NORTH KARANPURA STPP (3 X 660MW)

EPC PACKAGE

VOLUME – IIB

TECHNICAL SPECIFICATION FOR

CABLE TRAY SUPPORT SYSTEM (BOLTABLE TYPE)

SPECIFICATION NO: ***PE-TS-405-507-E013***
REVISION: ***01***

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

LIST OF CONTENTS

TOTAL NO. OF SHEETS = 52
(INCLUDING COVER SHEET & CONTENT SHEET)

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

BIDDER'S STAMP & SIGNATURE

INSTRUCTIONS TO BIDDERS FOR PREPARING TECHNICAL OFFERS

1. Two signed and stamped copies of the following shall be furnished by all bidders as technical offer :

    a. Unpriced Price Schedule (Annexure-I: BOQ, as enclosed with the specification).
    b. A copy of this sheet ("Instructions to Bidders for Preparing Technical Offer").
    c. A copy of previous sheet ("Contents").
    d. Name & Address of galvaniser as per clause 3.3 of section C.

2. No other technical submittal such as copies of type test certificates, data Sheets, write-up, drawing, technical literature, etc. is required during tender stage. Any such submission, even if made, shall not be considered as part of offer.

3. No comments/ additions/ deletions shall be made by the bidder on the signed & stamped copy of the specification. Any such changes made by the bidder shall not be considered.

4. Confirmations/ comments (if any) regarding delivery schedules shall be furnished as part of the commercial offer. Any reference elsewhere/ covering letter of technical offer shall not be considered by BHEL.

5. 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.

6. Any changes made by the bidder in the price schedule with respect to the item description/ quantities, notes etc. from those given in Annexure-I of specification [Bill Of Quantities] shall not be considered (i.e., technical description, quantities, notes etc. as per specification shall prevail).

BIDDER'S STAMP & SIGNATURE

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.

SECTION – 'A'
SCOPE OF ENQUIRY

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 TRAY SUPPORT SYSTEM (BOLTABLE TYPE) as mentioned in different sections of this specification for NORTH KARANPURA STPP (3 X 660MW), EPC PACKAGE at Chatra districts in Jharkhand.

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 Deviations if any should be brought out very clearly on deviation sheet. Otherwise it will be presumed that the bidder's offer is in line with what has been stated/ asked for in this specification.

6.0 The documents shall be in English Language and MKS system of units.

SECTION – 'B'
PROJECT INFORMATION

1.00.00 **BACKGROUND**

North Karanpura Super Thermal Power Project (3x660 MW), a pit head coal based thermal power project, is located in Hazaribagh and Chatra districts of Jharkhand State. Basic inputs i.e. coal, water and land have already been tied up. The project is proposed for the States & Union Territories of Northern, Western and Eastern Regions and the State of Jharkhand.

The capacity of the project is 1980 MW comprising of three (3) units of 660 MW each.

1.01.00 **Location and Approach**

The power project is proposed to be located near Tandwa town in Chatra districts in the state of Jharkhand on Hazaribagh-Chatra State highway at a distance of about 50 kms from Hazaribagh city. The nearest commercial airport is Ranchi at a distance of 150 kms from project site. The nearest railhead Khalari Railway Station on Ranchi-Garhwa section of Eastern Railways is about 40 kms from project site.
Major rail/road distances from the project site are as under:

City		**Distance Approx. (kms)**
Ranchi	:	150
Khalari	:	40

The site is located near Tandwa town having latitude and longitude of about 23^0 50' N to 23º 52' N and 84^0 59' E to 85º 2' E respectively. The Vicinity Plan of the project is placed at **Annexure-I.**

Further to the information given in this sub-section, Bidders are also advised to visit the project site and collect data on local site conditions.

1.02.00 **Land**

About 2245 acres of land is being acquired for the project. About 1500 acres of land is under possession/legal possession and out of 1500 acres, about 890 acres of land is to be used for plant, ash dyke and initial enabling township. No additional land is envisaged to be acquired in plant area. About 15 acres of land is envisaged to be acquired in Hazaribagh city for Township.
Commissioner, Chatra vide dated 25.05.1999 and 14.06.2000 has given in-principle clearance for NKSTPP.

1.03.00 **Water**

Make up water available for this project would be about 22 cusec and will be arranged by constructing a dam/reservoir across river Garhi.

1.04.00 **Fuel (Coal)**

1.04.01 **Coal Requirement, Availability and Linkage**

Coal requirement for the project is estimated as 10.6 Million Tonne/Annum (MTPA), considering a GCV of 3800 kcal/kg. Ministry of Coal vide letter dated 21.10.99 accorded in-principle coal linkage of 10.00 MTPA subject to ratification by Standing Linkage Committee-Long Term (SLC (LT)), of MOC. SLC (LT) in its meeting held on 15.12.2000 firmed up the coal linkage of 10.24 MTPA for the project. Subsequently, the coal linkage was withdrawn by SLC (LT) in its meeting held on 22/23.10.08.

Cabinet Committee on Investment (GOI) in its meeting on 20.02.13 decided in-principle to restore the original coal linkage granted to NKSTPP (i.e. from Magadh Coal Block) with the stipulation that the coal supply will commence during the 13th Five Year Plan. MOC vide letter dated 09.05.2013 restored the coal linkage with the stipulation that the coal supply will commence during the 13th five year plan.

1.04.02 **Coal Transportation**

Coal from Magadh block of North Karanpura Coalfields is proposed to be transported to the project site through conveyor belt system. One external coal handling plant and one internal coal handling plant are envisaged.

1.05.00 **Meteorological Data**

Important meteorological data from nearest observatory at Hazaribag is placed at Annexure-II**.**

1.06.00 **Plant Water Scheme**

The Plant water scheme is described below.

1.06.01 **Condenser Cooling System**

It is proposed to adopt Air Cooled Condenser for the project.

1.06.02 **Equipment Cooling Water (ECW) System (Unit Auxiliaries)**

All plant auxiliaries shall be cooled by De-mineralized water (DM) in a closed circuit. The primary circuit DM water shall be cooled through heat exchangers by auxiliary cooling water system. The hot secondary circuit cooling water shall be cooled in the cooling towers and shall be returned back to the system.

1.06.03 **Ash Water System**

It is proposed to have HCSD (High concentration Slurry Disposal) system for combined fly ash and bottom ash. No recirculation of ash water from ash disposal area is envisaged.

1.06.04 **Other Miscellaneous Water Systems**

(a) Raw water shall be used for meeting the Fly ash and bottom ash system requirement etc.

(b) The service water shall be taken from clarified water tank of Pretreatment plant. Service water (wash water) collected from various areas shall be treated using oil water separators, tube settlers, coal settling pits etc. as per requirement and treated water from liquid effluent treatment plant shall be recycled back to the service water system for re-use.

(c) The drinking water requirement of the plant shall be provided from water treatment plant.

(d) Steam Cycle make-up water, makeup to the primary circuit of ECW (unit auxiliaries) system, boiler fill water and makeup to the hydrogen generation plant shall be provided from Demineralising plant.

(e) The quality of Raw water is enclosed with this sub-section as Annexure-III.

1.07.00 **Criteria for Earthquake Resistant Design of Structures and Equipment**

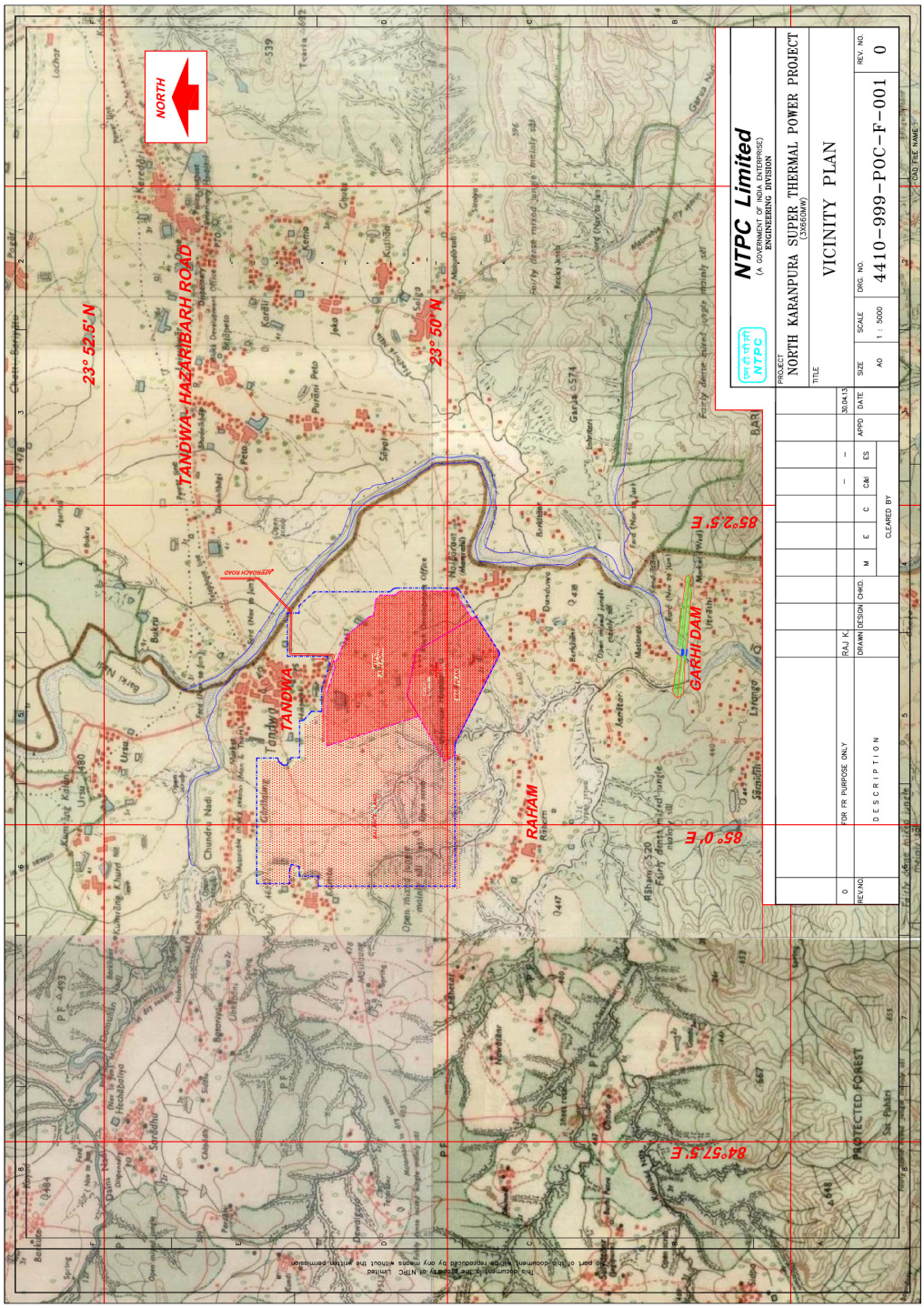
All power plant structures and equipment, including plant auxiliary structures and equipment shall be designed for seismic forces as given in the Part - B of this section.

1.08.00 **Criteria for Wind Resistant Design of Structures and Equipment**

All structures and equipment of the power plant, including plant auxiliary structures and equipment, shall be designed for wind forces as given as given in Part B of this section.

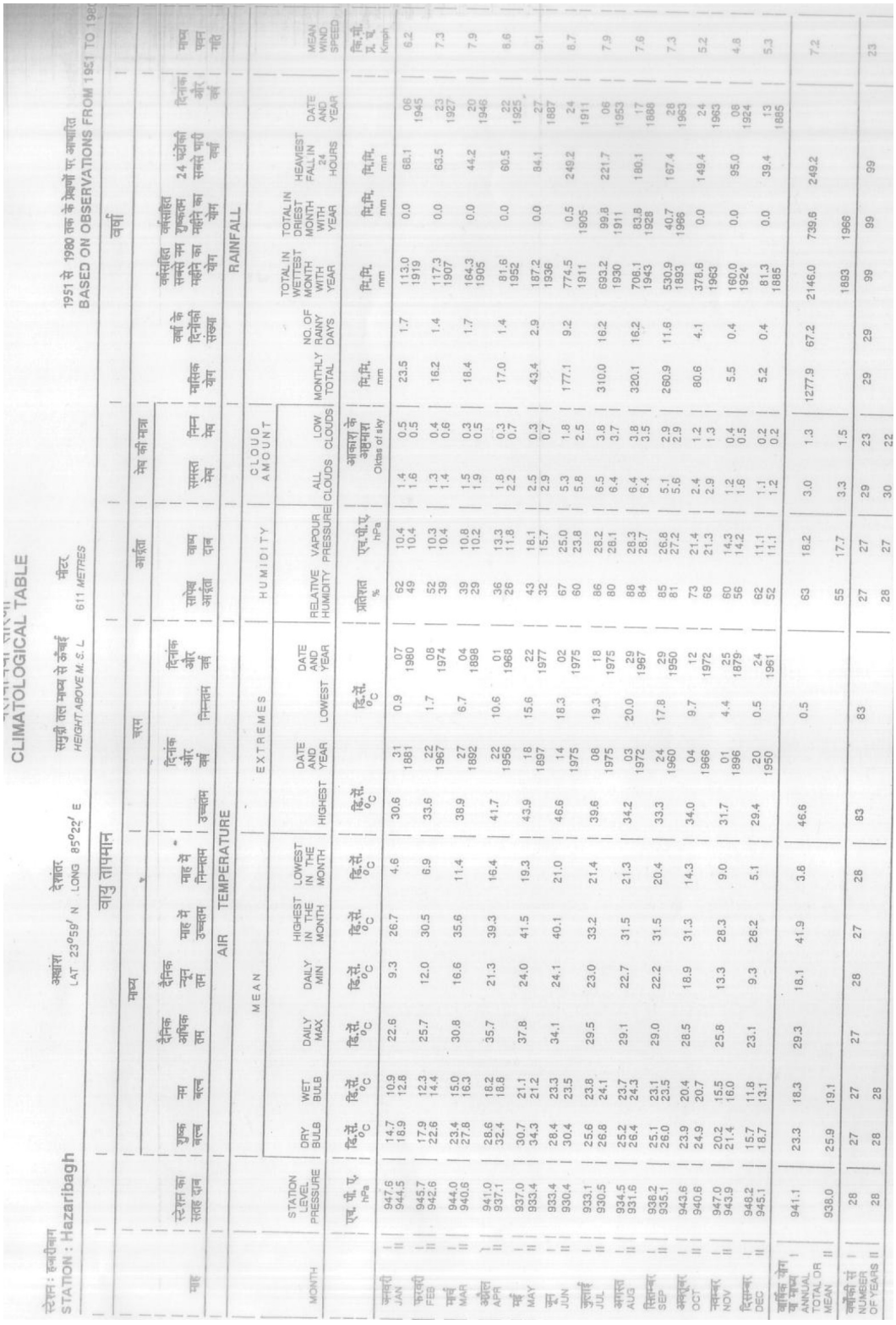
Annexure-I

VICINITY PLAN



Annexure-II

CLIMATOLOGICAL TABLE



CLIMATOLOGICAL TABLE

स्टेशन : हजारीबाग STATION : Hazaribagh

अक्षांश LAT 23°59′ N देशांतर LONG 85°22′ E समुद्री तल माध्य से ऊँचाई HEIGHT ABOVE M. S. L. 611 METRES

