

800-918-218-8-BL ON 380

400 kV SARDARSROVAR DOUBLE CIRCUIT LINE

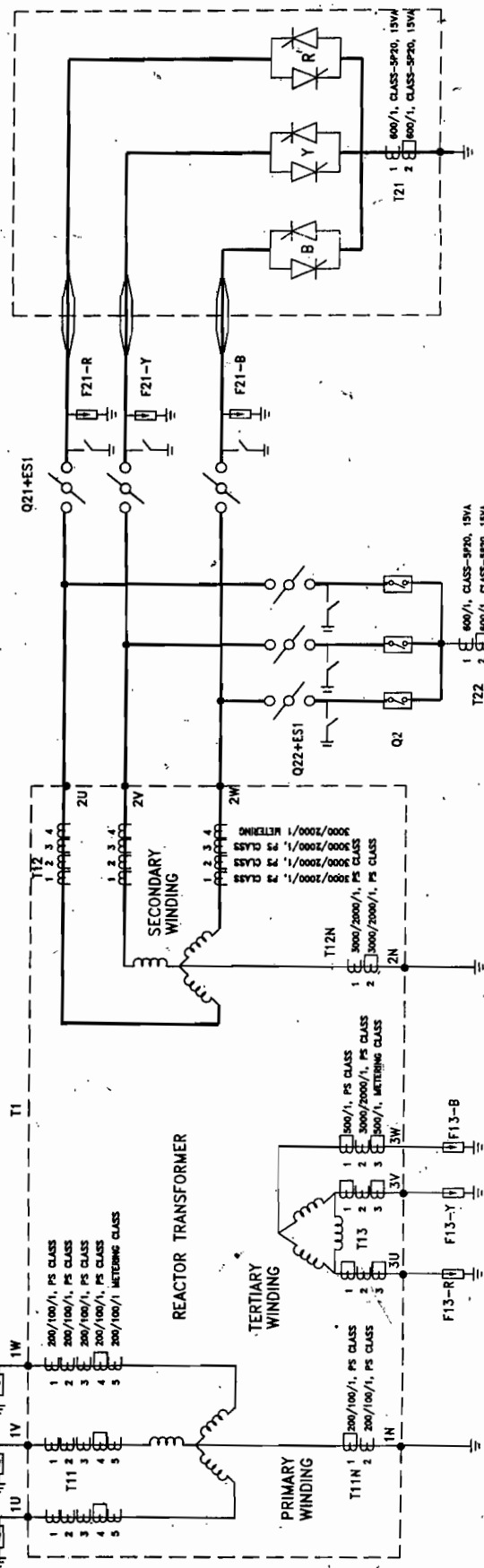
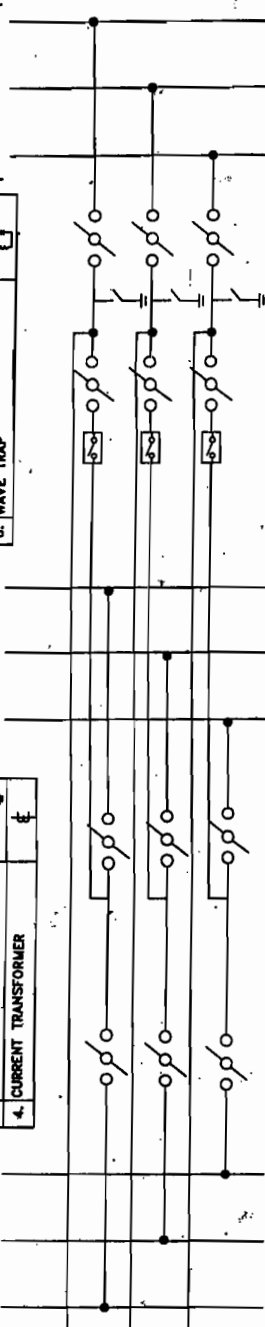
SL. NO.	ITEM DESCRIPTION	SYMBOL
1.	LV CIRCUIT BREAKER	
2.	CENTER BREAK ISOLATOR WITH ONE EARTH SWITCH	
3.	DOUBLE BREAK ISOLATOR WITH ONE EARTH SWITCH	
4.	CURRENT TRANSFORMER	
5.	SURGE ARRESTER	
6.	ANTI-PARALLEL VALVE	
7.	CURRENT VOLTAGE TRANSFORMER	
8.	WAVE TRAP	

SL. NO.	ITEM DESCRIPTION	SYMBOL
1.	LV CIRCUIT BREAKER	
2.	CENTER BREAK ISOLATOR WITH ONE EARTH SWITCH	
3.	DOUBLE BREAK ISOLATOR WITH ONE EARTH SWITCH	
4.	CURRENT TRANSFORMER	

400kV MAIN BUS-I

400kV MAIN BUS-II

400 kV AUX. BUS



LOA NO. MSETCL/CO/TR/PROJ/790/DHULE/CSR/9484/DT.6.09.2007

CUSTOMER MAHARASHTRA STATE ELECTRICITY TRANSMISSION CO. LTD.

PROJECT : 50 MVAR 400kV CONTROLLED SHUNT REACTOR AT DHULE SUBSTATION



BHARAT HEAVY ELECTRICALS LIMITED  
TRANSMISSION PROJECTS DIVISION

SCHEMATIC DIAGRAM FOR CSR DHULE

REV.	DATE	ALTD.	CHD.	APPD.	REV.	DATE	ALTD.	CHD.	APPD.	NAME	SIGN.	DATE
										JUGENDRA	-SD-	JUGENDRA
										ARUNA	-SD-	
										MIK	-SD-	
DISTRIBUTION OF PRINTS												
										DEPT.	CODE	
										TBEM	422	

CARD CODE	MAHATRANSCQ
NEXT SHEET	-
SHEET No.	01
REV.	00

SCALE W.O. No. TB-3-312-316-003

Copy Right and Confidential  
The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED  
It must not be used directly or indirectly in any way detrimental to the interest of the company.

COMPUTER DRG. PATH NAME :

SIGN & DATE



FIRST ANGLE PROJECTION ( ALL DIMENSIONS ARE IN MM )

TB-3-312-316-002

NO. 0360

7

6

5

4

3

2

1

COPY RIGHT AND CONFIDENTIAL  
The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED  
it must not be used directly or indirectly in anyway detrimental to the interest of the company.

COMPUTER DRG. PATH NAME :

SIGN & DATE

INVENTORY NO.

REV.	DATE	ALTD.	CHD.	APPD.	REV.	DATE	ALTD.	CHD.	APPD.	DRAWN	NAME	SIGN.	DATE
					01	04.11.08				JUGENDRA	JUGENDRA	-SD-	30.04.08
										CHECKED	ARUNA	-SD-	30.04.08
										APPROVED	MIK	-SD-	30.04.08
										DISTRIBUTION OF PRINTS			



BHARAT HEAVY ELECTRICALS LIMITED  
TRANSMISSION PROJECTS DIVISION  
CSR BAY SECTION ELEVATION

CARD CODE  
NEXT SHEET --  
SHEET No. 04  
REV. 01

SCALE 1:175 W.O. No. 87006  
DRG. No. TB-3-312-316-002

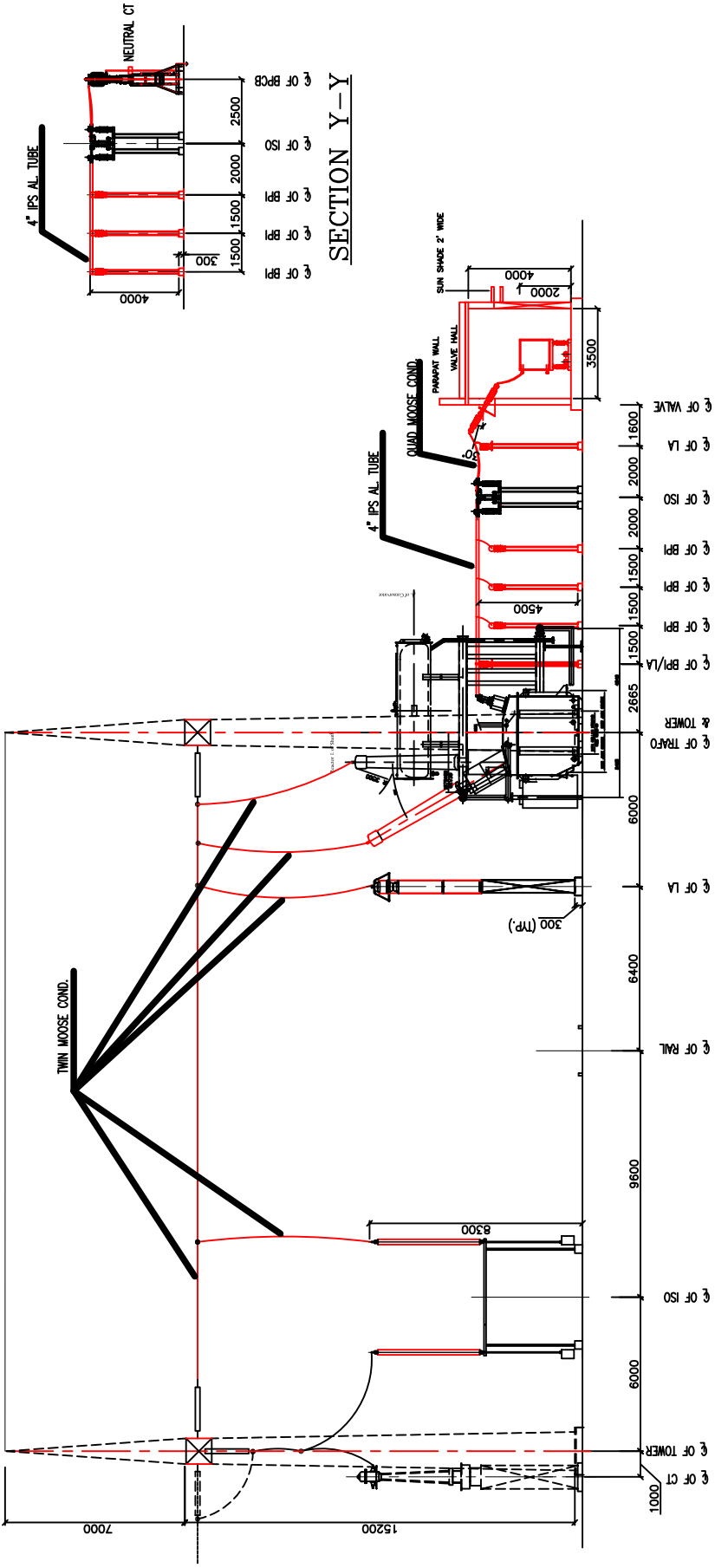
LOA NO. MSECL/CO/TR/PROJ/790/DHULE/CSR/9464/Dt.6.09.2007  
CUSTOMER: MAHARASHTRA STATE ELECTRICITY TRANSMISSION CO. LTD.  
PROJECT 50 MVAR 400KV CONTROLLED SHUNT REACTOR  
AT DHULE SUBSTATION



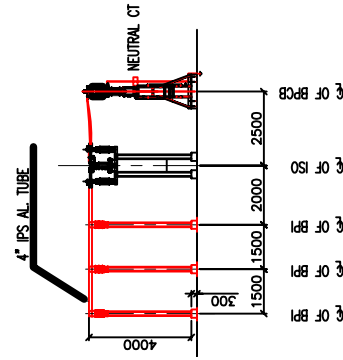
SECTION X-X

LEGEND:-

- 1. PRESENT SCOPE
- 2. EXISTING



SECTION Y-Y





58100 00 859 2

THE INFORMATION ON THIS DOCUMENT IS THE PROPERTY OF BHARAT HEAVY ELECTRICALS LTD. IT MUST NOT BE USED DIRECTLY OR INDIRECTLY IN ANY WAY DETRIMENTAL TO THE INTEREST OF THE COMPANY.

