

(ALL DIMENSIONS IN mm)

REV	DATE	ALTERED	REV	DATE	ALTERED	ADDITIONAL INFORMATION : STATUS OF DRAWING : DISTRIBUTION OF PRINTS :
		CHECKED			CHECKED	
		APPROVED			APPROVED	

Please

1. DESIGN OF 420 KV, 3150/2000A, 3 PH, HCB, ISOLATOR FOR NORTH KARANPURA STPP (3 X 660MW) IS EXACTLY IDENTICAL TO 420 KV, 3150/2000A, 3 PH, HCB, ISOLATORS SUPPLIED FOR 400/132KV SWITCHYARD EXTENSION AT NABINAGAR TPP
2. DRAWING NOS. 3.HS 2002 01, 01A, 02, 4. HSM 2002 03, 3A, 4. HSE 2002 04, 4.HZ 2002 11, 4. HO 2002 12, 4. HZ 2002 13 ENCLOSED WHICH HAS ALREADY BEEN APPROVED BY NTPC VIDE DOCUMENT NO. 0370-572-PVE-B-345 FOR NABINAGAR TPP
3. REMAINING DRAWING NOS. 4. MS 2310 05, 4. MS 2310 06, 4.ME 2310 07, 4. ME 2310 08, 4. HI 2310 09, 4. Z 2310 10 ARE ATTACHING FOR PROJECT SPECIFIC REQUIREMENT.
4. DATA SHEET NO.0370-572-PVE-B-353 ENCLOSED WHICH HAS ALREADY BEEN APPROVED BY NTPC FOR NABINAGAR TPP

NOA no: CS-4410-001-2-FC-NOA-6127 dated 28.02.14.

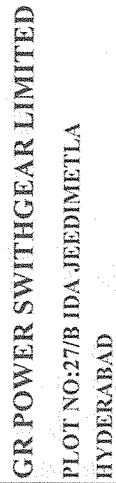


**GR POWER SWITCHGEAR LTD.,
JEEDIMETLA HYDERABAD-500 055 INDIA**

PROJECT	NORTH KARANPURA SUPER THERMAL POWER PROJECT (3x660MW)						
OWNER एन टी सी NTPC	NTPC Limited (A GOVERNMENT OF INDIA ENTERPRISE)						
QBTGM बी एच ई एल BHEL	BHARAT HEAVY ELECTRICALS LTD POWER SECTOR TRANSMISSION BUSINESS GROUP NOIDA P.O. NO : 155 P 162 DATE: 09.11.2015		DEPT CODE M		NAME	SIGN	DATE
				DRN	DRAWN		5/12/2015
				CHD	CHD		5/12
				APPD	APPD		

COVER SHEET FOR ISOLATOR DRAWINGS

						DEPT.	SCALE	DRAWING NO.		
						SIGN		4. Z 2310 00		
						20.11.15		SHEET 1 OF 01		REV. 00



LIST OF 420 KV ISOLATOR DRAWINGS/DOCUMENTS

[illegible]

COMPLIANCE REPORT FOR NABINAGAR STPP SWITCHYARD PACKAGE DRAWINGS AND DOCUMENTS COMMENTS

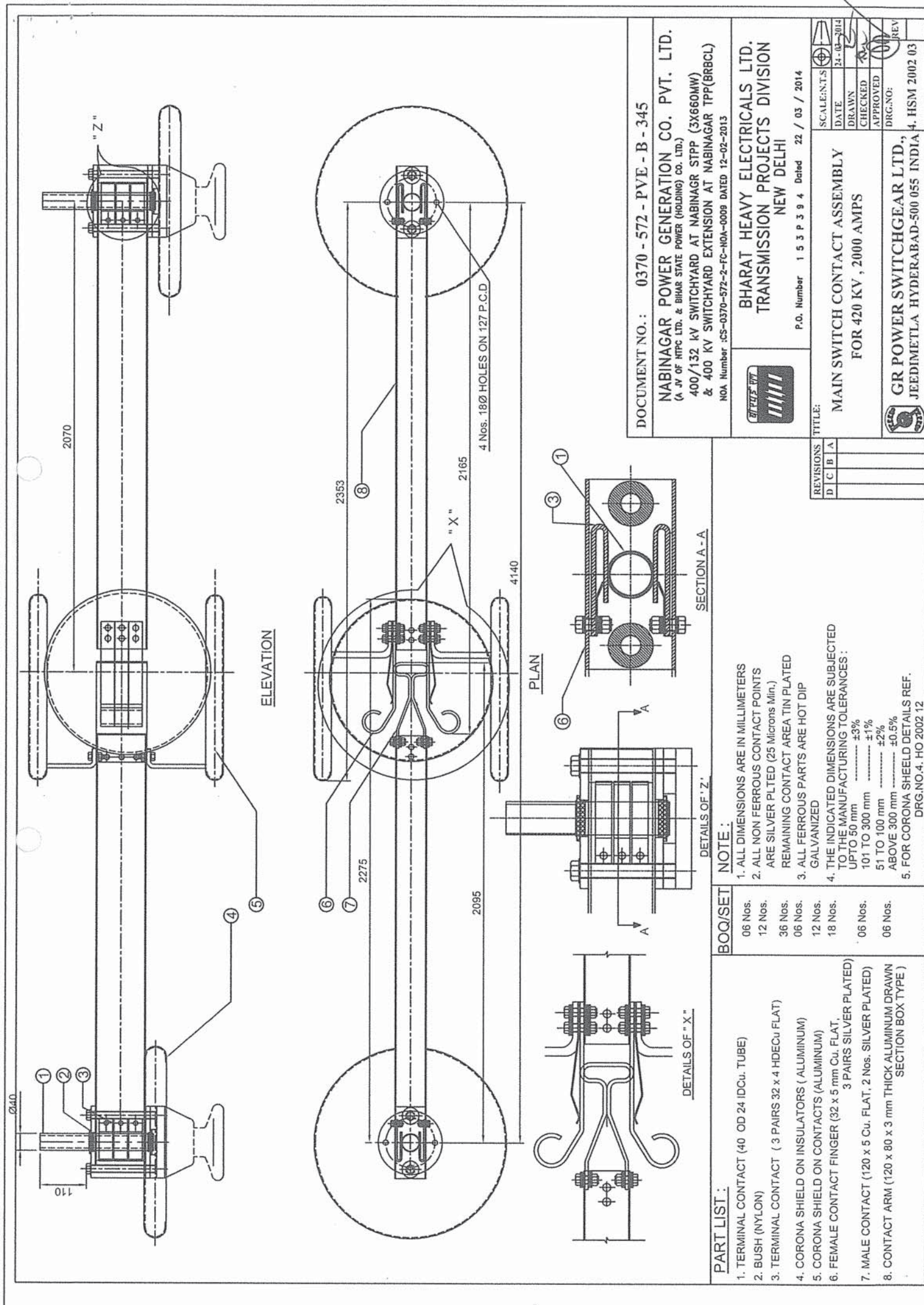
PROJECT:	400/132 kV SWITCHYARD PACKAGE AT NABINAGAR STPP (3X660MW)		
CONTRACT NO.:	NOA Number :CS-0370-572-2-FC-NOA-0009 DATED 12-02-2013		
NTPC DRG. /DOC. NO.:	0370-572-PVE-B-345	REV	2
BHEL DRG./DOC. NO.:		Date of submission of revised documents:	01-08-2014
DRG./DOC TITLE:	400 kV Isolator - Drawings		
Sl. No.	Comments from NTPC	BHEL Compliance	
	List of 400 kV drg & documents sheet-		
1	Quantity shall be as per actual requirements	Quantity given as per actual requirement as per SLD/ layout	
2	Please include the drawings of isolator showing the combination of Earth switches (i.e. male and female contact side) as per layout. Please check w.r.t. Layout/ SLD and furnish accordingly	incorporated as per Layout/SLD	
	DRG. NO. -3 HS 2002 01		
3	Make is subject to NTPC-QA approval	Noted	
	DRG. NO. -3 HS 2002 01(A), 02		
4	Quantity shall be as per actual requirements	Quantity given as per actual requirement as per SLD/ layout	
5	Make is subject to NTPC-QA approval	Noted	
	DRG. NO. -3 HSM2002 05(A)		
6	PI furnish dimensions of gasket	incorporated	
	DRG. NO. -3 HSM2002 06 (A)		
7	All items shall be NTPC QA approved make.	incorporated	
8	terminal no -12,13,14 shall be wired to BCU L/R status	incorporated	
9	terminal no -15 &16, BCU interlock shall be provided.	incorporated	
	DRG. NO. -3 HSM2002 08(A)		
10	All items shall be NTPC QA approved make.	incorporated	
11	DC supply from Isolator shall be provided	incorporated	
12	BCU interlocks shall be provided	incorporated	
	DRG. NO. -3 HZ 2002 10		
13	ENGRAVED LETTERING white in black background	incorporated	
	DRG. NO. -3 HZ 2002 13		
14	PI mention the parts	incorporated	
15	Separate drawings for different current ratings i.e. 2000A and 3150A may be enclosed.	incorporated. Seperate drawings for 2000A & 3150 A enclosed.	
16	M/s BHEL to ensure and submit all the combination of isolators as per layout/ SLD	incorporated	

Certification signature by **Digitally signed**
 skchedwal@ntpcceoc.com By **Kantash** Unknown
 Date: 2014.08.19
 09:52:37 IST
 Reason: CAT I
 Location:
 NTPCEOC

CONTENTS

SL. NO.	DOCUMENT TITLE	PAGES
1.	400 kV, 2000A Isolator drg. as per cover sheet enclosed	15
2.	400 kV, 3150A Isolator drg. as per cover sheet enclosed	14

DOC. TITLE	400kV Isolator - Drawings	
NTPC DOC NO.	0370-572-PVE-B-345	Rev-02
NABINAGAR POWER GENERATION CO. PVT. LTD. (A JV OF NTPC LTD. & BIHAR STATE POWER (HOLDING) CO. LTD.) 400/132 kV SWITCHYARD AT NABINAGR STPP (3X660MW) & 400 KV SWITCHYARD EXTENSION AT NABINAGAR TPP(BRBCL) NOA Number :CS-0370-572-2-FC-NOA-0009 DATED 12-02-2013		
	BHARAT HEAVY ELECTRICALS LTD. TRANSMISSION PROJECTS DIVISION NEW DELHI PO No. 153P394 Dated. 22.03.2014	



DOCUMENT NO.: 0370 - 572 - PVE - B - 345

NABINAGAR POWER GENERATION CO. PVT. LTD.
(A JV OF NTPC LTD. & BIHAR STATE POWER (HOLDING) CO. LTD.)

400/132 kV SWITCHYARD AT NABINAGR STPP (3X660MW)
& 400 KV SWITCHYARD EXTENSION AT NABINAGAR TPP(BR8CL)

NOA Number :CS-0370-572-2-FC-NOA-0009 DATED 12-02-2013

SCALE 1:1

DATE 24-02-2014

DRAWN [Signature]

CHECKED [Signature]

APPROVED [Signature]

DRG.NO. 4. HSM 2002 03

REVISIONS

D	C	B	A

TITLE:

MAIN SWITCH CONTACT ASSEMBLY

FOR 420 KV , 2000 AMPS

P.O. Number 1 5 3 P 3 4 Dated 22 / 03 / 2014

BY [Signature]

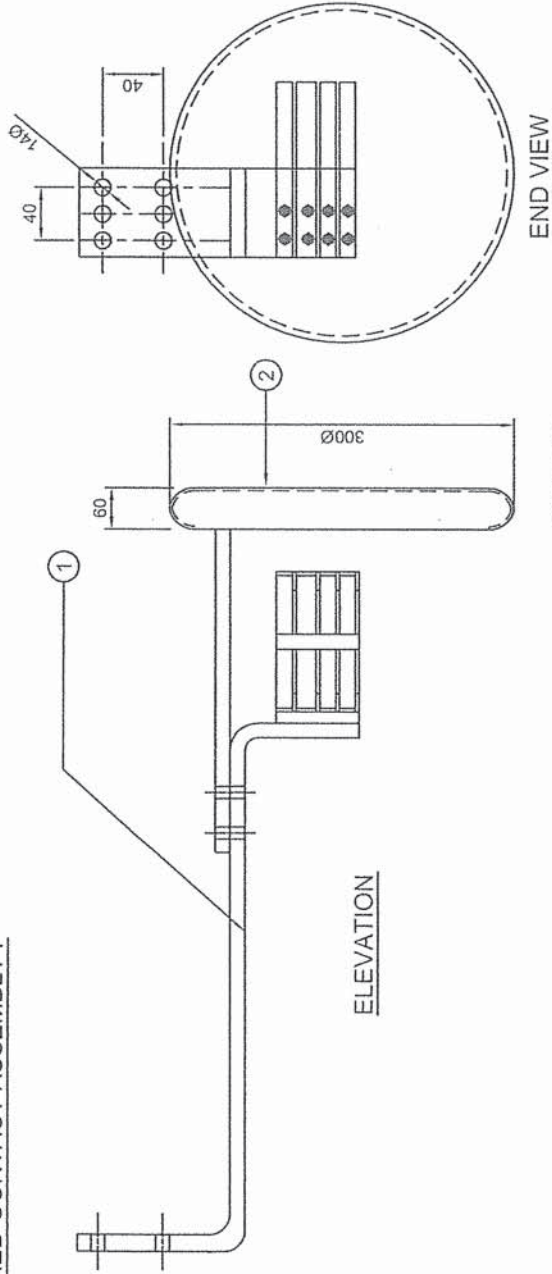
FOR [Signature]

GR POWER SWITCHGEAR LTD.,
JEEDEMETLA HYDERABAD-500 055 INDIA

PART LIST:	BOQ/SET	NOTE:
1. TERMINAL CONTACT (40 OD 24 IDCu. TUBE)	06 Nos.	1. ALL DIMENSIONS ARE IN MILLIMETERS
2. BUSH (NYLON)	12 Nos.	2. ALL NON FERROUS CONTACT POINTS ARE SILVER PLATED (25 Microns Min.)
3. TERMINAL CONTACT (3 PAIRS 32 x 4 HDECu FLAT)	36 Nos.	REMAINING CONTACT AREA TIN PLATED
4. CORONA SHIELD ON INSULATORS (ALUMINUM)	06 Nos.	3. ALL FERROUS PARTS ARE HOT DIP GALVANIZED
5. CORONA SHIELD ON CONTACTS (ALUMINUM)	12 Nos.	4. THE INDICATED DIMENSIONS ARE SUBJECTED TO THE MANUFACTURING TOLERANCES:
6. FEMALE CONTACT FINGER (32 x 5 mm Cu. FLAT, 3 PAIRS SILVER PLATED)	18 Nos.	UP TO 50 mm ----- ±3%
7. MALE CONTACT (120 x 5 Cu. FLAT, 2 Nos. SILVER PLATED)	06 Nos.	101 TO 300 mm ----- ±1%
8. CONTACT ARM (120 x 80 x 3 mm THICK ALUMINUM DRAWN SECTION BOX TYPE)	06 Nos.	51 TO 100 mm ----- ±2%
		ABOVE 300 mm ----- ±0.5%
		5. FOR CORONA SHIELD DETAILS REF. DRG.NO.4. HO 2002 12

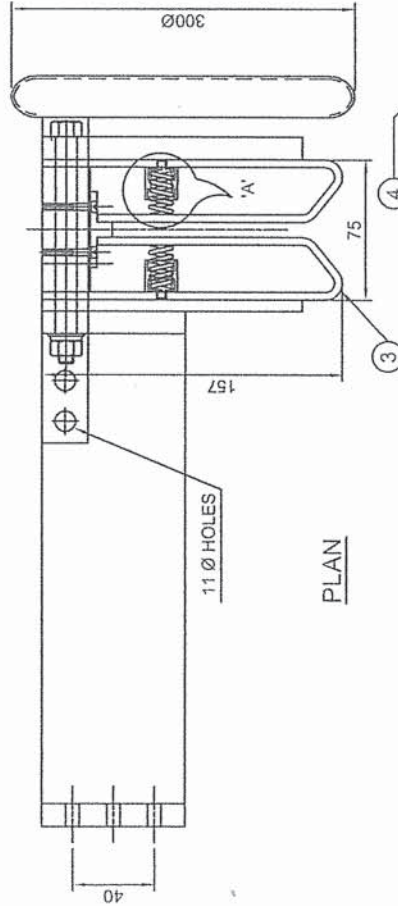
Make is subject to NTPC-QA approval

FIXED CONTACT ASSEMBLY :



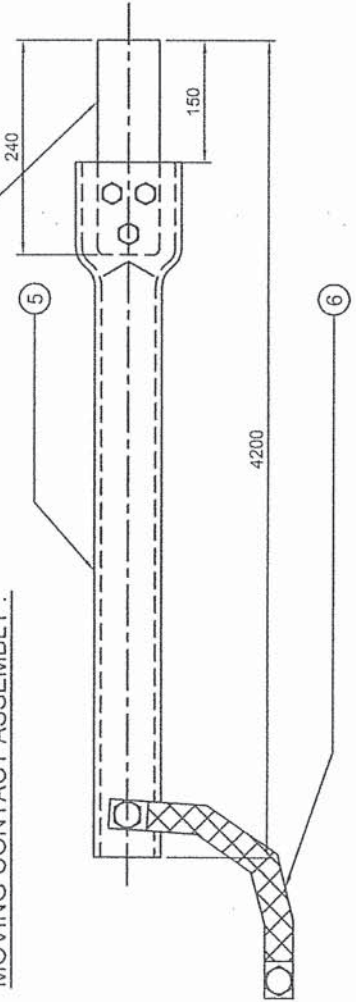
ELEVATION

END VIEW



PLAN

MOVING CONTACT ASSEMBLY :



PART LIST

1. CONTACT HOLDER (75 x 12 Alu. FLAT)
2. CORONA SHIELD (3000, 1mm THIK. Alu. 1 No)
3. CONTACT FINGER (25 x 4 Cu. FLAT 4 PAIRS, SILVER PLATED)
4. MOVING CONTACT (50 x 10 Cu. FLAT, SILVER PLATED)
5. CONTACT ARM (60 OD x 50 ID Alu. TUBE)
6. FLEXIBLE (25 x 3 mm Cu. BRAIDED FLEXIBLE 8NO.S)

NOTES :

