

***RAJASTHAN RAJYA VIDYUT UTPADAN NIGAM
LIMITED***

2X660 MW SURATGARH STPS, STAGE-V, UNIT-7&8

VOLUME – IIB

**TECHNICAL SPECIFICATION
FOR**

CABLE TRAYS & ACCESSORIES

**SPECIFICATION NO : PE-TS-392-507-E021
REVISION : 0**



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



TECHNICAL SPECIFICATION FOR CABLE TRAYS & ACCESSORIES

SPECIFICATION NO. PE-TS- 392-507-E021

VOLUME II B

SECTION ---

REVISION 0

DATE: 15.04.14

SHEET 1 OF 1

CONTENTS

Sl. No.	DESCRIPTION	NO. OF SHEETS
1.0	INSTRUCTIONS TO BIDDERS	01
2.0	PREAMBLE	01
3.0	SECTION – 'A' (SCOPE OF ENQUIRY)	02
4.0	SECTION – 'B' (PROJECT INFORMATION)	04
5.0	SECTION – 'C' (SPECIFIC TECHNICAL REQUIREMENTS)	02
5.1	ANNEXURE-I (BOQ CUM PRICE SCHEDULE)	03
5.2	ANNEXURE-II (LIST OF DRAWINGS /DOCUMENTS TO BE SUBMITTED BY SUCCESSFUL BIDDER)	01
5.3	ANNEXURE-III (VENDOR DRAWING/DOCUMENT SCHEDULE)	01
6.0	SECTION- 'D'	
6.1	STANDARD TECHNICAL SPECIFICATION	03
6.2	DATA SHEET -A	02
7.0	STANDARD QUALITY PLAN	04
8.0	TYPICAL DETAILS OF CABLE TRAYS & ACCESSORIES (DRAWING NO. PE-DG-392-507-E005)	11

IT IS CONFIRMED THAT OUR TECHNICAL OFFER COMPLIES WITH THE SPECIFICATION IN TOTO & THAT THERE ARE NO TECHNICAL DEVIATIONS.

BIDDER'S STAMP & SIGNATURE



TECHNICAL SPECIFICATION FOR CABLE TRAYS & ACCESSORIES

SPECIFICATION NO. PE-TS-**392**-507-E021

VOLUME II B

SECTION ---

REVISION 0

DATE: **15.04.14**

SHEET 1 OF 1

PREAMBLE

1.0 The tender document contains two (2) volumes. The bidder shall meet the requirements of all the two volumes.

1.1 Volume-I (CONDITIONS OF CONTRACT)

This consists of four parts as below:-

- Volume-IA : This part contains instructions to bidders for making bids to BHEL.
- Volume-IB : This part contains general commercial conditions of the tender & includes provision that vendor is responsible for the quality of item supplied by their sub-vendors.
- Volume-IC : This part contains special conditions of contract.
- Volume-ID : This part contains commercial conditions for erection & commissioning site work, as applicable.

1.2 Volume-II TECHNICAL SPECIFICATIONS

Technical requirements are stipulated in Volume-II which comprises of :-

- Volume-IIA : General Technical Conditions
- Volume-IIB : Technical Specification including Drawings, if any.

1.2.1 Volume-IIB

This volume is sub-divided into following sections:-

- Section-A : This section outlines the scope of enquiry.
- Section-B : This section provides "Project Information".
- Section-C : This section indicates technical requirements specific to the contract, not covered in Section-D.
- Section-D : This section comprises of technical specifications of equipments complete with data sheet A.

Data Sheet - A specifies data and other requirements pertaining to the Equipment.

2.0 The requirements mentioned in Section-C / Data Sheets-A of section-D shall prevail and govern in case of conflict between the same and the corresponding requirements mentioned in the descriptive portion in Section-D.



TECHNICAL SPECIFICATION FOR
CABLE TRAYS & ACCESSORIES

SPECIFICATION NO. PE-TS- 392-507-E021

VOLUME II B

SECTION A

REVISION 0

DATE: 15.04.14

SHEET 1 OF 2

SECTION – A

SCOPE OF ENQUIRY



TECHNICAL SPECIFICATION FOR CABLE TRAYS & ACCESSORIES

SPECIFICATION NO. PE-TS- 392-507-E021

VOLUME II B

SECTION A

REVISION 0

DATE: 15.04.14

SHEET 2 OF 2

SCOPE OF ENQUIRY

- 1.0 This specification covers the Design, Manufacture, Inspection and Testing at Manufacturer's works, proper packing and delivery to site of **Cable Trays & Accessories** as mentioned in different sections of this specification for **2X660MW SURATGARH TPS**.
- 2.0 It is not the intent to specify herein all the details of design & manufacture. However, the equipment shall conform in all respects to high standards of design engineering and workmanship and shall be capable of performing in continuous commercial operation at site conditions.
- 3.0 The general terms and conditions, instructions to bidders and other attachment referred to elsewhere are hereby made part of the tender specification.
- 4.0 The bidder shall be responsible for and governed by all requirements stipulated hereinafter.
- 5.0 Bidder shall confirm total compliance to the specification without any deviations from technical/quality assurance requirements stipulated.
- 6.0 The documents shall be in English Language and MKS system of units.



TECHNICAL SPECIFICATION FOR
CABLE TRAYS & ACCESSORIES

SPECIFICATION NO. PE-TS-392-507-E021

VOLUME NO. : II-B

SECTION : B

REV NO. : 0 DATE : 15.04.14

SHEET : 1 OF 1

SECTION - B

PROJECT INFORMATION

SPEC.NO. TCE.5750A-H-500-001	TATA CONSULTING ENGINEERS LIMITED		VOLUME II SECTION – B
	RRVUNL, 2 x 660 MW, Super-Critical TPS, Stage-V, Unit # 7 & 8 at Suratgarh, Rajasthan GENERAL PROJECT INFORMATION		SHEET 1 OF 3

1.0	Owner	Rajasthan Rajya Vidyut Utpadan Nigam Ltd., Jaipur
2.0	Consulting Engineer	TATA Consulting Engineers Ltd. 73/1, St. Marks Road, Bangalore – 560 001 Tel : 080 – 6622 6000 Fax : 080 – 22274874
3.0	Location of the plant	Prabat Nagar, Suratgarh Sriganganagar district, Rajasthan.
4.0	Latitude and longitude	Latitude : 29 deg. 10 min. N Longitude : 74 deg.01 min. E
5.0	Elevation above mean sea level	186 m (approximate)
6.0	Climatic conditions	
6.1	Temperatures : Monthly basis	
	Mean of daily max.	32.8 deg.C (in the month of May)
	Mean of daily min.	17.6 deg.C (in the month of Jan)
6.2	Temperatures : Annual basis	
	Mean of daily max.	32.3 deg.C
	Mean of daily min.	19.6 deg.C
	Highest temperature recorded	50 deg.C
	Lowest temperature recorded	(-) 2.8 deg.C
	Design Ambient Temperature for Electrical Equipment design	50 deg C
6.3	Relative humidity	Varies between 21% and 81%
6.4	Annual average rain fall	312 mm
6.5	Annual mean wind speed :	4 km / hr.
7.0	Wind load	

ISSUE R1

SPEC.NO. TCE.5750A-H-500-001	TATA CONSULTING ENGINEERS LIMITED		VOLUME II SECTION – B
	RRVUNL, 2 x 660 MW, Super-Critical TPS, Stage-V, Unit # 7 & 8 at Suratgarh, Rajasthan GENERAL PROJECT INFORMATION		SHEET 2 OF 3

	Calculations for wind effect shall be in accordance with IS:875-1987(Part-3) taking into account the following:		
	a) Basic wind speed = 47 m/sec		
	b) Factor K1 = 1.07		
	c) Category of terrain = Category 2		
	d) K3 – as per IS 875		
8.0	Seismic data (As per IS: 1893 latest issue)		
	a) Zone	Zone II	
	Designs & design coefficients shall be based on IS 1893:2002		
	Design condenser cooling water inlet temperature	33 Deg C	
9.0	Auxiliary power supply:		
	Auxiliary electrical equipment to be supplied against this specification shall be suitable for operation on the following system:		
	a)	For motors rated 160 kW and below.	415V AC, 3-phase, 3-wire effectively earthed.
	b)	For motors rated above 160 kW and up to 1500 kW	6600V AC, 3-phase, 3-wire, 50 Hz, non-effectively earthed
	c)	For motors rated above 1500kW	11000V AC, 3-phase, 3-wire, 50 Hz, non-effectively earthed
	d)	For motor control centres	415V AC, 3-phase, 3/4-wire effectively earthed.
	e)	DC motor starters, DC solenoids, DC alarm control and protection	220 V DC, 2-wire unearthed
	f)	AC control & protective devices	110 V 1 phase, 50Hz, 2 wire AC supply. The single phase 110V AC supply shall be derived by VENDOR by providing 415V / 110 V Control transformers of adequate rating with MCCB / MCB on both the primary and secondary sides.
	g)	Uninterrupted power supply	230 V, 1-phase, 50 Hz, 2-wire, AC

ISSUE R1

SPEC.NO. TCE.5750A-H-500-001	TATA CONSULTING ENGINEERS LIMITED		VOLUME II SECTION – B
	RRVUNL, 2 x 660 MW, Super-Critical TPS, Stage-V, Unit # 7 & 8 at Suratgarh, Rajasthan GENERAL PROJECT INFORMATION		SHEET 3 OF 3

		supply (For all instrumentation and control system equipment and solenoid valves)
--	--	---

g) Lighting fixtures and space heaters 240 V, 1 phase, 2 wire, 50Hz,solidly earthed system

h) Construction supply 415 V, 3 phase, 4 wire, 50Hz AC supply with neutral lead solidly earthed.

i) The above voltages may vary as follows :


All devices shall be suitable for continuous operation over the entire range of voltage and frequency indicated below without any change in their performance.