1951 से 1980 तक के प्रेक्षणों पर आधारित BASED ON OBSERVATIONS FROM 1951 TO 1980

MONTH	STATION LEVEL PRESSURE एच. पी. ए. hPa	MEAN DRY BULB शुष्क बल्ब डि.से. °C	MEAN WET BULB नम बल्ब डि.से. °C	MEAN DAILY MAX दैनिक अधिक तम डि.से. °C	MEAN DAILY MIN दैनिक न्यून तम डि.से. °C	AIR TEMPERATURE HIGHEST IN THE MONTH माह में उच्चतम डि.से. °C	AIR TEMPERATURE LOWEST IN THE MONTH माह में निम्नतम डि.से. °C	EXTREMES HIGHEST DATE AND YEAR दिनांक और वर्ष उच्चतम डि.से. °C	EXTREMES LOWEST DATE AND YEAR दिनांक और वर्ष निम्नतम डि.से. °C	HUMIDITY RELATIVE HUMIDITY सापेक्ष आर्द्रता प्रतिशत %	HUMIDITY VAPOUR PRESSURE आर्द्रता दाब एच.पी.ए. hPa	CLOUD AMOUNT ALL CLOUDS समस्त मेघ आकाश के अष्टमांश Oktas of sky	CLOUD AMOUNT LOW CLOUDS निम्न मेघ आकाश के अष्टमांश Oktas of sky	RAINFALL MONTHLY TOTAL मासिक योग मि.मि. mm	RAINFALL NO. OF RAINY DAYS वर्षा के दिनों की संख्या	RAINFALL TOTAL IN WETTEST MONTH WITH YEAR वर्षासहित समस्त माह का योग मि.मि. mm	RAINFALL TOTAL IN DRIEST MONTH WITH YEAR वर्षासहित समस्त माह का योग मि.मि. mm	RAINFALL HEAVIEST FALL IN 24 HOURS 24 घंटों में समस्त भारी वर्षा मि.मि. mm	RAINFALL DATE AND YEAR दिनांक और वर्ष	MEAN WIND SPEED माध्य पवन गति कि.मी. प्र. घं. Kmph
जनवरी JAN	I 947.6	14.7	10.9	22.6	9.3	26.7	4.6	30.6	31 1881	0.9	07 1980	92	10.4	1.4	0.5	23.5	1.7	113.0 1919	0.0	68.1	06 1945	6.2
	II 944.5	18.9	12.8									49	10.4	1.6	0.5							
फरवरी FEB	I 945.7	17.9	12.3	25.7	12.0	30.5	6.9	33.6	22 1967	1.7	08 1974	52	10.3	1.3	0.4	16.2	1.4	117.3 1907	0.0	63.5	23 1927	7.3
	II 942.6	22.6	14.4									39	10.4	1.4	0.6							
मार्च MAR	I 944.0	23.4	15.0	30.8	16.6	35.6	11.4	38.9	27 1892	6.7	04 1898	39	10.8	1.5	0.3	18.4	1.7	164.3 1905	0.0	44.2	20 1946	7.9
	II 940.6	27.8	16.3									29	10.2	1.9	0.5							
अप्रैल APR	I 941.0	28.6	18.2	35.7	21.3	39.3	16.4	41.7	22 1956	10.6	01 1968	36	13.3	1.8	0.3	17.0	1.4	81.6 1952	0.0	60.5	22 1925	8.6
	II 937.1	32.4	18.8									26	11.8	2.2	0.7							
मई MAY	I 937.0	30.7	21.1	37.8	24.0	41.5	19.3	43.9	18 1897	15.6	22 1977	43	18.1	2.5	0.3	43.4	2.9	187.2 1936	0.0	84.1	27 1887	9.1
	II 933.4	34.3	21.2									32	15.7	2.9	0.7							
जून JUN	I 933.4	28.4	23.3	34.1	24.1	40.1	21.0	46.6	14 1975	18.3	02 1975	67	25.0	5.3	1.8	177.1	9.2	774.5 1911	0.5 1905	249.2	24 1911	8.7
	II 930.4	30.4	23.5									60	23.8	5.8	2.5							
जुलाई JUL	I 933.1	25.6	23.8	29.5	23.0	33.2	21.4	39.6	08 1975	19.3	18 1975	86	28.2	6.5	3.8	310.0	16.2	693.2 1930	99.8 1911	221.7	06 1953	7.9
	II 930.5	26.8	24.1									80	28.1	6.4	3.7							
अगस्त AUG	I 934.5	25.2	23.7	29.1	22.7	31.5	21.3	34.2	03 1972	20.0	29 1967	88	28.3	6.4	3.8	320.1	16.2	708.1 1943	83.8 1928	180.1	17 1886	7.6
	II 931.6	26.4	24.3									84	28.7	6.4	3.5							
सितम्बर SEP	I 938.2	25.1	23.1	29.0	22.2	31.5	20.4	33.3	24 1960	17.8	29 1950	85	26.8	5.1	2.9	260.9	11.6	530.9 1893	40.7 1966	167.4	28 1963	7.3
	II 935.1	26.0	23.5									81	27.2	5.6	2.9							
अक्तूबर OCT	I 943.6	23.9	20.4	28.5	18.9	31.3	14.3	34.0	04 1966	9.7	12 1972	73	21.4	2.4	1.2	80.6	4.1	378.6 1963	0.0	149.4	24 1963	5.2
	II 940.6	24.9	20.7									68	21.3	2.9	1.3							
नवम्बर NOV	I 947.0	20.2	15.5	25.8	13.3	28.3	9.0	31.7	01 1896	4.4	25 1879	60	14.3	1.2	0.4	5.5	0.4	160.0 1924	0.0	95.0	06 1924	4.8
	II 943.9	21.4	16.0									56	14.2	1.6	0.5							
दिसम्बर DEC	I 948.2	15.7	11.8	23.1	9.3	26.2	5.1	29.4	20 1950	0.5	24 1961	62	11.1	1.1	0.2	5.2	0.4	81.3 1885	0.0	39.4	13 1885	5.3
	II 945.1	18.7	13.1									52	11.1	1.2	0.2							
वार्षिक योग ANNUAL TOTAL OR MEAN	I 941.1	23.3	18.3	29.3	18.1	41.9	3.8	46.6		0.5		63	18.2	3.0	1.3	1277.9	67.2	2146.0 1893	739.6 1968	249.2		7.2
	II 938.0	25.9	19.1									55	17.7	3.3	1.5							
वर्षों की संख्या NUMBER OF YEARS	I 28	27	27	27	28	27	28	83		83		27	27	29	23	29	29	99	99	99		23
	II 28	28	28									28	27	30	22							

1.00.00 **General Requirements**

1.01.00 For the purpose of design of equipment/systems, an ambient temperature of 50 deg. Centigrade and relative humidity of 95% shall be considered. The equipment shall operate in a highly polluted environment. However, for equipment in air conditioned areas, design ambient temperature shall be 35 deg.C, if 2x100% air conditioning system is provided.

1.02.00 All equipments shall be suitable for rated frequency of 50Hz with a variation of +3% & -5%, and 10% combined variation of voltage and frequency unless specifically brought out in the specification. The step-up voltage level for the project shall be 400 KV. The turbo generator unit will be connected to its own step-up transformers for feeding power into the EHV grid. The overall system shall be designed considering voltage variation of +/- 5% and fault level of 50kA for 400KV and 40kA for 220 KV system. Under black start condition the minimum fault level of 1000 MVA shall be considered at 400KV voltage level and voltage variation at 400kV may be considered as +/-10% till system stabilization.

1.03.00 Contractor shall provide fully compatible electrical system, equipments, accessories and services for the entire station/plant in his scope as well as those specifically required by the Employer.

1.04.00 All the equipment, material and systems shall, in general, conform to the latest edition of relevant National and International Codes & Standards, especially the Indian Statutory Regulations.

1.05.00 The auxiliary AC voltage supply arrangement shall have 33 kV, 11 kV, 3.3KV and 415V systems. It shall be designed to limit voltage variations as given below under worst operating condition:

a)	33KV/11KV/3.3KV (MV)	+/- 6%
b)	415 V/240 V	+/- 10%
c)	220V DC	-15% to +10% However the nominal continuous DC power supply shall be 240V.

1.06.00 The voltage level for motors shall be as follows:

a)	Upto 0.2 KW	:	Single phase 240V AC / 3 phase 415V AC
b)	Above 0.2 KW and upto 200 KW	:	3 phase, 415V AC
c)	Above 200 KW and upto 1500 KW	:	3 phase, 3.3 kV AC
d)	Above 1500 KW	:	11 kV

The bidder may adopt 415V/3.3 KV for the drives rated in the range of 160-210 KW.

For CHP conveyor motor's rating above 160 kW, 3.3 KV, three phase AC supply is to be used.

The voltage rating of the drives indicated above is for basic guideline. Minor variations in above can be accepted on case to case basis based on techno-economic considerations of the various sub-systems.

Voltage rating for special purpose motors viz, VFD and screw compressors, shall be as per manufacturer's standard. All the motors ratings on Stacker/ reclaimer shall be 415V ac supply only.

1.07.00	The preferred AC control supply voltage shall be 110V for all 415 V non breaker controlled feeders. Control supply voltages other than above may be offered by bidder based on the bidder's standard proven practice.
1.08.00	The designed fault levels for 11 KV & 3.3 KV systems shall be restricted to 40 kA rms for 1 second and 50 kA rms for 1 second for 415 V systems. The 33 KV system equipments shall have a minimum short circuit fault withstand rating of 12.5 kA for 1 second.
1.09.00	The nominal voltage of main DC system shall be 220V. DC batteries shall be designed for continuous float operation with trickle charge, hence all the associated components like batteries, battery chargers, DC motors, relays, contactors, timers etc shall be suitable for continuous operation at the maximum continuous battery float voltage including suitable temperature correction factors. The operational limits of variation of DC voltage is (+)10 % to (-)15%. In addition, the bidder may propose 110V, 48V or 24V systems as per requirements of control and instrumentation of his equipment and design.
1.10.00	The Contractor shall furnish calculations of maximum loading and fault levels under the most onerous conditions for the various equipment/systems as defined else where in the specification to prove adequacy of their parameters. In case any equipment or system is found to be inadequate, it shall be changed/ modified without any additional liability to the Employer.

SECTION – 'C'
SPECIFIC TECHNICAL REQUIREMENTS

1.0 SCOPE OF ENQUIRY:

1.1 This enquiry covers the supply of Galvanised sheet steel structural members for BOLTABLE type cable tray support system as per requirement of this specification.

1.2 General technical requirements of Cable tray support system (Boltable type) Materials are indicated in Section-D. Project specific technical/ quality requirements / changes are listed in Section-C & Data Sheet-A.

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.

3.0 SPECIFIC TECHNICAL REQUIREMENTS:

3.1 Technical:

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

3.2 Quality/ Inspection:

S. No.	*Reference clause No. of Section D (if any)*	*Specific Requirement/ Change*
1	Clause 5.0 (b) of Section D to be read as	Routine tests – a) Routine test as per specification and applicable standards shall be carried out on all requirements/items covered in the specification. b) Physical & dimensional check on all equipments as per approved drawings/ standards. c) HV/IR as applicable. d) Check/ measurement of thickness of paint/zinc coating / nickel – chrome plating as per specification & applicable standard.
	Clause 5.0 (c) of Section D to be read as	Acceptance tests- a) Galvanising tests as per applicable standards. b) Welding checks c) Proof load tests on cable tray support system- i) Tests on main support channel shall be done if only SC1 channel are in the scope of supply & cantilever arms shall be fitted on one side. This test will be same as test 4 of type test.

		ii) Test on main support channel shall be done with DC1 channel & cantilever arms fitted on both sides, if DC1 channels are in scope of supply. The test will be same as test 2 A of type test.Then test (i) above shall not be done. iii) Nut slip characteristic test (it shall support minimum load of 350 kg before nut slips with a bolt torque of 65 NM). The test shall be same as test 5B3 of type test. The procedure for carrying out tests at "c" above shall be as per details given in Type Tests in specification thereafter Die Penetration test shall be carried out to check weld integrity. d) Dimensional checks. e) The above acceptance tests shall be done only on one sample from each offered lot.
3	BHEL Standard Quality plan PED-507-00-Q-013/01	NTPC standard quality plan (0000-999-QOE-S-38) to be considered.

NTPC Quality Assurance Plan has been attached as annexure-V. Bidder to furnish the quality Plan accordingly.

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3.3 Bidder has to submit a document indicating the galvaniser name & works address at the bidding stage as per PQR for BHEL/NTPC review

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ANNEXURE-I

BOQ CUM PRICE SCHEDULE

Item No.	Item Code	Item Description	Unit	Order Quantity	Lot-I Quantity	Unit Price (Ex-Works) Rs.	Total Price (Ex-Works) Rs.
1.0	507-34016-A	SINGLE CHANNEL SC1 (IN STANDARD LENGTH OF 6M PER PIECE)	Metres	36000	25200		
2.0	507-34012-A	DOUBLE CHANNEL DC1 (IN STANDARD LENGTH OF 6M PER PIECE)	Metres	2500	1750		
3.0		CANTILEVER ARM EACH COMPLETE WITH 2 NOS. - M12 HEX. BOLT & WASHER 2 NOS. - M12 SPRING NUTS 2 NOS. - M6 PAN HEAD SCREWS & WASHER 2 NOS. - M6 SPRING NUTS					
3.1	507-34009-A	Cantilever arm for 600mm wide cable trays (750mm)	Nos.	1000	700		
3.2	507-34008-A	Cantilever arm for 600mm wide cable trays (620mm)	Nos.	62000	43400		
3.3	507-34007-A	Cantilever arm for 300mm wide cable trays (320mm)	Nos.	21000	14700		
3.4	507-34006-A	Cantilever arm for 150mm wide cable trays (170mm)	Nos.	3500	2450		
4.0		CLAMPS AND FITTINGS COMPLETE WITH REQUIRED HARDWARES (Spring nuts/ washers etc. as required for complete installation)					
4.1	507-34001-A	90˚ ANGLE FITTING HL1	Nos.	14000	9800		
4.2	507-34010-A	CLAMP FOR SINGLE CHANNEL CC1	Nos.	36000	25200		
4.3	507-34011-A	CLAMP FOR DOUBLE CHANNEL CC2	Nos.	2500	1750		
4.4	507-34004-A	BASE PLATE FOR SINGLE CHANNEL BP1	Nos.	5000	3500		
4.5	507-34003-A	BASE PLATE FOR DOUBLE CHANNEL BP2	Nos.	500	350		
4.6	507-34005-A	BEAM CLAMP BC1	Nos.	8000	5600		
4.7	507-34021-A	TRAY FIXING CLAMP TC1	Nos.	2000	1400		
4.8	507-34014-A	FLAT PLATE STRAIGHT FITTING PF2	Nos.	1500	1050		
4.9	507-34015-A	FLAT PLATE TEE FITTING PF1	Nos.	900	630		
4.10	507-34002-A	90˚ ANGLE FITTING LA1	Nos.	14000	9800		
4.11	507-34003-A	TRESTLE BRACKET	Nos.	500	350		

Notes:

1. 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.