1. ALL DIMENSIONS ARE IN MILLIMETERS
2. ALL NON-FERROUS CONTACT POINTS ARE SILVER PLATED (25 MICRONS Min) REMAINING CONTACT AREA TIN PLATED
3. ALL FERROUS PARTS ARE HOT DIP GALVANIZED
4. THE INDICATED DIMENSIONS ARE SUBJECTED TO THE MANUFACTURING TOLERANCES :
 UPTO 50 mm ----- ±3% 51 TO 100 mm ----- ±2%
 101 TO 300 mm ----- ±1% ABOVE 300 mm ----- ±0.5%

DOCUMENT NO. : 0370 - 572 - PVE - B - 345

NABINAGAR POWER GENERATION CO. PVT. LTD.
 (A JV OF NTPC LTD. & BIHAR STATE POWER (HOLDING) CO. LTD.)
 400/132 KV SWITCHYARD AT NABINAGR STPP (3X660MW)
 & 400 KV SWITCHYARD EXTENSION AT NABINAGAR TPP(BR8CL)
 NOA Number :CS-0370-572-2-FC-NOA-0009 DATED 12-02-2013



BHARAT HEAVY ELECTRICALS LTD.
 TRANSMISSION PROJECTS DIVISION
 NEW DELHI

P.O. Number 1 5 3 P 3 9 4 Dated 22 / 03 / 2014

REVISIONS

REV.	DATE	BY	CHKD.	APPD.	REMARKS
A	24-03-2014				REV. as per customer comment

SCALE	DATE	DRAWN	CHECKED	APPROVED	DRG.NO.	REV
1:1	24-03-2014					A

EARTH SWITCH CONTACT ASSEMBLY
 FOR 400 KV

GR POWER SWITCHGEAR LTD.,
 JEEDIMETLA HYDERABAD-500 055 INDIA

PART LIST:

1. OUTPUT FLANGE (10 mm THICK, 14 HOLES)
2. ON/OFF INDICATOR
3. THERMOSTAT (30 TO 85°C RECOMMENDED SETTING 40°)
4. GEAR BOX (SPUR / WORM & WORM SHAFT, RATIO 1 : 630)
5. MOTOR (Ø3, 415 Volts, 1.0 HP MOTOR)
6. CAUTION NAME PLATE
7. LIMIT SWITCH OPERATING CAM
8. OPERATING HANDLE
9. AC CONTROL SWITCH (3 POLE MCB)
10. DC CONTROL SWITCH (2 POLE MCB)
11. PUSH CAP (FOR HIL)
12. HANDLE INTERLOCK (HIL)
13. SCHEMATIC DIAGRAM PLATE
14. OVER LOAD RELAY CUM SINGLE PHASE PREVENTOR (OLR)
15. OPENING CONTACTOR (OC)
16. LOCAL/REMOTE SELECTOR SWITCH(S3, CAM TYPE)
17. OPEN / CLOSE / MANUAL / OFF PUSH BUTTON (PBC / PBC / PBH / EPB)
18. HEATER / POWER SOCKET SWITCHES (HS, PSS)
19. POWER SOCKET (PS)
20. DETACHABLE CABLE GLANDS FIXING PLATE (WITH OUT GLANDS)
21. CUBICLE LAMP HOLDER
22. LIMIT SWITCH (LSO)
23. LIMIT SWITCH (LSC)
24. CUBICLE WITH DOOR (2.5 mm THICK MS. SHEET)
25. AUX. SWITCH (14 NO / 14 NC + (2NO / 2 NC) MBB)
26. DOOR OPERATED LIGHT SWITCH (LS)
27. PROVISION FOR PAD LOCK
28. INTERLOCK CONTACTOR (IC)
29. CLOSING CONTACTOR (CC)
30. RUBBER GASKET (EPDM)
31. TERMINAL BLOCK (STUD TYPE OF ELMEX OR ITS EQUIVALENT)
32. SUPPORT CLEATS (MS WELDED TO BOX)
33. HEATER, 80 WATTS, 240 V
34. MANUAL OPERATING CAP / COVER
35. RAIN SHADE
36. Ø1 AC CONTROL SWITCH (2 POLE MCB)
37. EARTHING TERMINAL 2 Nos. WELDED TO BOX(SUITABLE FOR 50 x 6 G FLAT) WITH M12X40 BOLT WITH CHECKNUT & WASHER

NOTE :

1. ALL DIMENSIONS ARE IN MILLIMETERS
2. CUBICLE WILL BE POWDER COATED WITH RAL : 5012 FOR OUTSIDE AND GLOSSY WHITE FOR INSIDE
3. DEGREE OF PROTECTION IP : 55 AS PER IS : 13947
4. 20% SPARE TERMINALS WILL BE PROVIDED
5. WIRING WILL BE DONE WITH 1100 V. GRADE
 - a) TB1- 1 TO 4 AND TB1 - 23 TO 30 ARE SUITABLE FOR 16 Sq.MM FOR DC/AC POWER SUPPLY (R, Y & B WIRES) REMAINING ALL OTHER TERMINALS ARE SUITABLE FOR 2.5 Sq.MM
6. WEIGHT OF THE BOX : 100 Kg (Approx.)
7. LUBRICATION OF GEARS : NON HARDENED GREASE FILLED GEAR BOX

NTPC DRG. No. 4410 - 001 - 572 - PVE - B - 0103



GR POWER SWITCHGEAR LTD.,
JEEDEMETLA HYDERABAD-500 055 INDIA

PROJECT

NORTH KARANPURA

SUPER THERMAL POWER PROJECT (3x660MW)

OWNER

NTPC Limited

(A GOVERNMENT OF INDIA ENTERPRISE)

DESIGN

SHARAT HEAVY ELECTRICALS LTD

POWER SECTOR

TRANSMISSION & BUSINESS GROUP

P.O. NO.: 155 P.16.2 DATE: 08.11.2015

APPROVED

DATE

20.11.15

20.11.15

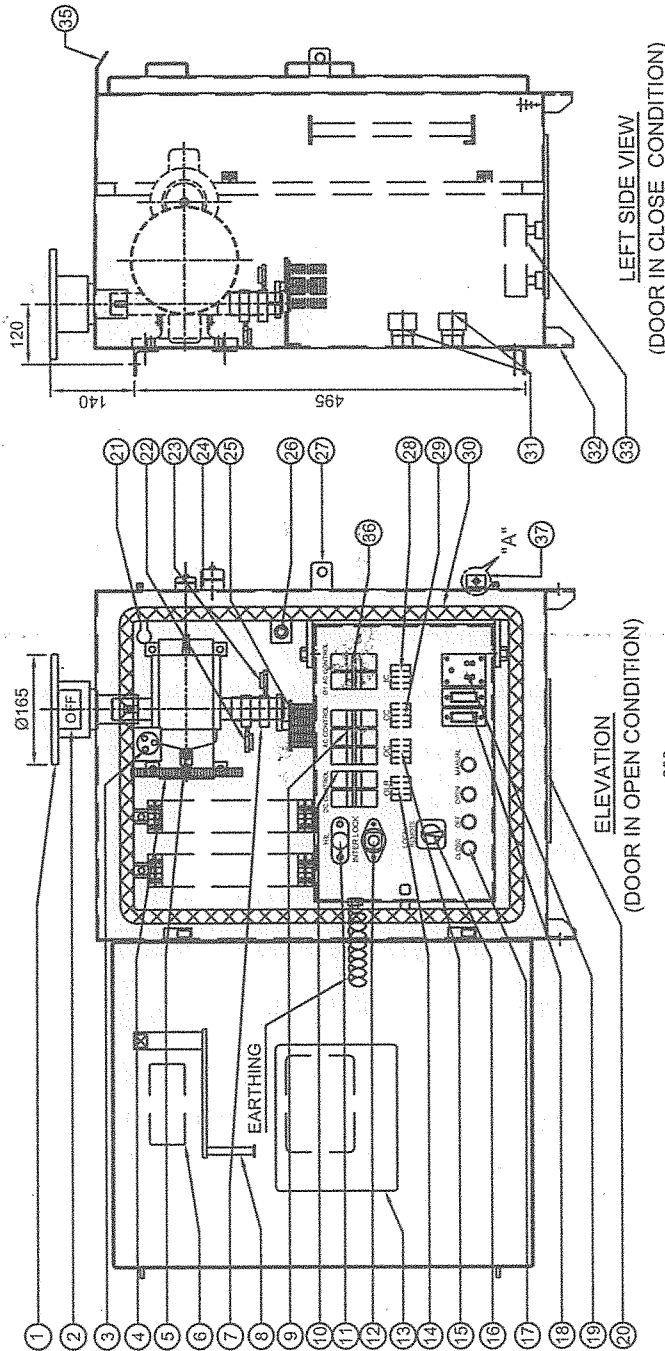
20.11.15

TITLE
MOTOR OPERATING MECHANISM
FOR 400 KV ISOLATOR

DRAWING NO.
4, MS 2310 05

SHEET 1 OF 01

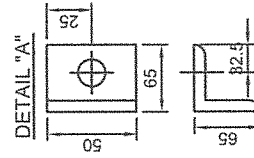
REV. 00



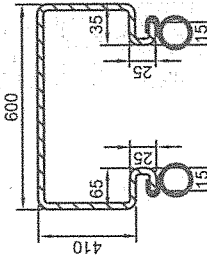
LEFT SIDE VIEW
(DOOR IN CLOSE CONDITION)

ELEVATION
(DOOR IN OPEN CONDITION)

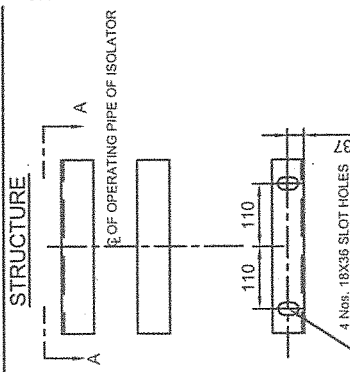
14 Nos. Ø18 HOLES ON 127 P.C.D.



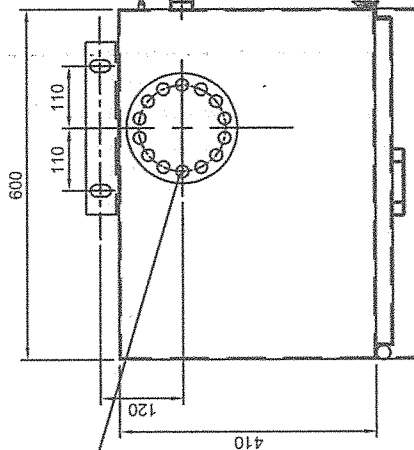
GASKET DETAILS



FIXING DETAILS FOR SUPPORTING STRUCTURE



PLAN



LEGEND	DESCRIPTION	MAKE
HIC	HANDLE INTERLOCK CONTACT	SWITRON/RECOM
M	MOTOR 3Ø 415 V, 10 HP	REMI / ELCON / CGL OR ITS EQUIVALENT
CH	CUBICLE HEATER 80 WATTS	KONTACTRAMANA ELECT.
S1	A.C. SUPPLY CONTROL SWITCH, 16 A MCB	SCHNEIDER/INDO ASIAN/C&S
S2	D.C. SUPPLY CONTROL SWITCH, 10 A MCB	SCHNEIDER/INDO ASIAN/C&S
S3	LOCAL/REMOTE SELECTOR SWITCH 10 A	SCHNEIDER/INDO ASIAN/C&S
OC,CC	OPEN/CLOSE CONTACTORS, 9 A	SCHNEIDER/INDO ASIAN/C&S
OL	OVER LOAD RELAY WITH SPP 1.6 TO 2.5 A	SCHNEIDER/INDO ASIAN/C&S
PBO/PBC	OPEN/CLOSE PUSH BUTTONS, 4 A	C&S/SCHNEIDER/VAISHNO
LS/OLSC	MANUAL HANDLE PUSH BUTTONS, 4 A	JAI BALAJI/MANI
PBH	EMERGENCY PUSH BUTTON, 4 A	C&S/SCHNEIDER/VAISHNO
EPB	HANDLE INTERLOCK COIL, 20 WATTS	C&S/SCHNEIDER/VAISHNO
HI	MANUAL HANDLE KEY INTERLOCK	SELMECH/GRPS
HIL	CUBICLE LAMP HOLDER	PS/EE
LS PSS/HS	POWER SOCKET, 5A	MARU OR ITS EQUIVALENT
CL	TERMINAL BLOCKS	MARU OR ITS EQUIVALENT
PS	TERMINAL BLOCKS	ELMEX/CONNECTWELL
TH	TERMINAL BLOCKS	BESL
IC	INTERLOCKING CONTACTOR, 9A, 220 V, 7W	SCHNEIDER/INDO ASIAN/C&S
EB	EARTH BLADE	GRPS
S4	Ø1 A.C. SUPPLY CONTROL SWITCH, 10 A MCB	SCHNEIDER/INDO ASIAN/C&S

OPERATING INSTRUCTIONS:

- DON'T OPERATE THE ISOLATOR WHEN THE 'CIRCUIT BREAKER' IS IN 'ON'
- ISOLATOR OPERATION IS POSSIBLE ONLY WHEN THE INTERLOCK CONDITIONS ARE SATISFIED
- FOR MANUAL OPERATION FOLLOW THE FOLLOWING INSTRUCTIONS:-
 - BY PRESSING THE PUSH BUTTON (PBH) REMOVE THE CASTLE KEY AND KEEP THE KEY IN HANDLE LOCK AND ROTATE FOR GETTING WAY TO INSERT THE OPERATING HANDLE.
 - INSERT THE OPERATING HANDLE AND ROTATE IN CLOCK / ANTI CLOCK WISE
 - DIRECTIONS FOR TO OPEN / CLOSE THE ISOLATOR.
 - IF MANUAL OPERATION IS NOT NEEDED RESTORE THE CASTLE KEY IN THE HANDLE INTERLOCK AND ROTATE.

TERMINALS (STUD TYPE)

- TB1-1 TO 4 AND TB1-23 TO 30 ARE SUITABLE FOR 16 Sq.MM
- FOR DC/AC POWER SUPPLY (R, Y & B WIRES) REMAINING ALL OTHER
- TERMINALS ARE SUITABLE FOR 2.5 Sq.MM

NTPC DRG. No. 4410 - 001 - 572 - PVE - B - 0103

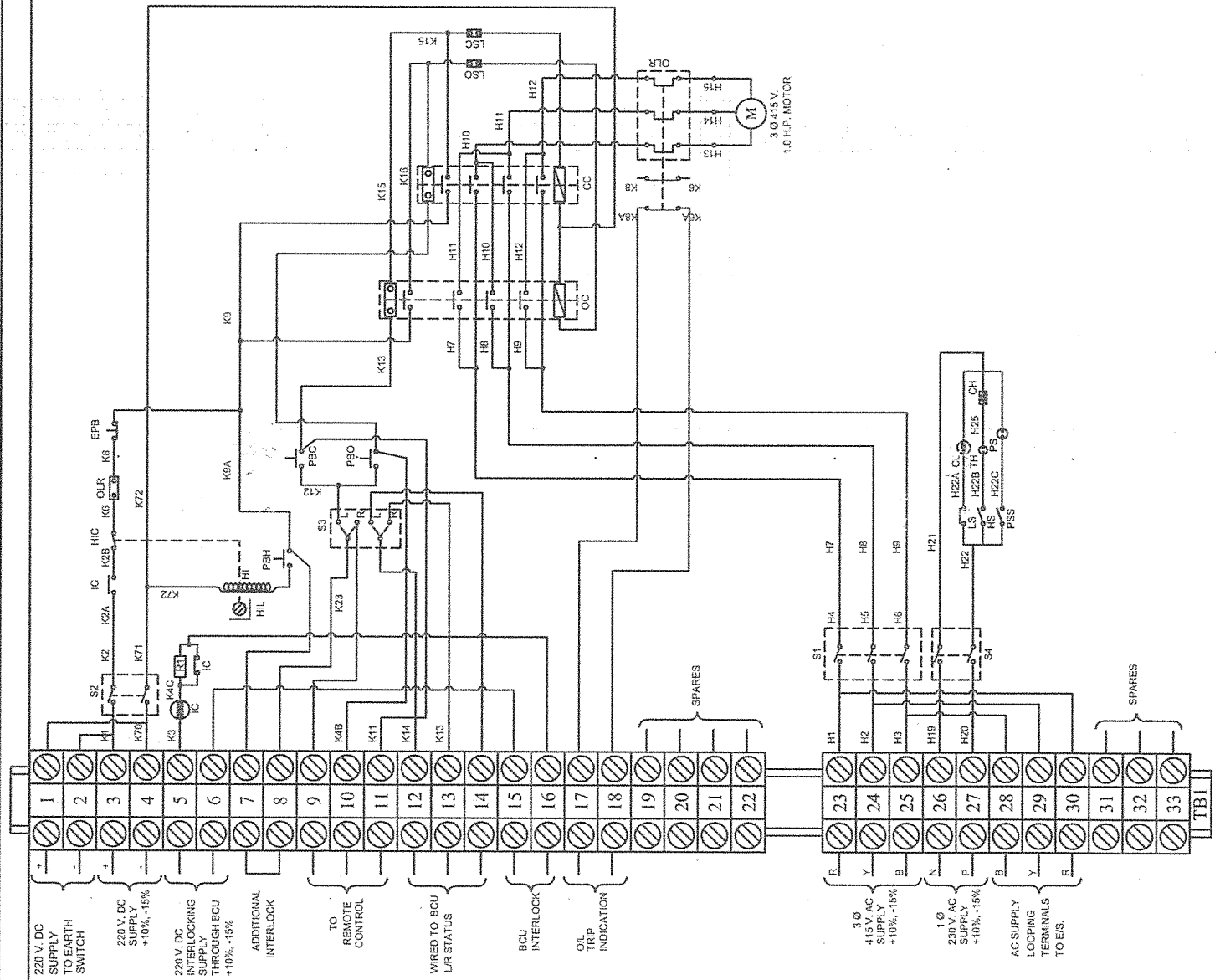
GR POWER SWITCHGEAR LTD.,
JEEDEMETLA HYDERABAD-500 055 INDIA

NORTH KARANPURA

SUPER THERMAL POWER PROJECT (3x660MW)

NTPC Limited
(A COMPANY OF NTPC GROUP)