AC supply	Voltage variation $\pm 10\%$ Frequency variation $\pm 5\%$
DC supply	Combined voltage & frequency variation 10% Voltage variation +10% , -15%

j) For instrument and control system of steam generator and steam turbine generator. 230 V $\pm 5\%$ AC UPS, 1-phase, 50 Hz, 2-wire. The 24 V DC required for control system shall be generated from this UPS.

10.0 All the electrical equipment shall be designed for 50° C reference ambient temperature.

ISSUE
R1

	TECHNICAL SPECIFICATION FOR CABLE TRAYS & ACCESSORIES	SPECIFICATION NO. PE-TS-392-507-E021	
		VOLUME II B	
		SECTION C	
		REVISION 0	DATE: 15.04.14
		SHEET 1 OF 2	

SECTION –C

SPECIFIC TECHNICAL REQUIREMENTS

	TECHNICAL SPECIFICATION FOR CABLE TRAYS & ACCESSORIES	SPECIFICATION NO. PE-TS-392-507-E021	
		VOLUME II B	
		SECTION C	
		REVISION 0	DATE: 15.04.14
		SHEET 2 OF 2	

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-D. Project specific technical/ quality requirements / changes are listed in Section-C.
- 1.3 The stipulations of Section-C, followed by those of Data Sheet-A shall prevail in case of any conflict between the stipulations of Section-C, Data Sheet - A & Section-D.

2.0 BILL OF QUANTITIES:

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

<i>S. No.</i>	<i>Reference clause No. of Section D (if any)</i>	<i>Specific Requirement/ Change</i>

3.2 Quality/ Inspection:


<i>S. No.</i>	<i>Reference clause No. of Section D (if any)</i>	<i>Specific Requirement/ Change</i>

	RRVUNL 2X660 MW SURATGARH TPS		SPECIFICATION NO.		PE-TS-392-507-E021
			VOLUME IIB		
	TECHNICAL SPECIFICATION FOR CABLE TRAY AND ACCESSORIES		SECTION - C		
			REVISION 0		DATE: 15.04.2014
		SHEET OF			


ANNEXURE - I

BOQ-CUM-PRICE SCHEDULE FOR CABLE TRAY ACCESSORIES

Sr. No.	ITEM CODE	ITEM DESCRIPTION	UNIT	ORDER QUANTITY	ORDER QUANTITY LOT-1	UNIT PRICE (EX WORKS) Rs.	TOTAL PRICE (EX-WORKS) Rs.
1.0		HOT DIP GALVANISED LADDER TYPE CABLE TRAY COMPLETE WITH COUPLER PLATES, FASTENERS, CLAMPS AND FIXING					
a)	507-21105-A	CABLE TRAY 2.5MM THICK- LADDER TYPE 150W	MTR	4000	2800		
b)	507-21106-A	CABLE TRAY 2.5MM THICK- LADDER TYPE 300W	MTR	21000	14700		
c)	507-21107-A	CABLE TRAY 2.5MM THICK- LADDER TYPE 450W	MTR	6000	4200		
d)	507-21108-A	CABLE TRAY 2.5MM THICK- LADDER TYPE 600W	MTR	44000	30800		
2.0		HOT DIP GALVANISED PERFORATED TYPE CABLE TRAY COMPLETE WITH COUPLER PLATES, FASTENERS, CLAMPS					
a)	507-21113-A	CABLE TRAY 2.5MM THICK PERFORATED TYPE 150W	MTR	2000	1400		
b)	507-21114-A	CABLE TRAY 2.5MM THICKPERFORATED TYPE 300W	MTR	5000	3500		
c)	507-21115-A	CABLE TRAY 2.5MM THICK PERFORATED TYPE 450W	MTR	2000	1400		
d)	507-21116-A	CABLE TRAY 2.5MM THICKPERFORATED TYPE 600W	MTR	18000	12600		
3.0		HOT DIP GALVANISED CABLE TRAY ACCESSORIES					
3.1		LADDER TYPE HORIZONTAL 90 DEG. BEND-600mm RADIUS					
a)	507-21120-A	LAD HOR 90DEG BEND 2.5MM THICK 600 RAD 300W	NOS	75	53		
b)	507-21121-A	LAD HOR 90DEG BEND 2.5MM THICK 600 RAD 450W	NOS	15	11		
c)	507-21122-A	LAD HOR 90DEG BEND 2.5MM THICK 600 RAD 600W	NOS	340	238		
3.2		LADDER TYPE VERTICAL 90 DEG. BEND-600mm RADIUS (INSIDE)					
a)	507-21126-A	LAD VER 90DEG BEND 2.5MM THICK 600 RAD-INSIDE 300W	NOS	80	56		
b)	507-21127-A	LAD VER 90DEG BEND 2.5MM THICK 600 RAD-INSIDE 450W	NOS	20	14		
c)	507-21128-A	LAD VER 90DEG BEND 2.5MM THICK 600 RAD-INSIDE 600W	NOS	120	84		
3.3		LADDER TYPE VERTICAL 90 DEG. BEND-600mm RADIUS (OUTSIDE)					
a)	507-21132-A	LAD VER 90DEG BEND 2.5MM THICK 600 RAD-OUTSIDE 300W	NOS	35	25		
b)	507-21133-A	LAD VER 90DEG BEND 2.5MM THICK 600 RAD-OUTSIDE 450W	NOS	20	14		
c)	507-21134-A	LAD VER 90DEG BEND 2.5MM THICK 600 RAD-OUTSIDE 600W	NOS	90	63		

	RRVUNL 2X660 MW SURATGARH TPS	SPECIFICATION NO.		PE-TS-392-507-E021
		VOLUME IIB		
	TECHNICAL SPECIFICATION FOR CABLE TRAY AND ACCESSORIES	SECTION - C		
		REVISION 0 SHEET OF	DATE: 15.04.2014	

Sr. No.	ITEM CODE	ITEM DESCRIPTION	UNIT	ORDER QUANTITY	ORDER QUANTITY LOT-1	PRICE (EX WORKS) Rs.	PRICE (EX-WORKS) Rs.
3.4		LADDER TYPE TEES-600mm RADIUS					
a)	507-21138-A	LAD TEES 2.5MM THICK 600MM RADIUS 300W	NOS	50	35		
b)	507-21139-A	LAD TEES 2.5MM THICK 600MM RADIUS 450W	NOS	10	7		
c)	507-21140-A	LAD TEES 2.5MM THICK 600MM RADIUS 600W	NOS	645	452		
3.5		LADDER TYPE CROSS-600mm RADIUS					
a)	507-21144-A	LAD CROSS 2.5MM THICK 600 RAD 300W	NOS	5	4		
b)	507-21145-A	LAD CROSS 2.5MM THICK 600 RAD 450W	NOS	10	7		
c)	507-21146-A	LAD CROSS 2.5MM THICK 600 RAD 600W	NOS	40	28		
3.6		LADDER TYPE REDUCERS					
a)	507-21150-A	LAD REDUCER (50% LHS/RHS) 2.5MM THICK 450-300W	NOS	5	4		
b)	507-21151-A	LAD REDUCER (50% LHS/RHS) 2.5MM THICK 600-300W	NOS	25	18		
c)	507-21152-A	LAD REDUCER (50% LHS/RHS) 2.5MM THICK 600-450W	NOS	10	7		
3.7		PERFORATED TYPE HORIZONTAL 90 DEG. BEND-600mm RADIUS					
a)	507-21156-A	PER HOR 90DEG BEND 2.5MM THICK 600 RAD. 300W	NOS	40	28		
b)	507-21157-A	PER HOR 90DEG BEND 2.5MM THICK 600 RAD. 450W	NOS	10	7		
c)	507-21158-A	PER HOR 90DEG BEND 2.5MM THICK 600 RAD. 600W	NOS	280	196		
3.8		PERFORATED TYPE VERTICAL 90 DEG. BEND-600mm RADIUS (INSIDE)					
a)	507-21162-A	PER VER 90DEG BEND 2.5MM THICK 600 RAD-INSIDE 300W	NOS	20	14		
b)	507-21163-A	PER VER 90DEG BEND 2.5MM THICK 600 RAD-INSIDE 450W	NOS	10	7		
c)	507-21164-A	PER VER 90DEG BEND 2.5MM THICK 600 RAD-INSIDE 600W	NOS	15	11		
3.9		PERFORATED TYPE VERTICAL 90 DEG. BEND-600mm RADIUS (OUTSIDE)					
a)	507-21168-A	PER VER 90DEG BEND 2.5MM THICK 600 RAD-OUTSIDE 300W	NOS	60	42		
b)	507-21169-A	PER VER 90DEG BEND 2.5MM THICK 600 RAD-OUTSIDE 450W	NOS	10	7		
c)	507-21170-A	PER VER 90DEG BEND 2.5MM THICK 600 RAD-OUTSIDE 600W	NOS	30	21		
3.10		PERFORATED TYPE TEES-600mm RADIUS					
a)	507-21174-A	PER TEES 2.5MM THICK 600 RADIUS 300W	NOS	20	14		
b)	507-21175-A	PER TEES 2.5MM THICK 600 RADIUS 450W	NOS	10	7		
c)	507-21176-A	PER TEES 2.5MM THICK 600 RADIUS 600W	NOS	380	266		