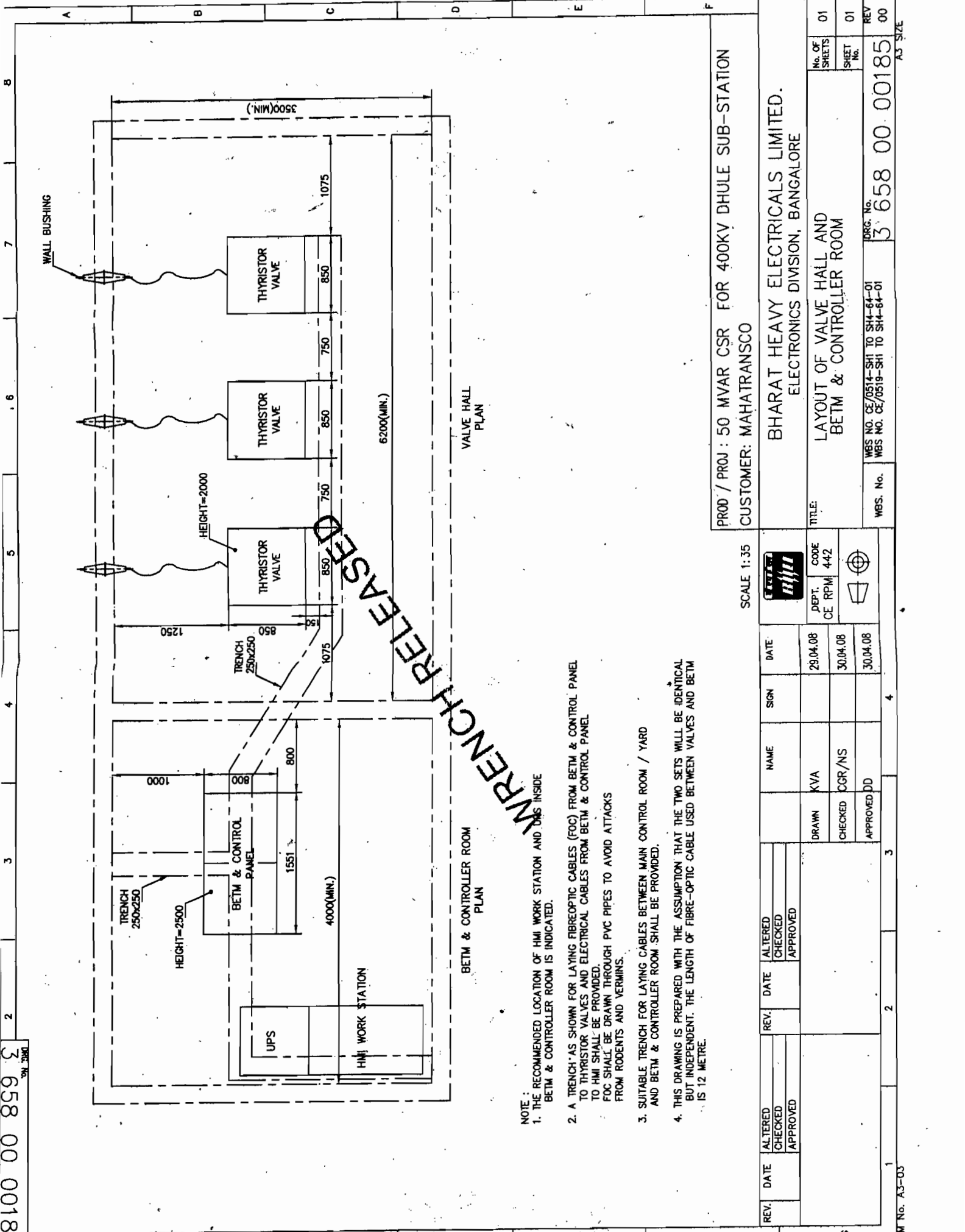
Copyright and Confidential

REF. DRG. No. 36580000185501

SIGN. & DATE

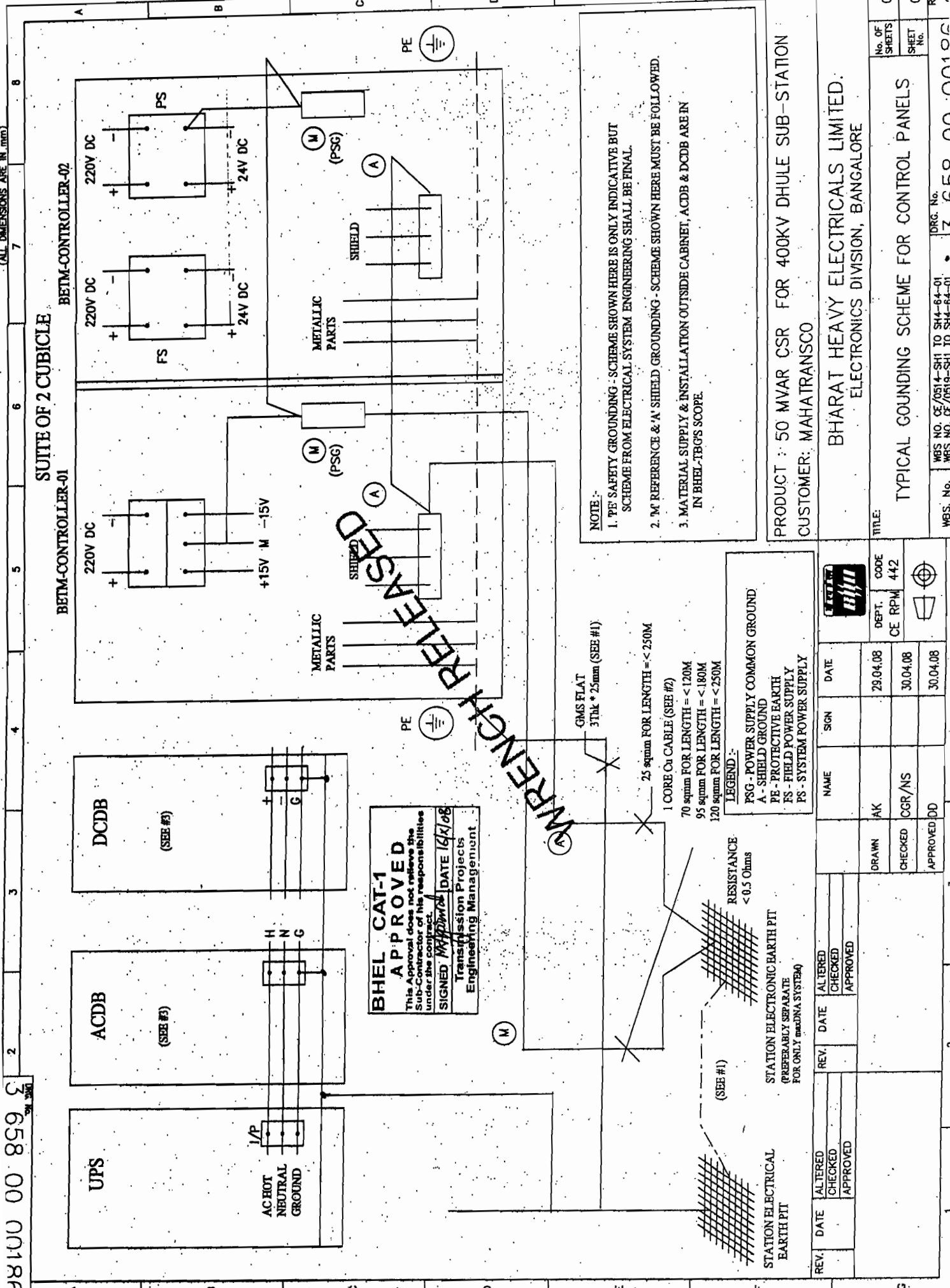
INVENTORY No.

FORM No. A3-03



- NOTE :
1. THE RECOMMENDED LOCATION OF HMI WORK STATION AND UPS INSIDE BETM & CONTROLLER ROOM IS INDICATED.
  2. A TRENCH AS SHOWN FOR LAYING FIBROPTIC CABLES (FOC) FROM BETM & CONTROL PANEL TO THYRISTOR VALVES AND ELECTRICAL CABLES FROM BETM & CONTROL PANEL TO HMI SHALL BE PROVIDED. FOC SHALL BE DRAWN THROUGH PVC PIPES TO AVOID ATTACKS FROM RODENTS AND VERMINS.
  3. SUITABLE TRENCH FOR LAYING CABLES BETWEEN MAIN CONTROL ROOM / YARD AND BETM & CONTROLLER ROOM SHALL BE PROVIDED.
  4. THIS DRAWING IS PREPARED WITH THE ASSUMPTION THAT THE TWO SETS WILL BE IDENTICAL BUT INDEPENDENT. THE LENGTH OF FIBRE-OPTIC CABLE USED BETWEEN VALVES AND BETM IS 12 METRE.

PRD / PROJ : 50 MVAR CSR FOR 400KV DHULE SUB-STATION		SCALE 1:35		CUSTOMER: MAHATRANSCO	
BHARAT HEAVY ELECTRICALS LIMITED.		ELECTRONICS DIVISION, BANGALORE		TITLE: LAYOUT OF VALVE HALL AND BETM & CONTROLLER ROOM	
WBS NO. CE/0514-SH1 TO SH14-64-01		WBS NO. CE/0519-SH1 TO SH14-64-01		DRG. No. 3 658 00 00185	
REV. 00		SHEET No. 01		No. OF SHEETS 01	
REV. 01		SHEET No. 01		No. OF SHEETS 01	
REV. 02		SHEET No. 01		No. OF SHEETS 01	
REV. 03		SHEET No. 01		No. OF SHEETS 01	
REV. 04		SHEET No. 01		No. OF SHEETS 01	
REV. 05		SHEET No. 01		No. OF SHEETS 01	
REV. 06		SHEET No. 01		No. OF SHEETS 01	
REV. 07		SHEET No. 01		No. OF SHEETS 01	
REV. 08		SHEET No. 01		No. OF SHEETS 01	
REV. 09		SHEET No. 01		No. OF SHEETS 01	
REV. 10		SHEET No. 01		No. OF SHEETS 01	
REV. 11		SHEET No. 01		No. OF SHEETS 01	
REV. 12		SHEET No. 01		No. OF SHEETS 01	
REV. 13		SHEET No. 01		No. OF SHEETS 01	
REV. 14		SHEET No. 01		No. OF SHEETS 01	
REV. 15		SHEET No. 01		No. OF SHEETS 01	
REV. 16		SHEET No. 01		No. OF SHEETS 01	
REV. 17		SHEET No. 01		No. OF SHEETS 01	
REV. 18		SHEET No. 01		No. OF SHEETS 01	
REV. 19		SHEET No. 01		No. OF SHEETS 01	
REV. 20		SHEET No. 01		No. OF SHEETS 01	