PROJECT	OWNER	DESIGN	DATE	SCALE	DRIVING NO.	SHEET	OF	REV.
GR POWER SWITCHGEAR LTD.	NORTH KARANPURA	20.11.11	4. MS 2310 06	1	01	REV. A		
DESIGN	OWNER	DATE	SCALE	DRIVING NO.	SHEET	OF	REV.	
GR POWER SWITCHGEAR LTD.	NORTH KARANPURA	20.11.11	4. MS 2310 06	1	01	REV. A		
DESIGN	OWNER	DATE	SCALE	DRIVING NO.	SHEET	OF	REV.	
GR POWER SWITCHGEAR LTD.	NORTH KARANPURA	20.11.11	4. MS 2310 06	1	01	REV. A		



PART LIST:

1. OUTPUT FLANGE (10 mm THICK, 14 HOLES)
2. ON/OFF INDICATOR
3. THERMOSTAT (30 TO 85°C RECOMMENDED SETTING 40°)
4. GEAR BOX (SPUR / WORM & WORM SHAFT, RATIO 1 : 630)
5. MOTOR (Ø3, 415 Volts, 1.0 HP MOTOR)
6. CAUTION NAME PLATE
7. LIMIT SWITCH OPERATING CAM
8. OPERATING HANDLE
9. AC CONTROL SWITCH (3 POLE MCB)
10. DC CONTROL SWITCH (2 POLE MCB)
11. PUSH CAP (FOR HIL)
12. HANDLE INTERLOCK (HIL)
13. SCHEMATIC DIAGRAM PLATE
14. OVER LOAD RELAY CUM SINGLE PHASE PREVENTOR (OLR)
15. OPENING CONTACTOR (OC)
16. CLOSING CONTACTOR (CC)
17. OPEN / CLOSE / MANUAL / OFF PUSH BUTTON (PBO / PBC / PBH / EPB)
18. HEATER / POWER SOCKET SWITCHES (HS, PSS)
19. POWER SOCKET (PS)
20. DETACHABLE CABLE GLANDS FIXING PLATE (WITH OUT GLANDS)
21. CUBICLE LAMP HOLDER
22. LIMIT SWITCH (LSO)
23. LIMIT SWITCH (LSC)
24. CUBICLE WITH DOOR (2.5 mm THICK MS. SHEET)
25. AUX. SWITCH (12 NO / 12 NC)
26. DOOR OPERATED LIGHT SWITCH (LS)
27. PROVISION FOR PAD LOCK
28. INTERLOCK CONTACTOR (IC)
29. RUBBER GASKET (EPDM)
30. TERMINAL BLOCK (STUD TYPE OF ELMEX OR ITS EQUIVALENT)
31. SUPPORT CLEATS (MS WELDED TO BOX)
32. HEATER, 80 WATTS, 240 V
33. MANUAL OPERATING CAP / COVER
34. RAIN SHADE
35. Ø1 AC CONTROL SWITCH (2 POLE MCB)
36. EARTHING TERMINAL 2 Nos. WELDED TO BOX(SUITABLE FOR 50 x 6 GI FLAT) WITH M12X40 BOLT WITH CHECKNUT & WASHER

NOTE :

1. ALL DIMENSIONS ARE IN MILLIMETERS
2. CUBICLE WILL BE POWDER COATED WITH RAL : 5012 FOR OUTSIDE AND GLOSSY WHITE FOR INSIDE
3. DEGREE OF PROTECTION IP : 55 AS PER IS : 1947
4. 20% SPARE TERMINALS WILL BE PROVIDED
5. WIRING WILL BE DONE WITH 1100V GRADE
 - a) TBI - 1 TO 4 AND TBI - 15 TO 19 ARE SUITABLE FOR 16 Sq.MM
 - FOR DC/AC POWER SUPPLY (R, Y & B WIRES) REMAINING ALL OTHER TERMINALS ARE SUITABLE FOR 2.5 Sq.MM
6. WEIGHT OF THE BOX : 100 Kg (Approx.)
7. LUBRICATION OF GEARS : NON HARDENED GREASE FILLED GEAR BOX

NTPC DRG. No. 4410 - 001 - 572 - PVE - B - 0103



GR POWER SWITCHGEAR LTD.,
JEEDEMETLA HYDERABAD-500 055 INDIA

PROJECT NORTH KARANPURA

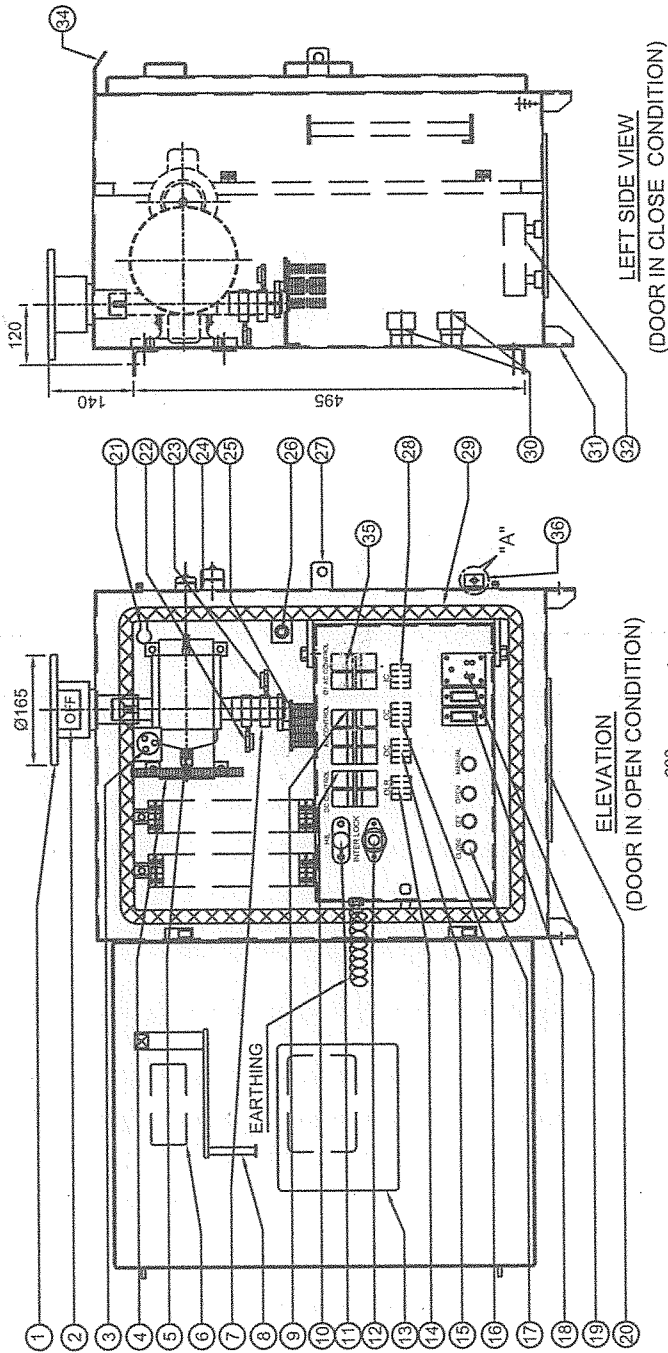
SUPER THERMAL POWER PROJECT (3x660MW)

NTPC Limited
(A GOVERNMENT OF INDIA ENTERPRISE)

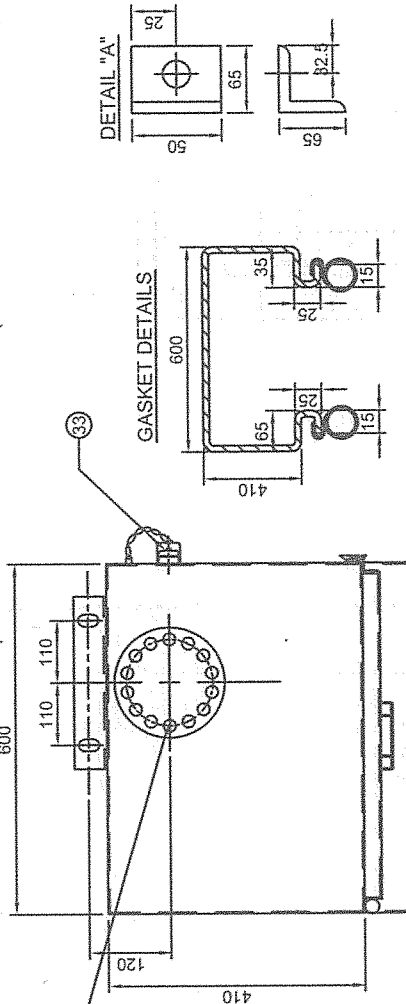
GROUP	OWNER	PROJECT	DATE	BY	DATE
TRANSMISSION BUSINESS GROUP	NTPC	30.11.15	09.11.2015	09.11.2015	09.11.2015
DESIGN	DESIGN	DESIGN	DESIGN	DESIGN	DESIGN
APPROVAL	APPROVAL	APPROVAL	APPROVAL	APPROVAL	APPROVAL

TITLE MOTOR OPERATING MECHANISM FOR 400 KV EARTH SWITCH

DEPT.	SCALE	DRAWING NO.	SHEET	REV.
TRANSMISSION BUSINESS GROUP	1:1	4. ME 2310 07	1 OF 01	REV.00



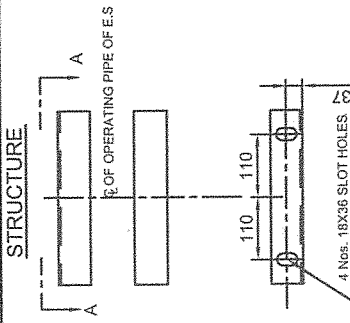
LEFT SIDE VIEW
(DOOR IN CLOSE CONDITION)



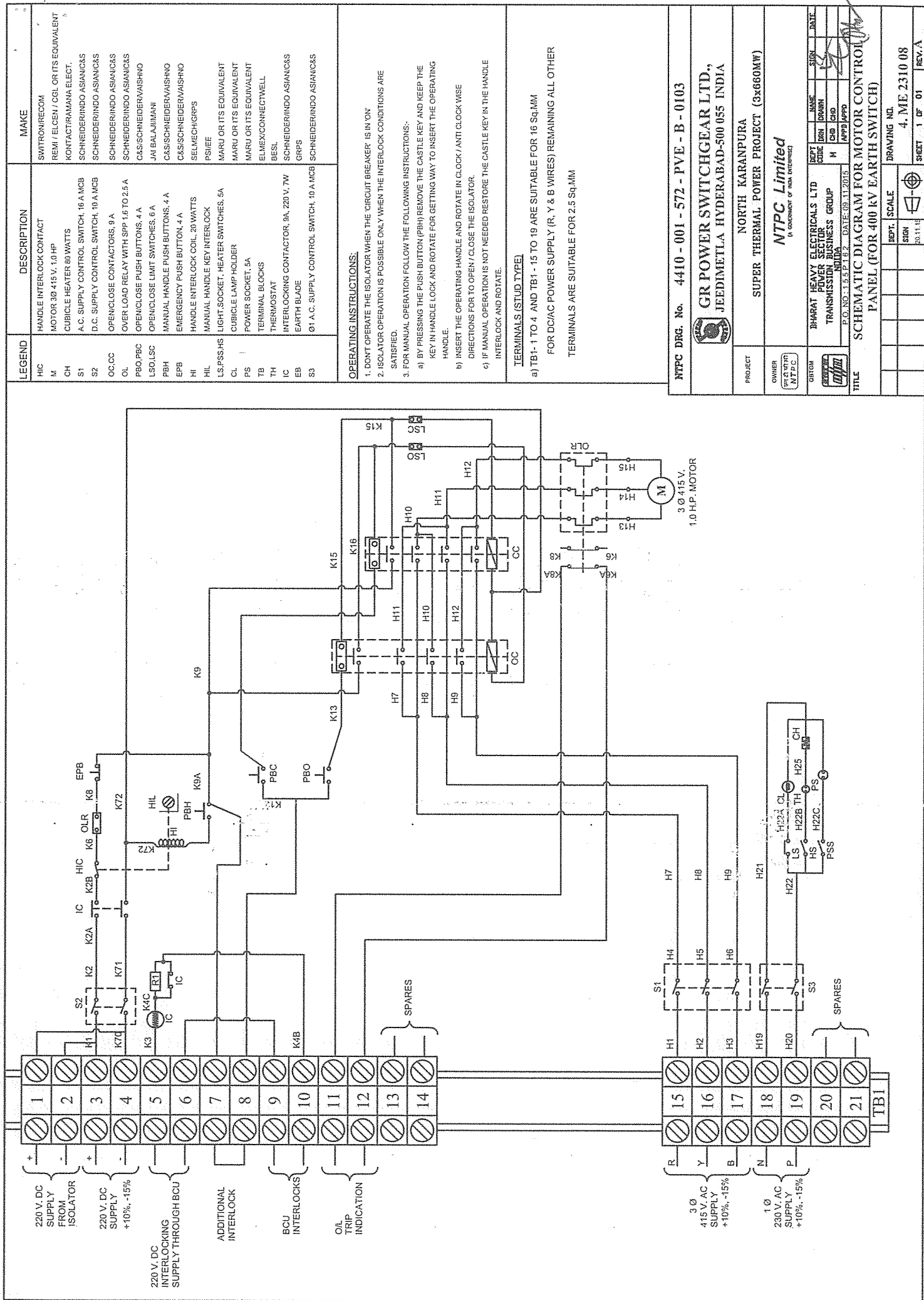
PLAN

14 Nos. Ø18 HOLES ON 127 P.C.D.

FIXING DETAILS FOR SUPPORTING STRUCTURE



4 Nos. 18X38 SLOT HOLES



LEGEND	DESCRIPTION	MAKE
HIC	HANDLE INTERLOCK CONTACT	SWITRON/RECOM
M	MOTOR 3Ø 415 V, 1.0 HP	REMI / ELCON / CGL OR ITS EQUIVALENT
CH	CUBICLE HEATER 80 WATTS	KONTAKTIRAMANA ELECT.
S1	A.C. SUPPLY CONTROL SWITCH, 16 A MCB	SCHNEIDER/INDO ASIAN/C&S
S2	D.C. SUPPLY CONTROL SWITCH, 10 A MCB	SCHNEIDER/INDO ASIAN/C&S
OC,CC	OPEN/CLOSE CONTACTORS, 9 A	SCHNEIDER/INDO ASIAN/C&S
OL	OVER LOAD RELAY WITH SPF 1.6 TO 2.5 A	SCHNEIDER/INDO ASIAN/C&S
PBO,PBC	OPEN/CLOSE PUSH BUTTONS, 4 A	C&S/SCHNEIDER/VAISHNO
LSQ,LSO	OPEN/CLOSE LIMIT SWITCHES, 6 A	JAI BALAJIMANI
PBH	MANUAL HANDLE PUSH BUTTONS, 4 A	C&S/SCHNEIDER/VAISHNO
EPB	EMERGENCY PUSH BUTTON, 4 A	C&S/SCHNEIDER/VAISHNO
HI	HANDLE INTERLOCK COIL, 20 WATTS	SELMECH/GRPS
HL	MANUAL HANDLE KEY INTERLOCK	PSIZEE
LS,FSS,HS	LIGHT SOCKET, HEATER SWITCHES, 5A	MARU OR ITS EQUIVALENT
CL	CUBICLE LAMP HOLDER	MARU OR ITS EQUIVALENT
PS	POWER SOCKET, 5A	MARU OR ITS EQUIVALENT
TB	TERMINAL BLOCKS	ELMEX/CONNECTWELL
TH	THERMOSTAT	BESL
IC	INTERLOCKING CONTACTOR, 9A, 220 V, 7W	SCHNEIDER/INDO ASIAN/C&S
EB	EARTH BLADE	GRPS
S3	Ø1 A.C. SUPPLY CONTROL SWITCH, 10 A MCB	SCHNEIDER/INDO ASIAN/C&S

OPERATING INSTRUCTIONS:

1. DON'T OPERATE THE ISOLATOR WHEN THE CIRCUIT BREAKER IS IN 'ON'.
2. ISOLATOR OPERATION IS POSSIBLE ONLY WHEN THE INTERLOCK CONDITIONS ARE SATISFIED.
3. FOR MANUAL OPERATION FOLLOW THE FOLLOWING INSTRUCTIONS:-
 - a) BY PRESSING THE PUSH BUTTON (PBH) REMOVE THE CASTLE KEY AND KEEP THE KEY IN HANDLE LOCK AND ROTATE FOR GETTING WAY TO INSERT THE OPERATING HANDLE.
 - b) INSERT THE OPERATING HANDLE AND ROTATE IN CLOCK / ANTI CLOCK WISE DIRECTIONS FOR TO OPEN / CLOSE THE ISOLATOR.
 - c) IF MANUAL OPERATION IS NOT NEEDED RESTORE THE CASTLE KEY IN THE HANDLE INTERLOCK AND ROTATE.

TERMINALS (STUD TYPE)

- a) TB1- 1 TO 4 AND TB1 - 15 TO 19 ARE SUITABLE FOR 16 Sq.MM
FOR DC/AC POWER SUPPLY (R, Y & B WIRES) REMAINING ALL OTHER
TERMINALS ARE SUITABLE FOR 2.5 Sq.MM

NTPC DRG. No. 4410 - 001 - 572 - PVE - B - 0103	
GR POWER SWITCHGEAR LTD., JEEDEMETLA HYDERABAD-500 055 INDIA	
PROJECT	NORTH KARNAPURA
OWNER	SUPER THERMAL POWER PROJECT (3x660MW)
DESIGNER	NTPC Limited (A GOVERNMENT OF INDIA ENTERPRISE)
DATE	11/01/2015
BY	DATE
CHKD	DATE
APPD	DATE
Bharat Heavy Electricals Ltd POWER SECTOR TRANSMISSION BUSINESS GROUP Noida	
P.O. NO. 1158 P 182	
TITLE SCHEMATIC DIAGRAM FOR MOTOR CONTROL PANEL (FOR 400 KV EARTH SWITCH)	
DEPT.	SCALE
SECT.	DRAWING NO.
1	4. ME 2310 08
OF	SHEET
01	REV. A



NO CONTACTS



NC CONTACTS



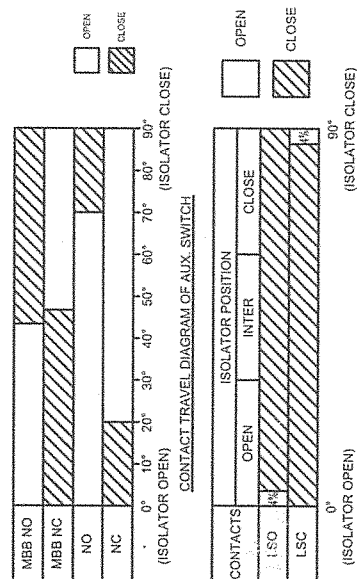
NC CONTACTS

2 MBB



NO CONTACTS

2 MBB


$$(14 \text{ NO} / 14 \text{ NC} + ((2\text{NO} / 2\text{NC}) \text{ MBB}))$$
[illegible]

NAME PLATE DETAILS FOR EARTH SWITCH

MANUFACTURED & SUPPLIED BY

GR POWER SWITCHGEAR LTD., JEEDIMETLA, HYDERABAD - 500 055

CUSTOMER :

M/s. NTPC LIMITED

PROJECT :

NORTH KARANPURA SUPER THERMAL POWER PROJECT (3x660MW)

CONTRACTOR :

M/s. BHARAT HEAVY ELECTRICALS LTD.