	RRVUNL 2X660 MW SURATGARH TPS	SPECIFICATION NO.		PE-TS-392-507-E021
		VOLUME IIB		
	TECHNICAL SPECIFICATION FOR CABLE TRAY AND ACCESSORIES	SECTION - C		
		REVISION 0	DATE: 15.04.2014	
		SHEET	OF	

Sr. No.	ITEM CODE	ITEM DESCRIPTION	UNIT	ORDER QUANTITY	ORDER QUANTITY LOT-1	PRICE (EX WORKS) Rs.	PRICE (EX-WORKS) Rs.
3.11		PERFORATED TYPE CROSS-600mm RADIUS					
a)	507-21180-A	PER CROSS 2.5MM THICK 600 RAD 300W	NOS	5	4		
b)	507-21181-A	PER CROSS 2.5MM THICK 600 RAD 450W	NOS	10	7		
c)	507-21182-A	PER CROSS 2.5MM THICK 600 RAD 600W	NOS	5	4		
3.12		PERFORATED TYPE REDUCERS					
a)	507-21186-A	PER REDUCER (50% LHS/RHS) 2.5MM THICK 450-300W	NOS	5	4		
b)	507-21187-A	PER REDUCER (50% LHS/RHS) 2.5MM THICK 600-300W	NOS	10	7		
c)	507-21188-A	PER REDUCER (50% LHS/RHS) 2.5MM THICK 600-450W	NOS	10	7		
3.13		HOT DIP GALVANISED CABLE TRAY COVER COMPLETE WITH FORMED CHANNEL, PIPE, GI FLAT, BOLTS WITH NUTS &					
a)	507-21201-A	COVER 1.7 MM THK-NON PER GALV MS 300W	MTR	1200	840		
b)	507-21202-A	COVER 1.7 MM THK-NON PER GALV MS 450W	MTR	600	420		
c)	507-21203-A	COVER 1.7 MM THK-NON PER GALV MS 600W	MTR	2000	1400		

NOTES:

- The quantities will be released for manufacture in more than one lot. Lot-I quantities, which are indicated above, shall be released for manufacture along with LOI.
- Manufacturing of Lot-I quantities shall be done after the approval of technical and quality documentation, and supply of same shall be completed within four months of date of approval of documents.
- Subsequent lots shall be cleared for manufacture based on progress of engineering and site requirements. A lead-time of three months shall be given for completion of supply of each lot from the date of clearance of the quantities.
- The total quantity variation shall be limited from -30% to +30 % of the total contract value derived on the basis of the Order Quantities.
- Raw materials: - Steel shall be procured from SAIL/TISCO/RINL/BHUSAN/JINDAL STEEL/JINDAL ISPAT/ESSAR/LLOYD/ IISCO/ authorised SAIL Re Rollers.
- The number of coupler plates, washers, bolts & nuts shall be as per Data Sheet- A attached with the specification.

	TECHNICAL SPECIFICATION FOR CABLE TRAYS & ACCESSORIES	SPECIFICATION NO. PE-TS-392-507-E021	
		VOLUME II B	
		SECTION - C	
		REVISION 0	DATE: 15.04.14
		SHEET 1	OF 1

ANNEXURE – II

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-V0-392-507-E011	Within one week of award of contract
2.	GA drawings of Cable Trays & Accessories	PE-V0-392-507-E012	Within one week of award of contract
3.	Quality Plan for Cable Trays & Accessories	PE-V0-392-507-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 CABLE TRAYS & ACCESSORIES	SPECIFICATION NO. PE-TS-392-507-E021	
		VOLUME II B	
		SECTION - C	
		REVISION 0	DATE: 15.04.14
		SHEET 1	OF 1

ANNEXURE-III

DRAWING & DOCUMENT DISTRIBUTION

S. NO.	DESCRIPTION	No. hard /soft copies	No. of CD-ROMs	Submission through DMS
1	Docs. /drgs. for approval (First submission)	PDF File + 2 Hard copies	NIL	YES
2	Drgs. / docs. for approval (Second & subsequent submission till approval)	PDF File + 2 Hard copies	NIL	YES
3	Final approval drgs. / docs. for Distribution after CAT-1.	PDF File + 5 Hard Copies	NIL	YES
4	As Built drgs./doc.	6 Hard Copies	4 CD-ROMS	-
5	Operation, Erection & Maintenance manual for approval	PDF File + 2 Hard Copies	NIL	-
6	Approved Operation & Maintenance Manual for distribution	PDF File + 6 Hard Copies	4 CD-ROMS	-
7	Type Test Certificates/ Reports for approval	PDF+ 2 hard Copies	NIL	-
8	Type Test Certificates/ Reports for distribution	6 hard Copies	6 CD-ROMS	-



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

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

VOLUME II B

SECTION D


REVISION 1

DATE: 26/08/2011

SHEET 1 OF 3

SECTION-D

STANDARD TECHNICAL SPECIFICATION

	STANDARD TECHNICAL SPECIFICATION FOR CABLE TRAYS & ACCESSORIES	SPECIFICATION NO. PE-TS- 999-507-E021	
		VOLUME II B	
		SECTION D	
		REVISION 1	DATE: 26/08/2011
		SHEET 2 OF 3	

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 the specification) 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.



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

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

VOLUME II B

SECTION D

REVISION 1

DATE: 26/08/2011

SHEET 3 OF 3

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.



TECHNICAL SPECIFICATION FOR CABLE TRAYS & ACCESSORIES

SPECIFICATION NO. PE-TS-392-507-E021

VOLUME II B

SECTION D

REVISION 0

DATE: 15.04.14

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 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 [YES]
Perforated Type [YES]
- 2.3 Standard Length of
Straight Length of
Cable Trays : 2.5 meters
- 2.4 Standard Width (mm) : 600 450 300 150
- 2.5 Construction : Conforming to enclosed drawing [PE-DG-392-507-E005]
- 2.6 Bending Radius
of Accessories(in mm) : 600 mm
- 2.7 Tolerance in length/width
/ height : + /- 2 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 [APPLICABLE]

- 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-392-507-E021

VOLUME II B

SECTION D

REVISION 0

DATE: 15.04.14

SHEET 2 of 2

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

5.0 SHEET THICKNESS

- a) For cable trays &
Accessories : 2.5 mm
- b) For cable tray cover : 1.7 mm
- c) For Coupler plate : 3.0 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

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.

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.