DRG. NO. 34640000887

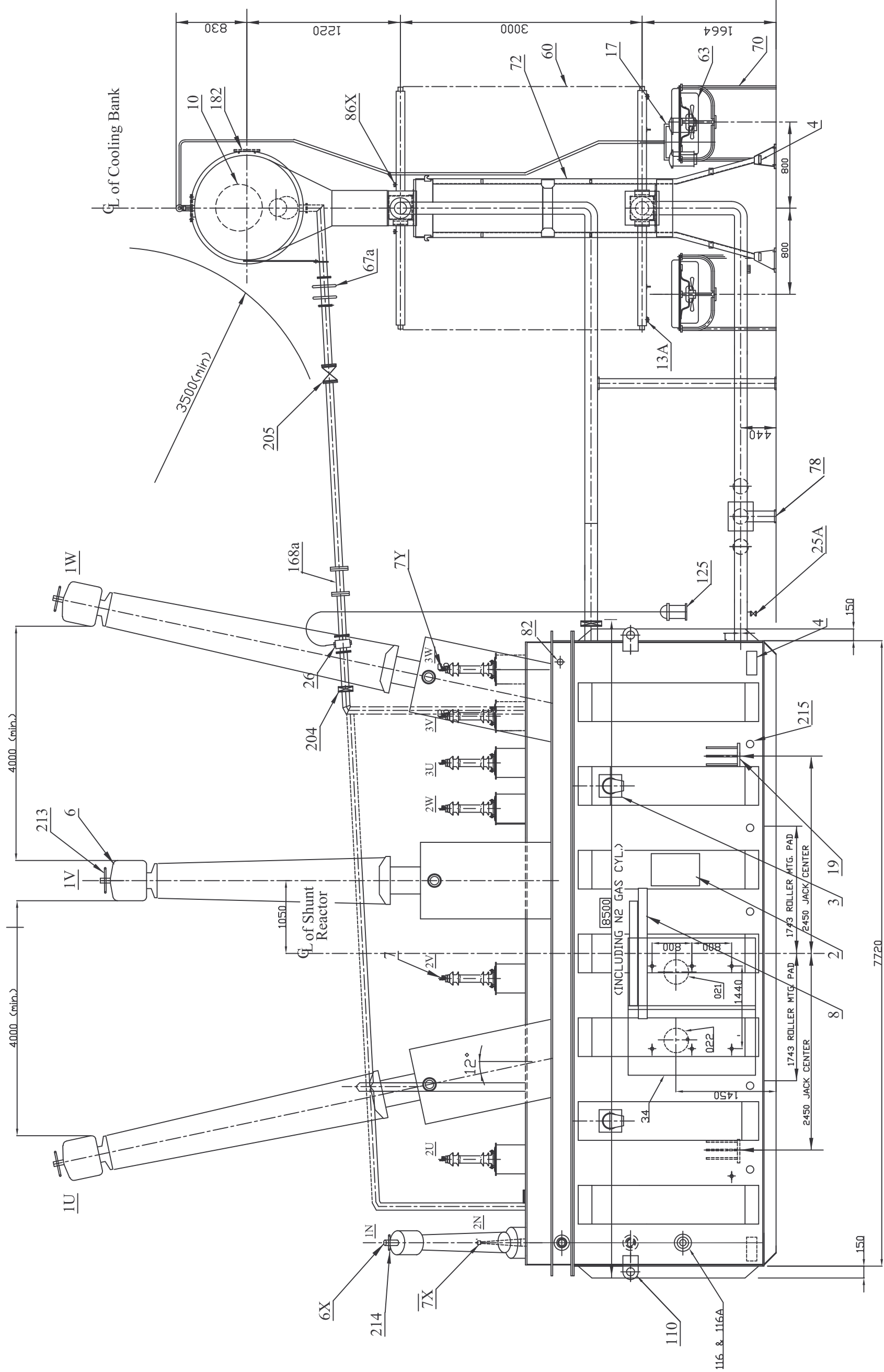
THE INFORMATION ON THIS DOCUMENT IS THE PROPERTY OF BHARAT HEAVY ELECTRICALS LTD. IT MUST NOT BE USED DIRECTLY OR INDIRECTLY IN ANY WAY DETRIMENTAL TO THE INTEREST OF THE COMPANY.

34640000749

REF.DRG.NO.

SIGN.DATE

INVENTORY NO.



SARDARSAROVAR-I

REV	DATE	ALT	MS	ALT	MS	NO. OF TRANSFORMERS	2	NO. OF TRANSFORMERS	2	NAME	SIGN	DATE
		CKD	VHG	CKD	VHG	PROJECT	DHULE 400 KV S/S	PROJECT	DHULE 400 KV S/S	DRN	MS	06.05.08
		APPD	AKG/SS	APPD	AKG/SS	LOA NO.	MSETCL/CD/TR PROJ/790/DHULE/CSR/9464 DT:06-09-2007	LOA NO.	MSETCL/CD/TR PROJ/790/DHULE/CSR/9464 DT:06-09-2007	CHD	VHG	08.05.08
ZONE						SPECIFICATION NO.	-	SPECIFICATION NO.	-	APPD	AKG/SS	10.05.08
						TYPE OF PRODUCT	50 MVAR, 420/14.43/8.33 KV, CONTROLLED SHUNT REACTOR	TYPE OF PRODUCT	50 MVAR, 420/14.43/8.33 KV, CONTROLLED SHUNT REACTOR	DRG. NO.	34640000887	REV.
						NAME OF CUSTOMER	M/S MSETCL DHULE, MAHATRANSCO	NAME OF CUSTOMER	M/S MSETCL DHULE, MAHATRANSCO	SHEET	01	OF
						IT. NO. 35a WAS NOT SHOWN.		IT. NO. 35a WAS NOT SHOWN.			03	01
						202	203	203	204		205	206
						207	208	207	208		01	03





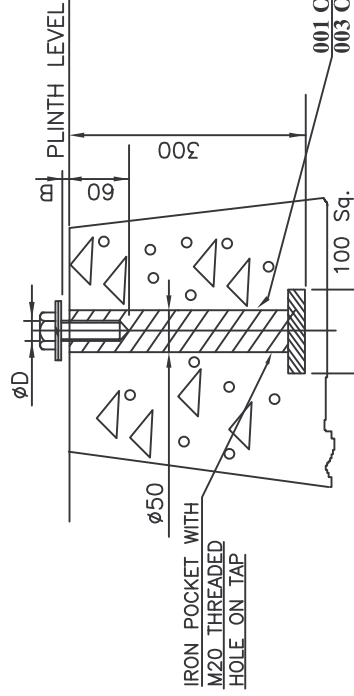


REV	DATE	ALT	REV	DATE	ALT	SHEELA	NO. OF TRANSFORMERS	2
		CKD	01	16/09/08	CKD	VHG	PROJECT	DHULE 4
		APPD			APPD	AKG/SS	LOA NO.	MSETCL/
ZONE			ZONE	DIM.4800	WAS	5300.	SPECIFICATION NO.	—
							TYPE OF PRODUCT	50 MVAR,
							NAME OF CUSTOMER	M/S MSE

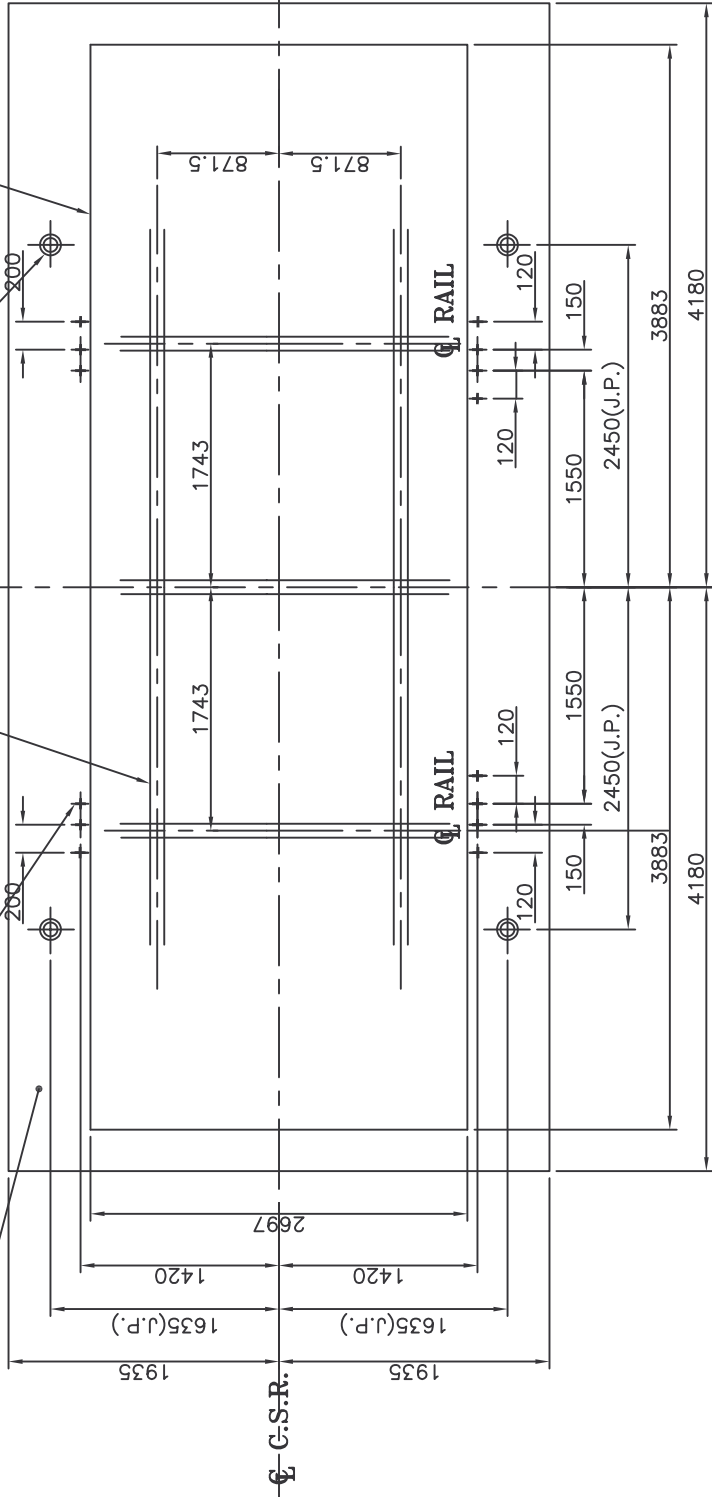
ADDITIONAL INFORMATION	भारत हेवी इलेक्ट्रिकल्स लिमिटेड भोपाल BHARAT HEAVY ELECTRICALS LTD. BHOPAL				NAME	SIGN	DATE
W.O.-67070-A-517-01	DEPT	CODE	WEIGHT(kg)	SCALE	DRN.	MS	06.05.08
STATUS OF DRAWING	TRE	406	COMP.SCALE--		CHD.	VHG	
DISTRIBUTION OF PRINTS	APPD.AKG/SS						
TRE-1,TRM-3	REV.						
TITLE					DRG. NO		
					34640000890		
FOUNDATION PLAN					SHEET		
					01 OF 02		

201	202	203	204	205	206	207	208
-----	-----	-----	-----	-----	-----	-----	-----

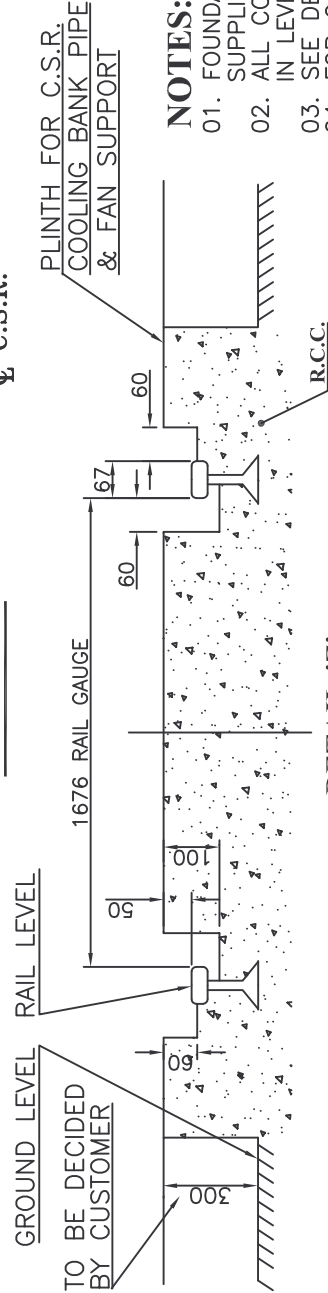
## SARDARSAROVAR-I



**DETAIL OF FOUNDATION BOLT**  
**DETAIL-C**  
**REFER TABLE FOR DIM B & ØD**



## H.V. SIDE




## DETAIL-'Z'

TABLE FOR FOUNDATION BOLTS			
IT.	DIM 'B'	BOLT Ø'D'	DESCRIPTION
001	20	M20	12 NOS. FOR C.S.R. MTG. MARKED THUS +
002	20	M20	16 NOS. FOR RADIATOR SUPPORT MARKED THUS*
003	10	M20	8 NOS. FOR PIPE SUPPORT MARKED THUS ⊕
004	20	M20	32 NOS. FAN SUPPORT MARKED THUS ⊕