2. 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.

3. 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.

4. The total quantity variation shall be limited to -30 to +30 % of the total contract value derived on the basis of the Order Quantity.

5. Raw materials:- Steel shall be procured from SAIL/ TISCO / RINL/ ISPAT IND/ JINDAL/ ESSAR/ BHUSHAN STEEL/ authorized re-rollers of SAIL.

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 date by vendor
a)	Technical Data Sheet	PE-V0-405-507-E051	Within one week of award of contract
b)	GA Drg of cable tray supports (Boltable type)	PE-V0-405-507-E052	Within one week of award of contract
c)	Type test procedure including Typical details of type test arrangement	PE-V0-405-507-E053	Within one week of award of contract
d)	Type test certificates	PE-V0-405-507-E054	Within one week of award of contract
e)	Quality Plan	PE-V0-405-507-E908	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, Standard Quality Plan/Reference Quality Plan agreed with end customer & Type test procedure as enclosed in the technical specification is to be appended with cover sheet bearing drawing/document number & description as stated above. The signed & stamped copy 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.

ANNEXURE – III

(VENDOR DRAWING/DOCUMENT SCHEDULE)

S. NO.	DESCRIPTION	THROUGH DMS	HARD PRINTS	CD-ROMs
1	Docs. /drgs. for approval (First submission)	YES	-	-
2	Docs. / drgs. for approval (Second & subsequent submission till approval)	YES	-	-
3	Final approved docs. / drgs. for Distribution	YES	As per project specific requirement	As per project specific requirement

S.No	Description of Drgs/Docs	No of Prints	No of CD ROMs/DVDs/Portable Hard Disk .
1	Drawings, Data sheets, Design calculations, Purchase specifications and other documents		
	First submission and submission with major changes		
	▪ Layout (A0&A1 sizes)	4	-
	▪ Other Drawings/Documents (A0&A1 sizes)	2	-
	▪ P&ID (All sizes)	4	-
	a) Final drawings/documents (Directly to site)	6	2
	b) "As Built" Drawing/Documents (Directly to site)	6	2
	c) Analysis reports of Equipments / piping /structures components/system employing software packages as detailed in the specifications.	2	2
2	Erection Manual (Directly to site)	4 sets	2
3	Operation & Maintenance manual i) First Submission	1 set	--
	ii) Final Submission (Directly to site)	4 sets	2
4	Plant Hand Book i) First Submission	1	1
5	Commissioning and Performance Test Procedure manual i) First Submission	1 set	--
	ii) Final Submission (Directly to site)	4 sets	2

CLAUSE NO.	QUALITY ASSURANCE

CABLING, EARTHING, LIGHTNING PROTECTION

ATTRIBUTES / CHARACTERISTICS / ITEMS/COMPONENTS / SUB SYSTEMS	Dimension	Paint shade, paint thickness, adhesion	Pre-treatment of sheet	IP protection	Proof load*	Surface finish	Deflection test*	HV & IR	Galvanise Test (If Applicable)	Functional	Bought out items/Bill of material	Routine tests as per relevant standard & specification	Acceptance tests as per relevant standard & specification	Constructional feature as per NTPC
Wall Mounted-Lighting Panel (IS-513, IS:5, IS:2629, 2633, 6745)	Y	Y	Y	Y		Y		Y	Y	Y	Y	Y	Y	Y
Switch box/junction box/ Receptacles Panel (IS-513, IS:5, IS:2629, 2633, 6745)	Y	Y	Y	Y		Y		Y	Y	Y	Y	Y	Y	Y
Cable glands(BS-6121)	Y											Y		
Cable lug(IS-8309)	Y											Y		
Lighting wire(IS-694)	Y											Y		
Flexible conduits	Y											Y		Y
Conduits(Galvanise & Epoxy) IS-9537 & IS-2629,2633 ,6745	Y		Y								Y	Y		Y
RCC Hume Pipe (IS-458)												Y		
Cable termination & straight through joint (VDE-0278)	Y											Y		Y
Cable Trays, Flexible supports system & accessories IS-513, 2629,2633,6745	Y		Y		Y	Y	Y	Y	Y	Y		Y	Y	Y
Trefoil clamp	Y													Y
GI flats for earthing & lighting protection (IS 2062, 2629, 6745,2633)	Y		Y						Y			Y		Y
GI wire (IS-280)	Y											Y		
Fire Sealing System (BS –476)												Y	Y	Y

.Note:1.This is an indicative list of tests /checks. The manufacturer is to furnish a detailed Quality Plan indicating the practice and procedure along with relevant supporting documents.
2.* Deflection Test on cable trays and Proof Load test on cable trays support system will be as per details given in the NTPC technical specification & approved MQP. The above acceptance tests shall be done only on one sample from each size of offered lot.
3. Make of all items will be subject to NTPC approval.

SECTION – 'D'

STANDARD TECHNICAL SPECIFICATION

1.0 GENERAL

This specification covers the design, manufacture, inspection & testing at vendor's works, packing and delivery to site of galvanized cable tray support system (boltable type).

2.0 CODES AND STANDARDS

2.1 The material shall comply with all currently applicable safety codes and statutory regulations of India as well as of the locality where the material is to be installed.

2.2 The design, material, construction, manufacture, inspection, testing and performance of cable tray support system (BOLTABLE) shall conform to the latest revision of relevant standards and codes of practices as per Annexure-III.

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 Cable Trays Support (boltable type) shall be manufactured as per Technical Data Sheet and as per applicable drawings as enclosed with the specification. Minor fabrication detail changes which do not affect the material /dimensional aspect of the equipment, shall be subject to BHEL/owner's approval without any commercial implication.

3.2 Standard lengths of SC1/ DC1 channels shall be fabricated out of single piece & it shall not have welded joints in between.

3.3 All finished galvanised MS structural members for cable tray supports shall be free from sharp edges, corners, burs & unevenness.

3.4 Necessary fasteners shall be provided with each cable tray support accessory as specified in enclosed drawings.

3.5 All welded joints of cable tray support accessories shall be smooth enough to provide a good appearance & shall not cause any injury to working personnel. 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-013/01) is enclosed as per Annexure-II 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/ subvendor 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 equipments & components shall be deemed to be included in the bid price.

5.0 TESTING:

The tests shall be in accordance with appropriate Indian Standards. The extent of the tests to be performed by the supplier shall include but not be limited to the following: -

a) Type tests :

Cable tray support system (Boltable Type) shall be of proven type & type tested design conforming to type tests as under:

a) Load test for Main support channel with cantilever arm fixed on one side
b) Load test for Main support channel with cantilever arm fixed on both sides
c) Load test for Channel fixed on Beam/Floor
d) Load test for channel supported on wall with Cantilever arm
e) Channel nut slip characteristics (wherever applicable)
f) Weld integrity test
g) Test for galvanizing: Weight, thickness and uniformity of zinc coating shall be determined in accordance with IS: 6745 and IS: 2633 for the values indicated in Data Sheet- A.

Type testing shall be carried out for tests listed at "(a) through (f)" above in line with Type test procedure and drawings attached in Annexure-IV. The final type test procedure shall be subjected to BHEL/customer approval.

Type tests listed at (a) through (f) shall be conducted once. However, type test listed at (g) shall be conducted on each lot offered for inspection.

b) Routine Tests:
(i) Dimension checks

c) Acceptance Test:
(i) Dimension checks
(ii) Tests for galvanizing

6.0 PACKING

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

7.0 DELIVERY

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

8.0 DOCUMENTATION

8.1 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 (Bill of Quantities)" 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.

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

8.3 Vendor drawing/ document schedule for one project shall be as per Annexure-III.

DATASHEET A
(SPECIFIC TECHNICAL REQUIREMENTS)

1.0 APPLICABLE STANDARDS:

a) IS: 2062 For structural steel.
b) IS: 1079 For hot rolled carbon steel sheet and strip.
c) IS: 513 For cold rolled low carbon steel sheet & strips
d) IS: 1730 For dimensions for steel sheet and strip.
e) IS: 1363 Hexagon head bolts, screws and nuts.
f) IS: 5 For colours of paint.
g) IS: 2629 For hot dip galvanising of steel & surface pre-treatment.
h) IS: 2633 For testing of zinc coating.
i) IS: 6745 For determining of mass of zinc coating.
j) IS: 1852 For rolling and cutting tolerances of hot rolled steel products.

2.0 CABLE TRAY SUPPORT

a) Tray support type:	Boltable type
b)Material:	Hot/ Cold Rolled MS sheet steel for channel SC1/ DC1 and channel portion of cantilever arms
c)Thickness:	2.5 mm
d) Length:	Standard length of 6 meters
e) Fabrication :	At works
f) Construction:	Conforming to enclosed drawings [PE-DG-405-507-E013]

3.0 SURFACE TREATMENT:

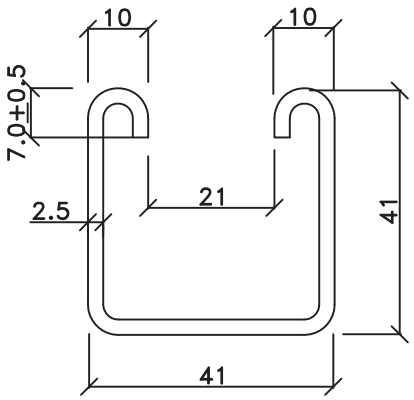
Galvanizing:

a) Pre-treatment:	As per IS 2629 prior to galvanisation
b) Type	Hot dip galvanization
c) Applicable Standard:	IS 2629
d) Minimum thickness:	75 microns (minimum)
e) Min. weight of Zinc deposit:	610 gms. 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 as per IS: 2629

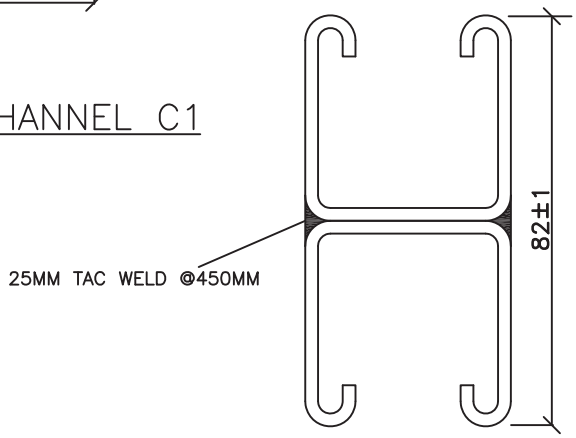
CABLE TRAY SUPPORT SYSTEM - DETAILS & DRAWINGS FOR CHANNELS, ARMS, BRACKETS AND OTHER HARDWARE

BHEL DOCUMENT NO. PE–DG–405–507–E005

NTPC DOCUMENT NO. : 4410-001-215-PVE-B-005



SINGLE CHANNEL C1



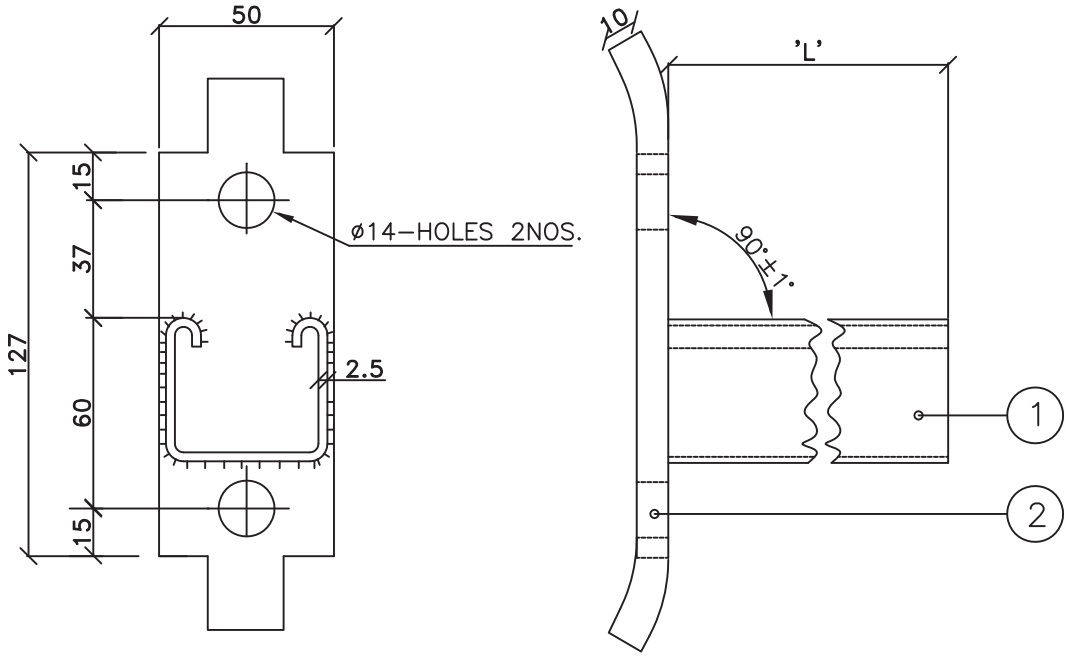
DOUBLE CHANNEL C2

TWO LENGTHS OF SINGLE CHANNEL

NOTE:

1. ALL DIMENSIONS ARE IN mm.
2. MATERIAL : 2.5MM THK MS SHEET HOT ROLLED M.S. PER IS : 1079
3. FINISH : HOT DIP GALVANISED AS PER IS 2629
4. TOLERANCE ON THICKNESS IS AS PER IS 1852
5. PROFILE TOLERANCE ±0.5 mm
6. ZINC COATING SHALL BE MIN. 75 MICRON /610 g/sq. mm