		QUALITY PLAN		CUSTOMER :		PROJECT TITLE :			SPECIFICATION NO. :			
				BIDDER/ VENDOR		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	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 TC'S	100%	IS1079	IS1079	MILL TC	3/2	-	1/2	Steel shall be procured from SAIL/TISCO/RINL/BHUSAN/JINDAL STEEL/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	3/2	-	-	
		3.SURFACE FINISH	MA	VISUAL	100%			QC RECORD	3/2	-	-	
1.2	ZINC	CHEM.COMP.	MA	CHEM TEST	EACH HEAT	IS-209	IS-209	QC RECORD	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
		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. :		
				BIDDER/ VENDOR			STANDARD QP NO. : PE-QP-999-507-E005, REV. 0			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	MA	TEMPERATURE INDICATOR	CONTINUOUS	IS-2629	IS-2629	QC RECORD	2/3	-	-	If vendor doesn't have his own galvanizing plant duly approved by BHEL PEM; then galvanizing shall be carried out at BHEL-PEM approved other galvanizing plants as per Annexure-2.
		2.DROSS	MA	VISUAL	PERIODIC	IS 2629	IS 2629	QC RECORD	2/3	-	-	
		3.RATE OF IMMERSION	MA	VISUAL	100%	IS 2629/ MFR'S PRACTICE	IS2629/ MFR'S PRACTICE	QC RECORD	2/3	-	2	
		4.SURFACE QUALITY	MA	VISUAL	100%	IS 2629	FREE FROM BURRS ROUGHNESS, SLAG FLUX. STAIN. ETC.	QC RECORD	2/3	-	-	
3.0	FINISHED ITEMS											
3.1	(CABLE TRAY, ACCESSORIES & HARDWARES)	1.DIMENSIONS	MA	MEASUREMENT	IS-2500 (PART 1) LEVEL S-4	APPD. DRG	APPD. DRG	INSP.REPORT	2	1	-	Fasteners shall be of reputed make. Overall thickness of finished product shall not be less than the thickness of cable tray & accessories defined in technical datasheet.
		2.SURFACE FINISH	MA	VISUAL	IS-2500 (PART 1) LEVEL S-4	APPD. DRG	FREE FROM BURRS, SLAG, ROUGHNESS, FLUX. STAIN. ETC.	INSP.REPORT	2	1	-	
		3.RIGIDITY (FOR TRAYS)	MA	DEFLECTION TEST	2 No./ LOT/TYPE	APPD. DRG	APPD. DRG	INSP.REPORT	2	1	-	600MM wide cable tray to be tested. Maximum deflection shall not exceed 7MM on mid span on uniform loading of 100KG/M.
		4.MASS OF ZINC COATING	MA	CHEM. TEST	IS-4759	IS-6745/ APPD. DATASHEET	APPD. DATASHEET	INSP.REPORT	2	1	-	
		5.UNIFORMITY OF ZINC COATING	MA	CHEM. TEST	IS-4759	IS-2633	IS-2633	INSP.REPORT	2	1	-	
		6.THICKNESS OF ZINC COATING	MA	ELCOMETER	IS-4759	APPD. DATASHEET	APPD. DATASHEET	INSP.REPORT	2	1	-	
		7.ADHESION	MA	MECH.TEST	IS-4759	IS-2629	IS-2629	INSP.REPORT	2	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

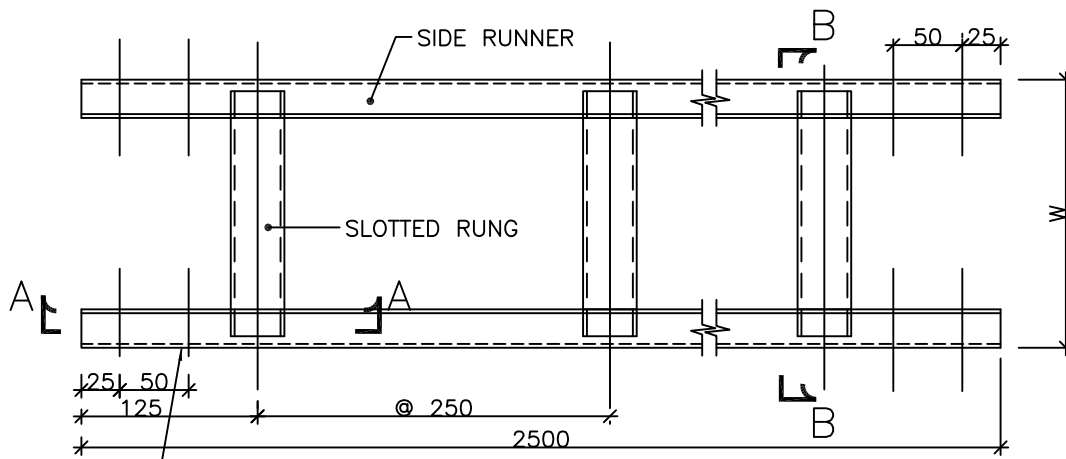
ANNEXURE -2 of Quality Plan**(LIST OF BHEL- PEM APPROVED GALVANIZERS)**

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 GALVANISING 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	M/s Shivam Engineers & Fabricators	A0-282-284, Industrial area, South side of G.T. road, Ghaziabad, U.P.
9	GALVANISING	M/s B.G. Shirke Construction Technology Pvt. Ltd.	Office & factory : 72-76, Mundhawa, Pune - 401 036
10	GALVANISING	M/s Galbro Ispat Galvanizers Pvt. Ltd.	Gut 11 and 12, Opp. Kudus Steel Rolling mill, Wada, Thane , Mumbai

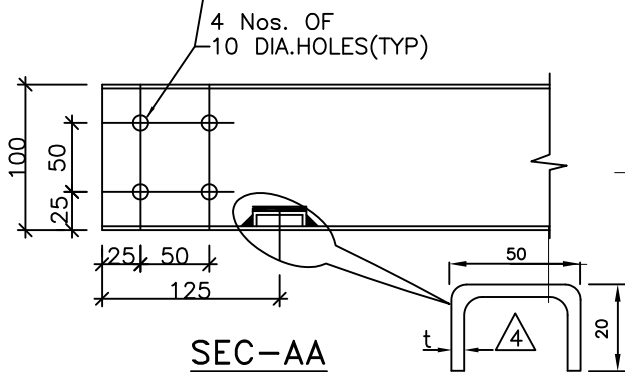
Note:- The above list doesn't include the list of BHEL - PEM approved galvanizing plants owned by BHEL - PEM registered vendor of cabling packages.

TYPICAL DETAILS OF CABLE TRAYS AND ACCESSORIES

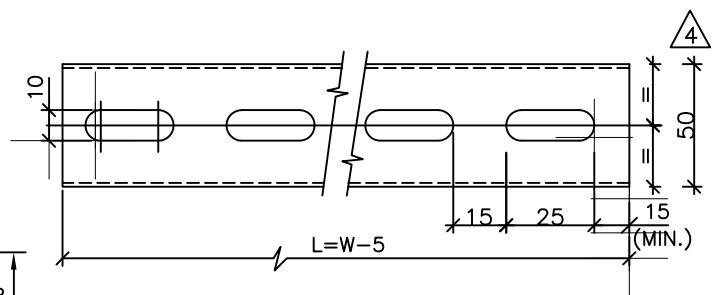
REV. 31/12/13	ALT KG	CHK SS	APP SKG	CUSTOMER RAJASTHAN RAJYA VIDYUT UTPADAN NIGAM LIMITED														
04	DRG. REVISED IN LINE WITH TCE COMMENTS DATED 29.11.13.			CUSTOMERS CONSULTANT	TATA CONSULTING ENGINEERS LIMITED													
REV. 14/11/13	ALT KG	CHK SS	APP SKG															
03	DRG. REVISED IN LINE WITH TCE COMMENTS DATED 06.11.13.			JOB NO.	392													
REV. 16/10/13	ALT KG	CHK SS	APP SKG															
02	DRG. REVISED IN LINE WITH CUSTOMER COMMENTS DATED 05.10.13.				BHARAT HEAVY ELECTRICALS LIMITED POWER SECTOR PROJECT ENGINEERING MANAGEMENT NOIDA(U.P) INDIA				DPT CODE-E	DRN	NAME	SIGN	DATE					
REV. 05/08/13	ALT KG	CHK SS	APP SKG							DSN	KG	-SD-	22/05/13					
01	DRG. REVISED IN LINE WITH CUSTOMER COMMENTS DATED 25.06.13.									CHD	SS	-SD-	22/05/13					
										APP	SKG	-SD-	22/05/13					
									DWG. NO. PE-DG-392-507-E005									
									SHT. 01 OF 11 REV. 04									



