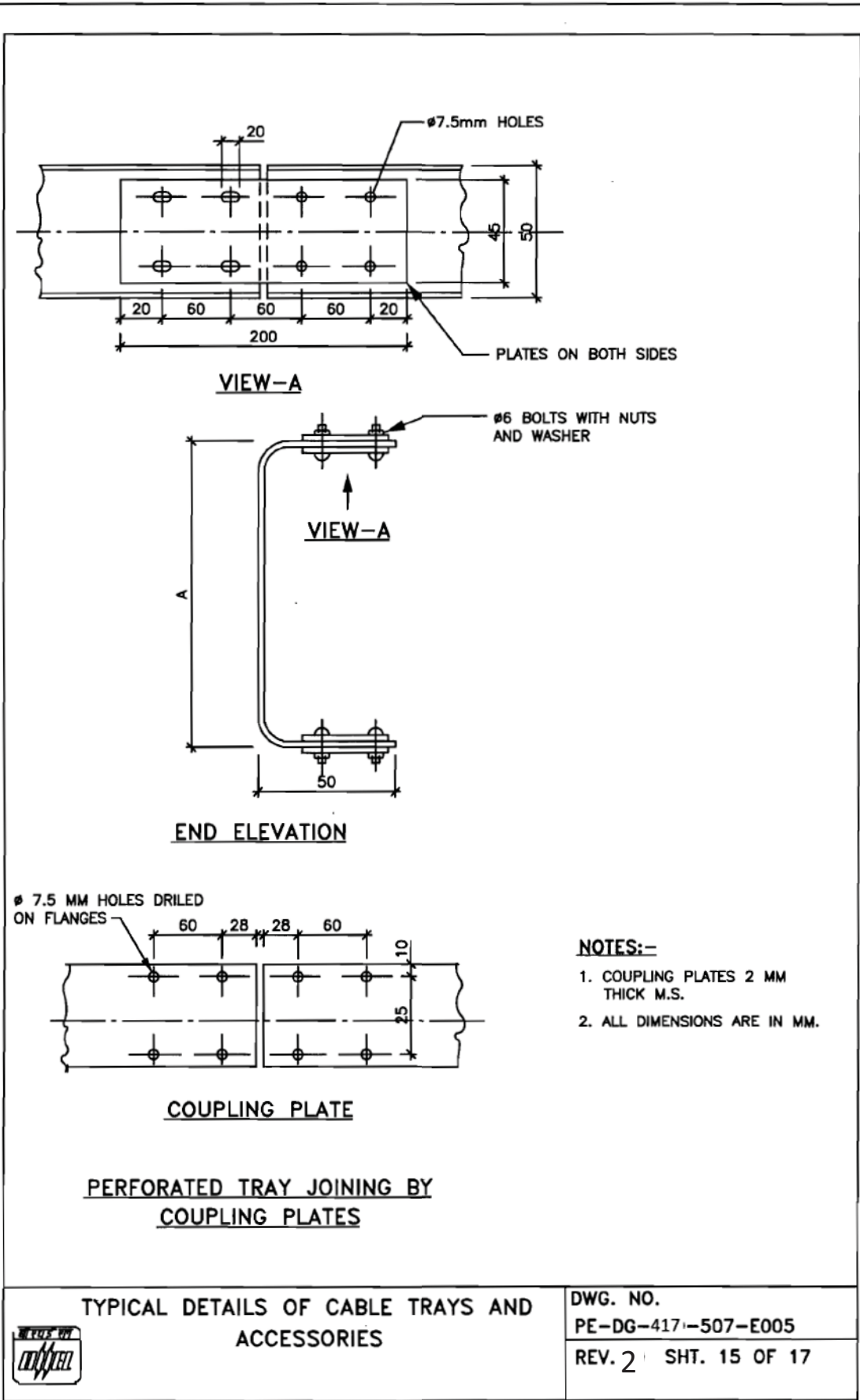
1. ALL DIMENSIONS ARE IN MM.
2. FOR MULTITIER CABLE TRAY, THE BENDING RADIUS AT THE BENDS SHALL BE SAME FOR ALL TRAYS AND THIS RADIUS SHALL BE AS PER THE RECOMMENDED BENDING RADIUS OF LARGEST CABLE IN THE ROUTE.