BHEL	**TITLE:** CABLE TRAY SUPPORT SYSTEM - DETAILS & DRAWINGS FOR CHANNELS, ARMS, BRACKETS AND OTHER HARDWARE	DRG. NO. PE-DG-405-507-E005
		REV. 0 | SH 2 OF 12



CANTILEVER ARMS

CANTILEVER ARM		
DESCRIPTION	TRAY WIDTH IN MM	CANTILEVER ARM LENGTH (L) IN MM
CA1	600	620
CA2	300	320
CA3	150	170

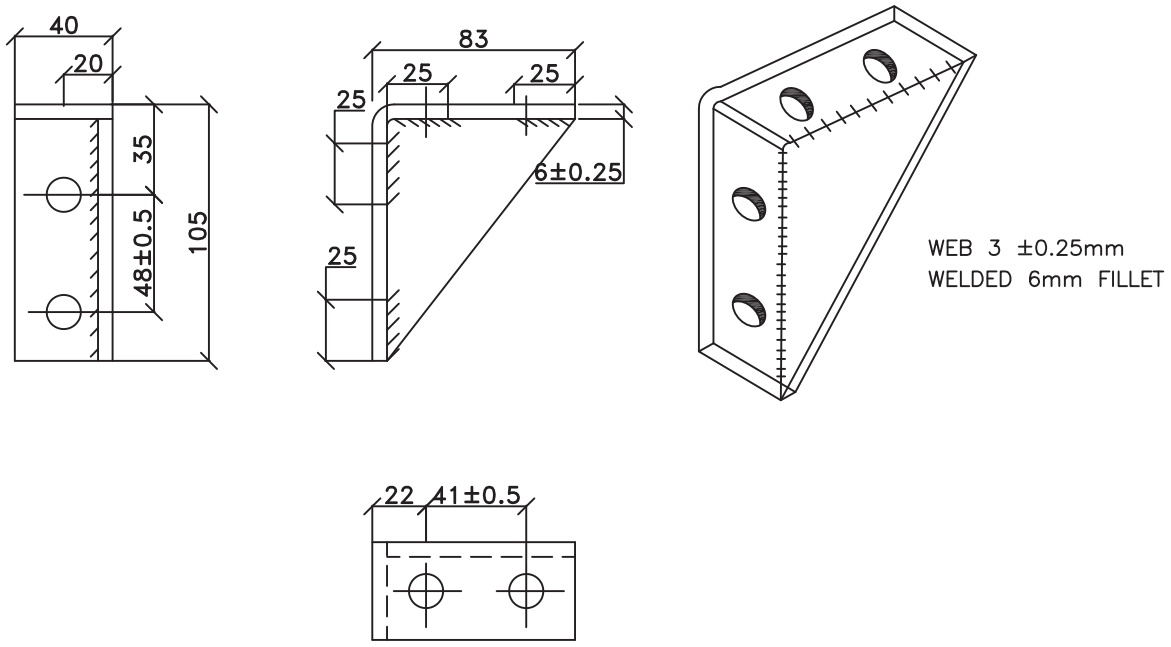
NOTES :

1. ALL DIMENSIONS ARE IN mm.
2. MATERIAL : 2.5MM THK MS SHEET HOT ROLLED AS PER IS 1079
3. FINISH : HOT DIP GALVANISED AS PER IS:2629
4. TOLERANCE ON THICKNESS IS AS PER IS:1852
5. PROFILE TOLERANCES ARE ± 0.5mm
6. ZINC COATING SHALL BE MIN. 75MICRON /610 g/sq.mm

TITLE:
CABLE TRAY SUPPORT SYSTEM - DETAILS & DRAWINGS FOR CHANNELS, ARMS, BRACKETS AND OTHER HARDWARE

DRG. NO.
PE-DG-405-507-E005

REV. 0 | SH 3 OF 12

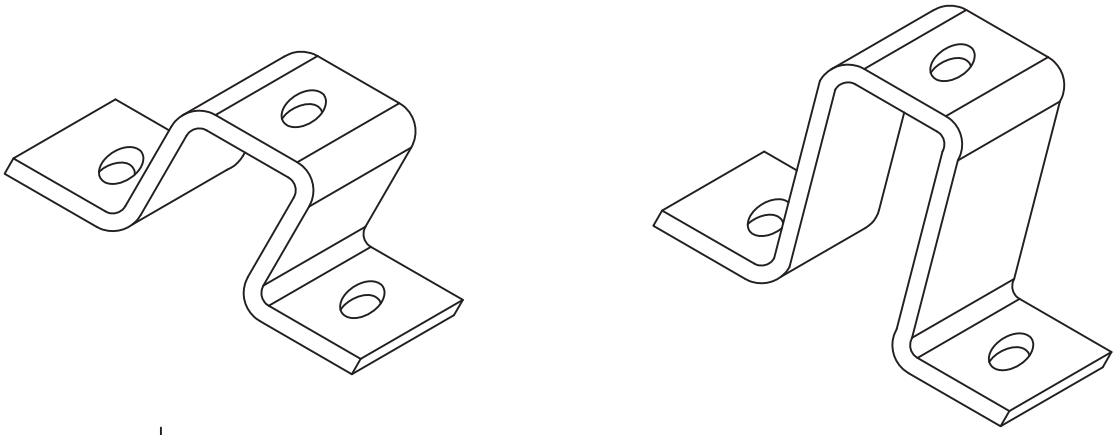


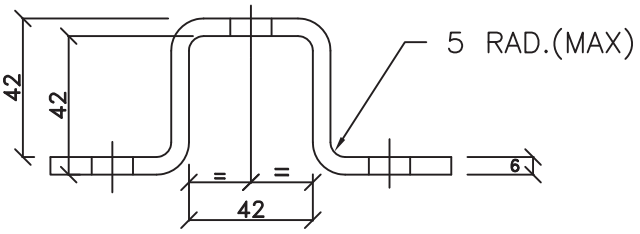
90^0 ANGLE FITTING HL1

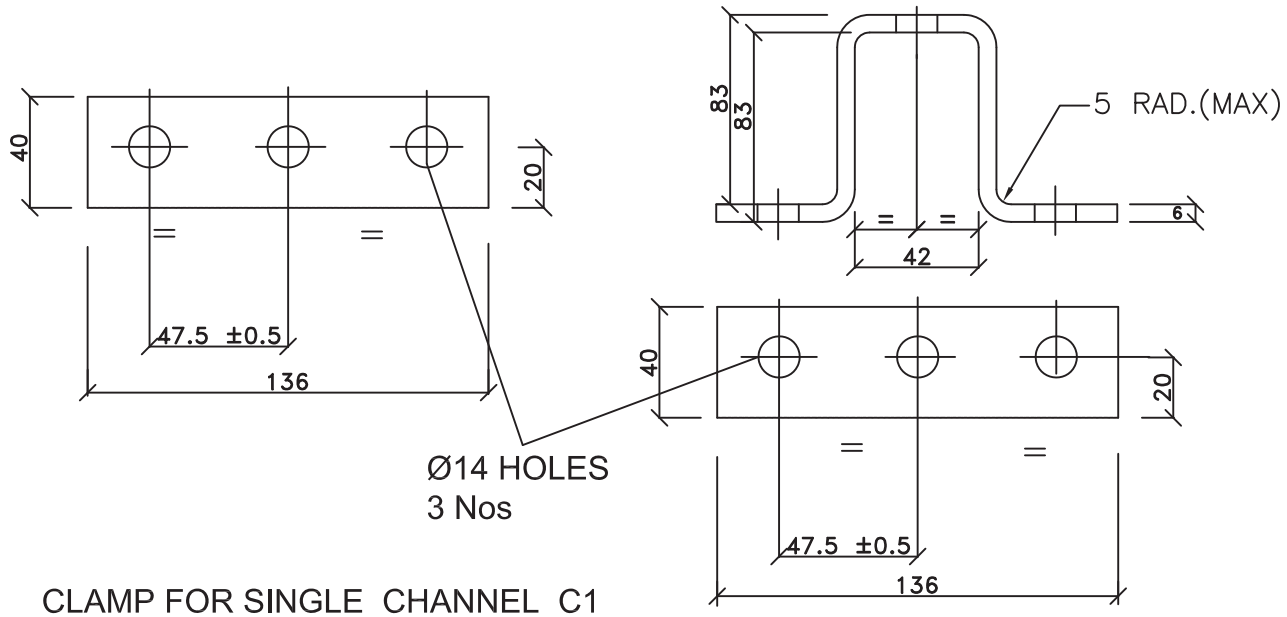
NOTES :

1. ALL DIMENSIONS ARE IN mm.
2. ALL FABRICATION TOLERANCES ±1.0 mm
3. MATERIAL :MILD STEEL AS PER IS–2062
4. FINISH : HOT DIP GALVANISED AS PER IS:2629
5. TOLERANCE ON THICKNESS AS PER IS:1852
6. ZINC COZTING SHALL BE MIN. 75 MICRON / 610 g/sq.mm

बीएचईएल BHEL	**TITLE:** CABLE TRAY SUPPORT SYSTEM - DETAILS & DRAWINGS FOR CHANNELS, ARMS, BRACKETS AND OTHER HARDWARE	DRG. NO. PE-DG-405-507-E005
		REV. 0 | SH 4 OF 12







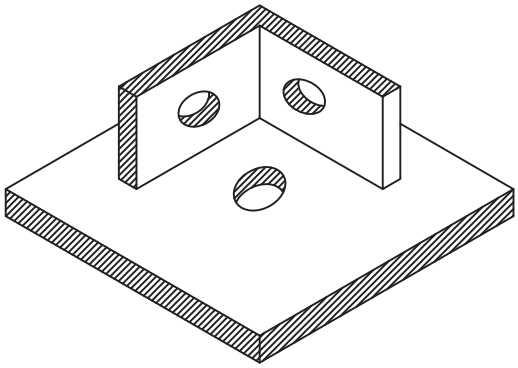
CLAMP FOR SINGLE CHANNEL C1

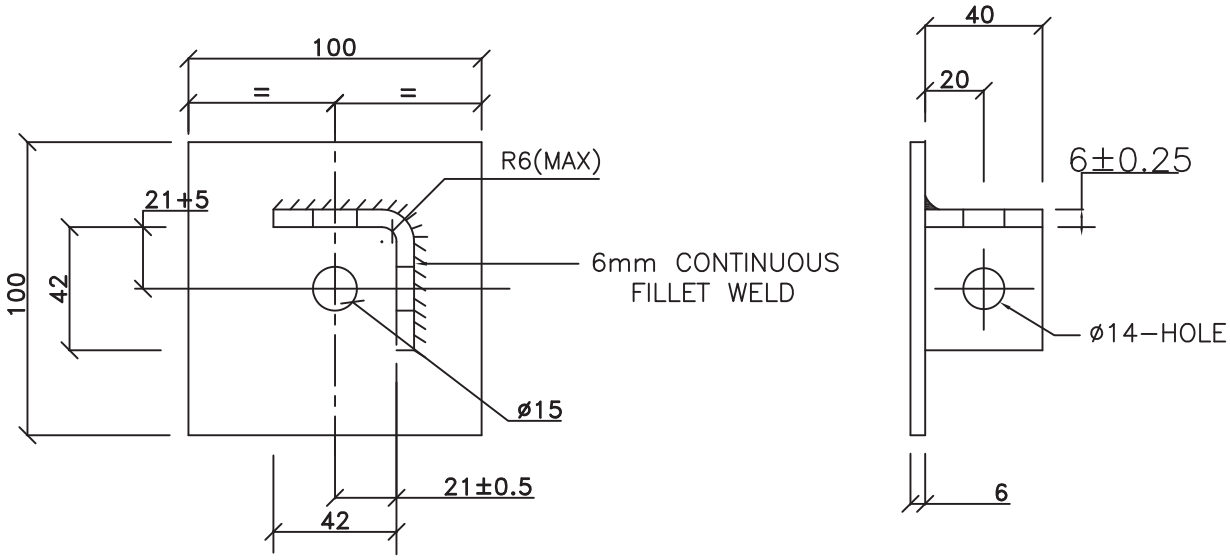
CLAMP FOR DOUBLE CHANNEL C2

NOTES

1. ALL DIMENSIONS ARE IN mm.
2. ALL FABRICATION TOLERANCES ±1.0 mm
3. MATERIAL : MILD STEEL AS PER IS–2062
4. FINISH : HOT DIP GALVANISED AS PER IS:2629
5. TOLERANCE ON THICKNESS AS PER IS:1852
6. ZINC COZTING SHALL BE MIN. 75 MICRON /610 g/sq.mm

TITLE: CABLE TRAY SUPPORT SYSTEM - DETAILS & DRAWINGS FOR CHANNELS, ARMS, BRACKETS AND OTHER HARDWARE	DRG. NO. PE-DG-405-507-E005	
	REV. 0	5 OF 12