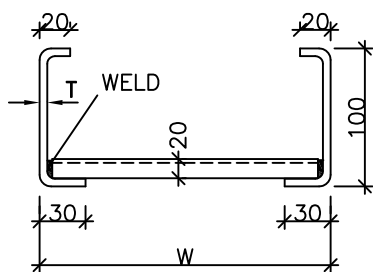
LADDER TYPE CABLE TRAY



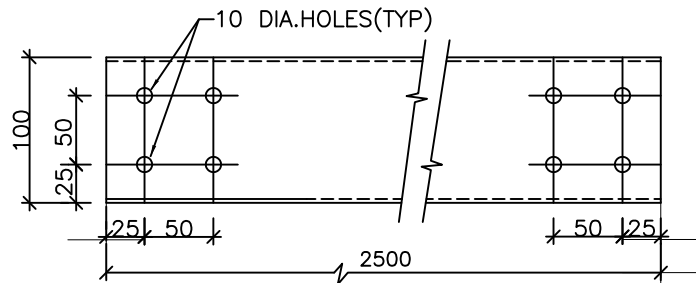
SEC-AA



SLOTTED RUNG



SEC-BB



SIDE RUNNER

W	150	300	450	600
L	145	295	445	595
T	2.5	2.5	2.5	2.5
t	2.5	2.5	2.5	2.5



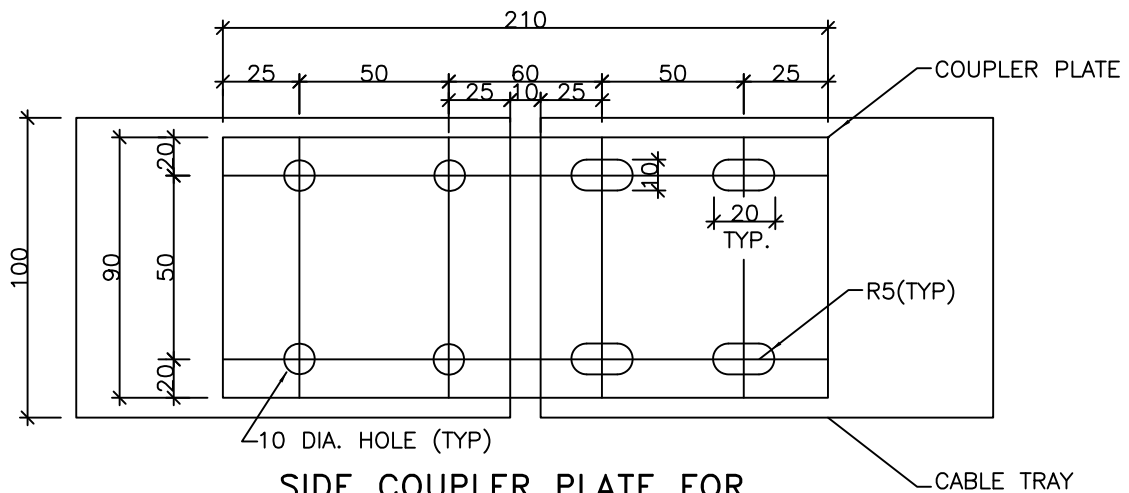
FOR GENERAL NOTES REFER SHEET 11 OF 11



TYPICAL DETAILS OF CABLE TRAYS AND ACCESSORIES

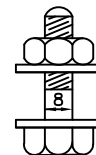
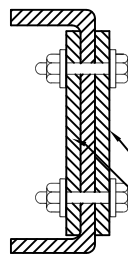
DWG. NO.
PE-DG-392-507-E005

SHT. 02 OF 11 REV. 04



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

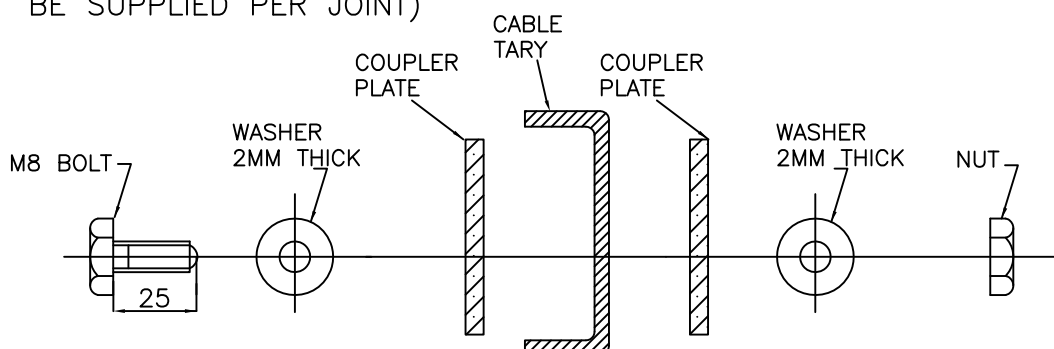
QTY. REQUIRED/TRAY SECTION : 4 NOS.



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

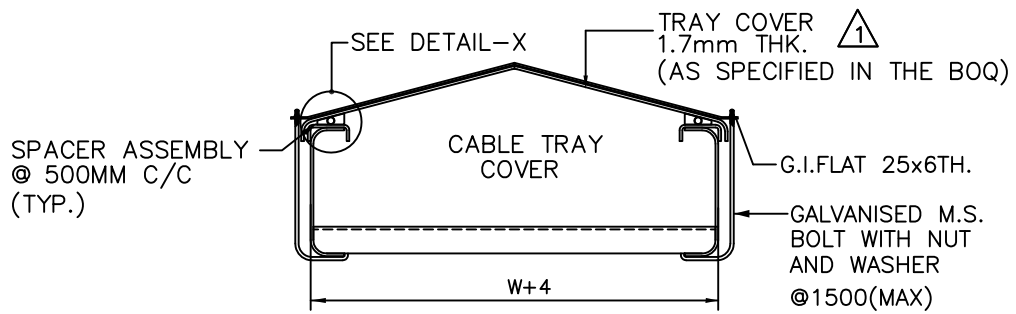
FOR GENERAL NOTES REFER SHEET 11 OF 11



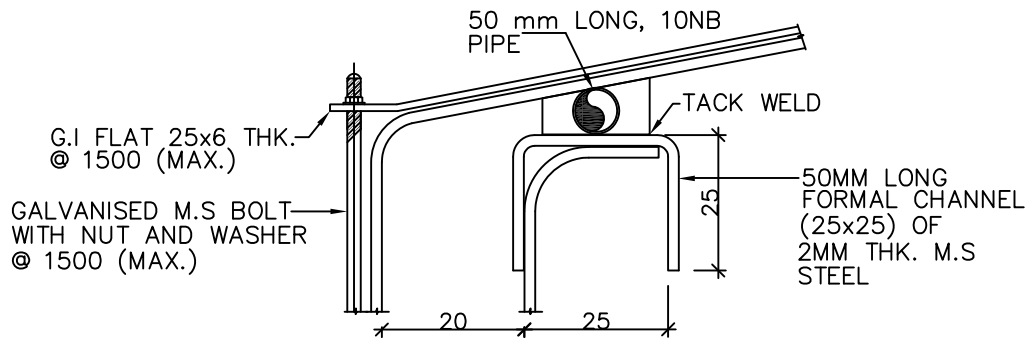
**TYPICAL DETAILS OF CABLE TRAYS AND
ACCESSORIES**

DWG. NO.
PE-DG-392-507-E005

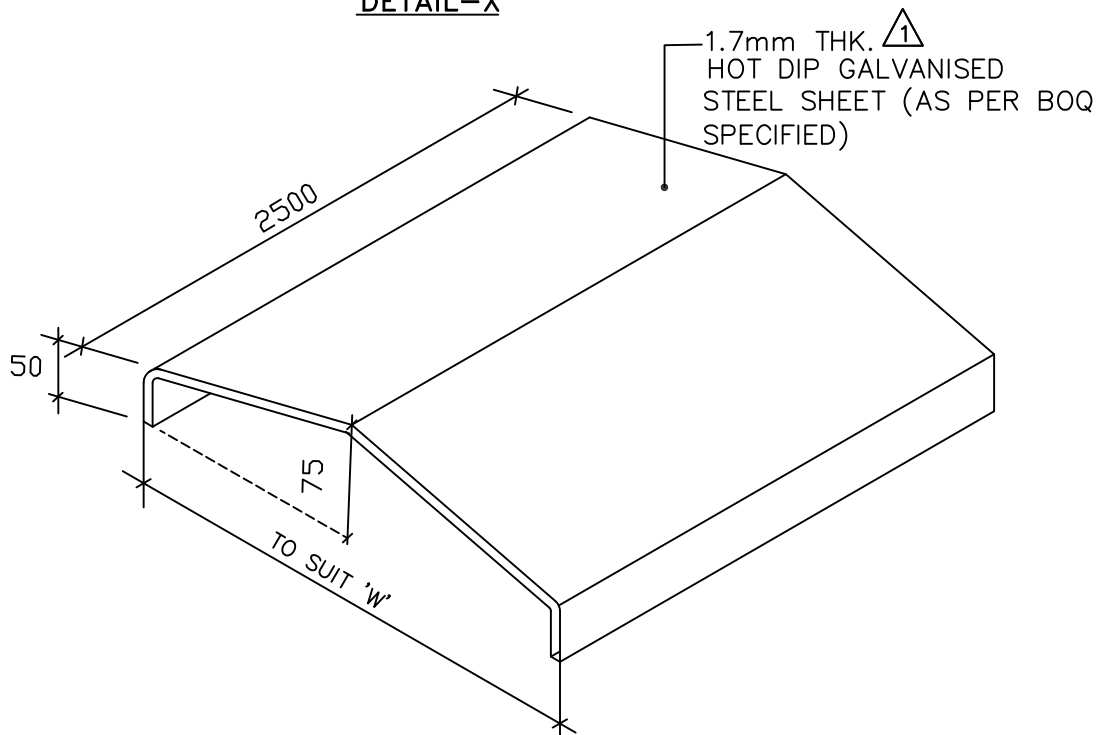
SHT. 03 OF 11 **REV. 04**



COVER FIXING (TYP.)