P.O. NO. :

155 P 162

Dt. : 09.11.2015

TYPE : LVB

SL. NO. : [AS APPLICABLE]

YEAR OF Mfg. : 2015

RATING : Un

420

KV ; In 18150/2000A

WEIGHT IN KG : 1400

IMPLUSE(U/I) :

1425

KV Peak

3150A

1050 KV Peak;

P.F. : 520

KV rms; STC(lth) :

50

KA rms; DURATION: 1 Sec;

OPERATING MECHANISM :

3 Ph. 415 V, 1.0 HP MOTOR

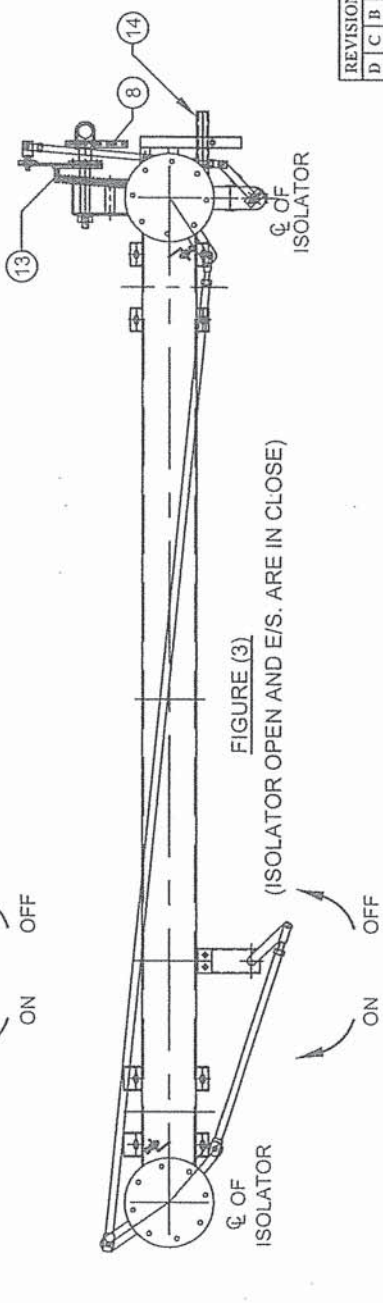
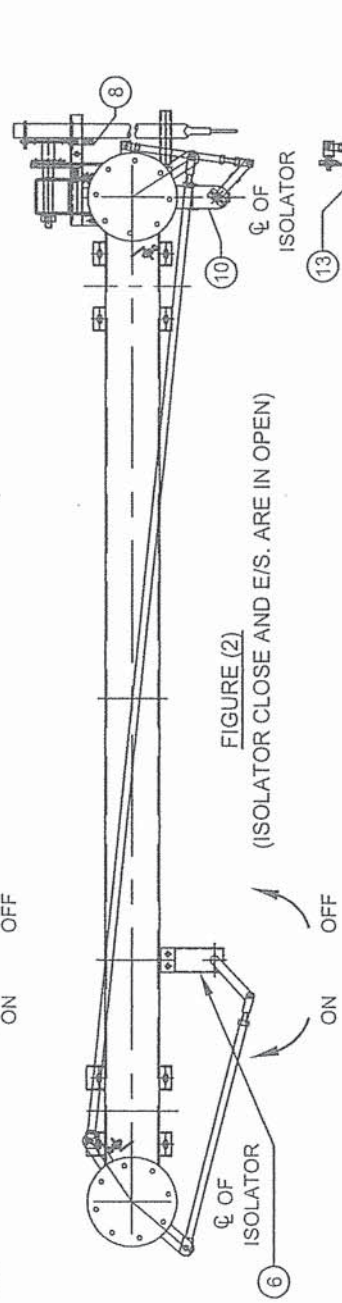
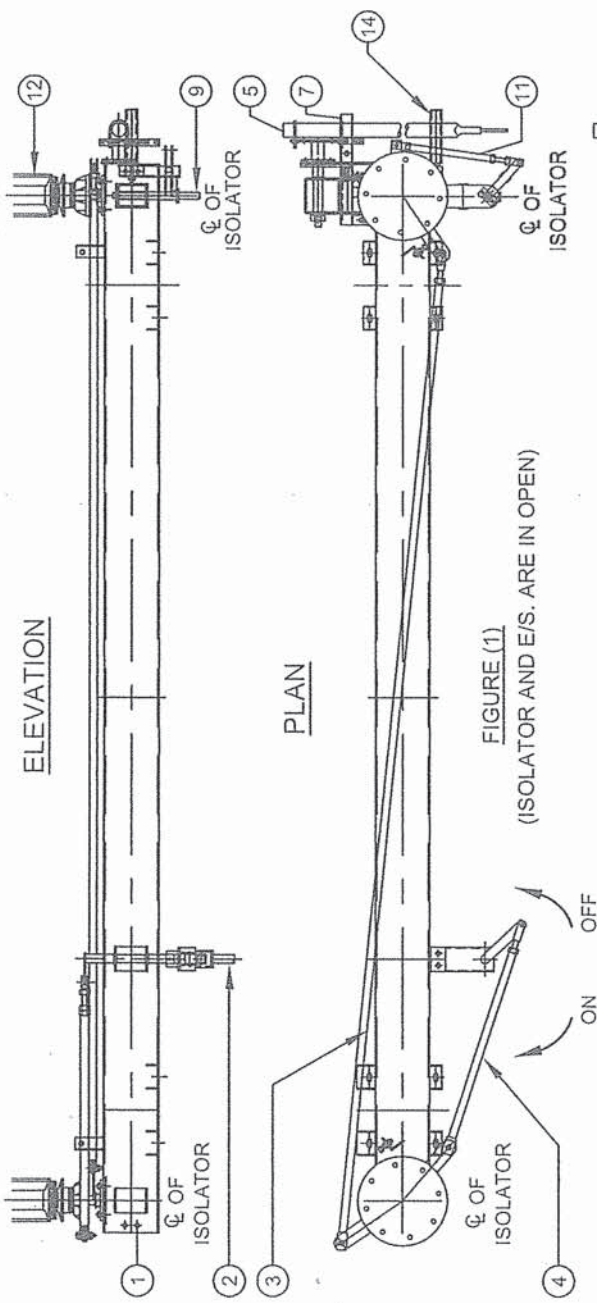
CONTROL VOLTAGE :

220 V DC

150

1. ENGRAVED LETTER SIZE : 2.5 mm
2. ENGRAVED LETTERING WHITE ON BLACK BACKGROUND
3. MATERIAL : ALUMINIUM
4. THICKNESS : 2 mm

NTPC DRG. No. 4410 - 001 - 572 - PVE - B - 0103		GR POWER SWITCHGEAR LTD., JEEDEMETLA HYDERABAD-500 055 INDIA		NORTH KARANPURA SUPER THERMAL POWER PROJECT (3x660MW)		NTPC Limited (A GOVERNMENT OF INDIA ENTERPRISE)		BHARAT HEAVY ELECTRICALS LTD POWER SECTOR TRANSMISSION BUSINESS GROUP NOLDA		DEPT CODE M		NAME DRAWN CHD CHKD		SIGN DATE	
PROJECT		OWNER NTPC		OBTGMM		P.O. NO.: TSSP162 DATE: 09.11.2015		NAME DRAWN CHD CHKD		APPD		SIGN DATE		REV. 00	
NAME PLATE DETAILS FOR 400 KV ISOLATOR & E.S.		DEPT. SCALE		SIGN		20.11.15		SHEET 1 OF 01		REV. 00		4. Z 310 10			



CONSTRUCTION :

ISOLATOR OPERATING MECHANISM OUT PUT SHAFT IS CONNECTED TO TOP OPERATING PIPE OF ISOLATOR (2) THROUGH DOWN OPERATING PIPE OF ISOLATOR (2). TOP OPERATING MECHANISM ONE SIDE IS CONNECTED TO ROTATING INSULATOR STACK (12), THROUGH A LINK TANDEM PIPE (3).

E.S. OPERATING MECHANISM OUTPUT SHAFT IS CONNECTED TO TOP OPERATING MECHANISM OF E.S. (10) THROUGH DOWN OPERATING PIPE OF E.S. (9) TOP OPERATING MECHANISM IS CONNECTED TO TANDEM PIPE OF E.S. THROUGH LINK PIPE (11).

FUNCTION :

WHILE ISOLATOR UNDER OPERATION MODE THE MECHANICAL INTERLOCK PIPE (7) WILL ROTATE ALONG WITH INSULATOR STACK (12).

INTERLOCK LEVER (8) WILL ROTATE ALONG WITH E.S. MOVING CONTACT.

REFER FIG. (1) :- WHEN ISOLATOR IS IN "OFF" POSITION THE MECHANICAL INTERLOCK PIPE (7) WILL PERMIT THE CLOSE OR OPEN EARTH SWITCH.

REFER FIG. (2) :- WHEN ISOLATOR IS IN "ON" POSITION MECHANICAL INTERLOCK PIPE (7) WILL NOT PERMIT THE EARTH - SWITCH MOVING CONTACT (5) TO CLOSE.

REFER FIG. (3) :- WHEN EARTH SWITCH IS IN "ON" POSITION THE INTERLOCK LEVER (8) WILL NOT PERMIT THE INSULATOR STACK (12) TO CLOSE.

PART LIST :

1. BASE CHANNEL
2. DOWN OPERATING PIPE FOR ISOLATOR
3. LINK TANDEM PIPE
4. TOP OPERATING MECHANISM LINK PIPE
5. E/S. MOVING CONTACT
6. TOP OPERATING MECHANISM FOR ISOLATOR
7. MECHANICAL INTERLOCK PIPE
8. INTERLOCK LEVER
9. DOWN OPERATING PIPE FOR E.S.
10. TOP OPERATING MECHANISM FOR E.S.
11. TOP OPERATING MECHANISM LINK PIPE
12. INSULATOR STACK
13. COUNTER SPRING
14. MOVING CONTACT STOPPER

DOCUMENT NO. : 0370 - 572 - PVE - B - 345

NABINAGAR POWER GENERATION CO. PVT. LTD.
(A JV OF NTPC LTD. & BIHAR STATE POWER (HOLDING) CO. LTD.)

400/132 KV SWITCHYARD AT NABINAGR STPP (3X660MW)
& 400 KV SWITCHYARD EXTENSION AT NABINAGR TPP(BRBCL)
NOA Number :CS-0370-572-2-FC-NOA-0009 DATED 12-02-2013



BHARAT HEAVY ELECTRICALS LTD.
TRANSMISSION PROJECTS DIVISION
NEW DELHI

P.O. Number 1 5 3 P 3 9 4 Dated 22 / 03 / 2014

REVISIONS
D
C
B
A

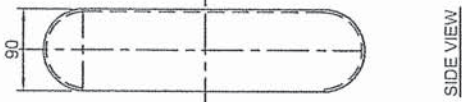
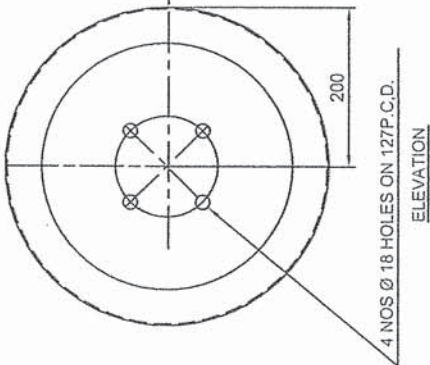
TITLE: **MECHANICAL INTER LOCK
BETWEEN ISOLATOR
& EARTH SWITCH**

SCALE: T.S.	DATE	CHECKED	APPROVED	DRG. NO.	REV
24 - 03 - 2014					

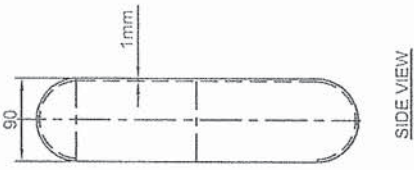
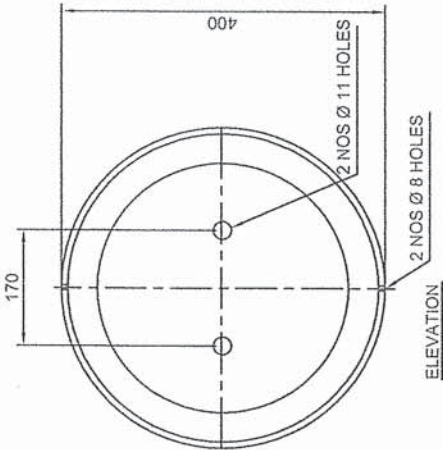
GR POWER SWITCHGEAR LTD.,
JEEDIMETLA HYDERABAD-500 055 INDIA

4. HZ 2002 11

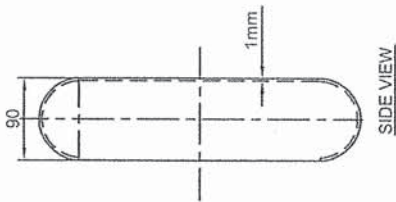
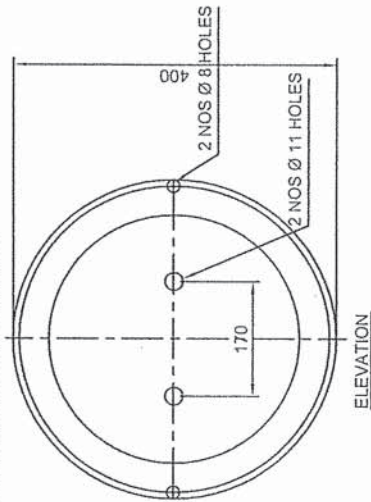
CORONA SHIELD ON INSULATORS



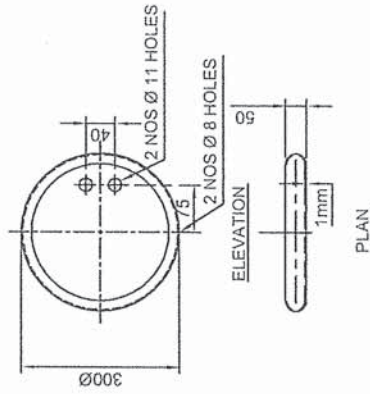
CORONA SHIELD ON FEMALE CONTACTS



CORONA SHIELD ON MALE CONTACTS



CORONA SHIELD ON EARTH SWITCH



NOTES :

1. ALL DIMENSIONS ARE IN MILLIMETERS
2. MANUFACTURING TOLERANCE :
 UPTO 50 mm ±3%
 51 TO 100 mm ±2%
 101 TO 300 mm ±1%
 ABOVE 300 mm ±0.5%

DOCUMENT NO.: 0370 - 572 - PVE - B - 345

NABINAGAR POWER GENERATION CO. PVT. LTD.
 (A JV OF NTPC LTD. & BIHAR STATE POWER (HOLDING) CO. LTD.)
 400/132 KV SWITCHYARD AT NABINAGR STPP (3X660MW)
 & 400 KV SWITCHYARD EXTENSION AT NABINAGR TPP(BRBCL)
 NOA Number :CS-0370-572-2-FC-NOA-0009 DATED 12-02-2013



BHARAT HEAVY ELECTRICALS LTD.
 TRANSMISSION PROJECTS DIVISION
 NEW DELHI

P.O. Number 1 5 3 P 3 9 4 Dated 22 / 03 / 2014

TITLE:

CORONA SHIELD DETAILS

REVISIONS	D	C	B	A
By E-mail on date: 05/05/2014				
By E-mail on date: 12/02/2014				
By E-mail on date: 05/05/2014				

SCALE: N.T.S.	DATE	DRAWN	CHECKED	APPROVED	DRG. NO.	REV	4. HO	2002 12	B
	24 - 03 - 2014								

GR POWER SWITCHGEAR LTD.,
 JEEDIMETLA HYDERABAD-500 055 INDIA



ALL HOLES ARE Ø18mm
UNLESS OTHERS AS SPECIFIED

DOCUMENT NO.: 0370 - 572 - PVE - B - 345

WABINAGAR POWER GENERATION CO. PVT. LTD.
(A JV OF NTPC LTD. & BHARAT STATE POWER (HOLDING) CO. LTD.)