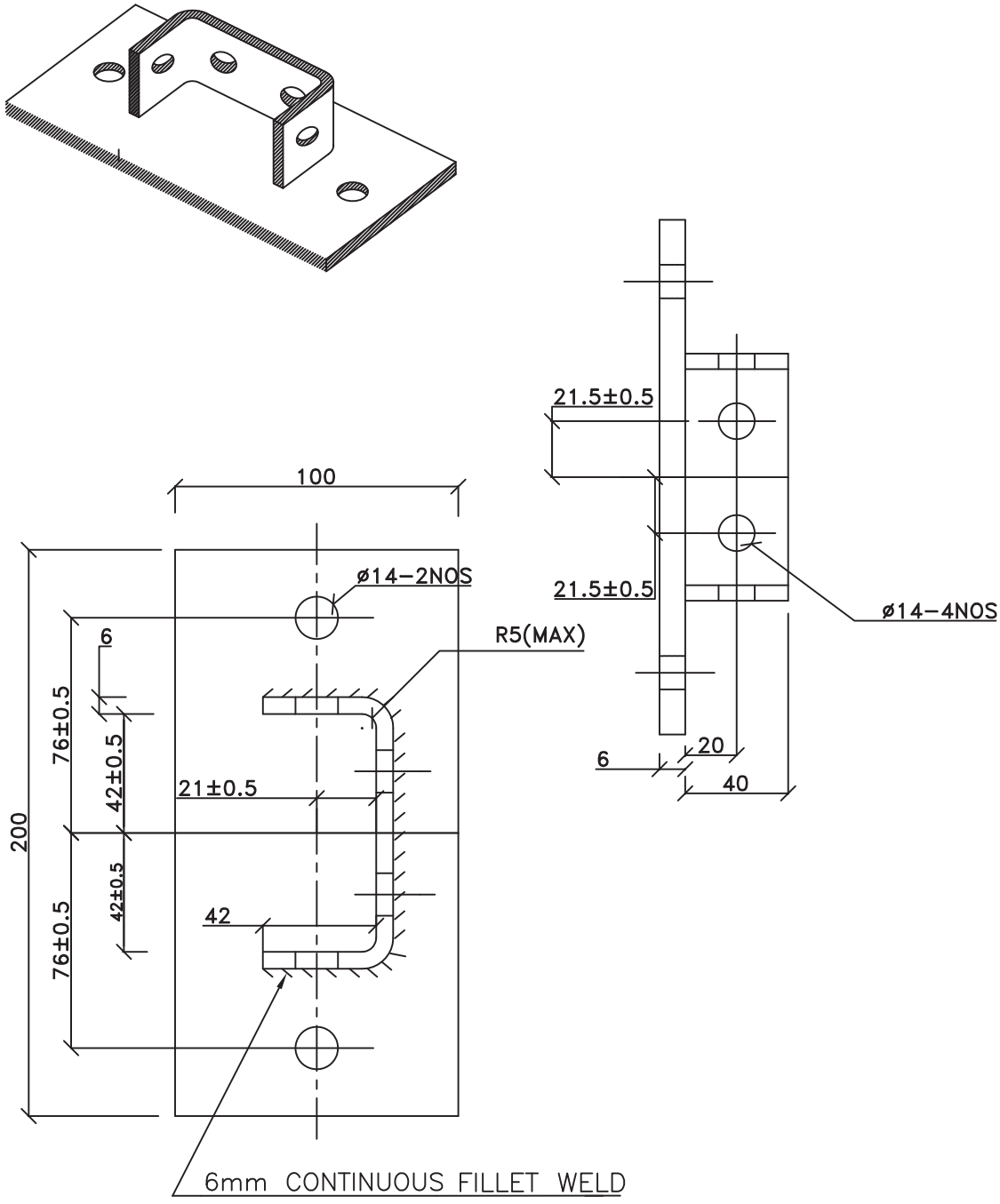


BASE PLATE FOR SINGLE CHANNEL BP1

NOTE

1. ALL DIMENSIONS ARE IN MM.
2. ALL FABRICATION TOLERANCES ±1.0mm.
3. MATERIAL :MILD STEEL AS PER IS–2062
4. FINISH : HOT DIP GALVANISED AS PER IS:2629
5. TOLERANCE ON THICKNESS AS PER IS:1852
6. ZINC COATING SHALL BE MIN. 75MICRON /610 g/sq.mm

BHEL	**TITLE:** CABLE TRAY SUPPORT SYSTEM - DETAILS & DRAWINGS FOR CHANNELS, ARMS, BRACKETS AND OTHER HARDWARE	DRG. NO. PE-DG-405-507-E005
		REV. 0 / SH 6 OF 12

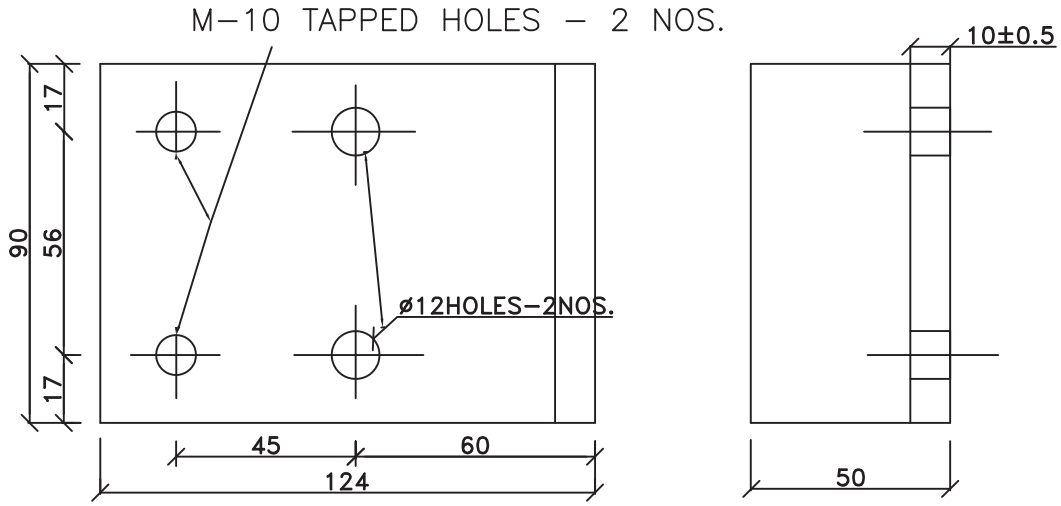


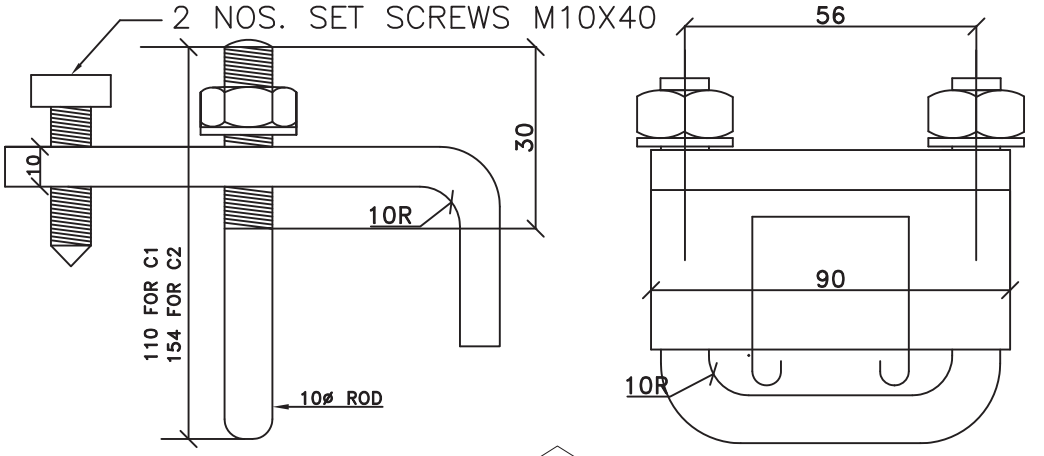
BASE PLATE FOR DOUBLE CHANNEL BP2

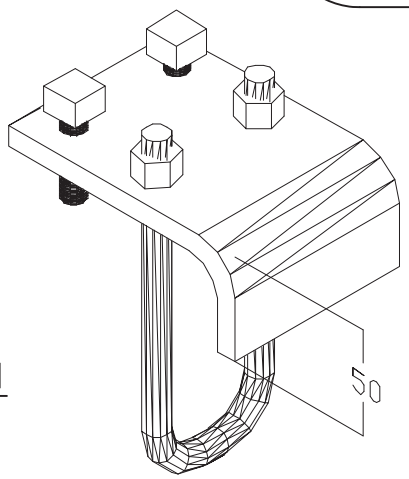
NOTES

1. ALL DIMENSIONS ARE IN MM
2. ALL FABRICATION TOLERANCES ±1.0mm
3. MATERIAL : MILD STEEL AS PER IS–2062
4. FINISH : HOT DIP GALVANISED AS PER IS:2629
5. TOLERANCE ON THICKNESS AS PER IS:1852
6. ZINC COATING SHALL BE MIN. 75 MICRON /610 g/sq.mm

BHEL	**TITLE:** CABLE TRAY SUPPORT SYSTEM - DETAILS & DRAWINGS FOR CHANNELS, ARMS, BRACKETS AND OTHER HARDWARE	DRG. NO. PE-DG-405-507-E005
		REV. 0 / SH 7 OF 12







M-10 U-BOLT WITH
2Nos PLAIN WASHERS & NUTS
110 mm FOR SC 1
154 mm FOR DC1

BEAM CLAMP - BC1

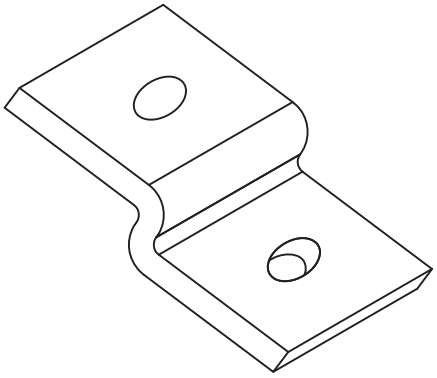
NOTES

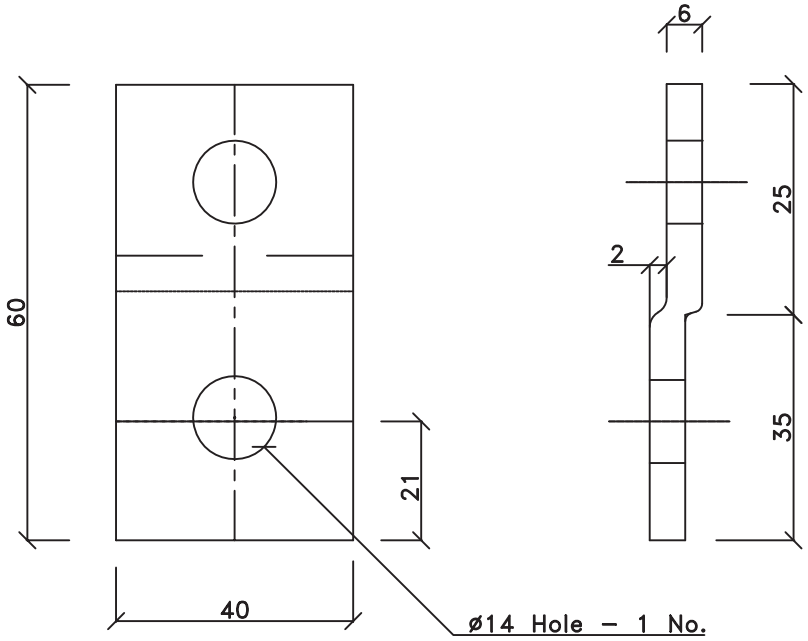
1. ALL DIMENSIONS ARE IN mm.
2. ALL FABRICATION TOLERANCES ±1.0mm
3. MATERIAL : MILD STEEL AS PER IS–2062
4. FINISH : HOT DIP GALVANISED AS PER IS:2629
5. TOLERANCE ON THICKNESS AS PER IS:1852
6. ZINC COATING SHALL BE MIN. 75MICRON /610 g/sq.mm

TITLE:
CABLE TRAY SUPPORT SYSTEM - DETAILS & DRAWINGS FOR CHANNELS, ARMS, BRACKETS AND OTHER HARDWARE

BHEL DRAWING NO.
PE-DG-405-507-E005

REV. 0 | SH 8 OF 12



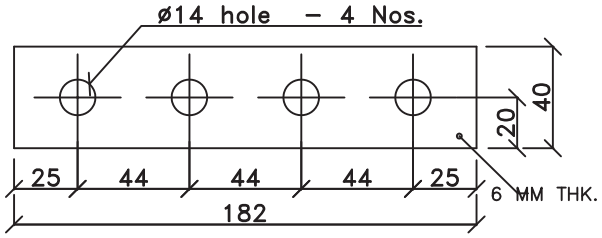


TRAY FIXING CLAMP - TC1

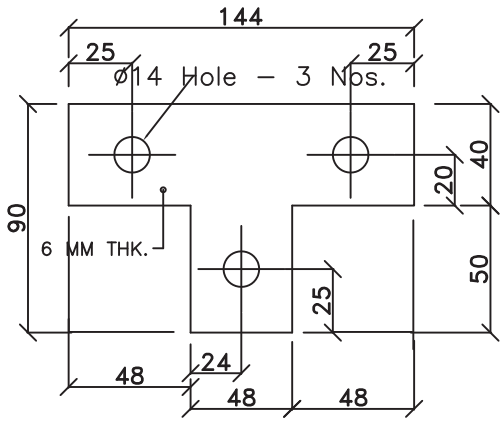
NOTES

1. ALL DIMENSIONS ARE IN mm.
2. ALL FABRICATION TOLERANCES : ±1.0mm
3. MATERIAL : MILD STEEL AS PER IS–2062
4. FINISH : HOT DIP GALVANISED AS PER IS:2629
5. TOLERANCE ON THICKNESS AS PER IS:1852
6. ZINC COATING SHALL BE MIN. 75MICRON /610 g/sq.mm

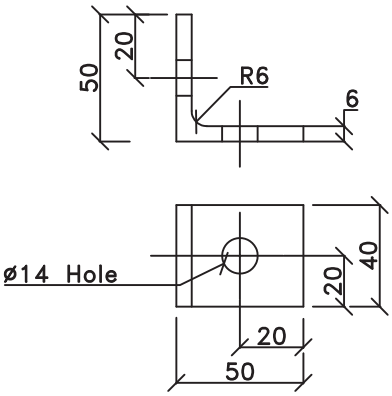
TITLE: CABLE TRAY SUPPORT SYSTEM - DETAILS & DRAWINGS FOR CHANNELS, ARMS, BRACKETS AND OTHER HARDWARE	BHEL DRAWING NO. PE-DG-405-507-E005
	REV. 0 | SH 9 OF 12