DETAIL-X



CABLE TRAY COVER

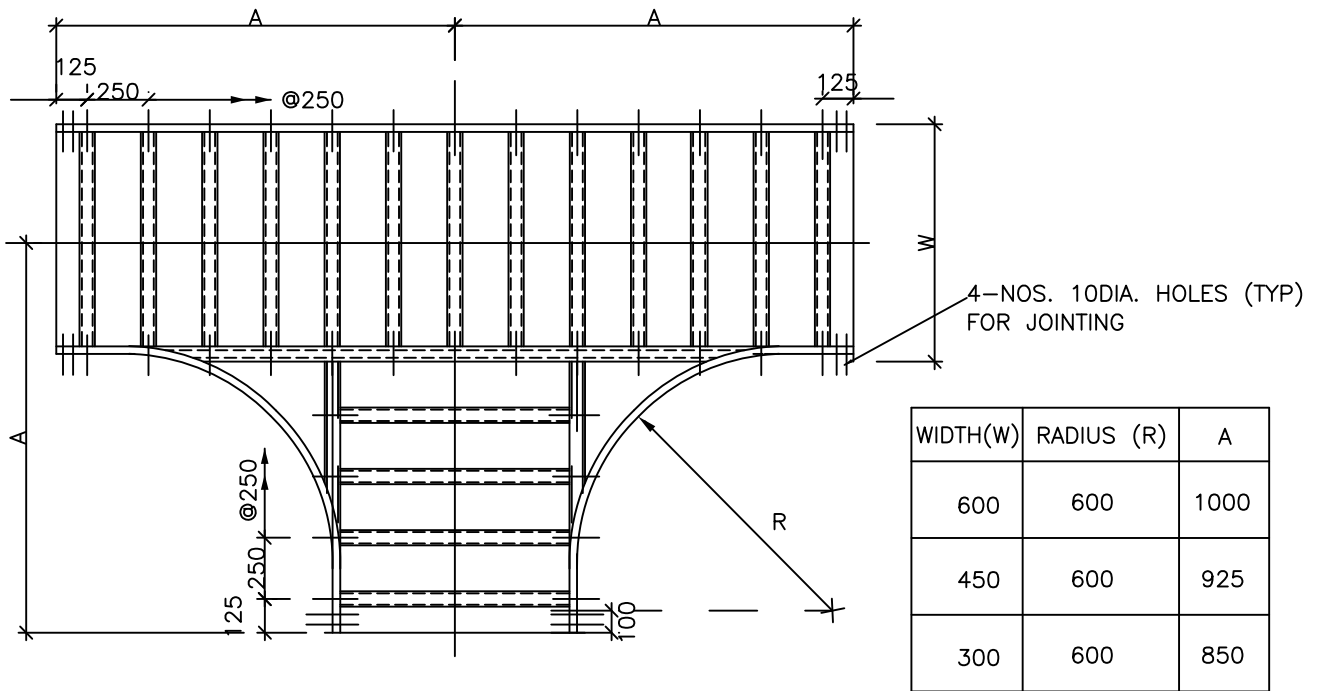
FOR GENERAL NOTES REFER SHEET 11 OF 11



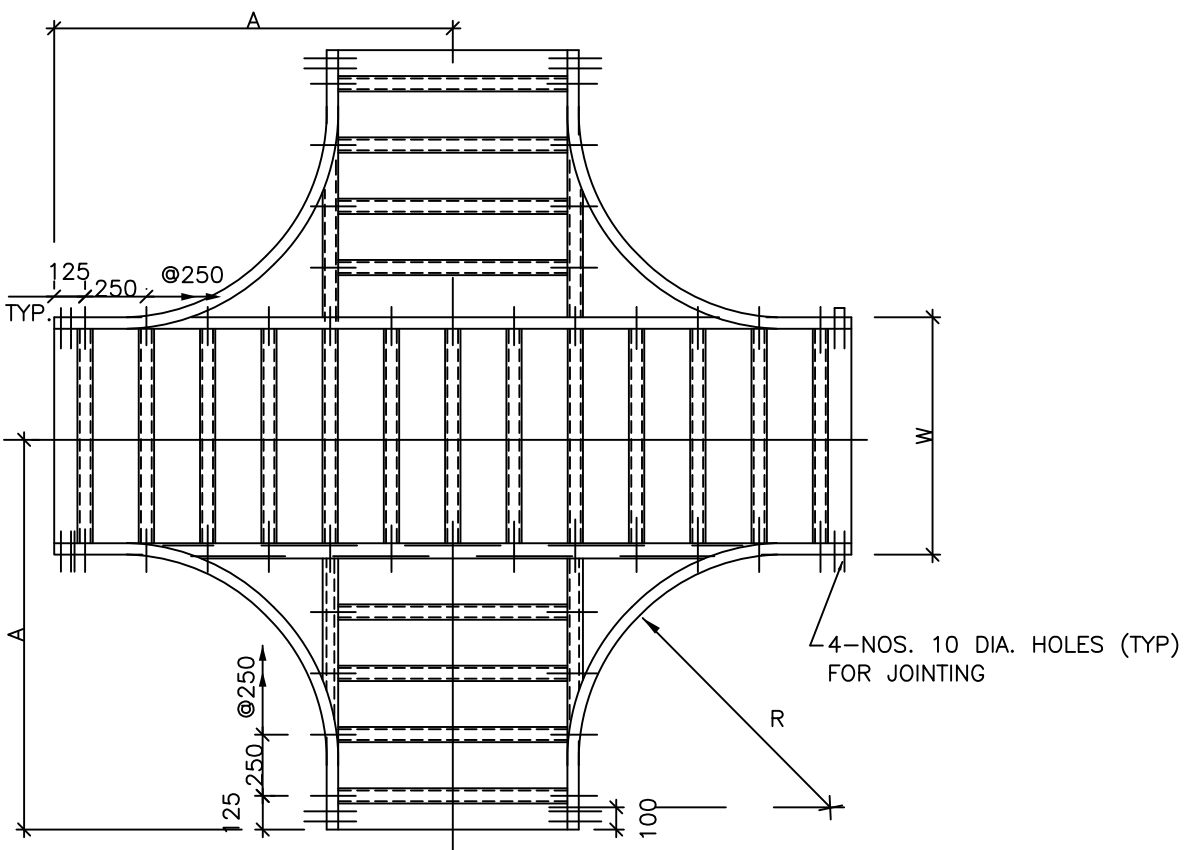
TYPICAL DETAILS OF CABLE TRAYS AND ACCESSORIES

DWG. NO.
PE-DG-392-507-E005

SHT. 04 OF 11 REV. 04



HORIZONTAL TEE-PLAN



HORIZONTAL CROSS-PLAN

LADDER TYPE ACCESSORIES

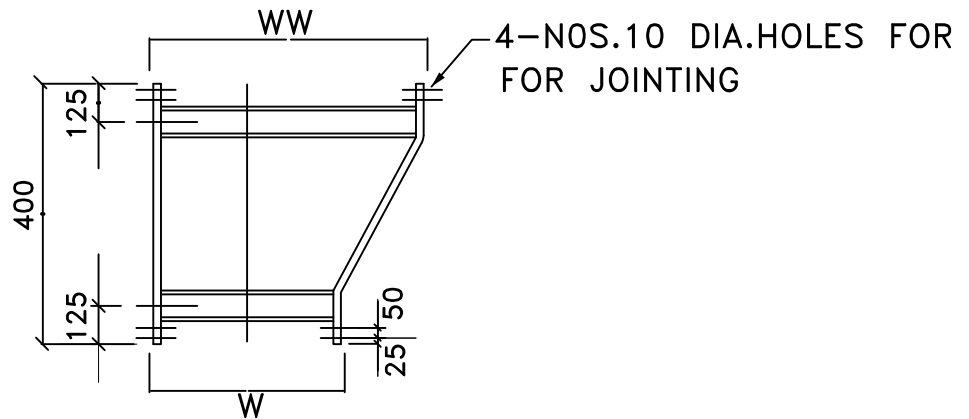
FOR GENERAL NOTES REFER SHEET 11 OF 11



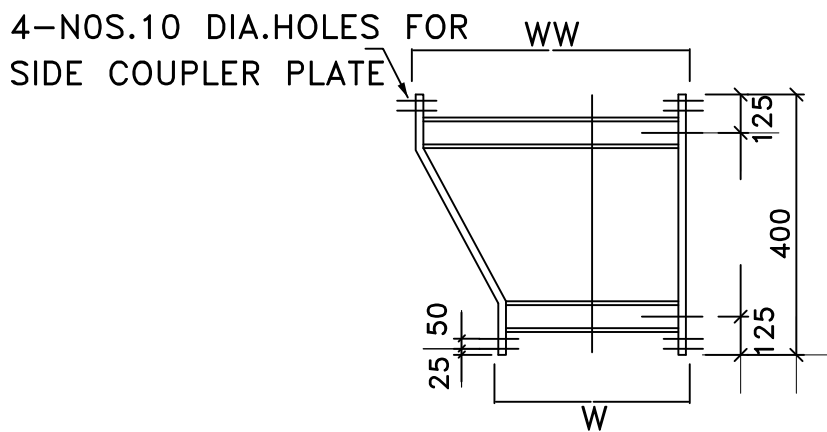
TYPICAL DETAILS OF CABLE TRAYS AND
ACCESSORIES

DWG. NO.
PE-DG-392-507-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

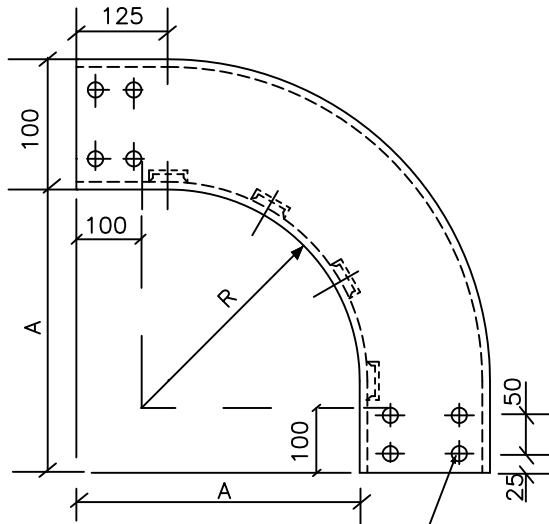
FOR GENERAL NOTES REFER SHEET 11 OF 11



TYPICAL DETAILS OF CABLE TRAYS AND ACCESSORIES

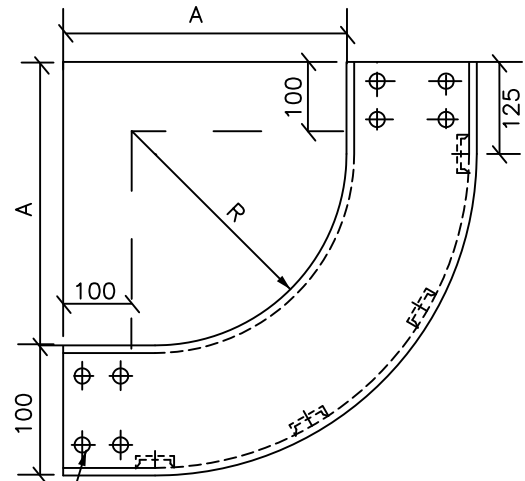
DWG. NO.