400/132 kV SWITCHYARD AT NABINAGR STPP (3X660MW)
& 400 KV SWITCHYARD EXTENSION AT NABINAGR TPP(BRBCL)

NOA Number :CS-0370-572-2-FC-HQA-0009 DATED 12-02-2013



BHARAT HEAVY ELECTRICALS LTD.
TRANSMISSION PROJECTS DIVISION
NEW DELHI

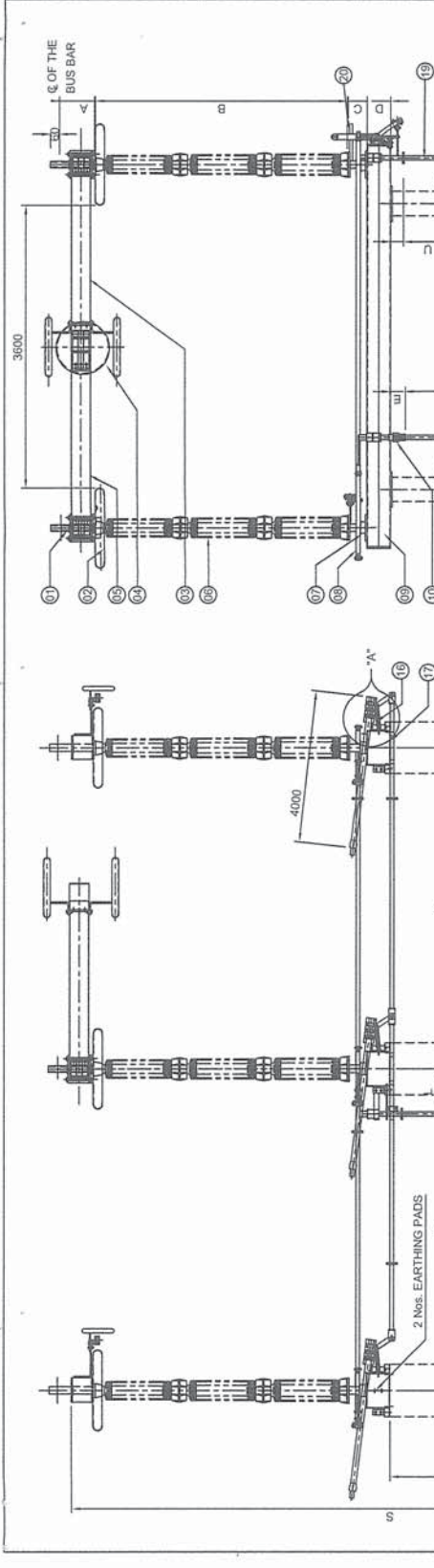
P.O. Number 153P394 Dated 22 / 03 / 2014

REVISIONS	D	C	B	A

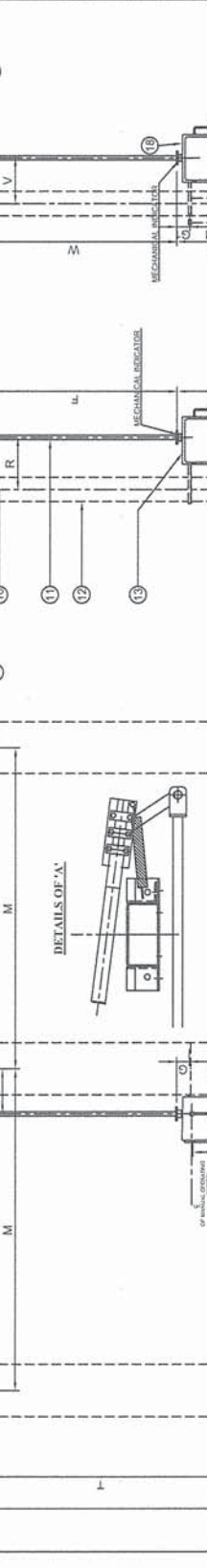
	400 KV, CB BASE CHANNEL ASSEMBLY (FOR 2000 A)	SCALE: N.T.S.	
		DATE: 12-06-2012 DRAWN: <i>TS</i> CHECKED: <i>TS</i> APPROVED: <i>TS</i> Dwg. NO: 4. HZ 2002 13 REV: A	GR POWER SWITCHGEAR LTD., JEEDIMETLA HYDERABAD-500 055 INDIA

GR POWER SWITCHGEAR LTD.,
JEEDEMETLA HYDERABAD-500 055 INDIA

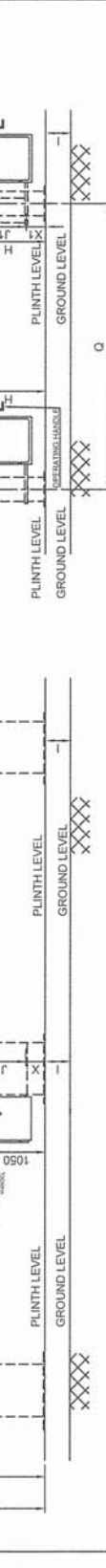
BOQ	ASSY. LOOSE
6 Nos.	6 Nos.
3 Nos.	3 Nos.
12 Nos.	12 Nos.
6 Nos.	6 Nos.
3 Nos.	3 Nos.
1 Nos.	1 Nos.
6 Nos.	6 Nos.
3 Nos.	3 Nos.
1 Nos.	1 Nos.
3 Nos.	3 Nos.
1 Nos.	1 Nos.
3 Nos.	3 Nos.
1 Nos.	1 Nos.
6 Nos.	6 Nos.



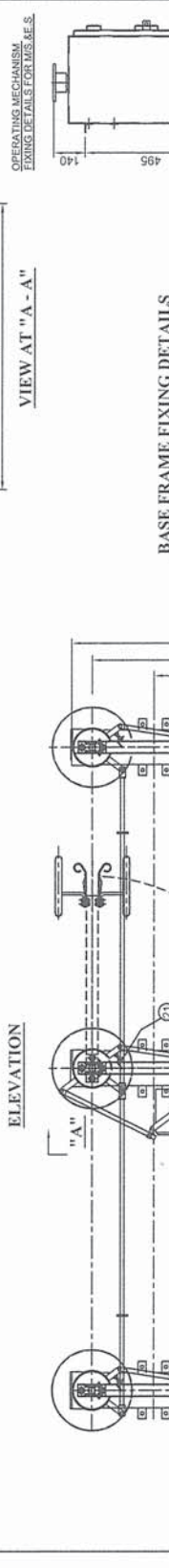
REFERENCE DRAWINGS
FOR MAIN CONTACT ASSEMBLY (2000 A) ----- 4. HSM 2002 03
FOR EARTH SWITCH CONTACT ASSEMBLY ----- 4. HSE 2002 04
FOR OPERATING MECHANISM FOR ISOLATOR ----- 4. HMS 2002 05
FOR SCHEMATIC DIAGRAM DETAILS (ISOLATOR) ----- 4. HMS 2002 06
FOR OPERATING MECHANISM FOR EARTH SWITCH ----- 4. HES 2002 07
FOR SCHEMATIC DIAGRAM DETAILS (EARTH SWITCH) ----- 4. HES 2002 08
FOR AXU SWITCH DETAILS (FORMS&S) ----- 4. HI 2002 09
FOR MECHANICAL INTERLOCK DETAILS ----- 4. HZ 2002 10
FOR NAME PLATE DETAILS ----- 4. HO 2002 11
FOR CORONA SHIELD DETAILS ----- 4. HO 2002 12
FOR BASE CHANNEL DETAILS ----- 4. HZ 2002 13



NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETERS
2. ALL FERROUS PARTS ARE HOT DIP GALVANIZED
3. ALL NON-FERROUS CONTACT POINTS ARE SILVER PLATED (25 MICRONS MINIMUM)
4. THE INDICATED DIMENSIONS ARE SUBJECT TO THE MANUFACTURING TOLERANCES:
UPTO 50 mm ----- ±3%
51 TO 100 mm ----- ±2%
101 TO 300 mm ----- ±1%
ABOVE 300 mm ----- ±0.5%
5. SHORT TIME CURRENT RATING 50 KA rms. FOR 1 Sec.
6. MIN. CREEPAGE DISTANCE 10,500 mm
7. ROTATING STOOL BASE HAVING 2 Nos. BALL BEARINGS OF ADEQUATE DIAMETER IN SEALED HOUSING
8. APPLICABLE TO ISOLATOR PART 1 TO V. IEC - 62271-102 / IEC 694
9. MAX. TERMINAL LOAD SHALL BE AS PER IEC - 62271-102
10. ALL G.I. PIPES ARE CLASS 'B' TYPE AS PER IS : 1239
11. ALL BOLTS & PINS ARE WITH LOCK WASHERS
12. EARTH SWITCH IS INTERCHANGEABLE AT SITE WITHOUT ANY MODIFICATION



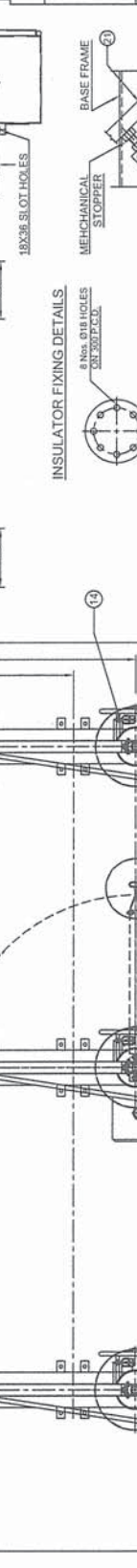
WEIGHTS:
NET WEIGHT OF THE ISOLATOR
EXCLUDING INSULATOR : 1400 Kgs (Approx.)



QUANTITY:
2000 A ----- 164.5 Nos.

Quantity shall be as per actual requirements

DOCUMENT NO.:	0370 - 572 - PVE - B - 345
NABINACAR POWER GENERATION CO. PVT. LTD.	(A P. OF MFC LTD. & BHAR STATE POWER (HOLDING) CO. LTD.)
400/132 KV SWITCHYARD AT NABINACAR STPP (3X660MW)	
& 400 KV SWITCHYARD EXTENSION AT NABINACAR TPP(BRCL)	
MDA Number CS-0370-572-2-FC-NDA-0009 DATED 12-02-2013	

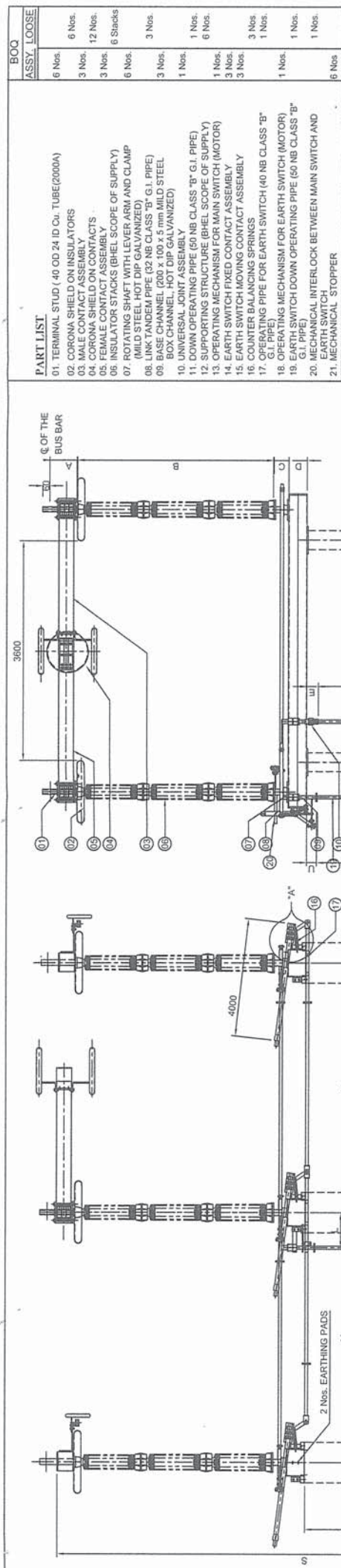


TRANSMISSION PROJECTS DIVISION	NEW DELHI
P.O. Number	1 5 3 P 3 4 Dated 22 / 03 / 2014



	TITLE:		G.A. OF 420 KV, 2000 A, TP, HCB ISOLATOR WITH ONE E/S (ON MALE SIDE) (MECHANICALLY GANG OPERATED)	
	SCALE: 1:10			
	DATE:	24-03-2014		
	BY:	DR		
	CHKD:	DR		
	APPROVED:			
	DRGNO:	3. HS 2002 01		
REV:		C		
GR POWER SWITCHGEAR LTD., JEEDIMETLA HYDERABAD-500 055 INDIA				

DIMENSIONS															
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
230	3650	220	100	180	2420	140	1200	300	495	220	450	7000	270	4140	4400
Q	R	S	T	U	V	W	X	K1	G1	J1	X1	265	495	140	220



PART LIST

BOQ	ASSY	LOOSE
01.	TERMINAL STUD (40 24 ID Cu. TUBE(2000A)	6 Nos.
02.	CORONA SHIELD ON INSULATORS	3 Nos.
03.	MALE CONTACT ASSEMBLY	12 Nos.
04.	CORONA SHIELD ON CONTACTS	6 Nos.
05.	FEMALE CONTACT ASSEMBLY	3 Nos.
06.	INSULATOR STACKS (BHEL SCOPE OF SUPPLY)	3 Nos.
07.	ROTATING SHAFT WITH LEVER ARM AND CLAMP (MILD STEEL HOT DIP GALVANIZED)	3 Nos.
08.	LINK TANDEM PIPE (32 NB CLASS "B" G.I. PIPE)	1 Nos.
09.	BASE CHANNEL (200 x 100 x 5 mm MILD STEEL BOX CHANNEL, HOT DIP GALVANIZED)	1 Nos.
10.	UNIVERSAL JOINT ASSEMBLY	1 Nos.
11.	DOWN OPERATING PIPE (50 NB CLASS "B" G.I. PIPE)	1 Nos.
12.	SUPPORTING STRUCTURE (BHEL SCOPE OF SUPPLY)	1 Nos.
13.	OPERATING MECHANISM FOR MAIN SWITCH (MOTOR)	3 Nos.
14.	EARTH SWITCH FIXED CONTACT ASSEMBLY	3 Nos.
15.	EARTH SWITCH MOVING CONTACT ASSEMBLY	1 Nos.
16.	COUNTER BALANCING SPRINGS	1 Nos.
17.	GLUE LAMPING PIPE FOR EARTH SWITCH (40 NB CLASS "B" G.I. PIPE)	1 Nos.
18.	OPERATING MECHANISM FOR EARTH SWITCH (MOTOR)	1 Nos.
19.	EARTH SWITCH DOWN OPERATING PIPE (50 NB CLASS "B" G.I. PIPE)	1 Nos.
20.	MECHANICAL INTERLOCK BETWEEN MAIN SWITCH AND EARTH SWITCH	1 Nos.
21.	MECHANICAL STOPPER	6 Nos.

REFERENCE DRAWINGS

FOR MAIN CONTACT ASSEMBLY (2000 A)	4. HSM 2002 03
FOR EARTH SWITCH CONTACT ASSEMBLY	4. HSE 2002 04
FOR OPERATING MECHANISM FOR ISOLATOR	4. HMS 2002 05
FOR SCHEMATIC DIAGRAM DETAILS (ISOLATOR)	4. HMS 2002 06
FOR OPERATING MECHANISM FOR EARTH SWITCH	4. HES 2002 07
FOR SCHEMATIC DIAGRAM DETAILS (EARTH SWITCH)	4. HES 2002 08
FOR AXU SWITCH DETAILS FORMS(SKES)	4. HES 2002 09
FOR MECHANICAL INTERLOCK DETAILS	4. HZ 2002 10
FOR NAME PLATE DETAILS	4. HZ 2002 11
FOR CORONA SHIELD DETAILS	4. HO 2002 12
FOR BASE CHANNEL DETAILS	4. HZ 2002 13

NOTES:

- ALL DIMENSIONS ARE IN MILLIMETERS
- ALL FERROUS PARTS ARE HOT DIP GALVANIZED
- ALL NON - FERROUS CONTACT POINTS ARE SILVER PLATED (25 MICRONS MINIMUM)
- THE INDICATED DIMENSIONS ARE SUBJECT TO THE MANUFACTURING TOLERANCES
- UPTO 50 mm ±3% 51 TO 100 mm ±2% ABOVE 100 mm ±0.5%
- SHORT TIME CURRENT RATING 50 KA rms. FOR 1 Sec.
- MIN. CREEPAGE DISTANCE 10,500 mm
- ROTATING STOOL BASE HAVING 2 Nos. BALL BEARINGS OF ADEQUATE DIAMETER IN SEALED HOUSING
- APPLICABLE STANDARDS IS : 9921 PART 1 TO V, IEC : 62271-102 / IEC 694
- MAX. TERMINAL LOAD SHALL BE AS PER IEC : 62271-102
- ALL PARTS ARE CLASS "B" TYPE AS PER IS : 1239
- ALL BOLTS & PINS ARE WITH LOCK WASHERS
- EARTH SWITCH IS INTERCHANGEABLE AT SITE WITHOUT ANY MODIFICATION

WEIGHTS:

NET WEIGHT OF THE ISOLATOR : 1400 Kgs (Approx.)

EXCLUDING INSULATOR : 17-3 Nos.