FLAT PLATE STRAIGHT FITTING PF2



FLAT PLATE TEE FITTING PF1

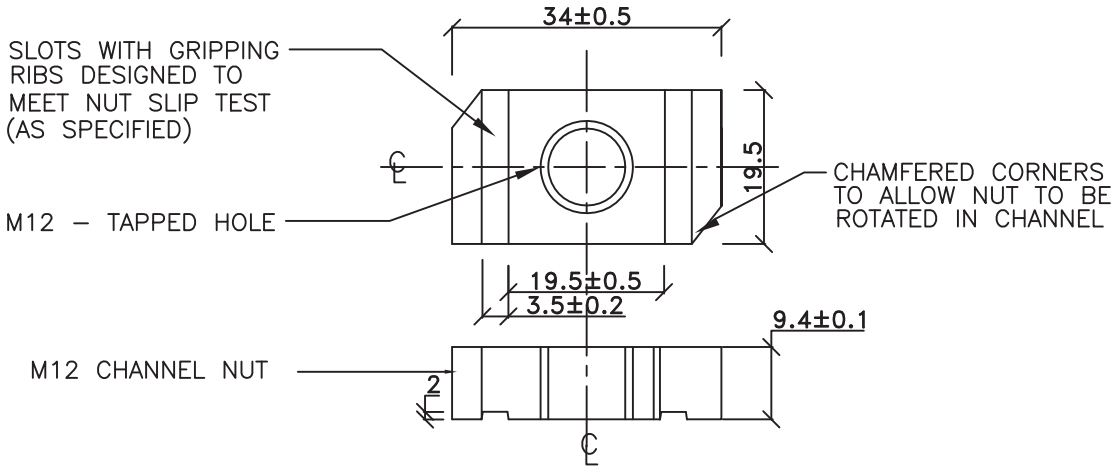


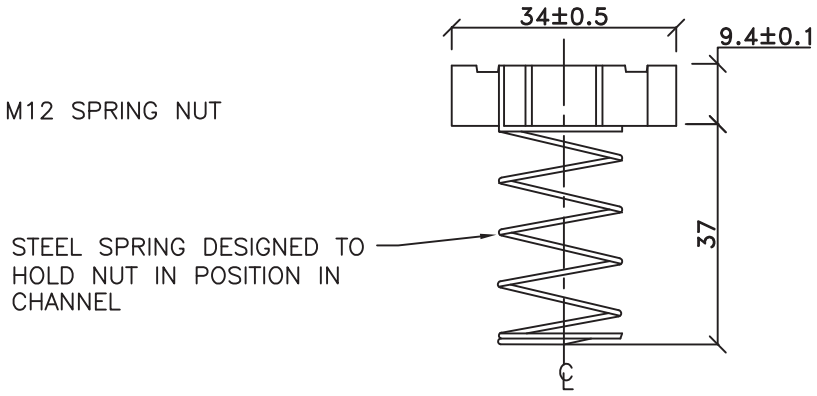
90° ANGLE FITTING LA1

NOTES

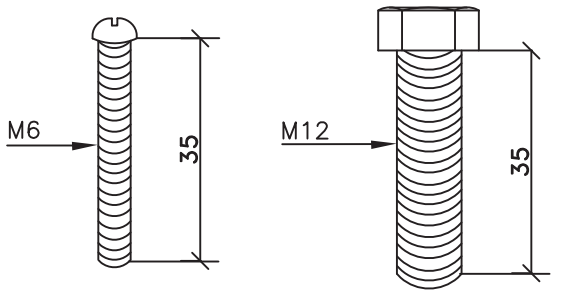
1. ALL DIMENSIONS ARE IN mm.
2. ALL FABRICATION TOLERANCES ±1.0 mm
3. MATERIAL :MILD STEEL AS PER IS–2062
4. FINISH : HOT DIP GALVANISED AS PER IS:2629
5. ZINC COATING SHALL BE MIN. 75MICRON /610 g/sq.mm

TITLE: CABLE TRAY SUPPORT SYSTEM - DETAILS & DRAWINGS FOR CHANNELS, ARMS, BRACKETS AND OTHER HARDWARE	BHEL DRAWING NO. PE-DG-405-507-E005	
	REV. 0	SH 10 OF 12

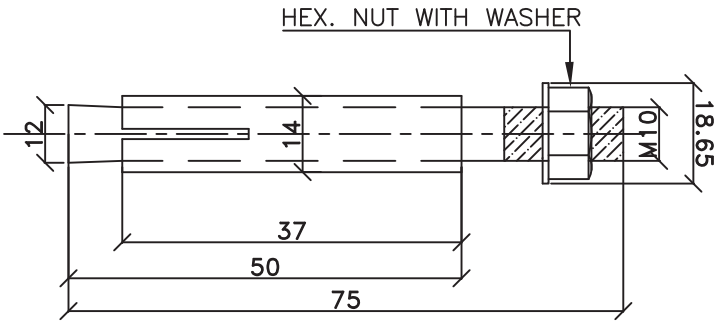




SPRING NUT ASSEMBLY



RAN HEAD SCREW HEX BOLT



ANCHOR BOLT M10

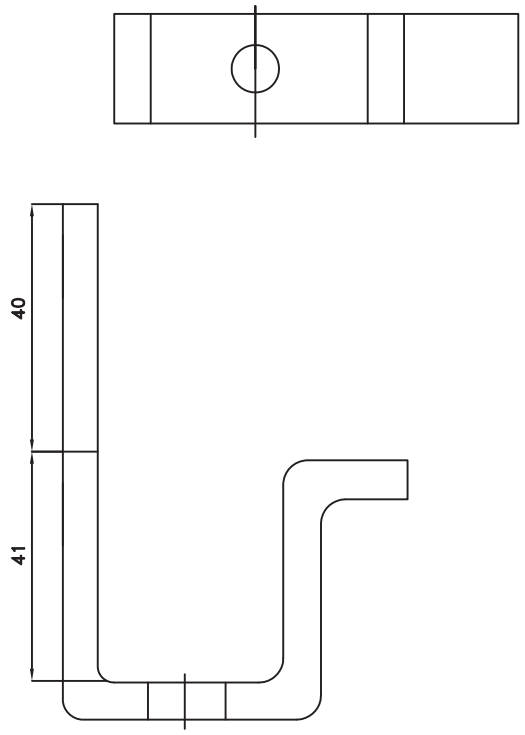
NOTES:

1. MATERIAL – MS AS PER IS – 2062.
2. M6 CHANNEL NUT DIMENSIONAL SIMILAR TO M12. EXCEPT HOLE DRILLED AND TAPPED TO M6 PAN HEAD SCREWS.
3. TAPPED HOLE THREADING TO MATCH WITH THREADING OF BOLTS.
4. SURFACE PROTECTION ELECTROGALVANISED/CADMIUM PLATED, 20MICRON THICK.
5. ALL DIMENSIONS ARE IN MM.
6. BOLTS SHALL BE HOT DIP GALVANISED.

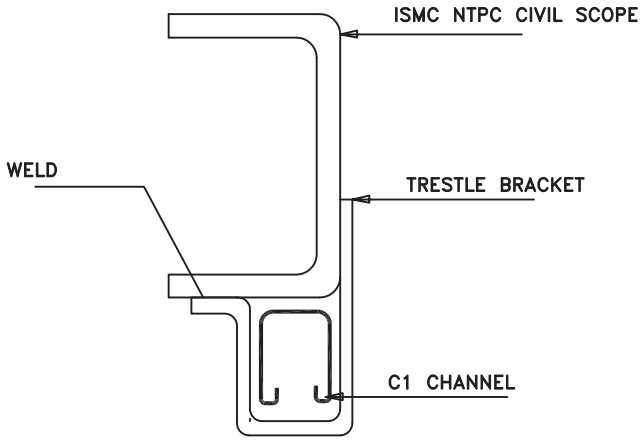
TITLE:
CABLE TRAY SUPPORT SYSTEM - DETAILS & DRAWINGS FOR CHANNELS, ARMS, BRACKETS AND OTHER HARDWARE

BHEL DRAWING NO.
PE-DG-405-507-E005

REV. 0 | SH 11 OF 12



TRESTLE BRAKET



FIXING ARRANGMENT OF TRESTLE BRACKET

NOTES

1. ALL DIMENSIONS ARE IN mm.
2. ALL FABRICATION TOLERANCES ±1.0 mm
3. MATERIAL :MILD STEEL AS PER IS–2062
4. FINISH : HOT DIP GALVANISED AS PER IS:2629
5. ZINC COATING SHALL BE MIN. 75MICRON /610 g/sq.mm

TITLE: CABLE TRAY SUPPORT SYSTEM - DETAILS & DRAWINGS FOR CHANNELS, ARMS, BRACKETS AND OTHER HARDWARE	BHEL DRAWING NO. PE-DG-405-507-E005
	REV. 0 | SH 12 OF 12

ANNEXURE – IV

TYPE TEST PROCEDURE

1.0 Type tests on Support System for Cable Trays

1.1 TEST 1 A

On main support channel type-DC1 for cantilever arms fixed on one side only. A 3.5 metre length of main support channel shall be fixed vertically at each end to a rigid structure as per the fixing arrangement as shown in the enclosed drawing PE-DG-999-507-E114 (Sheet 02 of 07). Eight (8) nos. 750 mm cantilever arms shall be fixed to the main channel and each arm shall be uniformly loaded to a working load of 100 kg. Subsequently a point load of 100 kg shall be applied on arm 2. A uniform proof load on all the arms equal to twice the working load shall be then be applied. Deflections shall be measured at the points shown in the enclosed drawings and at the following load intervals:

i) Working load

ii) Working load + point load

iii) Off load

iv) Proof load + point load

v) Off load

The deflection measured at working loads shall not exceed 16mm. The permanent deflection after removing the combination of working load and point load shall not exceed 10 mm at the arm tips and 6 mm on the channel. No collapse of the structure shall occur with a combination of proof load and point load applied.

1.2 TEST 1 B

Test 1 A shall be repeated with Eight Cantilever arms uniformly loaded and with the same point load on arm 2.

2.0 TEST 2

On Main support channel type – DC1 for cantilever arms fixed on both sides

2.1 TEST 2 A

A 3.5 m length of main support channel DC1 for cantilever arms fixing on both sides shall be fixed at each end to rigid structure as per the fixing arrangement as shown in the enclosed drawing PE-DG-999-507-E114(Sheet 03 of 07). Six (6) nos. 750 mm cantilever arms shall be attached to each sides and each arm uniformly loaded to a working load of 100 kg over the outboard 600 mm. A point load of 100 kg shall then be applied to arm 2, followed by a uniform proof load of twice the working load on all the arms, deflection shall be measured at points shown in the enclosed drawings at the following load intervals.

i) Working load

ii) Working load + point load

iii) Offload

iv) Proof load + point load

v) Offload

The deflection measured at working loads shall not exceed 16mm. The permanent deflection after removing the combination of working load and point load shall not exceed 10 mm at the arm tips and 6 mm on the channel. No collapse of the structure shall occur with a combination of proof load and point load applied.

2.2 TEST 2 B

Test 2 A shall be repeated with the assembly but with an asymmetrical load on the DC1 column and point load applied to arm 8 as shown in the enclosed drawing PE-DG-999-507-E114 (Sheet 04 of 07). The 100 kg and 200 kg uniformly distributed loads shall be applied to the upper three arms on one side and the lower three arms on the opposite side.

3.0 TEST 3

Tests on Channel Fixed on Beam/Floor
A length of main support channel section shall be fixed to steel structure/ floor and have loads applied as shown in the drawing no. PE-DG-999-507-E114 (sheet 05 of 07) enclosed and as detailed below:

3.1 TEST 3 A

A length of steel structure shall be rigidly supported. It should be fitted on a metre length of channel section using beam clamps welded/bolted. A point load of 1200 kg shall be applied to the centre point via two brackets. No distortion or pulling of the components shall take place.

3.2 TEST 3 B

With the components assembled in Test 3A, two perpendicular point loads of 600 kg shall be simultaneously applied at positions 150 mm either side of the centre line, no distortion or pulling of the components shall take place.

3.3 TEST 3 C

With the components assembled as in Test 3 A, a perpendicular point load of shall be applied at a point 150 mm on one side of the centre line.

The load shall be gradually increased to the maximum value that can be applied without causing distortion or pulling of the components. This value shall be recorded.

4.0 TEST 4: CHANNEL INSERT (If applicable)

2.5 metre of SC1 Channel fixed to the concrete wall / steel structure as per actual site installation conditions. 6 nos. of 750 mm cantilever arms shall be fixed to the SC1 Channel as shown in enclosed drawing PE-DG-999-507-E114 (sheet 06 of 07). Each arm uniformly loaded to a working load of 100 kg over the out board 600 mm. A point load of 100 kg shall then be applied to arm 2, followed by a uniform proof load of twice the working load on all the arms; deflection shall be measured at points shown in the enclosed drawing at the following load intervals:

i) Working load

ii) Working load + point load

iii) Offload

iv) Proof load + point load

v) Offload

The deflection measured at working loads shall not exceed 16mm. The permanent deflection after removing the combination of working load and point load shall not exceed 10 mm at the arm tips and 6 mm on the channel. No collapse of the structure shall occur with a combination of proof load and point load applied.

3.0 TEST 5:

Channel nut slip characteristics (If applicable)

TEST 5 A1, 5 A2, and 5 A3:
A length of channel SC1 section 200 mm long shall have fitted brackets with the two bolts fixing as shown in enclosed drawing PE-DG-999-507-E114 (sheet 07 of 07).
With loads applied at the position shown in drawing enclosed nut slip shall be determined with bolt torque of 30 NM, 50 NM and 65 NM. No fewer than three measurements shall be made for each torque setting.

A minimum loading of 720 kg shall be obtained before nut slip with bolt torque of 65 NM.

TEST 5 B1, 5 B2, and 5 B3:
The length of channel SC1 section 200 mm long shall have fitted bracket with the one bolt fixing as shown in enclosed drawing PE-DG-999-507-E114 (sheet 07 of 07).
With loads applied at the position shown in drawing enclosed nut slip shall be determined with bolt torque of 30 NM, 50 NM and 65 NM. No fewer than three measurements shall be made for each torque setting.

A minimum loading of 350 kg shall be obtained before nut slip with a bolt torque of 65 NM.