PE-DG-392-507-E005

SHT. 06 OF 11 REV. 04



ELEVATION
90° VERTICAL BEND
(OUTSIDE)

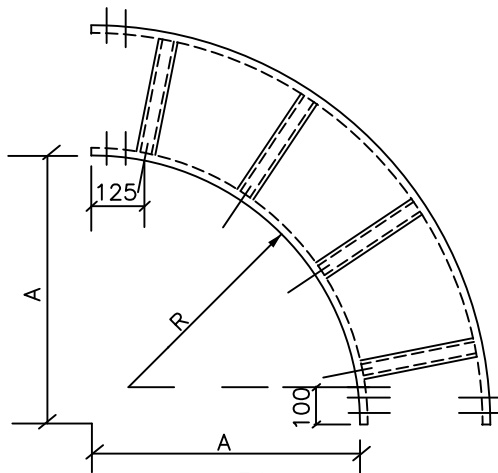
4 NOS. 10 DIA. HOLES
FOR JOINTING



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

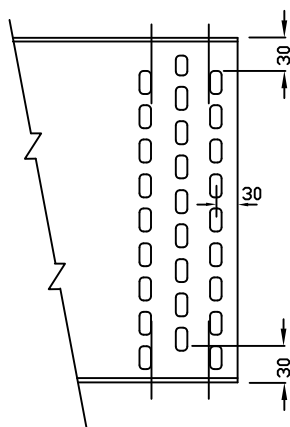
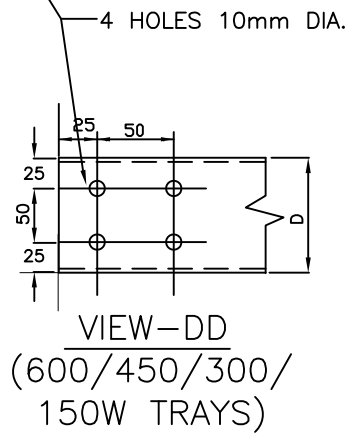
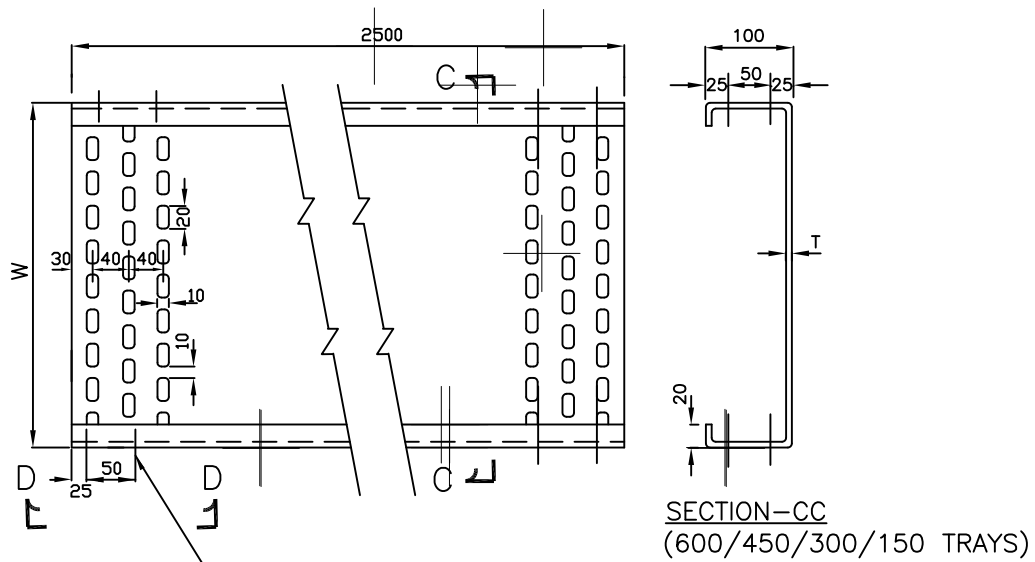
FOR GENERAL NOTES REFER SHEET 11 OF 11



TYPICAL DETAILS OF CABLE TRAYS AND
ACCESSORIES

DWG. NO.
PE-DG-392-507-E005

SHT. 07 OF 11 REV. 04



TRAY WIDTH W (mm)	600	450	300	150
TRAY DEPTH D (mm)	100	100	100	100
T (mm)	2.5	2.5	2.5	2.5



PERFORATED TYPE TRAY

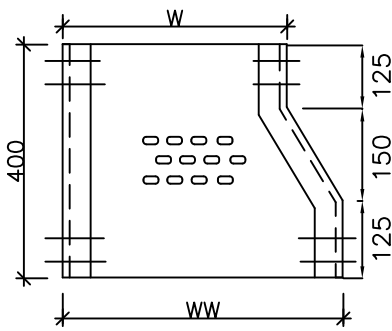
FOR GENERAL NOTES REFER SHEET 11 OF 11



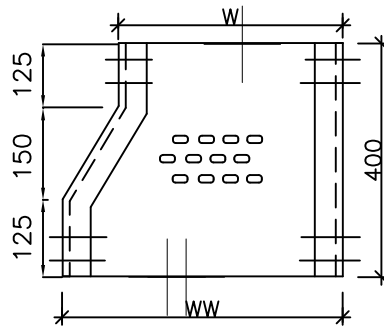
TYPICAL DETAILS OF CABLE TRAYS AND ACCESSORIES