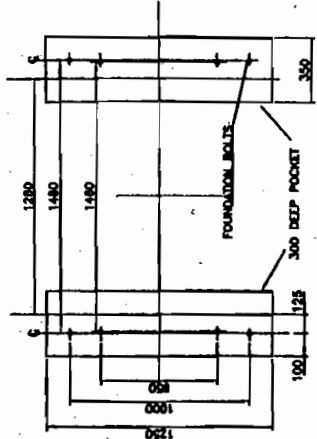
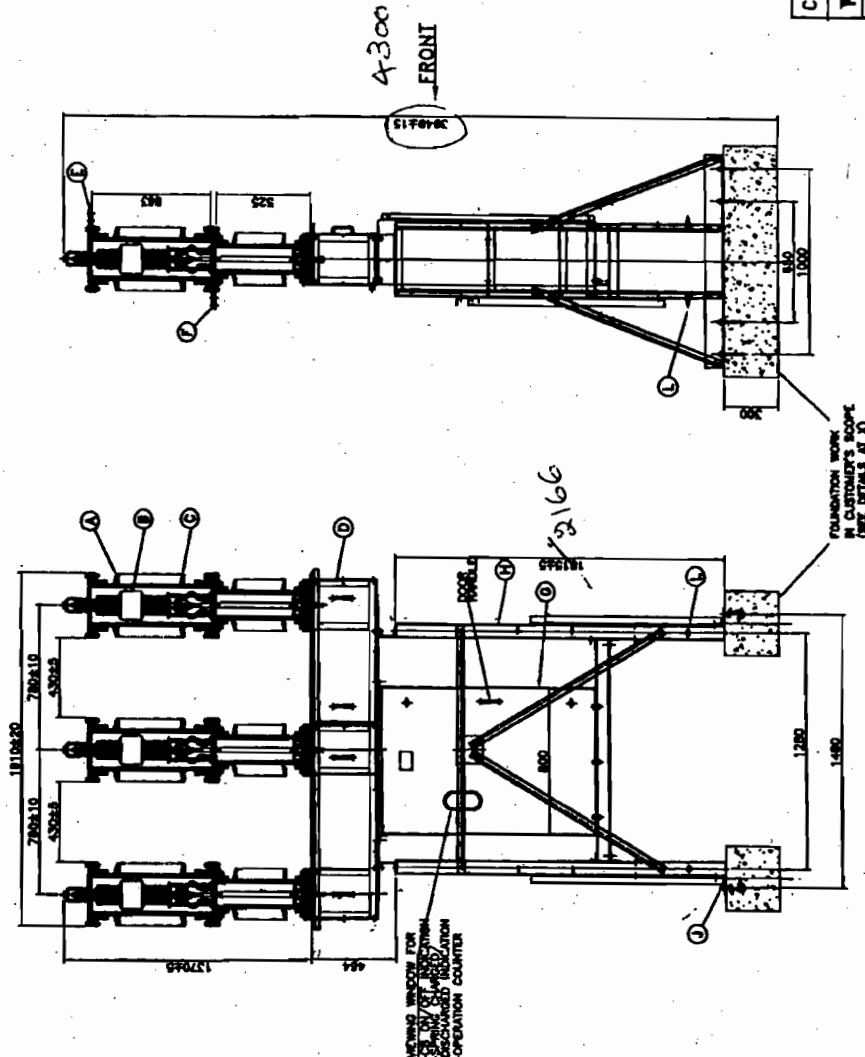
## NOTES:-

01. FOUNDATION BOLTS ASSY. WILL BE SUPPLIED BY B.H.E.L. BHOPAL
02. ALL CONCRETE FOUNDATION SHOULD BE IN LEVEL OF PLINTH LEVEL
03. SEE DETAIL 'C' FOR FOUNDATION BOLTS
04. FOR Q.G.A. REFERRDRG. 34640000887

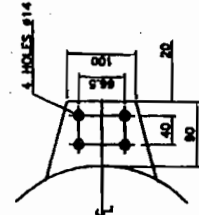
<b>भारत हेवी इलेक्ट्रिकल्स लिमिटेड भोपाल</b> <b>भारत HEAVY ELECTRICALS LTD. BHOPAL</b>		<b>DRN. MS</b> <b>CHD. VHG</b> <b>APPD. AKG/SS</b>		<b>NAME</b> <b>MS</b> <b>VHG</b> <b>AKG/SS</b>		<b>SIGN</b>    		<b>DATE</b> <b>06.05.08</b>	
<b>ADDITIONAL INFORMATION</b> <b>W.O.-67070-A-517-01</b>		<b>DEPT</b> <b>CODE</b>		<b>WEIGHT(kg)</b> <b>SCALE</b>					
<b>STATUS OF DRAWING</b> <b>DISTRIBUTION OF PRINTS</b>		<b>TRE</b> <b>406</b>		<b>COMP. SCALE--</b>					
<b>TRE-1, TRM-3</b>		<b>TITLE</b>		<b>FOUNDATION PLAN</b>					
				<b>DRG. NO</b> <b>34640000890</b>		<b>REV.</b> <b>01</b>			
				<b>SHEET</b> <b>01</b>		<b>OF</b> <b>02</b>			

## FOUNDATION PLAN

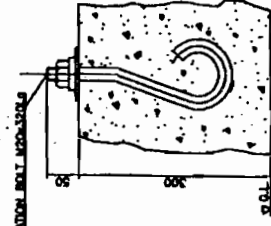
DRG. NO.35210030700



**FOUNDATION PLAN**  
**DETAIL X**



TERMINAL DETAILS E & F  
(THICKNESS—19mm. MIN.)








**DETAILS**

CUSTOMER PO NO:- LDA NO. PP/EHV/790/CSR/DHULE DTD:20/09/2006.

**W.O.NO.87534-A-475-01**

<b>TYPE OF PRODUCT OR</b>	<b>36KV OUTDOOR PORCELAINCLAD VCB TYPE PVN36</b>
<b>NAME OF CUSTOMER/PROJECT</b>	<b>M/S M.S.E.T.CO.LTD</b>

		DEPT. SVE CODE 409		TUNOL. DIMS. GR. M AA D230208			SCALE 1/30	WEIGHT(K.G.)		DRN CKD APPD		NAME C.M.V. R.K.M. S.C.			SIGN   		DATE 11.03.08 11.03.08 11.03.08		NO. OF ITEM				
TITLE QGA OF 36KV OUTDOOR VCB										DRAWING NO. 35210030700										REV. 00		02	
										SHT. NO. 01		NO. OF SHT.											

A3 SIZE

[illegible]

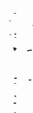
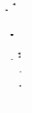
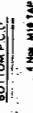
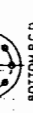
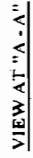
1. ALL DIMENSIONS ARE IN MILLIMETERS  
2. ALL FERROUS PARTS ARE HOT DIP GALVANIZED FOR MORE DETAIL S  
REFER QUALITY PLAN.  
3. ALL NON-FERROUS CONTACT POINTS ARE SILVER PLATED  
(25 MICRONS)  
4. THE INDICATED DIMENSIONS ARE SUBJECT TO THE  
MANUFACTURING TOLERANCES  
UNTO 50 mm  $\pm 0.13\%$  51 TO 100 mm  $\pm 0.14\%$   
101 TO 300 mm  $\pm 0.17\%$  ABOVE 300 mm  $\pm 0.19\%$   
5. SHORT TIME CURRENT RATING 40 KA rms FOR 3 Sec  
6. MIN. CREEPAGE DISTANCE 10.50 mm  
7. THE STUOL BASE HAVING 2 Nos. BALL BEARINGS OF ADEQUATE  
DIAMETER  
8. APPLICABLE STANDARDS IS 9821 PART 1 TO V.E.C - 179  
9. MAX. TERMINAL LOAD SHALL BE AS PER I.E.C - 129  
10. ALL G.I. PIPES ARE CLASS 'B' TYPE  
11. MOUNTING FASTENERS, TERMINAL CONNECTORS ARE IN GR POWER  
SCOPE OF SUPPLY  
12. DRY CREEP DISTANCE BETWEEN TERMINAL TO GROUND 3000 MM APPROX  
BETWEEN TERMINAL 3000 mm  
13. CABLE GLANDS ARE GR POWER SCOPE OF SUPPLY

NOMINAL SYSTEM VOLTAGE	400 V <sub>rms</sub>
HIGH VOLTAGE	420 V <sub>rms</sub>
P.F. WITHSTAND VOLTAGE	520 / 610 V <sub>rms</sub>
IMPULSE WITHSTAND VOLTAGE	1425 / 1428 V <sub>pk</sub> PEAK
SWITCHING IMPULSE WITHSTAND VOLTAGE	1425 / 1428 V <sub>pk</sub> PEAK
CORONA EXTENSION DISTANCE	1050 / 500 V <sub>pk</sub> PEAK
CORONA EXTENSION VOLTAGE	1050 / 500 V <sub>pk</sub> PEAK
R <sub>V</sub>	100 Mega Volts at 296 kV rms

**NET WEIGHT OF THE ISOLATOR  
EXCLUDING INSULATOR**

2000 A. TRIPLE POLE, HCB ISOLATOR WITH ONE EARTH SWITCH		NO. OF SHEETS	10
DATE	18-11-2003	BY	
DRAWN		CHECKED	
APPROVED			

**POWER SWITCHGEAR LTD.,**  
METLA HYDERABAD-500 055 INDIA



DIMENSIONS																											
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	J1	X1
280	3650	120	200	180	2570	300	1000	115	635	720	540	7000	360	4320	4770	3400	620	6000	3750	200	525	2550	250			500	385

Sl. No.	DESCRIPTION	MATERIAL	QTY /SET
1.	FIXED CONTACT ASSEMBLY (32 x 4 mm)	HDEC	6 Nos
2.	PAD FOR TERMINAL CONNECTOR FIXING	HDEC	6 Nos
3.	MOVING CONTACT ASSEMBLY (38 OD x 30 ID)	HDEC	3 Nos
4.	INSULATOR STACK (IEC / BIRLA NGK)	SOLID CORE TYPE GI PIPE CLASS "B"	9 Nos
5.	PHASE COUPLING (Ø 25)	M.S. HDG	2 Nos
6.	ELEVATOR CHANNEL (125 x 65 x 5 mm THK.)	M.S. HDG	6 Nos
7.	BASE CHANNEL (100 x 50 x 5 mm THK.)	M.S. HDG	3 Nos
8.	ROTATING STOOL BASE WITH LEVER ARM & CLAMP	M.S. HDG	3 Nos
9.	UNIVERSAL JOINT ARRANGEMENT	M.S. HDG	1 No
10.	DOWN OPERATING PIPE (Ø50)	GI PIPE CLASS "B"	1 No
11.	OPERATING MECHANISM (MANUAL, REGULATION GEAR)	M.S. HDG	1 No
12.	SUPPORTING STRUCTURE (114 OD 4.5 THK)	ERW M.S PIPE HDG	1 Set
13.	SUPERVISION FOR PADLOCK	M.S. HDG	1 No
14.	OPERATING LEVER (10 THK.)	M.S. HDG	6 Nos
15.	RAIN HOOD (1mm THK)	M.S. HDG	6 Nos
16.	ARCING HORNS (Ø10)	M.S. HDG	6 Nos
17.	FIXED CONTACT SUPPORT PLATE	M.S. HDG	6 Nos
18.	EARTHING PADS (M12)	M.S. HDG	1 No
19.	OPERATING MECHANISM FOR EARTH SWITCH (MANUAL)	GI PIPE "CLASS R"	1 No
20.	DOWN OPERATING PIPE FOR EARTH SWITCH	GI PIPE "CLASS B"	1 No
21.	AUXILIARY TANDEM PIPE FOR EARTH SWITCH	GI PIPE "CLASS B"	1 No
22.	EARTH SWITCH TANDEM PIPE (25 NB)	HDEC	3 Nos
23.	EARTH SWITCH MOVING CONTACT (38 OD 3.15 THK)	CU. FLAT	3 Nos
24.	EARTH SWITCH FIXED CONTACT (25 x 4 mm)	GI PIPE "CLASS B"	1 No
25.	MECHANICAL INTER LOCK BETWEEN MAIN SWITCH & EARTH SWITCH	GI PIPE "CLASS B"	1 No
26.	AUXILIARY TANDEM PIPE	GI PIPE "CLASS B"	1 No