Quantity shall be as per actual requirements

DOCUMENT NO.: 0370 - 572 - PYE - B - 345

NABINAGAR POWER GENERATION CO. PVT. LTD.
(A JV OF NTPC LTD. & BIHAR STATE POWER HOLDING CO. LTD.)
400/132 KV SWITCHYARD AT NABINAGAR STPP (3X660MW)
& 400 KV SWITCHYARD EXTENSION AT NABINAGAR TPP(BRBL)
NOA Number :CS-0370-572-2-FC-NOA-0009 DATED 12-02-2013

BHARAT HEAVY ELECTRICALS LTD.
TRANSMISSION PROJECTS DIVISION
NEW DELHI

P.O. Number : 1 5 3 P 3 9 4 Dated : 22 / 03 / 2014

REVISIONS

REV	DATE	BY	CHKD	APPD	REASON
1	24.01.2014				ISSUED FOR APPROVAL
2	24.01.2014				REVISIONS
3	03.02.2014				REVISIONS

SCALE: 1:10

DATE: 24.01.2014

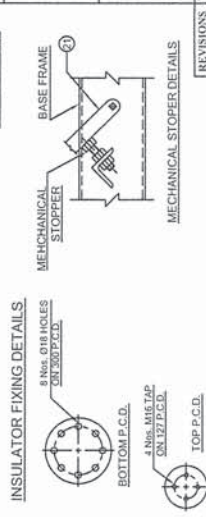
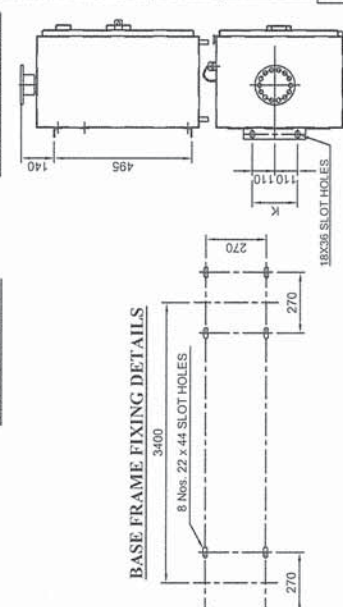
BY: [Signature]

CHKD: [Signature]

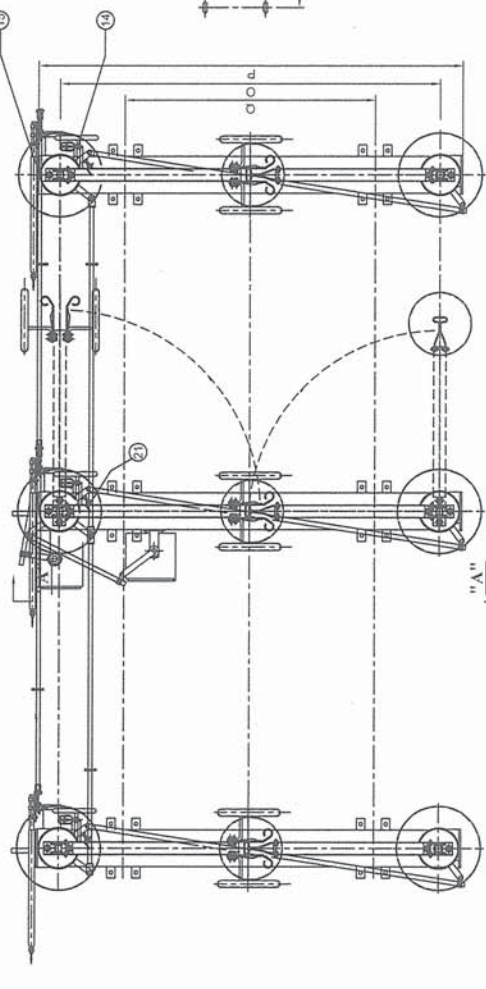
APPD: [Signature]

REASON: 3. HS 2002 01A

VIEW AT "A - A"



ELEVATION



PLAN



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	K1	G1	J1	X1
230	3650	220	100	180	2420	140	1200	300	495	220	450	7000	270	4140	4400	3400	620	8000	3800	200	370	2400	265	220	140	495	265

PART LIST		BOQ
QTY	DESCRIPTION	UNIT
01	TERMINAL STUD (40 OD 24 ID COPPER TUBE)	6 Nos.
02	CORONA SHIELD ON INSULATORS	3 Nos.
03	MALE CONTACT ASSEMBLY	12 Nos.
04	FEMALE CONTACT ASSEMBLY	6 Nos.
05	INSULATOR STACKS (BHEL SCOPE OF SUPPLY)	3 Nos.
06	ROTATING SHAFT WITH LEVER ARM AND CLAMP (MILD STEEL HOT DIP GALVANIZED)	1 Nos.
07	LINK TANDEM PIPE (32 NB CLASS "B" G.I. PIPE)	1 Nos.
08	BASE CHANNEL (200 x 100 x 5 mm MILD STEEL BOX CHANNEL, HOT DIP GALVANIZED)	1 Nos.
09	UNIVERSAL JOINT ASSEMBLY	1 Nos.
10	DOWN OPERATING PIPE (50 NB CLASS "B" G.I. PIPE)	1 Nos.
11	SUPPORTING STRUCTURE (BHEL SCOPE OF SUPPLY)	1 Nos.
12	OPERATING MECHANISM FOR MAIN SWITCH (MOTOR)	1 Nos.
13	EARTH SWITCH FIXED CONTACT ASSEMBLY	1 Nos.
14	EARTH SWITCH MOVING CONTACT ASSEMBLY	1 Nos.
15	COUNTER BALANCING SPRINGS	1 Nos.
16	OPERATING PIPE FOR EARTH SWITCH (40 NB CLASS "B" G.I. PIPE)	1 Nos.
17	OPERATING MECHANISM FOR EARTH SWITCH (MOTOR)	1 Nos.
18	DOWN OPERATING PIPE (50 NB CLASS "B" G.I. PIPE)	1 Nos.
19	SUPPORTING STRUCTURE (BHEL SCOPE OF SUPPLY)	1 Nos.
20	MECHANICAL INTERLOCK BETWEEN MAIN SWITCH AND EARTH SWITCH	1 Nos.
21	MECHANICAL STOPPER	1 Nos.

REFERENCE DRAWINGS	
FOR MAIN CONTACT ASSEMBLY (2000 A)	4. HSE 2002 03
FOR EARTH SWITCH CONTACT ASSEMBLY	4. HSE 2002 04
FOR OPERATING MECHANISM FOR ISOLATOR	4. HMS 2002 05
FOR SCHEMATIC DIAGRAM DETAILS (ISOLATOR)	4. HMS 2002 06
FOR OPERATING MECHANISM FOR EARTH SWITCH	4. HES 2002 07
FOR SCHEMATIC DIAGRAM DETAILS (EARTH SWITCH)	4. HES 2002 08
FOR AXU SWITCH DETAILS FORMS&ES	4. HI 2002 09
FOR MECHANICAL INTERLOCK DETAILS	4. HZ 2002 10
FOR NAME PLATE DETAILS	4. HZ 2002 11
FOR CORONA SHIELD DETAILS	4. HO 2002 12
FOR BASE CHANNEL DETAILS	4. HZ 2002 13

NOTES:

- ALL DIMENSIONS ARE IN MILLIMETERS
- ALL FERROUS PARTS ARE HOT DIP GALVANIZED
- ALL NON-FERROUS CONTACT POINTS ARE SILVER PLATED
- THE INDICATED DIMENSIONS ARE SUBJECT TO THE MANUFACTURING TOLERANCES:

UPTO 50 mm	± 0.5%
51 TO 100 mm	± 0.5%
101 TO 300 mm	± 0.5%
ABOVE 300 mm	± 0.5%

- SHORT TIME CURRENT RATING 50 KA rms FOR 1 Sec.
- MIN. CREEPAGE DISTANCE 10,500 mm
- ROTATING STOOL BASE HAVING 2 NOS. BALL BEARINGS OF ADEQUATE RATING
- APPLICABLE STANDARDS IS: 1. PART I TO V. IEC - 62271-102 / IEC 694
- MAX. TERMINAL LOAD SHALL BE AS PER IEC - 62271-102
- ALL G.I. PIPES ARE CLASS "B" TYPE AS PER IS: 1239
- ALL BOLTS & PINS ARE WITH LOCK WASHERS.
- EARTH SWITCH IS INTERCHANGEABLE AT SITE WITHOUT ANY MODIFICATION

WEIGHTS:	QUANTITY:
NET WEIGHT OF THE ISOLATOR	
EXCLUDING INSULATOR	1050 Kgs (Approx.)

Quantity shall be as per actual requirements

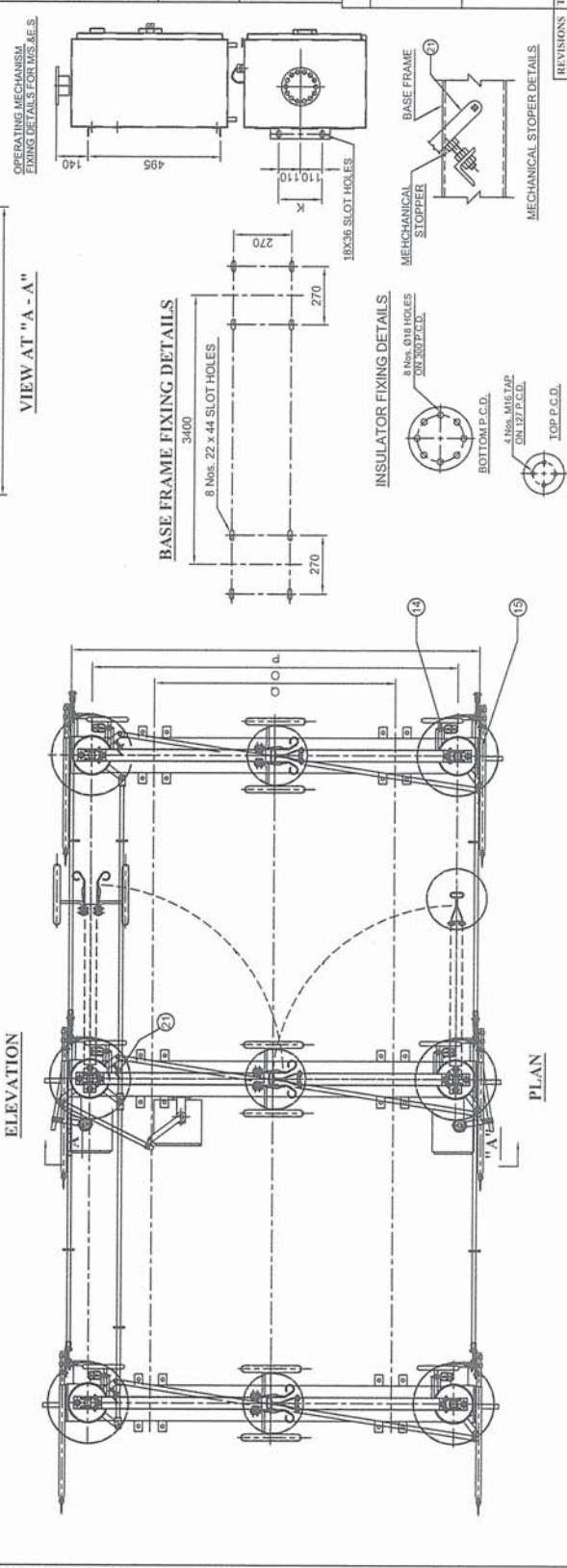
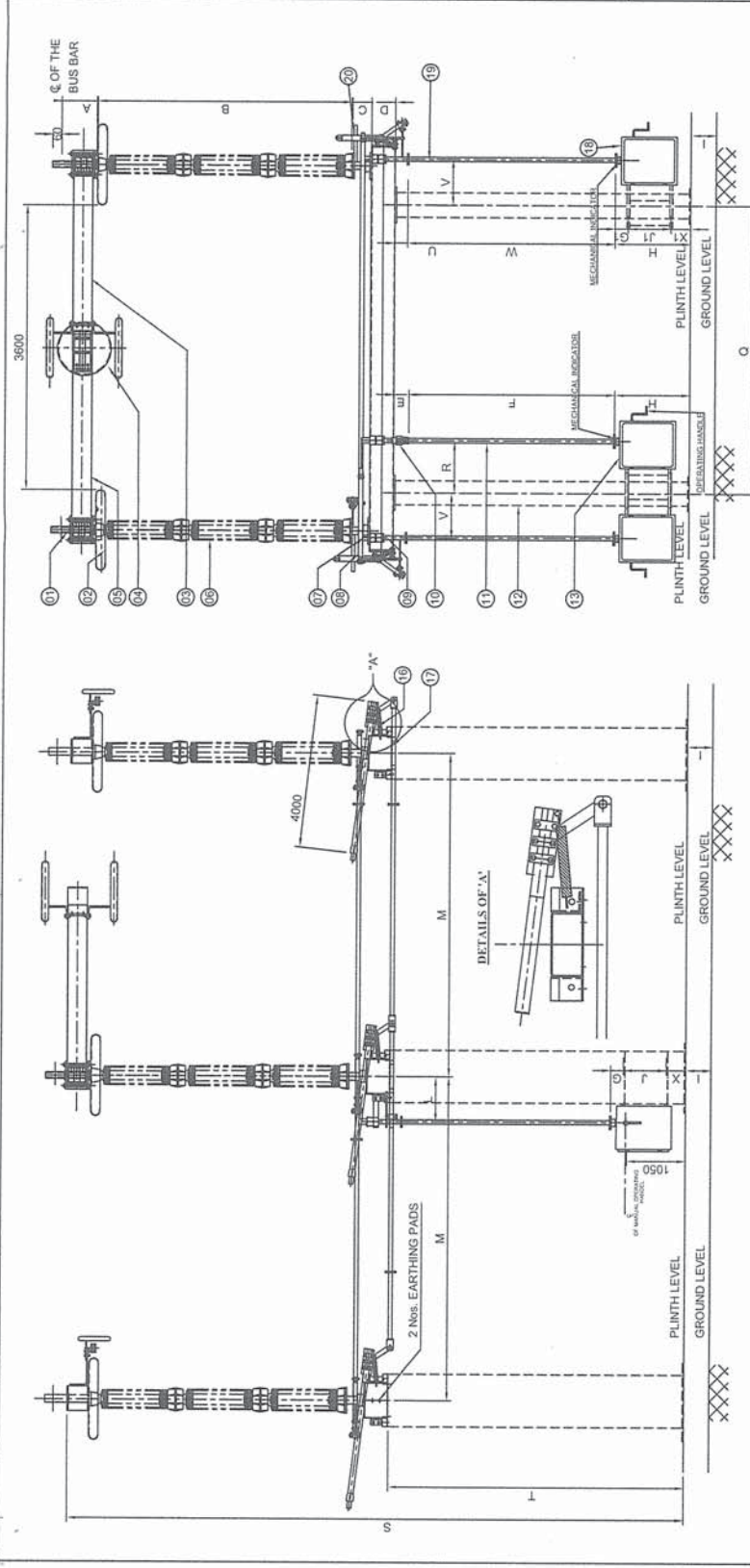
DOCUMENT NO.: 0370-572-PVE-B-345

NABINAGAR POWER GENERATION CO. PVT. LTD.
(A JV OF NTPC LTD. & BHARAT STATE POWER (HOLDING) CO. LTD.)
400/132 KV SWITCHYARD AT NABINAGAR STPP (33660MW)
& 400 KV SWITCHYARD EXTENSION AT NABINAGAR TPP(BRCL)
NMA Number: 45-0370-572-PC-NMA-0009 DATED 12-02-2013

BHARAT HEAVY ELECTRICALS LTD.
TRANSMISSION PROJECTS DIVISION
NEW DELHI

P.O. Number: 153 P 3 4 Dated: 22 / 03 / 2014

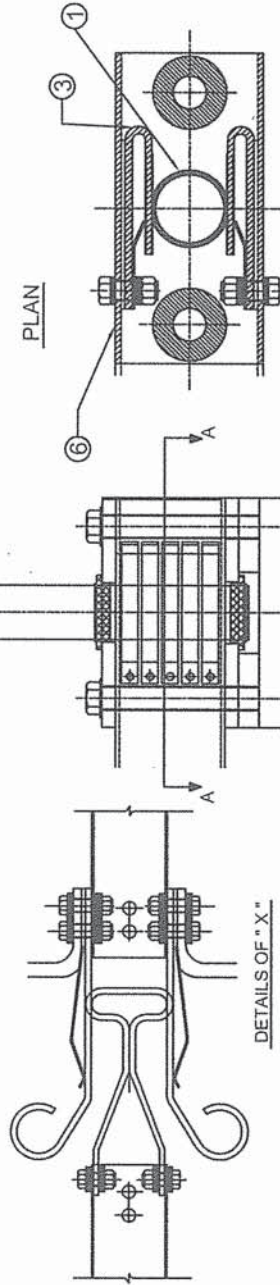
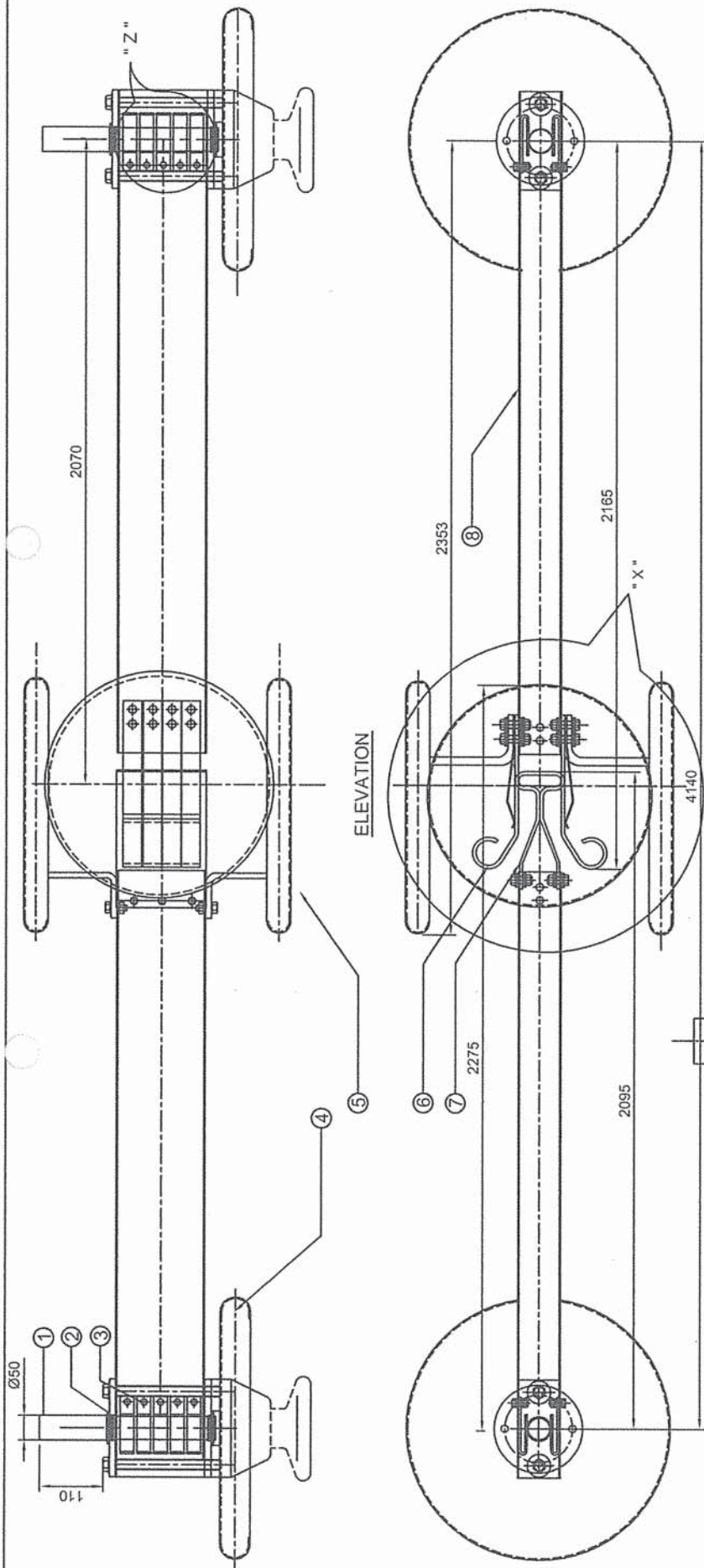
REVISIONS		TITLE:
NO.	DESCRIPTION	
01	AS PER APPROVED	G.A. OF 420 KV, 2000 A, TP, HCB ISOLATOR WITH TWO ES (MECHANICALLY GANG OPERATED)
02	AS PER APPROVED	
03	AS PER APPROVED	
04	AS PER APPROVED	
05	AS PER APPROVED	
06	AS PER APPROVED	
07	AS PER APPROVED	
08	AS PER APPROVED	
09	AS PER APPROVED	
10	AS PER APPROVED	
11	AS PER APPROVED	
12	AS PER APPROVED	
13	AS PER APPROVED	
14	AS PER APPROVED	
15	AS PER APPROVED	
16	AS PER APPROVED	
17	AS PER APPROVED	
18	AS PER APPROVED	
19	AS PER APPROVED	
20	AS PER APPROVED	
21	AS PER APPROVED	
22	AS PER APPROVED	
23	AS PER APPROVED	
24	AS PER APPROVED	
25	AS PER APPROVED	
26	AS PER APPROVED	
27	AS PER APPROVED	
28	AS PER APPROVED	
29	AS PER APPROVED	
30	AS PER APPROVED	
31	AS PER APPROVED	
32	AS PER APPROVED	
33	AS PER APPROVED	
34	AS PER APPROVED	
35	AS PER APPROVED	
36	AS PER APPROVED	
37	AS PER APPROVED	
38	AS PER APPROVED	
39	AS PER APPROVED	
40	AS PER APPROVED	
41	AS PER APPROVED	
42	AS PER APPROVED	
43	AS PER APPROVED	
44	AS PER APPROVED	
45	AS PER APPROVED	
46	AS PER APPROVED	
47	AS PER APPROVED	
48	AS PER APPROVED	
49	AS PER APPROVED	
50	AS PER APPROVED	
51	AS PER APPROVED	
52	AS PER APPROVED	
53	AS PER APPROVED	
54	AS PER APPROVED	
55	AS PER APPROVED	
56	AS PER APPROVED	
57	AS PER APPROVED	
58	AS PER APPROVED	
59	AS PER APPROVED	
60	AS PER APPROVED	
61	AS PER APPROVED	
62	AS PER APPROVED	
63	AS PER APPROVED	
64	AS PER APPROVED	
65	AS PER APPROVED	
66	AS PER APPROVED	
67	AS PER APPROVED	
68	AS PER APPROVED	
69	AS PER APPROVED	
70	AS PER APPROVED	
71	AS PER APPROVED	
72	AS PER APPROVED	
73	AS PER APPROVED	
74	AS PER APPROVED	
75	AS PER APPROVED	
76	AS PER APPROVED	
77	AS PER APPROVED	
78	AS PER APPROVED	
79	AS PER APPROVED	
80	AS PER APPROVED	
81	AS PER APPROVED	
82	AS PER APPROVED	
83	AS PER APPROVED	
84	AS PER APPROVED	
85	AS PER APPROVED	
86	AS PER APPROVED	
87	AS PER APPROVED	
88	AS PER APPROVED	
89	AS PER APPROVED	
90	AS PER APPROVED	
91	AS PER APPROVED	
92	AS PER APPROVED	
93	AS PER APPROVED	
94	AS PER APPROVED	
95	AS PER APPROVED	
96	AS PER APPROVED	
97	AS PER APPROVED	
98	AS PER APPROVED	
99	AS PER APPROVED	
100	AS PER APPROVED	