4.0 TEST 6:

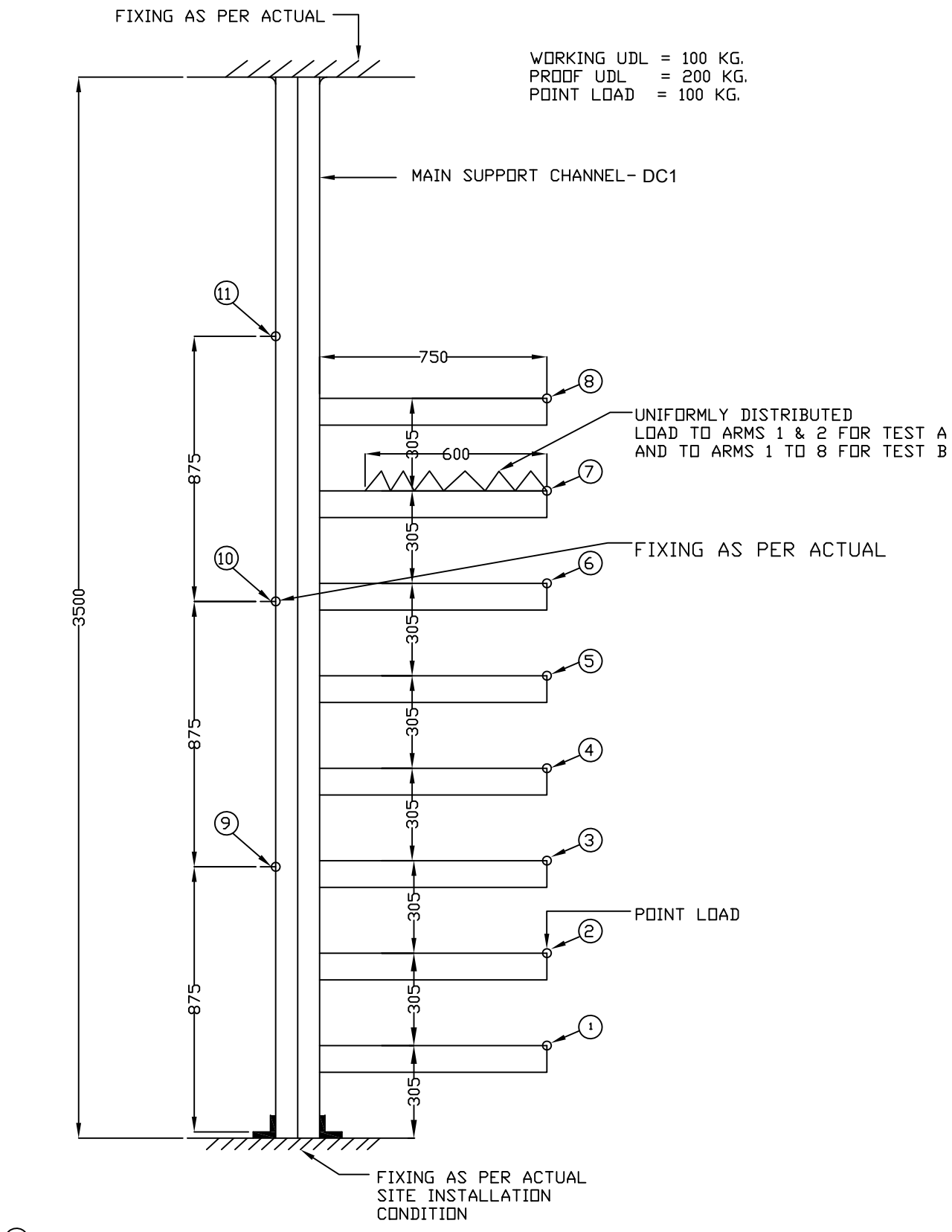
Weld Integrity Test

After the deflection test as per test 1A, 1B, 2A, 2B and 4 above weld integrity shall be checked by magnetic particle inspection to detect sub- surface cracks developed, if any.

TYPICAL DETAILS OF TYPE TEST ARRANGEMENT

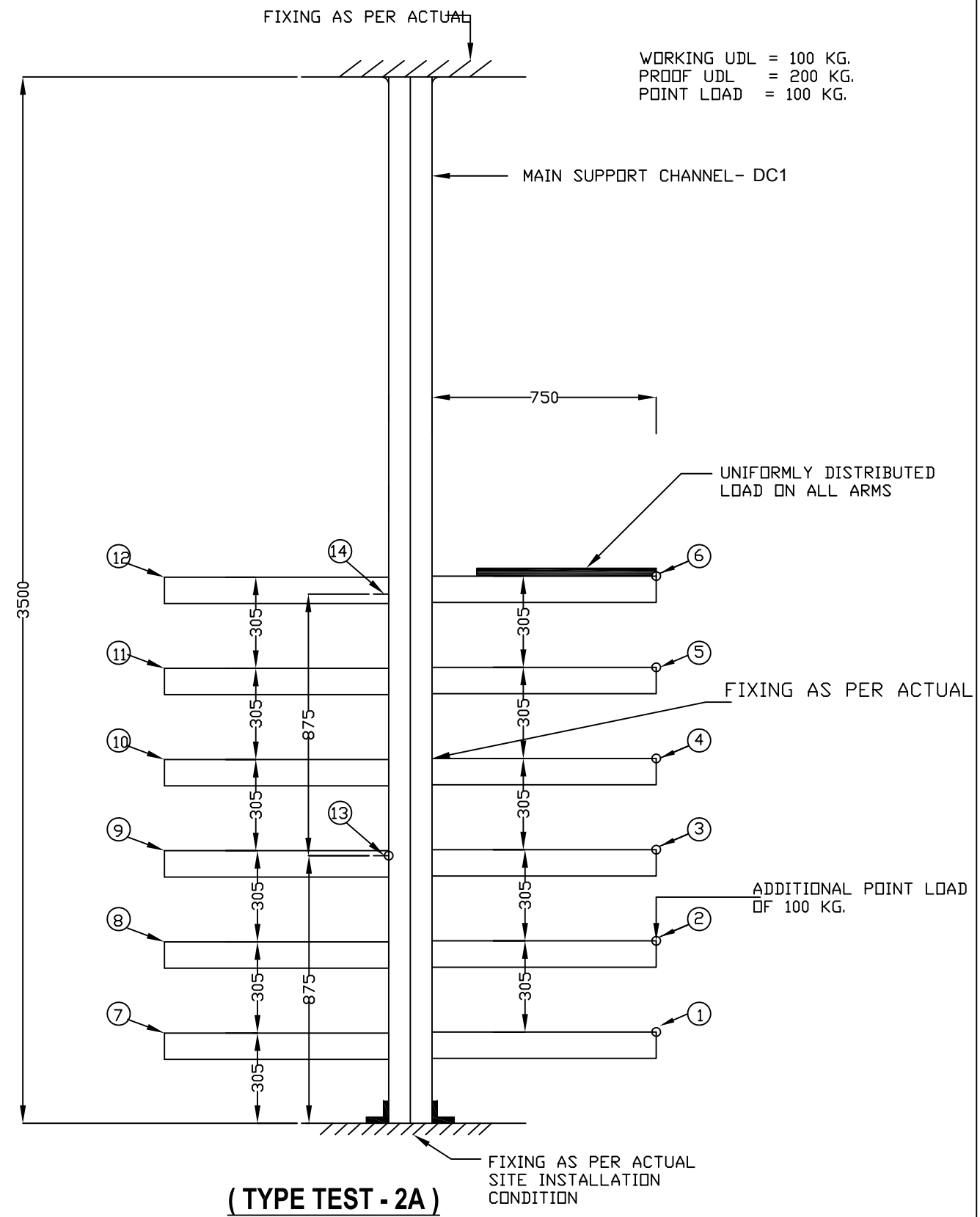
REVISIONS				
		NAME	DATE	

TITLE: TYPICAL DETAILS OF TYPE TEST ARRANGEMENT		NAME	DATE
	DRAWN	SG	
	DSGN	SG	
DRG. NO. PE-DG-999-507-E114	CHKD	PD	
	APPD	AK	



(TEST : 1A & 1B)

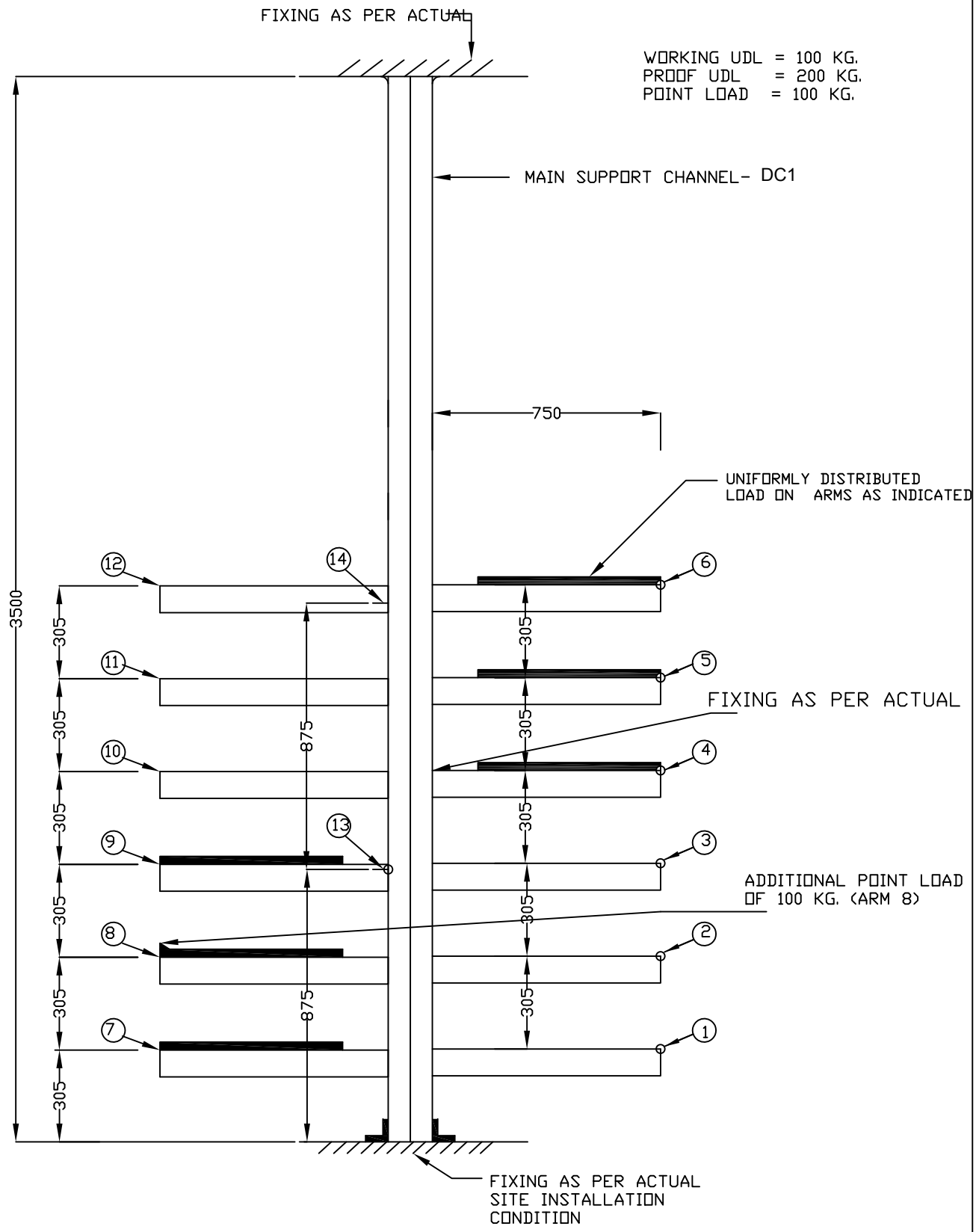
TITLE: TYPICAL DETAILS OF TYPE TEST ARRANGEMENT	DRG. NO. PE-DG-999-507-E114
	SH 2 OF 7



(TYPE TEST - 2A)

DEFLECTION MEASURING POINTS.

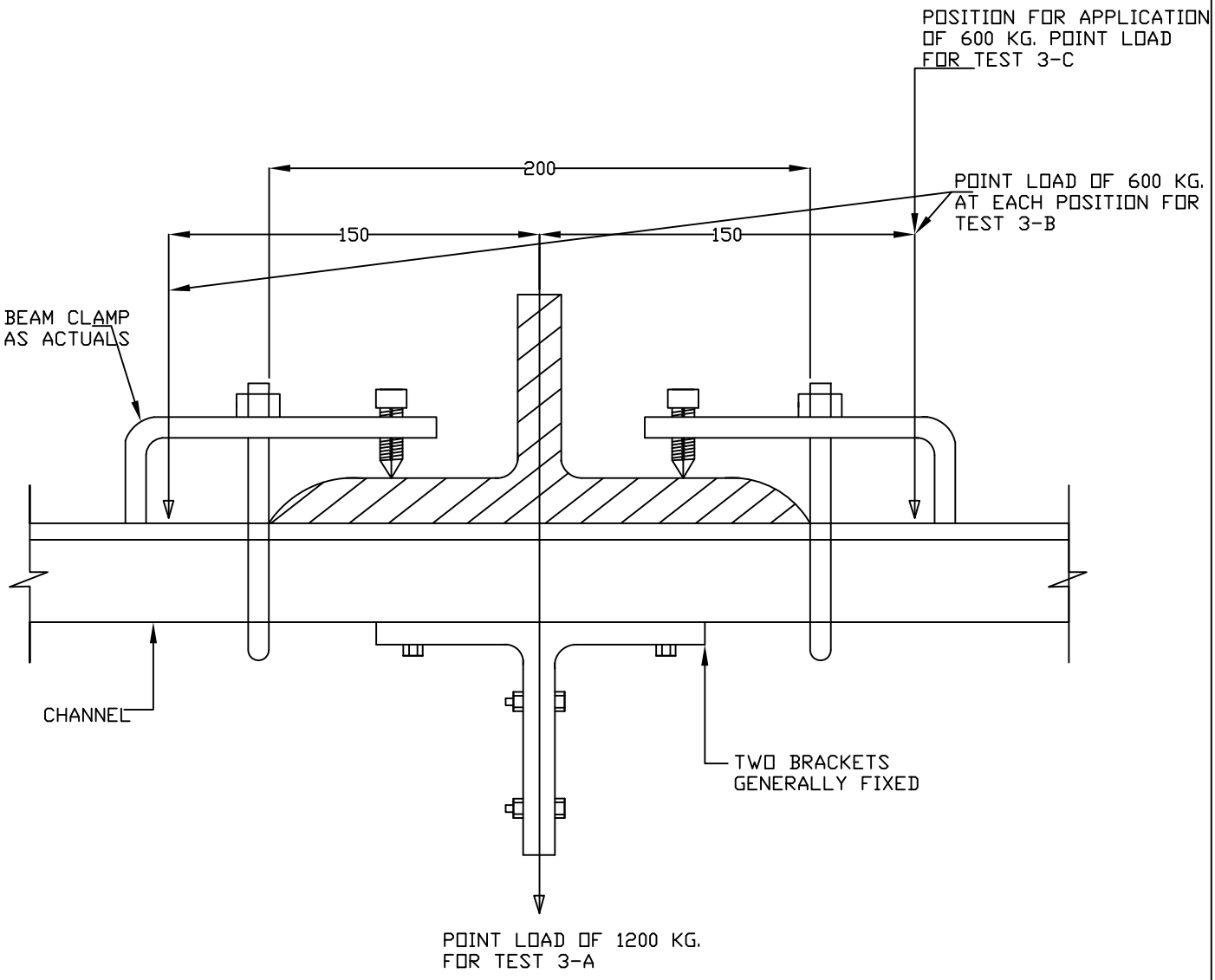
TITLE: TYPICAL DETAILS OF TYPE TEST ARRANGEMENT	DRG. NO. PE-DG-999-507-E114
	SH 3 OF 7



(TYPE TEST - 2B)