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS
2. ALL FERROUS PARTS ARE HOT DIP GALVANIZED ( 87 microns minimum)
3. ALL NON FERROUS CONTACT PARTS ARE SILVER PLATED (10 TO 15 MICRONS)
4. THE INDICATED DIMENSIONS ARE SUBJECTED TO THE MANUFACTURING TOLERANCE:  
UP TO 50 mm ---+3%,-51 TO 100 mm ---+2%,-101 TO 300 mm ---+1%,-ABOVE 300 mm ---+0.5%,-
5. SHORT TIME CURRENT RATING 25 KA rms. FOR 3 Sec.
6. MIN. CREEPAGE DISTANCE 900 mm
7. APPLICABLE STANDARD : IS 9821 PART 1 TO V
8. MAIN ROTATING POST HAVING 2 Nos. 50 mm ID TAPERED ROLLER BEARINGS
9. 1 No. EMERGENCY HANDLE
10. G1 : GALVANIZED IRON; M.S. : H08 : MILD STEEL HOT DIP GALVANIZED

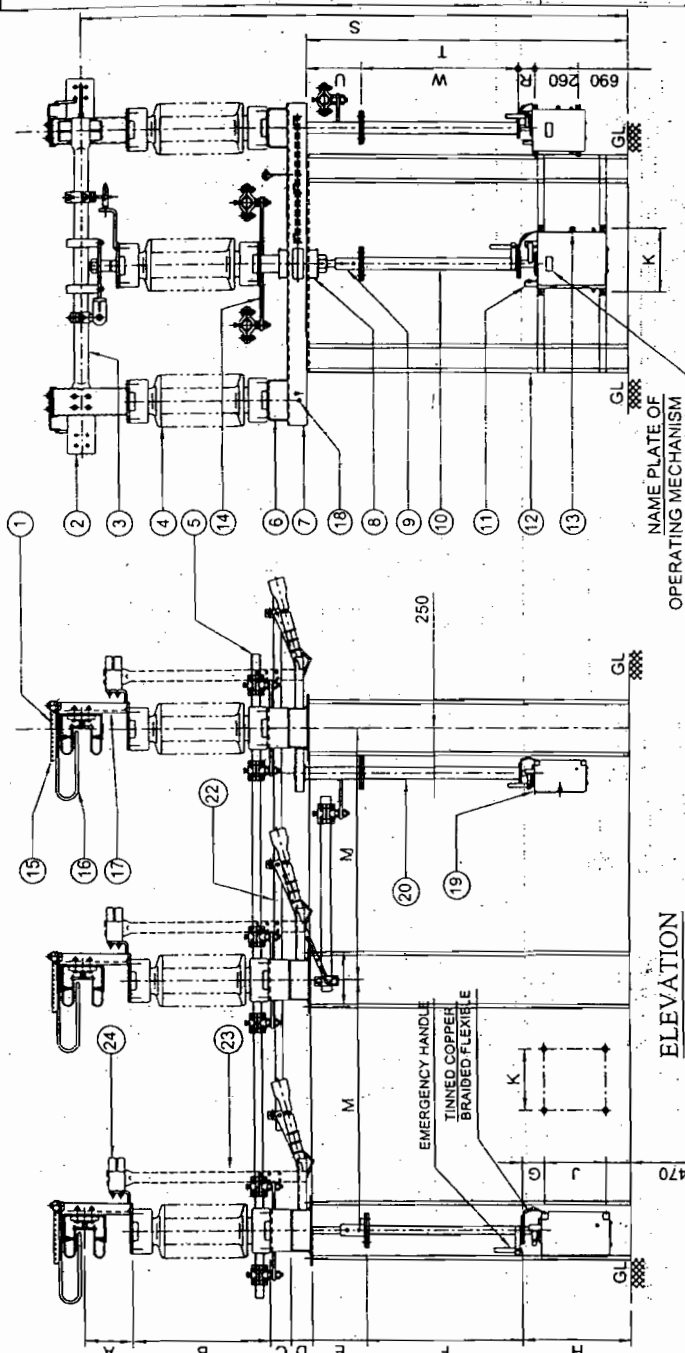
WEIGHT:

**NET WEIGHT OF THE ISOLATOR**

NET WEIGHT OF THE ISOLATOR :  
INCLUDING INSULATOR : 0.62 MT (Approx.)

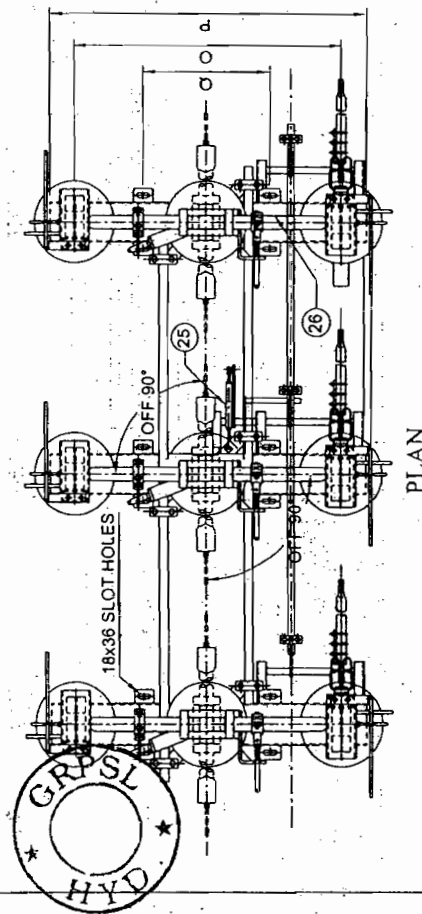
**QUANTITY:**

12 Nos.



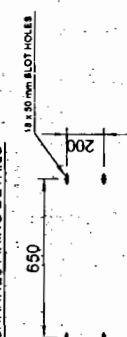
END VIEW

## ELEVATION



## PLAN

### BASE CHANNEL FIXING DETAILS



REVISIONS			
D	C	B	A

TITLE:

0256

33 kV, <sup>2500</sup> A, TP, DB, RT  
ISOLATOR WITH ONE E.S.

SCALE: N.T.S.	( )
DATE	26 - 06 - 2005
DRAWN	E. K. Hoff
CHECKED	A. Ward
APPROVED	A. Ward

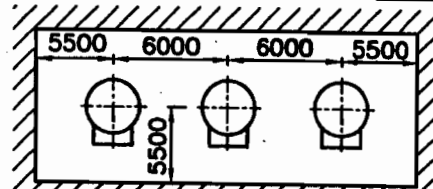
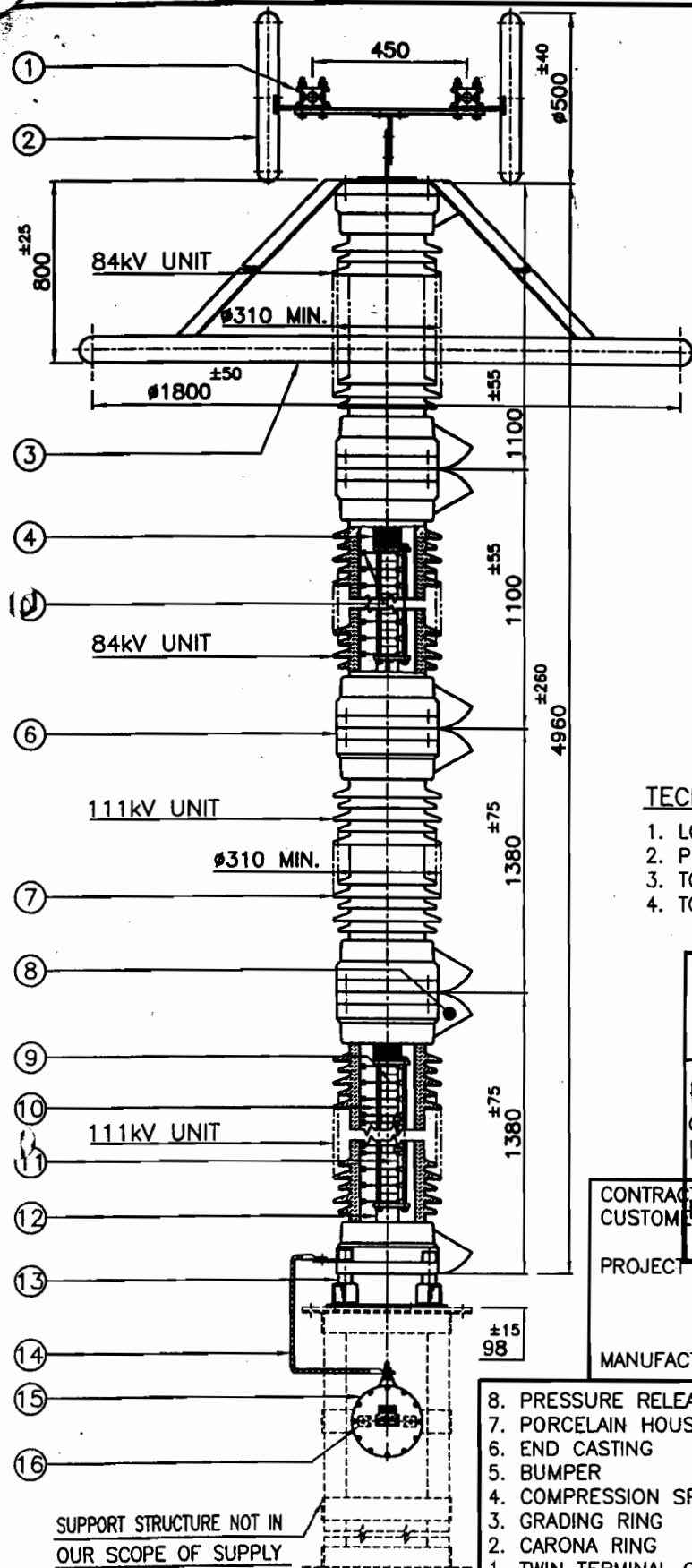
## DIMENSIONS

A	B	C	D	E	F	G	H	I	J	K	M	N	O	P	Q	R	S	T	U	W
175	508	65	60	175	1617	180	1100	450	400	1500	200	915	1075	650	150	3700	2892	175	1617	

**GR POWER SWITCHGEAR LTD.,**  
NEEDIMETLA HYDERABAD-500 055 INDIA

**DRG.NO:**

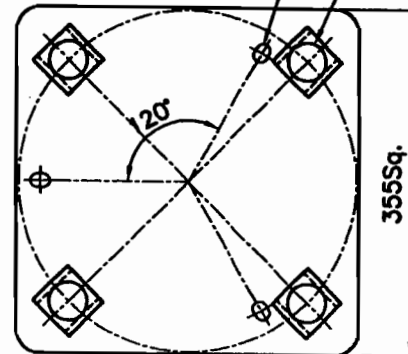
3. CR 415.05



MINIMUM CLEARANCES FROM EARTHED  
OBJECTS AND BETWEEN PHASES

4-INSULATORS ON PCD 350<sup>±6</sup> AT 90°

3-SLOTS 14x20 ON PCD 305



ARRESTER BASE MOUNTING DETAILS

#### TECHNICAL PARAMETERS :-

1. LONG DURATION DISCHARGE CLASS : 3
2. PRESSURE RELIEF CLASS : 40kA (RMS)
3. TOTAL CREEPAGE DISTANCE : 10500mm (MIN.)
4. TOTAL WEIGHT : 600Kg.±10%

 Signature Designation Date	I. Approved II. Approved with comments/The Sub-Contractor can go ahead with manufacture subject to incorporation of comments III. Not Approved Revise and Resubmit For Reference only.
	Approved by Designation Date

CONTRACTOR : BHARAT HEAVY ELECTRICALS LIMITED  
 CUSTOMER : MAHARASHTRA STATE ELECTRICITY TRANSMISSION CO. LTD.  
 PROJECT : 420kV, 50MVAR on/off type controlled shunt reactor (CSR) as line reactor on Dhule-Sardar Sarovar double circuit lines at 400kV Dhule Sub-station  
 MANUFACTURER : OBLUM ELECTRICAL INDUSTRIES PVT. LTD.,

- |                            |   |
|----------------------------|---|
| 8. PRESSURE RELEASE PORT   | 16. EARTHING AND FIXING TERMINATION                           |
| 7. PORCELAIN HOUSING       | 15. SURGE MONITOR   |
| 6. END CASTING             | 14. CONNECTING LEAD (35.94mm Insulated Al Cable, 3.5m length) |
| 5. BUMPER                  | 13. INSULATING BASE   |
| 4. COMPRESSION SPRING      | 12. SPACER  |
| 3. GRADING RING            | 11. ZnO. ELEMENT  |
| 2. CARONA RING             | 10. INSULATING TIE ROD  |
| 1. TWIN TERMINAL CONNECTOR | 9. CONTACT ELECTRODE  |

TITLE:  
390kV-10kA METAL OXIDE SURGE ARRESTER

MATL: ALL M.S. PARTS ARE HOTDIP GALVANISED

REV. No.: 0

DATE: 21/08/2008

DRG. No.: G-ZAP-390SM

DRN. BY: D. Kumar

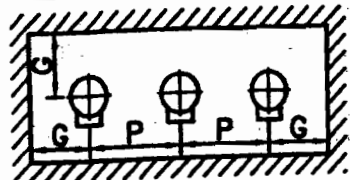
SCALE: N.T.S.