DIMENSIONS	
NO.	DESCRIPTION
1	3650
2	230
3	220
4	100
5	180
6	2420
7	140
8	1200
9	300
10	495
11	220
12	450
13	7000
14	270
15	4140
16	4400
17	3400
18	620
19	8000
20	3800
21	200
22	370
23	2400
24	225
25	220
26	140
27	495
28	225
29	140
30	495
31	225
32	140
33	495
34	225
35	140
36	495
37	225
38	140
39	495
40	225
41	140
42	495
43	225
44	140
45	495
46	225
47	140
48	495
49	225
50	140
51	495
52	225
53	140
54	495
55	225
56	140
57	495
58	225
59	140
60	495
61	225
62	140
63	495
64	225
65	140
66	495
67	225
68	140
69	495
70	225
71	140
72	495
73	225
74	140
75	495
76	225
77	140
78	495
79	225
80	140
81	495
82	225
83	140
84	495
85	225
86	140
87	495
88	225
89	140
90	495
91	225
92	140
93	495
94	225
95	140
96	495
97	225
98	140
99	495
100	225

GR POWER SWITHGEAR LIMITED PLOT NO:27/B IDA JEEDIMETLA HYDERABAD		420 KV,3150A LIST OF DRAWINGS/DOCUMENTS			
CUSTOMER : M/s. NABINAGAR POWER GENERATION COMPANY PRIVATE LIMITED PROJECT : 400 / 132 KV SWITCHYARD AT NABINAGAR SUPER THERMAL POWER PROJECT DOCUMENT NO. : 0370-572-PVE-B-345 CONTRACTOR : M/s. BHARAT HEAVY ELECTRICALS LIMITED NOIDA PO NO : 1 5 3 P 3 9 4 DATED : 22 - 03 - 2014 QTY : 1. 420 KV 3150-A WTES ----- 8 Nos. (Male side) 2. 420 KV 3150-A WTES ----- 13 Nos. (Female side)		SL.NO. 1 2 3 4 5 6 7 8 9 10 11 12 13	DRG.NO. 3. HS 2002 01 3. HS 2002 01A 4.HSM 2002 03A 4. HSE 2002 04 4.HMS 2002 05 4. HMS 2002 06 4.HES 2002 07 4. HES 2002 08 4. HI 2002 09 4. HZ 2002 10 4. HZ 2002 11 4. HO 2002 12 4. HZ 2002 13A	REV C A 0 A E G E E 0 C 0 B A	DESCRIPTION OF DRAWINGS/DOCUMENTS WO : 2002 420 KV , 3150 AMPS, TP,CB,RT,ISOLATOR WITH ONE E. S (M. G)MALE SIDE 420 KV , 3150 AMPS, TP,CB,RT,ISOLATOR WITH ONE E. S (M. G)FEMALE SIDE MAIN SWITCH CONTACT ASSEMBLY FOR 3150 AMPS EARTH SWITCH CONTACT ASSEMBLY MOTOR OPERATING MECHANISM FOR ISOLATOR SCHEMATIC DIAGRAM DETAILS MOTOR OPERATING MECHANISM FOR EARTH SWITCH SCHEMATIC DIAGRAM DETAILS AUX. SWITCH DETAILS FOR M/S. & E/S. NAME PLATE DETAILS FOR 420 kv HCB MECHANICAL INTERLOCK DETAILS FOR 420 kv HCB CORONA SHIELD DETAILS FOR 420 kv HCB BASE CHANNEL DETAILS (3150 A)
PREPARED BY		CHECKED BY			
APPROVED BY		APPROVED BY			

Quantity shall be as per actual requirements



DETAILS OF 'Z'

NOTE:

1. ALL DIMENSIONS ARE IN MILLIMETERS
2. ALL NON FERROUS CONTACT POINTS ARE SILVER PLATED (25 Microns Min.) REMAINING CONTACT AREA TIN PLATED
3. ALL FERROUS PARTS ARE HOT DIP GALVANIZED
4. THE INDICATED DIMENSIONS ARE SUBJECTED TO THE MANUFACTURING TOLERANCES :
 UPTO 50 mm $\pm 3\%$
 51 TO 100 mm $\pm 1\%$
 ABOVE 100 mm $\pm 2\%$
 ABOVE 300 mm $\pm 0.5\%$
5. FOR CORONA SHIELD DETAILS REF. DRG.NO.4. HO 2002 12

BOQ/SET

- | BOQ/SET | PART LIST : |
|---------|---|
| 06 Nos. | 1. TERMINAL CONTACT (50 OD Cu. ROD) |
| 12 Nos. | 2. BUSH (NYLON) |
| 60 Nos. | 3. TERMINAL CONTACT (5 PAIRS 25 x 4 HDECu FLAT) |
| 06 Nos. | 4. CORONA SHIELD ON INSULATORS (ALUMINUM) |
| 12 Nos. | 5. CORONA SHIELD ON CONTACTS (ALUMINUM) |
| 24 Nos. | 6. FEMALE CONTACT FINGER (32 x 5 mm Cu. FLAT, 4 PAIRS SILVER PLATED) |
| 06 Nos. | 7. MALE CONTACT (150 x 6 Cu. FLAT, 2 Nos. SILVER PLATED) |
| 06 Nos. | 8. CONTACT ARM (140 x 80 x 4 mm THICK ALUMINUM DRAWN SECTION BOX TYPE) |

DOCUMENT NO.: 0370 - 572 - PVE - B - 345
 NABINAGAR POWER GENERATION CO. PVT. LTD.
 (A JV OF NTPC LTD. & BIHAR STATE POWER (HOLDING) CO. LTD.)
 400/132 KV SWITCHYARD AT NABINAGR STPP (3X660MW)
 & 400 KV SWITCHYARD EXTENSION AT NABINAGAR TPP(BRBCL)
 NOA Number :CS-0370-572-2-FC-NOA-0009 DATED 12-02-2013



BHARAT HEAVY ELECTRICALS LTD.
 TRANSMISSION PROJECTS DIVISION
 NEW DELHI

P.O. Number 1 5 3 P 3 4 Dated 22 / 03 / 2014

TITLE:

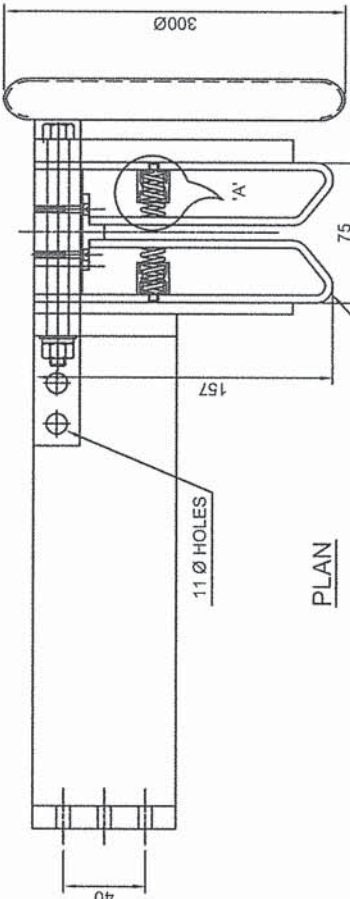
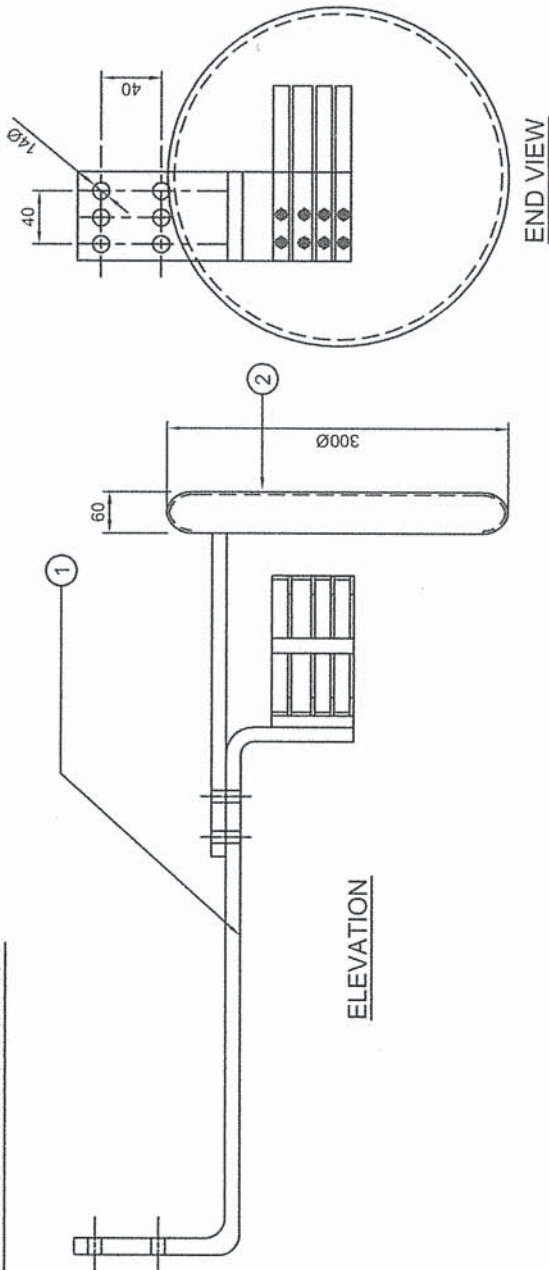
MAIN SWITCH CONTACT ASSEMBLY
 FOR 420 KV , 3150 AMPS

REVISIONS	SCALE	DATE	DRAWN	CHECKED	APPROVED	DRG.NO.	REV
D	C	B	A				

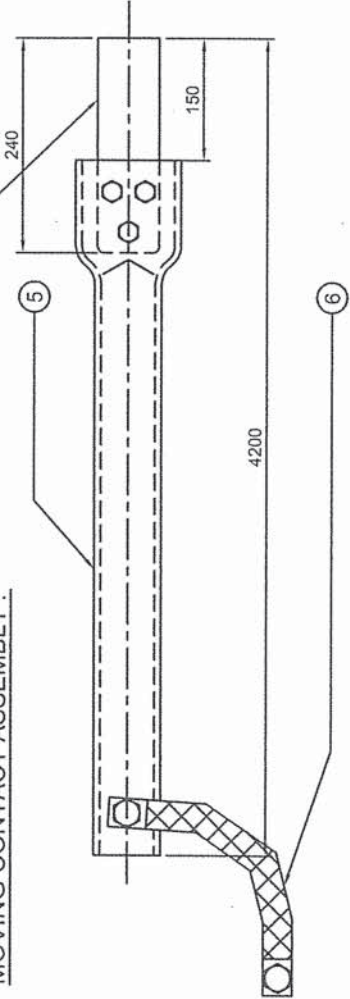
GR POWER SWITCHGEAR LTD.,
 JEEDIMETLA HYDERABAD-500 055 INDIA

4. HSM 2002 03A

FIXED CONTACT ASSEMBLY :



MOVING CONTACT ASSEMBLY :



PART LIST

1. CONTACT HOLDER (75 x 12 Alu. FLAT)
2. CORONA SHIELD (3000, 1mm THIK. Alu. 1 No)
3. CONTACT FINGER (25 x 4 Cu. FLAT 4 PAIRS, SILVER PLATED)
4. MOVING CONTACT (50 x 10 Cu. FLAT, SILVER PLATED)
5. CONTACT ARM (60 OD x 50 ID Alu. TUBE)
6. FLEXIBLE (25 x 3 mm Cu. BRAIDED FLEXIBLE 8NO.S)

NOTES :

1. ALL DIMENSIONS ARE IN MILLIMETERS
2. ALL NON-FERROUS CONTACT POINTS ARE SILVER PLATED (25 MICRONS Min) REMAINING CONTACT AREA TIN PLATED
3. ALL FERROUS PARTS ARE HOT DIP GALVANIZED
4. THE INDICATED DIMENSIONS ARE SUBJECT TO THE MANUFACTURING TOLERANCES :
 UPTO 50 mm ----- ±3% 51 TO 100 mm ----- ±2%
 101 TO 300 mm ----- ±1% ABOVE 300 mm ----- ±0.5%

DOCUMENT NO.: 0370 - 572 - PVE - B - 345

NABINAGAR POWER GENERATION CO. PVT. LTD.
 (A JV OF NTPC LTD. & BIHAR STATE POWER (HOLDING) CO. LTD.)
 400/132 kV SWITCHYARD AT NABINAGR STPP (3X660MW)
 & 400 KV SWITCHYARD EXTENSION AT NABINAGAR TPP(BRBCL)
 NOA Number :CS-0370-572-2-FC-NOA-0008 DATED 12-02-2013



BHARAT HEAVY ELECTRICALS LTD.
 TRANSMISSION PROJECTS DIVISION
 NEW DELHI

P.O. Number 1 5 3 P 3 9 4 Dated 22 / 03 / 2014

REVISIONS		TITLE:		SCALE: N.T.S	
D	C	B	A	DATE	REV
				24-03-2014	
				DRAWN	
				CHECKED	
				APPROVED	
				DRG. NO:	
				4. HSE 2002 04	A

EARTH SWITCH CONTACT ASSEMBLY
 FOR 400 KV

GR POWER SWITCHGEAR LTD.,
 JEEDIMETLA HYDERABAD-500 055 INDIA

Technical drawing of a mechanical device, likely a door or hatch assembly, showing three views and dimensions.

Views:

- ELEVATION (DOOR IN OPEN CONDITION):** Shows the front view of the device with the door open. It includes a handle assembly (1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20) and a locking mechanism (21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37). The door is labeled "DOOR" and "DOOR LOCK". The handle is labeled "HANDLE". The locking mechanism is labeled "LOCKING MECHANISM".
- LEFT SIDE VIEW (DOOR IN CLOSE CONDITION):** Shows the side view of the device with the door closed. It includes a handle assembly (1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20) and a locking mechanism (21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37). The door is labeled "DOOR" and "DOOR LOCK". The handle is labeled "HANDLE". The locking mechanism is labeled "LOCKING MECHANISM".