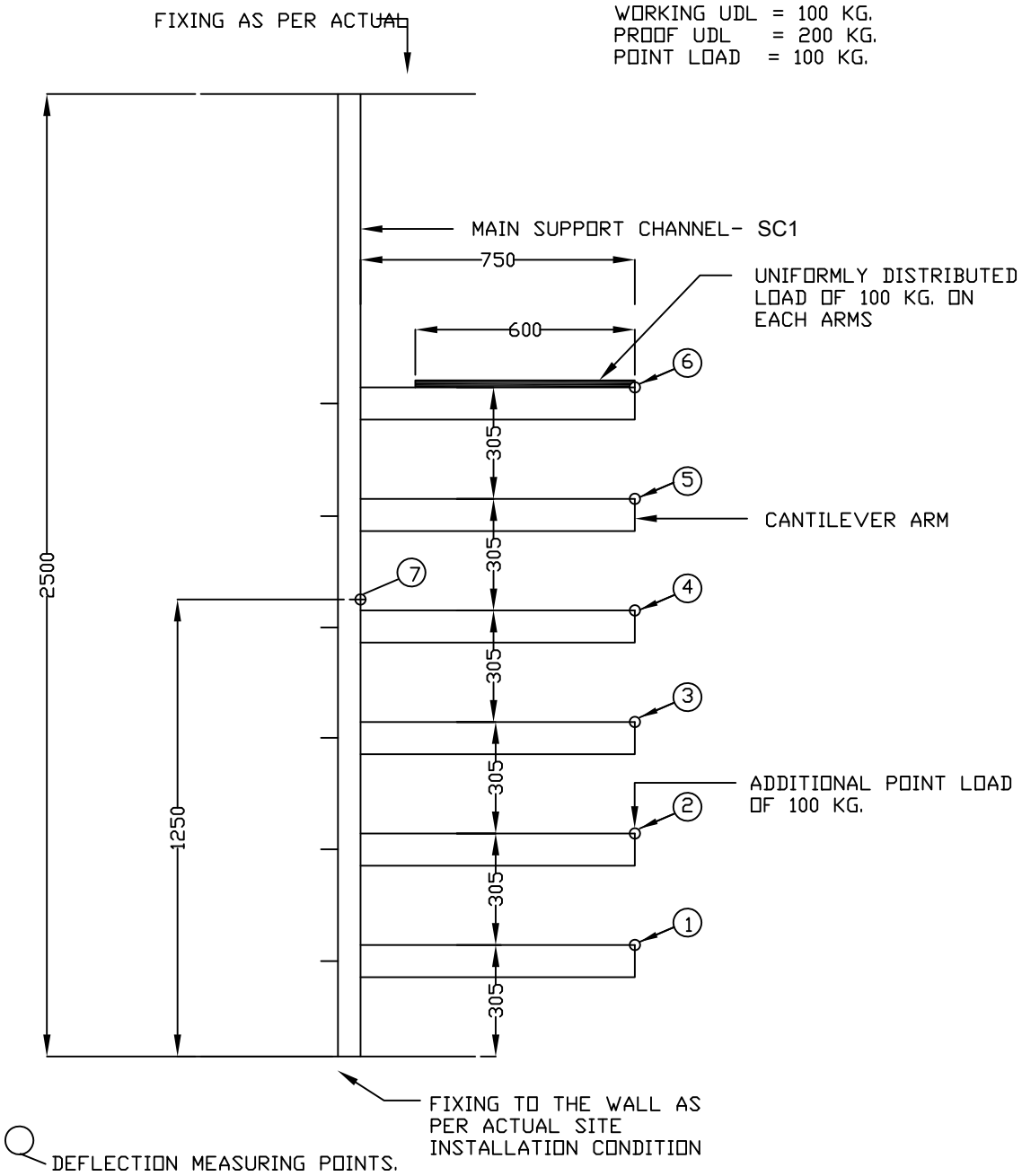
DEFLECTION MEASURING POINTS.

TITLE: TYPICAL DETAILS OF TYPE TEST ARRANGEMENT	DRG. NO. PE-DG-999-507-E114
	SH 4 OF 7



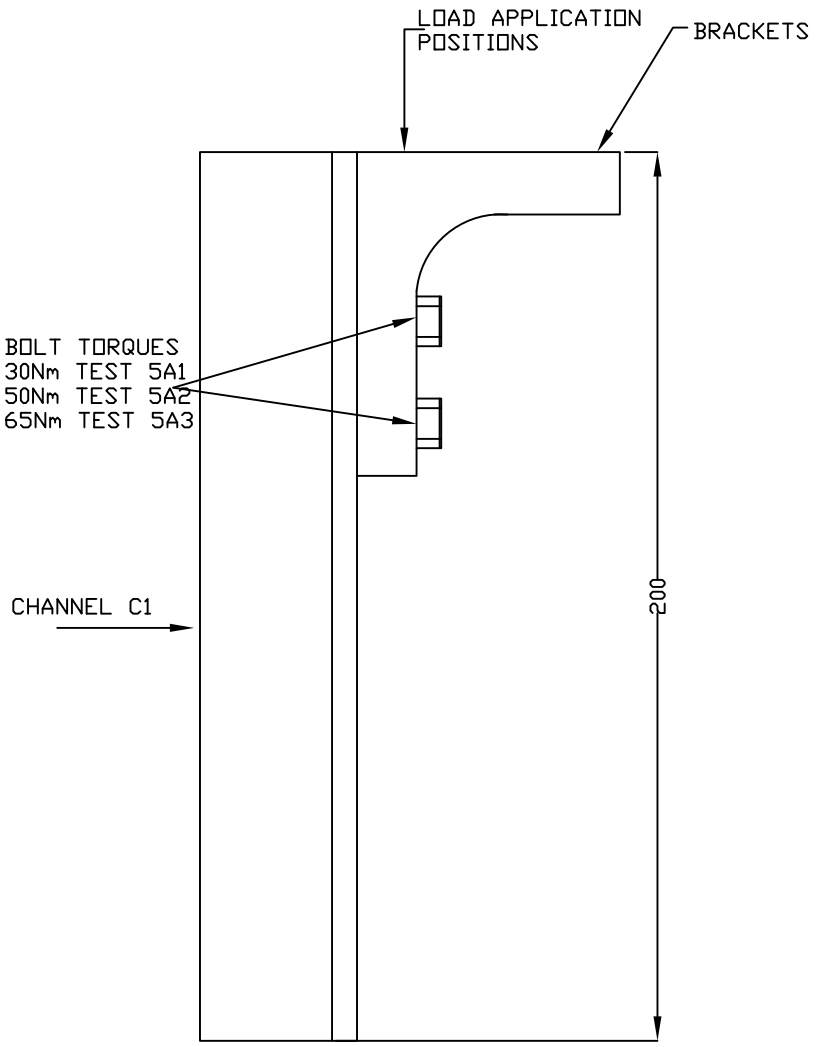
(TEST - 3A, 3B, 3C)

TITLE:	TYPICAL DETAILS OF TYPE TEST ARRANGEMENT	DRG. NO. PE-DG-999-507-E114
		SH 5 OF 7



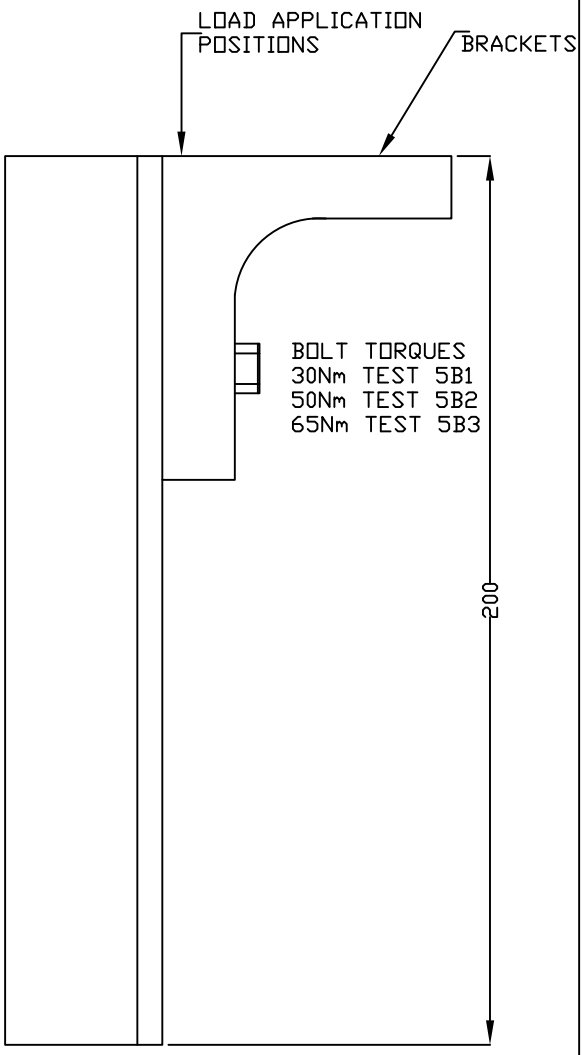
(TYPE TEST - 4)

TITLE:	TYPICAL DETAILS OF TYPE TEST ARRANGEMENT	DRG. NO. PE-DG-999-507-E114
		SH 6 OF 7



ASSEMBLY USING M12 X 25MM LONG
HEX. HD. SCREWS LOCK WASHER AND
M12 CHANNEL NUT WITH SPRING

(TEST - 5A1, 5A2, 5A3)



ASSEMBLY USING M12 X 25MM LONG
HEX. HD. SCREWS LOCK WASHER AND
M12 CHANNEL NUT WITH SPRING

(TEST - 5B1, 5B2, 5B3)

TITLE: TYPICAL DETAILS OF TYPE TEST ARRANGEMENT	DRG. NO. PE-DG-999-507-E114
	SH 7 OF 7

STANDARD
QUALITY PLAN

एनटीपीसी NTPC	ITEM: (MATERIAL, CLASS, GRADE, RATING, SIZE ETC.) GALVANISED FLEXIBLE CABLE TRAYS SUPPORT SYSTEM	STANDARD QUALITY PLAN CONFORMING TO CODE: Design as per NTPC Specification	QP NO. 0000-999-QOE-S-38 REV.:00 DATE : 01.09.04 PAGE 1 OF 2 VALID UPTO:31.08.07	REVIEWED BY S.D.SINGH O.P.NIRANJAN I.J.SINGH	APPROVED BY ANIL GURTA

SL. NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS
					M	C/N					M	C	N	
1.	2.	3.	4.	5.	6.		7	8	9	D*	**	10		11
	Flexible cable trays Support Structure	1. In Black Condition a) Weld Quality	Major	Visual	100%	Random	Manufacturer's Plant Std	Manufacturer's Plant Std	Inspection Report		P	V	V	o
		b) Burs	Major	Visual	Rando m	-	No Burs	No Burs	-do-		P		-	
2.	Finished Galvanized	2. After Galvanising												
		2.1 General physical inspection including Galvanizing Quality/Defects, Dicromating, White Rusting etc.	Major	Visual	100%	5 Sample/L ot	IS-2629-1985 IS-4759-1996	IS-2629-1985 IS-4759-1996	-do-		P	W	W	
		2.2 Dimensional Check & Thickness Check	Major	Measurem ent	-do-	-do-	NTPC/Main Supplier Approved Drg.	NTPC/Main Supplier Approved Drg.	-do-		P	W	W	
		2.3 Galvanizing Tests												
		a) Coating thickness measurement survey by Elcometer	Critical	Measurem ent	IS-4759-1996	-do-	IS-4759-1996 IS-3203-1982	IS-4759-1996 IS-3203-1982	-do-		P	W	W	
		b) Mass of zinc coating	Critical	Measurem ent	-do-	1 coupon sample of each thickness	IS-6745-1972 IS-4759-1996	IS-6745-1972 IS-4759-1996	-do-		P	W	W	
		c) Uniformity of zinc coating/dip test	Critical	Measurem ent	-do-	-do-	IS-2633-1986 IS-4759-1996	IS-2633-1986 IS-4759-1996	-do-		P	W	W	
		d) Adhesion Test	Critical	Visual	-do-	-do-	IS-2629-1985	IS-2629-1985	-do-		P	W	W	

LEGEND: RECORDS IDENTIFIED WITH "TICK" SHALL BE ESSENTIALLY INCLUDED BY THE CONTRACTOR IN QA DOCUMENTATION

M: MANUFACTURER/SUB-SUPPLIER, C: **Main Supplier: NTPC, N: NTPC. INDICATE "P" PERFORM "W" WITNESS AND "V" VERIFICATION AS APPROPRIATE

"CHP" BY NTPC SHALL BE IDENTIFIED IN COLUMN "N" AS "W"

एनटीपीसी NTPC	ITEM: (MATERIAL, CLASS, GRADE, RATING, SIZE ETC.)	STANDARD QUALITY PLAN CONFORMING TO CODE: Design as per NTPC Specification	QP NO. 0000-999-QOE-S-38 REV.:00 DATE : 01.09.04 PAGE 2 OF 2 VALID UPTO: 31.08.07	REVIEWED BY S.D.SINGH O.P.NIRANJAN I.J.SINGH	APPROVED BY ANIL GUPTA QUALITY ASSURANCE APPROVED NTPC, New Delhi

SL. NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY		
					M	C/N				D*	M	C	N
1.	2.	3.	4.	5.	6.		7	8	9		**	10	
		Proof Load Test as per note 6 Followed by Die Penetration Test (For 600 mm and above cable tray support system)	A	Meas/Visual	One Sample from each offered lot	One Sample from each offered lot	NTPC Technical Specification/ No visible cracks should develop on the weld part	NTPC Technical Specification/ No visible cracks should develop on the weld part	Inspection Report		P	W	W

Note :

1. The supplier to ensure procurement of steel from main producers like SAIL/TISCO, Rastriya Ispat/Ispat Ind. Jindal/Esser/Lloyds/IIS Co. and Zinc from Hindustan Zinc Ltd.
2. Welding shall be done by qualified welders as per supplier system.
3. Material shall be galvanized at NTPC approved sources only.
4. Pre-treatment of cable trays support system shall be carried out in seven tank process as per IS-2629. All the process parameters e.g. Concentration, temperature, density etc. to be maintained and recorded by the galvaniser.
5. The process of pre-treatment shall be verified by NTPC on surveillance basis during inspection of Galvanised Flexible Cable Trays support system.
6. (i) Test on Main support Channel shall be done if only CI channel are in scope of supply and cantilever arms shall be fitted on one side. This test shall be same as test 4 of type test as per tech. Spec.

   (ii) Test on Main Support Channel shall be done with C2 Channel and cantilever arms fitted on both sides, if C2 channels are in scope of supply. This test shall be same as test 2 A of type tests. Then test at (i) above shall not be repeated.

   (iii) Nut slip characteristic test (It shall support minimum load of 350 Kg. Before Nut Slips with bolt torque of 65 NM). This test shall be same as test 5 B of type tests.

   (iv) The procedure for carrying out above test shall be as per details given in Type Tests Specification.

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