APPRD. BY: om

ALL DIMENSIONS ARE IN m.m.

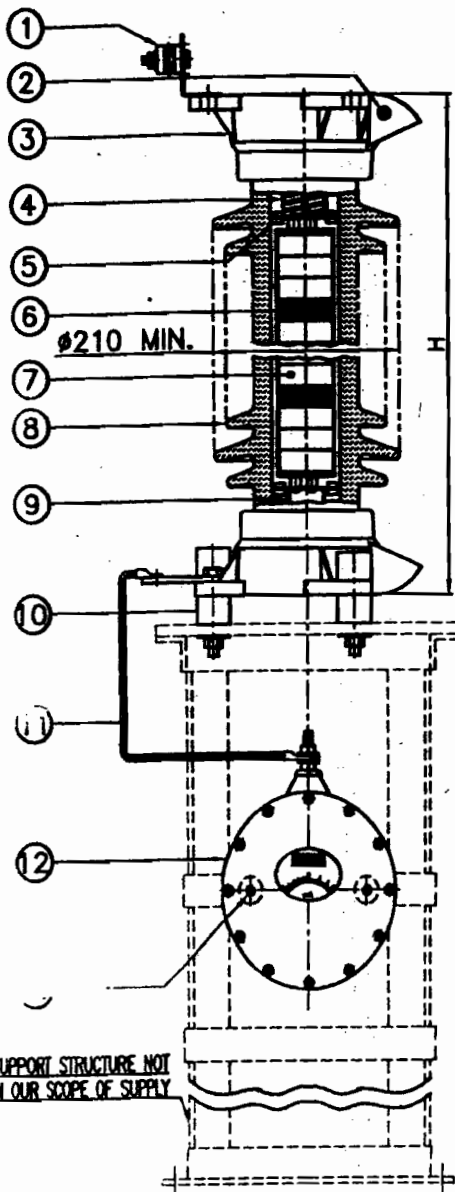
OBLUM ELECTRICAL INDUSTRIES PRIVATE LIMITED  
 A-16&17 ASSISTED PRIVATE INDUSTRIAL ESTATE  
 BALANAGAR  
 HYDERABAD - 37 A.P. (INDIA)





MINIMUM CLEARANCE FROM EARTHED OBJECTS AND BETWEEN PHASES

ARRESTER MODEL	ARRESTER RATING-KV (U <sub>r</sub> )	DISCHARGE CURRENT-KA (I <sub>n</sub> )	L.D. CLASS	HEIGHT-H	MOUNTING CLEARANCES	
					PHASE TO PHASE - P	PHASE TO GROUND-G
ZAB-3	3	10	3	295 <sup>±15</sup>	550	450
ZAB-4.5	4.5	10	3	295 <sup>±15</sup>	550	450
ZAB-6	6	10	3	295 <sup>±15</sup>	550	450
ZAB-7.2	7.2	10	3	360 <sup>±20</sup>	650	500
ZAB-9	9	10	3	360 <sup>±20</sup>	650	500
ZAB-12	12	10	3	360 <sup>±20</sup>	650	500
ZAB-18	18	10	3	450 <sup>±25</sup>	950	700
ZAB-21	21	10	3	450 <sup>±25</sup>	950	700
ZAB-24	24	10	3	450 <sup>±25</sup>	950	700
ZAB-30	30	10	3	535 <sup>±25</sup>	950	700
ZAB-36	36	10	3	635 <sup>±30</sup>	1250	800
ZAB-39	39	10	3	635 <sup>±30</sup>	1250	800
ZAB-42	42	10	3	635 <sup>±30</sup>	1250	800



APPROVED

Signature: *[Signature]*

Designation: *[Designation]*

Date: *18/9/08*

3-INSULATORS ON PCO-226±6

SHABAT HEAVY ELECTRICALS LIMITED

Transmission Business Group

Cat - II

### ARRESTER BASE MOUNTING DETAILS

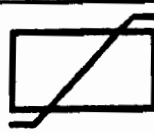
13. EARTHING & FIXING TERMINATION
12. SURGE MONITOR
11. CONNECTING LEAD  
(35 Sq mm INSULATED AL CABLE 3.5M LENGTH)
10. INSULATING BASE
9. PIPE SPACER
8. ARRESTER HOUSING
7. ZnO. ELEMENT
6. HEAT SINK
5. BUMPER
4. COMPRESSION SPRING
3. END CASTING
2. PRESSURE RELEASE PORT
1. TERMINAL CLAMP

TITLE:  
**METAL OXIDE SURGE ARRESTERS**

MATL: ALL M.S. PARTS ARE HOT DIP GALVANISED  
REV. No.: 0 DATE: 23/02/2008

DRG. No.: G-ZAB-342083SM DRN. BY: *[Signature]*

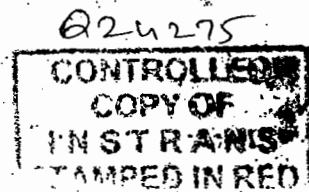
OBELUM ELECTRICAL INDUSTRIES PRIVATE LIMITED  
A-16&17 ASSISTED PRIVATE INDUSTRIAL ESTATE  
BALANAGAR  
HYDERABAD - 37 A.P. (INDIA)



N.T.S. APPRD. BY: *[Signature]*

ALL DIMENSIONS ARE IN m.m.





Rev. 1 - Busbar hole size changed 18 TO 14 Dt. 9-9-97

TOL.	0-30	30-120	120-1000
	± 0.5	± 1.5	± 3

<del>6</del>	<del>200</del>	<del>280</del>	<del>350</del>	<del>390</del>	<del>280</del>	<del>170</del>
<del>5</del>	<del>180</del>	<del>260</del>	<del>330</del>	<del>370</del>	<del>260</del>	<del>150</del>
<del>4</del>	<del>100</del>	<del>180</del>	<del>250</del>	<del>290</del>	<del>180</del>	<del>70</del>
<del>3</del>	<del>120</del>	<del>200</del>	<del>270</del>	<del>310</del>	<del>200</del>	<del>90</del>
<del>2</del>	<del>140</del>	<del>220</del>	<del>290</del>	<del>330</del>	<del>220</del>	<del>110</del>
<del>1</del>	<del>160</del>	<del>240</del>	<del>310</del>	<del>350</del>	<del>240</del>	<del>130</del>
ITEM NO	A	B	C	D	E	F

**intrans** BANGALORE\_560038

CURRENT  
TRANSFORMER

86	23/9	23/9	23/9
----	------	------	------

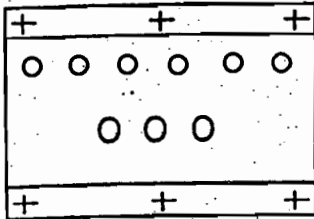
ALL DIMENSIONS ARE IN MMS. AND  
ARE SUBJECT TO MINOR CHANGES

DRG. NO. 0 229 R1

### SCALE

N.T.S

TOTAL Wt -100 kgs (Approx)  
SEC TERMINAL M6 STUD  
MIN. DISTANCE 35MM

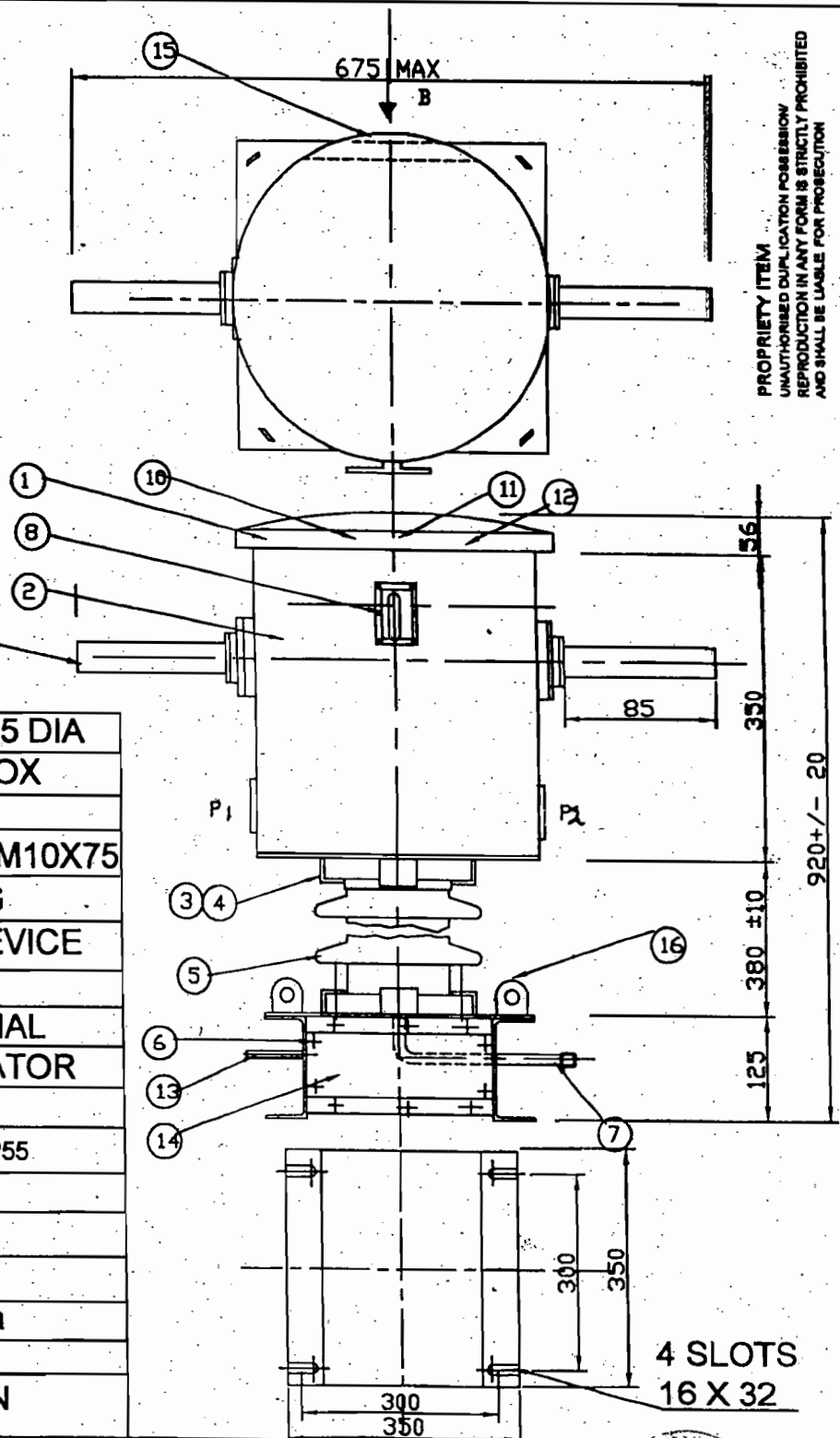


VIEW -B

Q24225  
**CONTROLLED**  
COPY OF  
INSTRANS  
TAMPED IN RED

0 - 30	30-120	120-1000
±1.5	±2	±3

16	LIFTING HOOKS 25 DIA
15	SEC TERMINAL BOX
14	NAME PLATE
13	EARTHING BOLT M10X75
12	OIL FILLING PLUG
11	PRE RELEASE DEVICE
10	TOP COVER
9	PRIMARY TERMINAL
8	OIL LEVEL INDICATOR
7	DRAIN PLUG
6	BASE SUITABLE FOR IP55
5	BUSHING
4	CLAMP
3	RUBBER PAD
2	TOP TANK 320 dia
1	DOMES COVER
S.NO	DESCRIPTION