DWG. NO.
PE-DG-392-507-E005

SHT. 08 OF 11 REV. 04



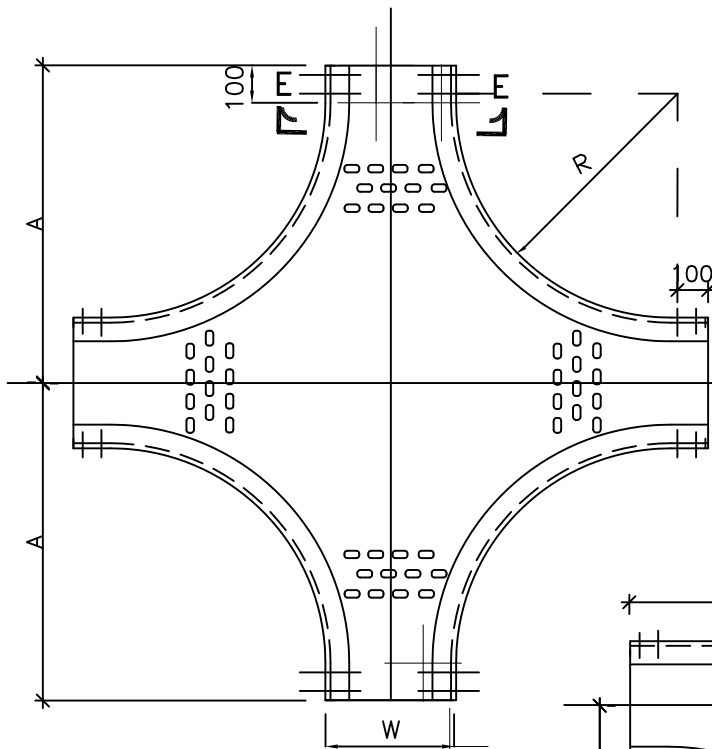
LEFT HAND REDUCER



RIGHT HAND REDUCER

WW	W	DEPTH	THICKNESS
600	450	100	2.5
600	300	100	2.5
450	300	100	2.5

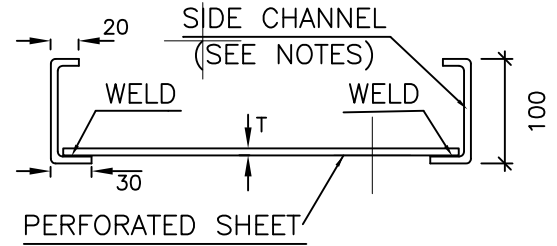
PERFORATED TYPE



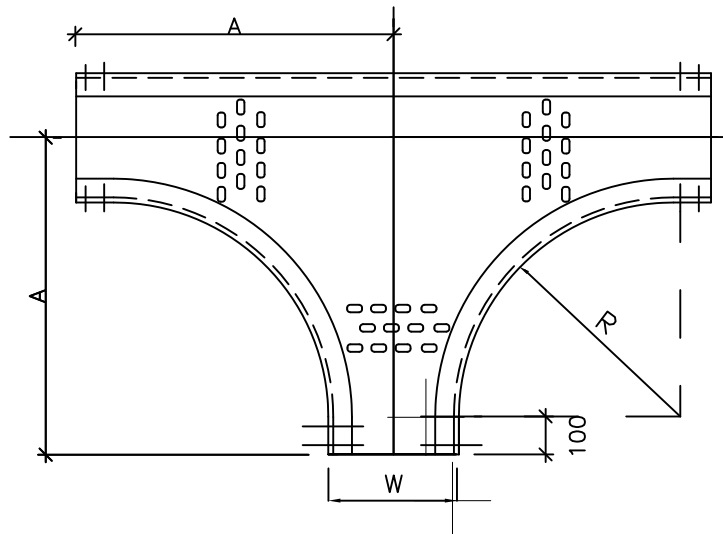
CROSS

PERFORATED TYPE

WIDTH(W)	RADIUS (R)	A	T
600	600	1000	2.5
450	600	925	2.5
300	600	850	2.5



SECTION-EE



TEE

PERFORATED TYPE ACCESSORIES

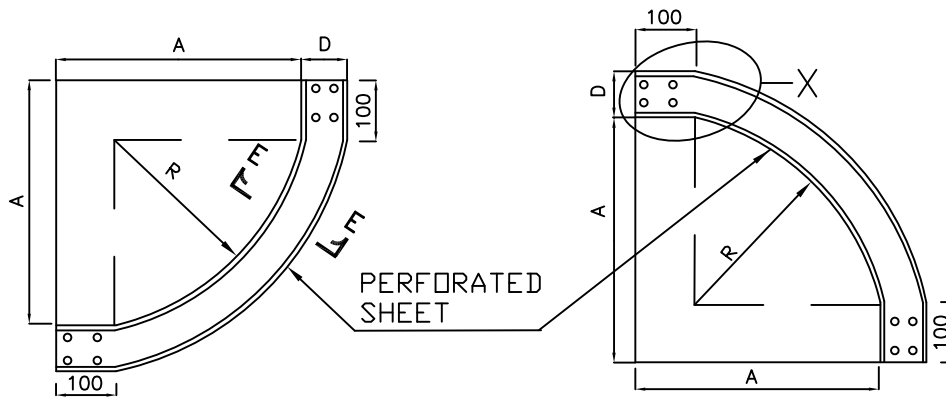
FOR GENERAL NOTES REFER SHEET 11 OF 11



TYPICAL DETAILS OF CABLE TRAYS AND ACCESSORIES

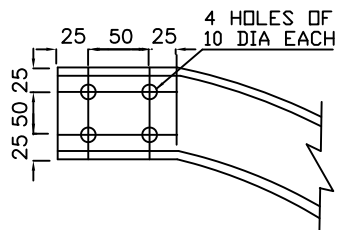
DWG. NO.
PE-DG-392-507-E005

SHT. 09 OF 11 REV. 04

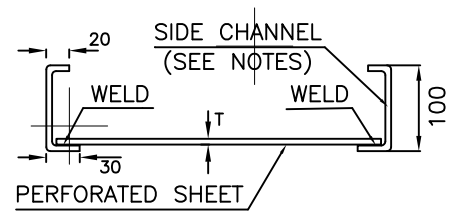


INSIDE TYPE

OUTSIDE TYPE

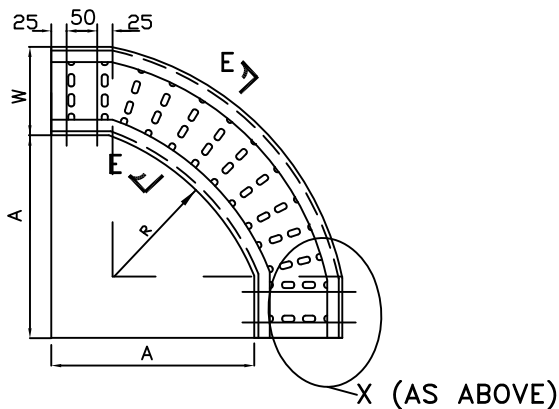


ENLARGED VIEW OF "X"



SECTION-EE

90° VERTICAL BEND - PERFORATED TYPE



90° HORIZONTAL BEND - PERFORATED TYPE

WIDTH(W)	RADIUS (R)	A	T
600	600	700	2.5
450	600	700	2.5
300	600	700	2.5



PERFORATED TYPE ACCESSORIES

FOR GENERAL NOTES REFER SHEET 11 OF 11



TYPICAL DETAILS OF CABLE TRAYS AND
ACCESSORIES

DWG. NO.
PE-DG-392-507-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 $\triangle 1$ 2.5 MM HOT ROLLED M.S. SHEET. ALL THE COUPLER PLATE SHALL BE 3 MM THICK.
2. THE CABLE TRAYS & ACCESSORIES SHALL BE HOT DIP GALVANISED AS PER IS 2629. THE MASS OF ZINC COATING SHALL BE 610 gm/m² AND THICKNESS SHALL BE 75 MICRONS (MINIMUM).
3. FOR LADDER TYPE CABLE TRAYS AND ACCESSORIES, ALL RUNGS SHALL BE SLOTTED.
4. PERFORATED TRAYS SHALL BE FABRICATED OUT OF A SINGLE M.S. SHEET.
5. 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 1.7 MM THICK MS SHEET AND SHALL BE HOT DIP GALVANISED. $\triangle 1$
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 PRODUCT SHALL NOT BE LESS THAN 2.5 MM. $\triangle 1$
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
18. THE DEPTH OF 600W, 450W, 300W, 150W TRAYS & ACCESSORIES SHALL BE 100MM.
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.



TYPICAL DETAILS OF CABLE TRAYS AND ACCESSORIES

DWG. NO.
PE-DG-392-507-E005

SHT. 11 OF 11 REV. 04