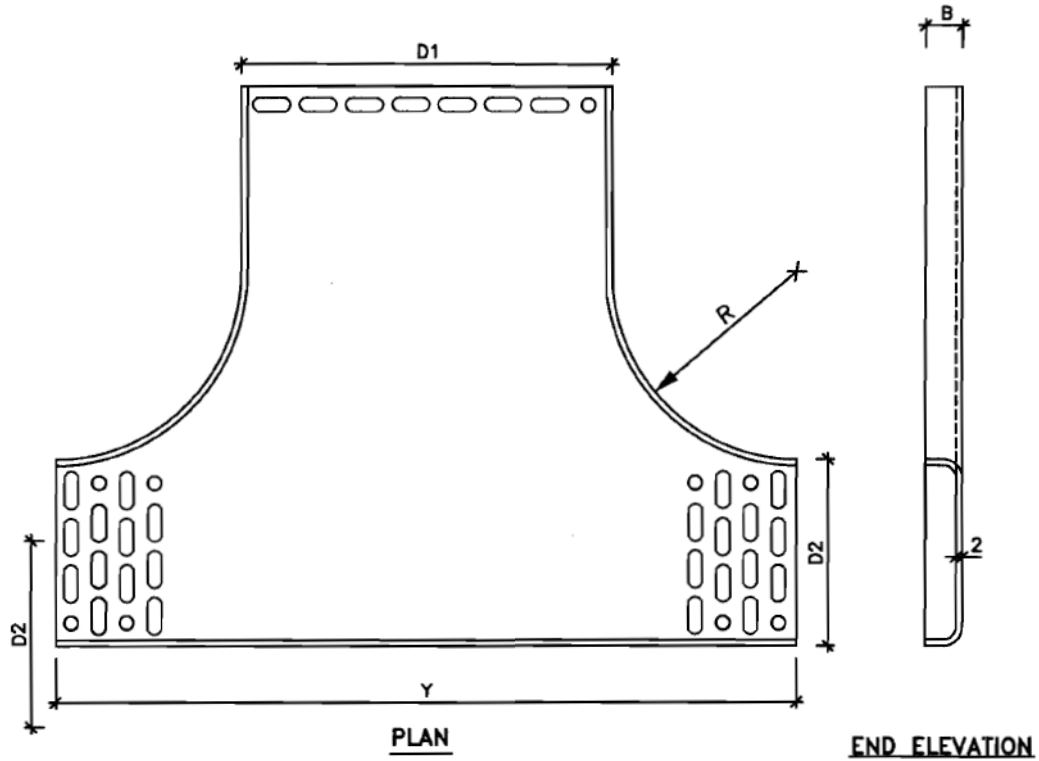
TYPICAL DETAILS OF CABLE TRAYS AND ACCESSORIES



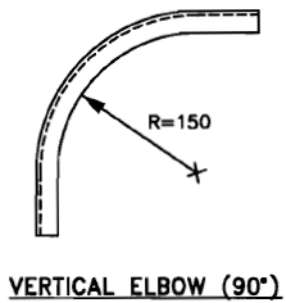
DWG. NO.
PE-DG-417-507-E005
REV. 2 SHT. 13 OF 17







HORIZONTAL TEE



VERTICAL ELBOW (90°)

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. 2 | 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 TRAY COVERS 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. EPOXY PAINT SHALL BE APPLIED IN CABLE TRAY COVERS IN CHEMICAL CORROSIVE AREA. 
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.
20. A 2.5 METER STRAIGHT SECTION OF EACH TYPE OF CABLE TRAY OF WIDTH 600mm, 450mm, 300mm &  150 mm SHALL BE SIMPLY SUPPORTED AT 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.



TYPICAL DETAILS OF CABLE TRAYS AND
ACCESSORIES

DWG. NO.
PE-DG-417-507-E005

REV. 2 | SHT. 17 OF 17