PROPRIETY ITEM  
UNAUTHORISED DUPLICATION PROHIBITED  
REPRODUCTION IN ANY FORM IS STRICTLY PROHIBITED  
AND SHALL BE LIABLE FOR PROSECUTION

R1: HT REVISED, DT. 24.04

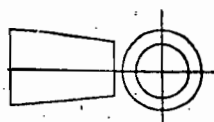
DRG REDRAWN

All Dimensions in MM

Date: 4.2.04

Dm by: VRS  
Date:Chd by:   
Date: 23/9/04Apr by:   
Date: 23/9/04

**Instrans**  
Bangalore - 560 048



TITLE  
11 KV  
OUTDOOR  
OIL FILLED C.T

DRG NO:  
231M

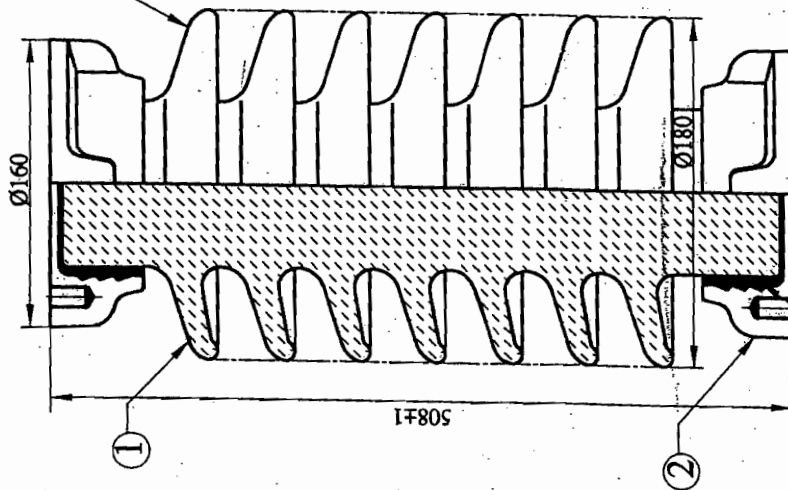
REV

1

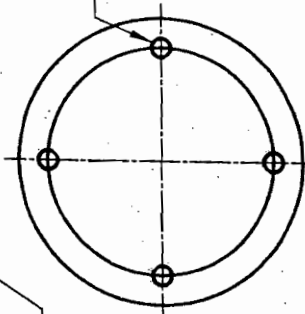
REV  
00  
4 983 06 10200  
DRG No.



INDIA  
MONTH & YEAR



4-M16 (0.5 mm OVERSIZED) x 2 x 22 DEEP  
EQUALLY SPACED ON Ø127±0.5 P.C.D



## NOTES:

1. APPLICABLE STANDARDS IEC:168, IS:2544 & 5350 IN GENERAL
2. TOTAL CREEPAGE DISTANCE mm 900

## 3. MECHANICAL VALUES

- a. CANTILEVER STRENGTH kN/kgf 4.5/450
- b. TENSILE STRENGTH kN/kgf 40/4000
- c. TORSIONAL STRENGTH kN-m/kgf-m 2.5/250
- d. COMPRESSION STRENGTH kN/kgf 90/9000

## 4. ELECTRICAL VALUES

## POWER FREQUENCY WITHSTAND VOLTAGE

- a. DRY kV 80
- b. WET kV 75
5. IMPULSE WITHSTAND VOLTAGE kVp 170
6. VISIBLE DISCHARGE VOLTAGE kV 27

7. PROFILE PARAMETERS AS PER IEC:815

**CONTROLLED COPY** Approved

Superintending Engineer (D&S)  
MSETCL, Prakashganga, Mumbai - 400061.

3	BINDING MATERIAL	PORTLAND CEMENT	-	-
2	CAP	M.C IRON	2.5	2
1	SHELL	PORCELAIN	11	1
ITEM	DESCRIPTION	MATERIAL	UNIT	QTY

 <b>BHARAT HEAVY ELECTRICALS LTD.</b> ELECTROPORCELAIN DIVISION BANGALORE - 560 012	GRADE OF TOL DIM C/M/T	SCALE N.T.S	WEIGHT (kg) 17 (Approx)	REF TO ASSY.DRG	ITEM No.	REV.
	DEPT CODE	GRADE OF TOL DIM C/M/T	SCALE N.T.S	WEIGHT (kg) 17 (Approx)	REF TO ASSY.DRG	ITEM No.
	TITLE 36 kV SOLID CORE POST INSULATOR			CARD CODE	DRAWING No.	REV.
	DRAWING No. 4 983 06 10200			REV. 00	No. OF SHEETS	

SIGN AND DATE		INVENTORY No.	
REV	DATE	REV	DATE
ALTERED	CHECKED	ALTERED	CHECKED
REV	DATE	REV	DATE
ALTERED	CHECKED	ALTERED	CHECKED

FERROUS PARTS ARE HOT-DIP GALVANIZED (EXCEPT FEMALE THREADS) AND TEST CONFORM TO IS:2633/IEC-383/BS 729 PORCELAIN BROWN GLAZED	
--	--

**NOTES :-**

- CUSTOMER TO ADVISE ACCEPTANCE

FINISH 1:- (POWDER COATED, PLAIN FINISH)

1. EXTERIOR 1:- LIGHT GREY TO SHADE NO. 631 OF IS: 5, SEM-GLOSS.

2. INTERIOR 1:- LIGHT GREY TO SHADE NO. 631 OF IS: 5, SEM-GLOSS.

3. PLINTH 1:- BLACK, SEM-MATT

4. COLOUR OF MIMC PAINTED ON FRONT PANEL (AS PER IS:11954-1987)

5. 400KV - SIGNAL RED TO SHADE NO. 537 OF IS: 5

6. 23KV - OLIVE GREEN TO SHADE NO. 220 OF IS: 5

7. 13KV - SEA GREEN TO SHADE NO. 217 OF IS: 5

8. EARTH - BLACK

9. ALL INSTRUMENTS, METERS & RELAYS ETC. MOUNTED ON FRONT PANEL ARE FLUSH MOUNTING TYPE.

10. FUSES, LINKS, E.LINKS, NO. OF T.B.s. WIRING ETC. AS PER WIRING TABLE.

11. CURBULES ARE SUITABLE FOR IP:31 DEGREE OF PROTECTION TO IS:13047.

12. EARTH BAR - 3 THK. x 60 W TM PLATED COPPER IS PROVIDED AT THE BOTTOM OF THE PANEL ACROSS THE WIDTH & ONE DEPTH OF THE CURBULE.

13. THE CURBULE'S FRONT PANEL IS MANUFACTURED FROM 3 THK C. R. S. SHEET & REST OF THE CURBULE IS FABRICATED FROM 2 THK C. R. S. SHEET.

14. EXPOSED TERMINALS OF ALL FUSES, LINKS, TERMINAL BLOCKS ARE SHROUDED.

15. REAR DOORS ARE CONNECTED TO EARTHBAR WITH GREEN PVC FLEXIBLE WIRE.

16. MAIN CIRCUIT LABEL & DEVICE LABELS ARE BLACK ANODISED ALUMINIUM WITH NATURAL WHITE ENGRAVING, PROVIDED ON FRONT & REAR OF THE DEVICE. LABELS FIXED TO THE PANEL WITH SCREWS AND NUTS, ENGRAVINGS AS PER THIS DRAWING.

17. TERMINAL BLOCKS ARE CLIP-ON TO CHANNEL. SCREW DRIVER OPERATED STUD TYPE, DISCONNECTED TYPE FOR CT & PT CIRCUITS, NON-DISCONNECTING TYPE FOR REST OF THE CIRCUITS. DISCONNECTING TERMINAL BLOCKS SUITABLE FOR TAKING TWO LOGGED WIRES WITH CONDUCTOR CROSS SECTION OF UP TO 6 SQUARE MM SIZE.

18. NON-DISCONNECTING TERMINAL BLOCKS SUITABLE FOR TAKING TWO LOGGED WIRES WITH CONDUCTOR CROSS SECTION OF UP TO 4 SQUARE MM SIZE.

19. PANEL WIRING 1:- PVC INSULATED, 850V GRADE STRANDED COPPER CONDUCTOR WIRE WITH CONDUCTOR CROSS SECTION AS UNDER :

20. 2.6 SQUARE MM FOR CT, PT & EARTH CIRCUITS

21. 0.5 SQUARE MM FOR ALARM CIRCUITS

22. 1.5 SQUARE MM FOR REST OF THE CIRCUITS.

23. WIRE TERMINATIONS 1:- USING SOLDERLESS CRIMPING LUGS.

24. COLOUR OF WIRES 1:- 1 PHASE AC CIRCUIT (PHASE & NEUTRAL) : BLACK  
DC CIRCUITS (POSITIVE & NEGATIVE) : GREY  
EARTH : GREEN

25. 3 PHASE CT & PT CIRCUITS :

26. A PHASE : RED

27. B PHASE : YELLOW


28. C PHASE : BLUE

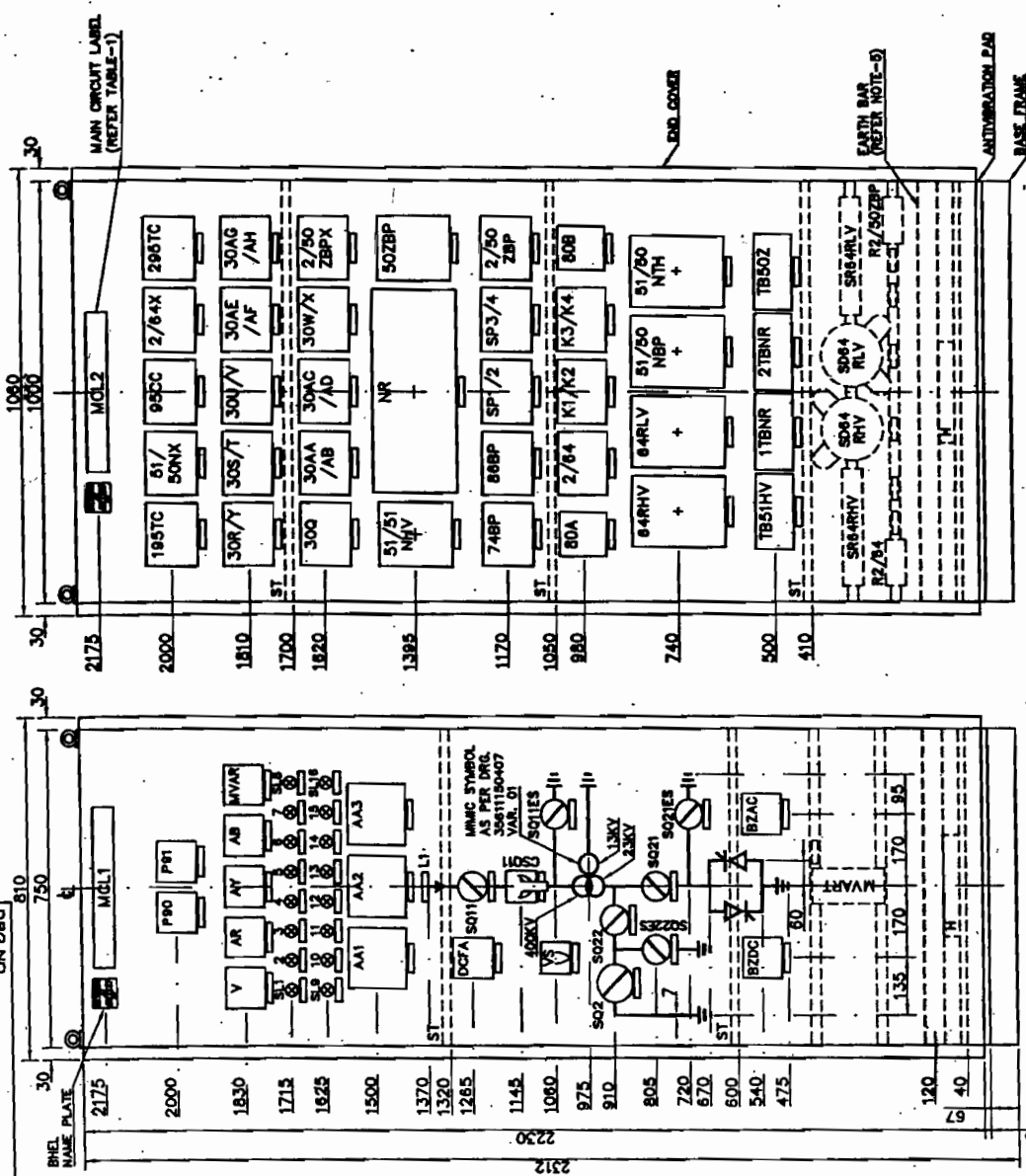
29. NEUTRAL : BLACK

30. FOR IDENTIFICATION OF WIRES NUMBERED FERRULES WITH BLACK LETTER/DIGIT OVER WHITE SURFACE AT BOTH ENDS OF WIRE ARE PROVIDED.

TABLE -- 1 MAIN CIRCUIT LABEL (MCL)	
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10
11	11
12	12
13	13
14	14
15	15
16	16
17	17
18	18
19	19
20	20
21	21
22	22
23	23
24	24
25	25
26	26
27	27
28	28
29	29
30	30
31	31
32	32
33	33
34	34
35	35
36	36
37	37
38	38
39	39
40	40
41	41
42	42
43	43
44	44
45	45
46	46
47	47
48	48
49	49
50	50
51	51
52	52
53	53
54	54
55	55
56	56
57	57
58	58
59	59
60	60
61	61
62	62
63	63
64	64
65	65
66	66
67	67
68	68
69	69
70	70
71	71
72	72
73	73
74	74
75	75
76	76
77	77
78	78
79	79
80	80
81	81
82	82
83	83
84	84
85	85
86	86
87	87
88	88
89	89
90	90
91	91
92	92
93	93
94	94
95	95
96	96
97	97
98	98
99	99
100	100

[illegible]

TYPE OF PRODUCT OR NAME OF PROJECT			<b>MAHARASHTRA STATE ELECTRICITY TRANSMISSION CO. LTD.</b> 80 MVAR, 400 KV CONTROLLED SHUNT REACTOR AT KARAD SUBSTATION	
<b>BHARAT HEAVY ELECTRICALS LIMITED</b> <b>BHOPAL</b>			CARD CODE NO.	REV. NO.
<b>GENERAL ARRANGEMENT OF CONTROL &amp; PROTECTION PANELS</b>			NO. OF SHEETS	08
SCALE: WEIGHT (IN KG) 1:10 1:20 1:40 1:80 1:160 1:320 1:640 1:1280 1:2560 1:5120 1:10240 1:20480 1:40960 1:81920 1:163840 1:327680 1:655360 1:1310720 1:2621440 1:5242880 1:10485760 1:20971520 1:41943040 1:83886080 1:167772160 1:335544320 1:671088640 1:1342177280 1:2684354560 1:5368709120 1:10737418240 1:21474836480 1:42949672960 1:85899345920 1:171798691840 1:343597383680 1:687194767360 1:1374389534720 1:2748779069440 1:5497558138880 1:10995116277760 1:21990232555520 1:43980465111040 1:87960930222080 1:175921864444160 1:351843728888320 1:703687457776640 1:1407374915533280 1:2814749831066560 1:5629499662133120 1:11258999324266240 1:22517998648532480 1:45035997297064960 1:90071994594129920 1:180143989188259840 1:360287978376519680 1:720575956753039360 1:1441151913506078720 1:2882303827012157440 1:5764607654024314880 1:11529215308048629760 1:23058430616097259520 1:46116861232194519040 1:92233722464389038080 1:184467444928778076160 1:368934889857556152320 1:737869779715112304640 1:1475739559430224609280 1:2951479118860449218560 1:5902958237720898437120 1:11805916475441796874240 1:23611832950883593748480 1:47223665901767187496960 1:94447331803534374993920 1:188894663607068749987840 1:377789327214137499975680 1:755578654428274999951360 1:1511157308856549999022720 1:3022314617713099998045440 1:6044629235426199996090880 1:12089258470852399992181760 1:24178516941704799984363520 1:48357033883409599968727040 1:96714067766819199937454080 1:19342813553363839987490880 1:38685627106727679974981760 1:77371254213455359949963520 1:15474250842691071989930880 1:30948501685382143979861760 1:61897003370764287959723520 1:123794006741528575919447040 1:247588013483057151838894080 1:495176026966114303677788160 1:990352053932228607355576320 1:1980704107864457214711152640 1:3961408215728914429422305280 1:7922816431457828858844610560 1:15845632862915657717689221120 1:31691265725831315435378442240 1:63382531451662630870756884480 1:126765062903325261741513768960 1:253530125806650523483027537920 1:507060251613301046966055075840 1:1014120503226602093932110151680 1:2028241006453204187864220303360 1:4056482012906408375728440606720 1:8112964025812816751456881213440 1:16225928456256034502913762426880 1:32451856912512069005827524853760 1:64903713825024138011655049707520 1:129807427650048276023310099415040 1:259614855300096552046620198830080 1:519229710600193104093240397660160 1:1038459421200386208186480795320320 1:2076918842400772416372961590640640 1:4153837684801544832745923181281280 1:8307675369603089665491846362562560 1:16615350739206179330983692725151360 1:33230701478401358661967385450302720 1:66461402956802717323934770900605440 1:132922805913605434447869538001210880 1:265845611827210868895739076002421760 1:531691223654421737791478152004843520 1:106338244730884347558295630400967040 1:212676489461768695116591260801934080 1:425352978923537390233182521603868160 1:8507059578470747804663650432077373120 1:1701411915694149560932730086415474240 1:3402823831388299121865460172830948480 1:6805647662776598243730920345661896960 1:13611295325553196487461840691323793920 1:27222590651106392974923681382647587840 1:54445181302212785949847362765295175680 1:108890362604425571899694725530590351360 1:217780725208851143799389451061180702720 1:435561450417702287598778902122361405440 1:8711				



8208262	1, HS, TH, SKTS, CFL DS	1 EACH
	CS	1 NO.
	0064RHV, S064RLV	1 EACH
	R064RHV, SR64RLV	1 EACH
	2/2/64, R2/S0ZBP	1 EACH

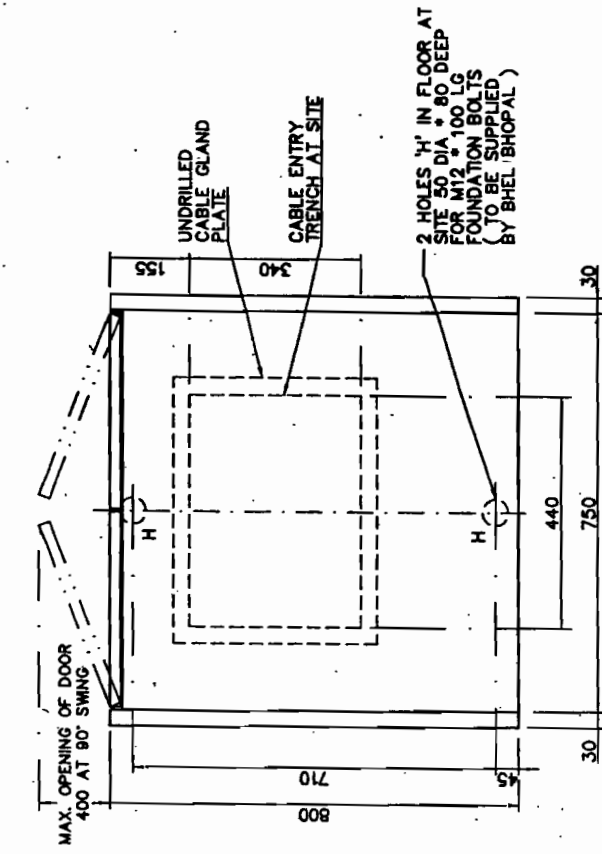
PANEL S. NO.	8208261	H, HS, TH, SKTS, CFL, DS	1 EACH
INTERNAL MOUNTINGS			1 NO.

**STIFFENER'S NOTES:-**  
2 - NOS. STIFFENERS ARE TO BE WELDED AT REAR OF 750 WIDE FRONT PANEL & 3 - NOS. STIFFENERS ARE TO BE WELDED AT REAR OF 1000 WIDE FRONT PANEL AT HEIGHTS MARKED "ST"  
STIFFENERS TO DRG. NO. 35811150300 ITEM - 008 FOR 750 WIDE FRONT PANEL FOR 1000 WIDE FRONT PANEL

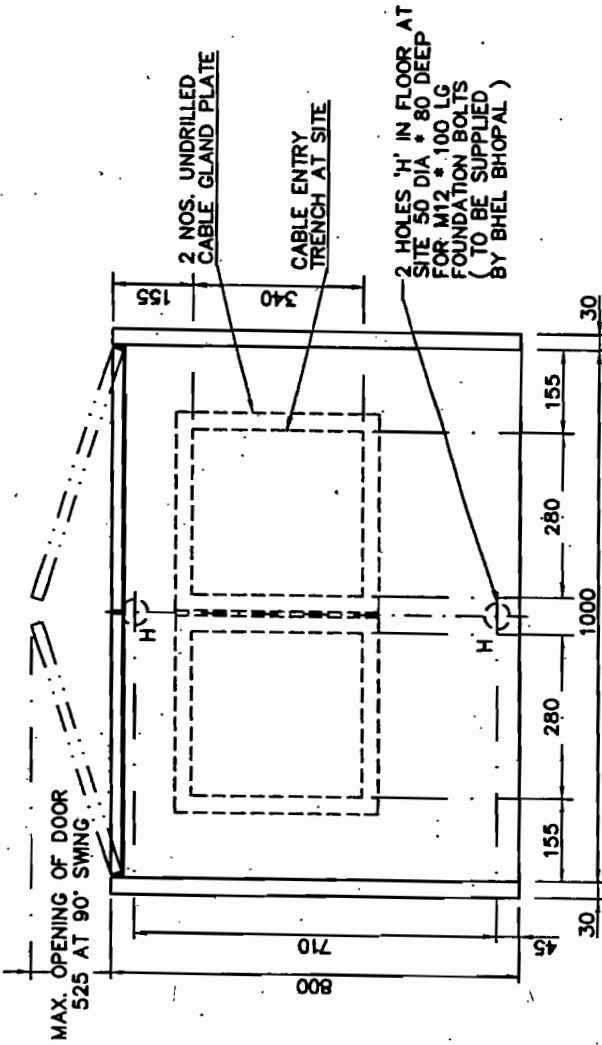
[illegible]

DATE RECEIVED

COPYRIGHT AND CONFIDENTIAL  
THE INFORMATION ON THIS DOCUMENT IS THE PROPERTY OF BHARAT HEAVY ELECTRICALS LIMITED.  
IT MUST NOT BE USED DIRECTLY OR INDIRECTLY IN ANY WAY DETRIMENTAL TO THE INTEREST OF THE COMPANY.



FLOOR PLAN FOR  
PANEL SL NO. 8208261



8208262

Approved

*[Signature]*

Executive Engineer (TKP-II)  
MSETCL, 'Prakashganga', Mumbai - 400051

TYPE OF PRODUCT OR NAME OF PROJECT		MAHARASHTRA STATE ELECTRICITY TRANSMISSION CO. LTD. 80 MW, 400 KV CONTROLLED SHUNT REACTOR AT KARAD SUBSTATION	
Bharat Heavy Electricals Limited Bhopal		Bharat Heavy Electricals Limited Bhopal	
TITLE		GENERAL ARRANGEMENT OF CONTROL & PROTECTION PANELS	
DEPT. CODE		SWE 409	
NO. OF SHEETS		08	
SHEET NO.		04	
SCALE		1:10	
WEIGHT		100gms	
W.O. NO.		87534-T-555-01	
DRG. NO.		3 561 00 5 0841	