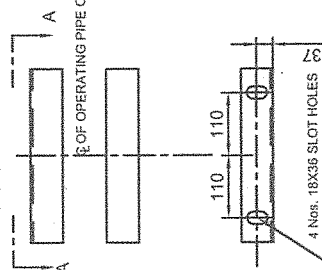
Dimensions:

- 120 (Vertical dimension on the left side view)
- 140 (Horizontal dimension on the left side view)
- 495 (Horizontal dimension on the left side view)
- Ø165 (Circular dimension on the left side view)

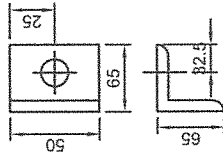
Callouts:

- 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20 (Handle assembly)
- 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37 (Locking mechanism)

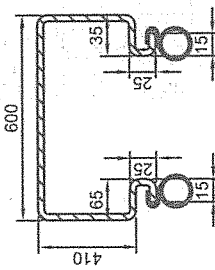
FIXING DETAILS FOR SUPPORTING STRUCTURE



DETAIL "A"



GASKET DETAILS



LEFT SIDE VIEW

(DOOR IN CLOSE CONDITION)

ELEVATION

(DOOR IN OPEN CONDITION)

PLAN

NOTE:

- ALL DIMENSIONS ARE IN MILLIMETERS
CUBICLE WILL BE POWDER COATED WITH RAL : 5012 FOR OUTSIDE AND
GLOSSY WHITE FOR INSIDE
GLASS OF PROTECTION IP : 55 AS PER IS : 13947
20% SPARE TERMINALS WILL BE PROVIDED
WIRING WILL BE DONE WITH 100 V. GRADE
a) TB1 - 1 TO 4 AND TB1 - 23 TO 30 ARE SUITABLE FOR 16 Sq. MM
FOR DC/AC POWER SUPPLY (Y & B WIRES) REMAINING ALL OTHER
TERMINALS ARE SUITABLE FOR 2.5 Sq. MM
WEIGHT OF THE BOX : 100 Kg (Approx.)
OPERATION OF THE BOX : 100 Kg (Approx.)
OPERATION OF THE BOX : 100 Kg (Approx.)

ANTPC DRG. No. 4410 - 001 - 572 - PVE - B - 0103

GR POWER SWITCHGEAR LTD.,
HEEDIMETLA HYDERABAD-500 055 INDIA

NORTH KARANPURA
SUPER THERMAL POWER PROJECT (3x660MW)

NTPC Limited
(A GOVERNMENT OF INDIA ENTERPRISE)

SHARAT HEAVY ELECTRICALS LTD POWER SECTOR TRANSMISSION BUSINESS GROUP NOIDA	DEPT CODE	NAME	SIGN	DATE
	M	DOH		
		CHD		
		APPD APPD		
P.O. NO: 155 P162 DATE: 09.11.2015				

MOTOR OPERATING MECHANISM FOR 400 KV ISOLATOR

DEPT.	SCALE	DRAWING NO.	
SIGN		4. MS 2310 05	
20.11.15		SHEET 1 OF 01	REV.00

DRAWING NO.	4. MS 2310 05	SHEET	1 OF 01	REV.00
-------------	---------------	-------	---------	--------

LEGEND	DESCRIPTION	MAKE
HIC	HANDLE INTERLOCK CONTACT	SWITRON/RECOM
M	MOTOR 3Ø 415 V, 10 HP	REMI / ELCON / CGL OR ITS EQUIVALENT
CH	CUBICLE HEATER 80 WATTS	KONTACTRAMANA ELECT.
S1	A.C. SUPPLY CONTROL SWITCH, 16 A MCB	SCHNEIDER/INDO ASIAN/C&S
S2	D.C. SUPPLY CONTROL SWITCH, 10 A MCB	SCHNEIDER/INDO ASIAN/C&S
S3	LOCAL/REMOTE SELECTOR SWITCH 10 A	SCHNEIDER/INDO ASIAN/C&S
OC,CC	OPEN/CLOSE CONTACTORS, 9 A	SCHNEIDER/INDO ASIAN/C&S
OL	OVER LOAD RELAY WITH SPP 1.6 TO 2.5 A	SCHNEIDER/INDO ASIAN/C&S
PBO/PBC	OPEN/CLOSE PUSH BUTTONS, 4 A	C&S/SCHNEIDER/VAISHNO
LS/OLSC	MANUAL HANDLE PUSH BUTTONS, 4 A	JAI BALAJI/MANI
PBH	EMERGENCY PUSH BUTTON, 4 A	C&S/SCHNEIDER/VAISHNO
EPB	HANDLE INTERLOCK COIL, 20 WATTS	C&S/SCHNEIDER/VAISHNO
HI	MANUAL HANDLE KEY INTERLOCK	SELMECH/GRPS
HIL	LIGHT SOCKET, HEATER SWITCHES, 5A	PS/EE
LS PSS/HS	CUBICLE LAMP HOLDER	MARU OR ITS EQUIVALENT
CL	POWER SOCKET, 5A	MARU OR ITS EQUIVALENT
PS	TERMINAL BLOCKS	ELMEX/CONNECTWELL
TH	THERMOSTAT	BESL
IC	INTERLOCKING CONTACTOR, 9A, 220 V, 7W	SCHNEIDER/INDO ASIAN/C&S
EB	EARTH BLADE	GRPS
S4	Ø1 A.C. SUPPLY CONTROL SWITCH, 10 A MCB	SCHNEIDER/INDO ASIAN/C&S

OPERATING INSTRUCTIONS:

1. DON'T OPERATE THE ISOLATOR WHEN THE 'CIRCUIT BREAKER' IS IN 'ON'
2. ISOLATOR OPERATION IS POSSIBLE ONLY WHEN THE INTERLOCK CONDITIONS ARE SATISFIED
3. FOR MANUAL OPERATION FOLLOW THE FOLLOWING INSTRUCTIONS:-
 - a) BY PRESSING THE PUSH BUTTON (PBH) REMOVE THE CASTLE KEY AND KEEP THE KEY IN HANDLE LOCK AND ROTATE FOR GETTING WAY TO INSERT THE OPERATING HANDLE.
 - b) INSERT THE OPERATING HANDLE AND ROTATE IN CLOCK / ANTI CLOCK WISE
 - c) DIRECTIONS FOR TO OPEN / CLOSE THE ISOLATOR.
4. IF MANUAL OPERATION IS NOT NEEDED RESTORE THE CASTLE KEY IN THE HANDLE INTERLOCK AND ROTATE.

TERMINALS (STUD TYPE)

- a) TB1-1 TO 4 AND TB1-23 TO 30 ARE SUITABLE FOR 16 Sq.MM
- FOR DC/AC POWER SUPPLY (R, Y & B WIRES) REMAINING ALL OTHER
- TERMINALS ARE SUITABLE FOR 2.5 Sq.MM

NTPC DRG. No. 4410 - 001 - 572 - PVE - B - 0103

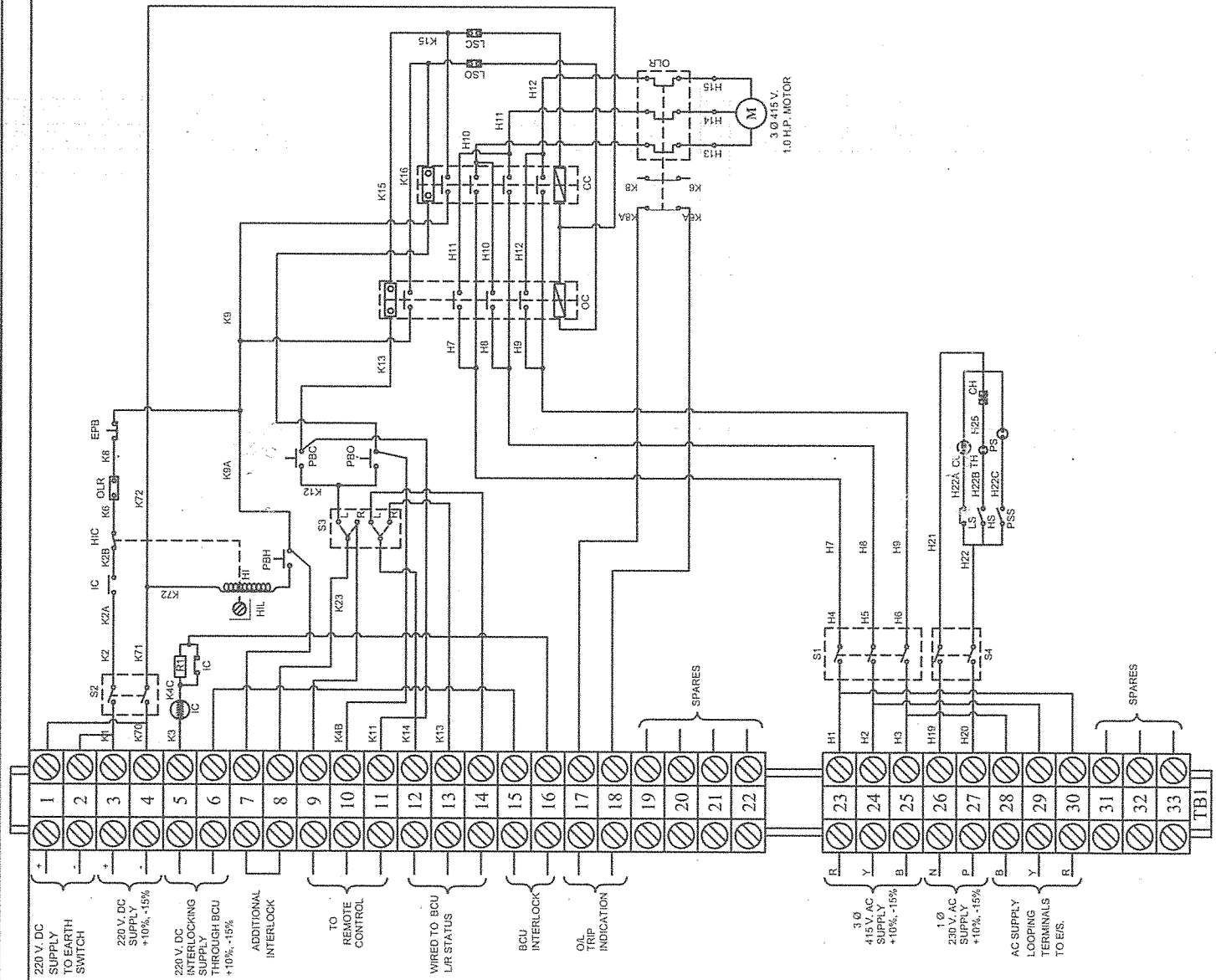
GR POWER SWITCHGEAR LTD.,
JEEDEMETLA HYDERABAD-500 055 INDIA

NORTH KARANPURA

SUPER THERMAL POWER PROJECT (3x660MW)

NTPC Limited
(A COMPANY OF NTPC GROUP)

PROJECT	OWNER	DATE	SCALE	DRAWING NO.	SHEET	OF	REV.
GR POWER SWITCHGEAR LTD.	NTPC Limited	09.11.2015	1:1	4. MS 2310 06	1	01	REV. A
DESIGNED BY	CHECKED BY	DATE	SCALE	DRAWING NO.	SHEET	OF	REV.
TRANSMISSION BUSINESS GROUP	INDIA	09.11.2015	1:1	4. MS 2310 06	1	01	REV. A
P.O. NO. 1.5.5 P.1.0.2	DATE: 09.11.2015	APPROVED BY					
TITLE							
SCHEMATIC DIAGRAM FOR MOTOR							
CONTROL PANEL (FOR 400 KV ISOLATOR)							



- 43. LIMIT SWITCH (LS)
- 44. CUBICLE WITH DOOR (2.5 mm THICK MS. SHEET)
- 45. AUX. SWITCH (12 NO / 12 NC)
- 46. DOOR OPERATED LIGHT SWITCH (LS)
- 47. PROVISION FOR PAD LOCK
- 48. INTERLOCK CONTACTOR (IC)

30. TERMINAL BLOCK (STUD TYPE OF ELMEX)

33. MANUAL OPERATING CAP

35. Ø1 AC CONTROL SWITCH (2 POLE MCB)

FOR 50 x 6 GI FLAT) WITH M12X40 BOLT WITH CHECKNUT & WASHER

NOTE:
ALL DIMENSIONS ARE IN MILLIMETERS

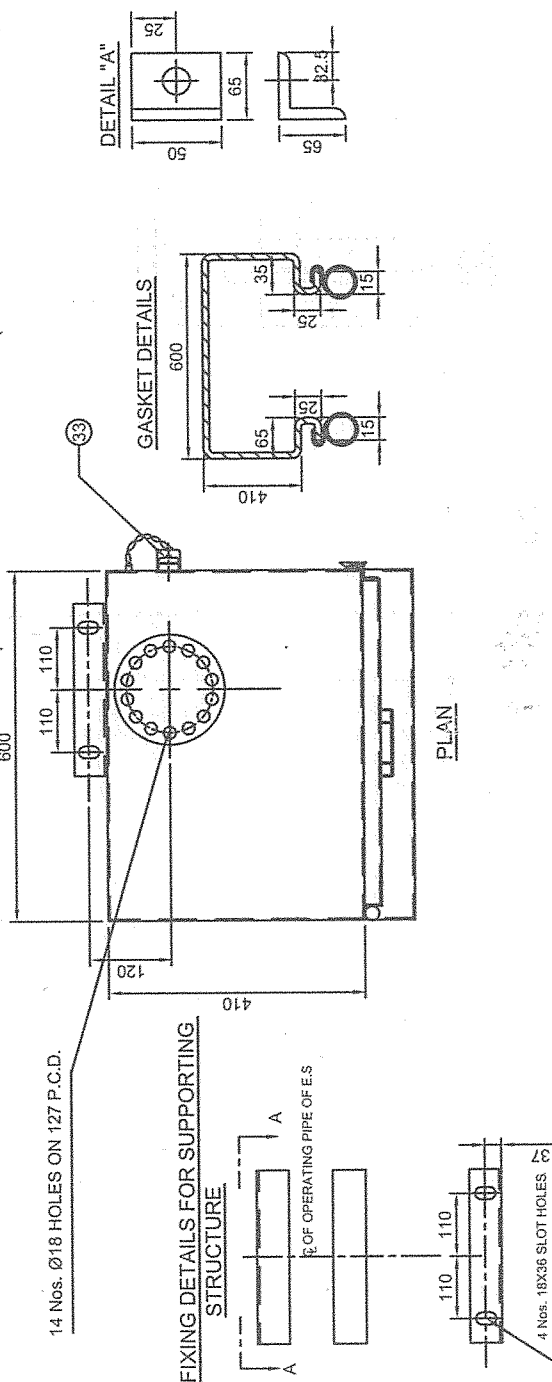
- DEGREE OF PROTECTION IP : 55 AS PER IS : 13947

WIRING WILL BE DONE WITH 1100 V. GRADE

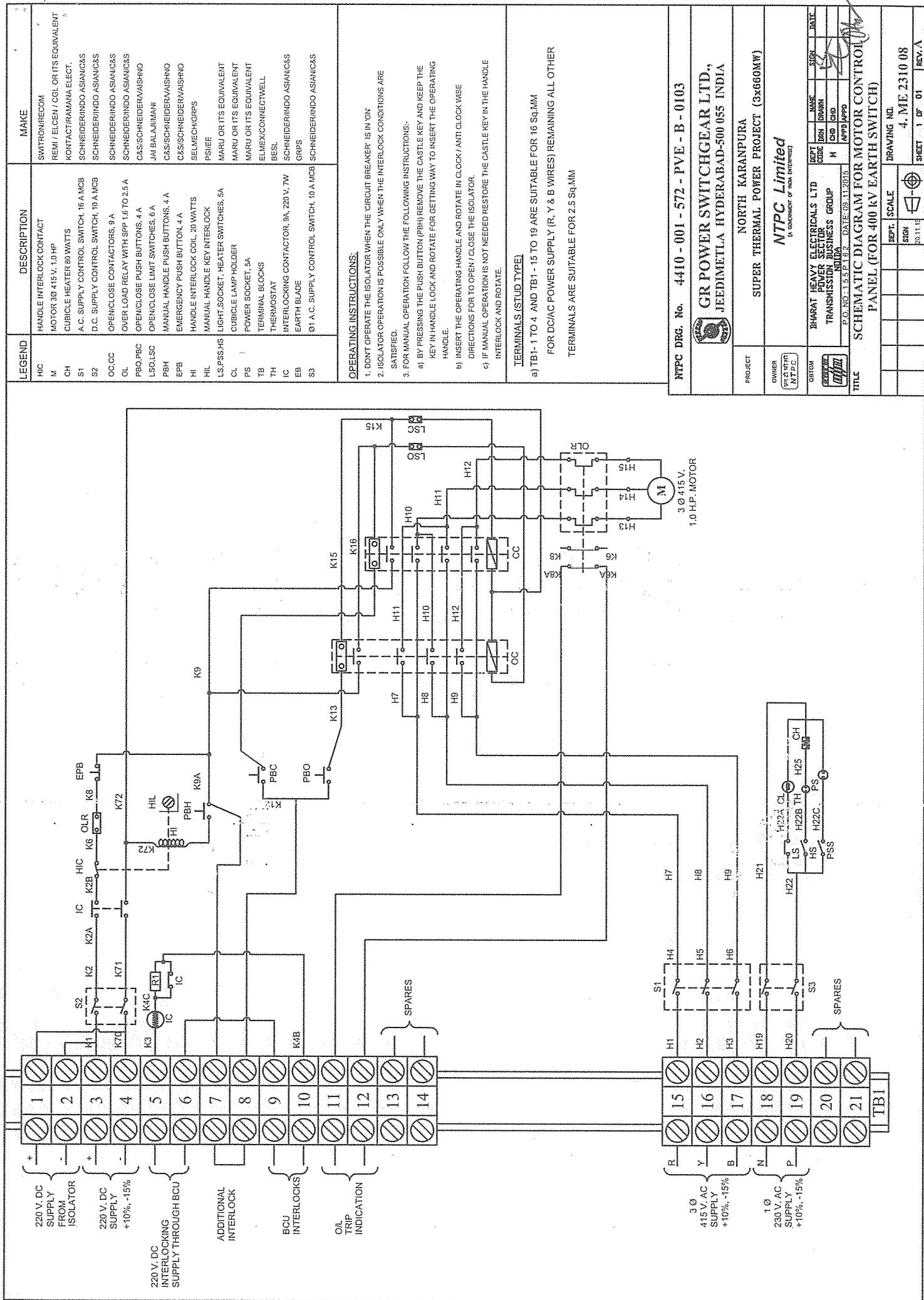
FOR DC/AC POWER SUPPLY (R, Y & B WIRE)

WEIGHT OF THE BOX : 100 Kg (Approx.)

LUBRICATION OF GEARS : NON HARDENED GREASE FILLED GEAR BOX

[illegible]

NTPC DEC. No.		4410 - 001 - 572 - PVE - B - 0103	
	GR POWER SWITCHGEAR LTD., JEEDEMETLA HYDERABAD-500 055 INDIA		
	NORTH KARANPURA SUPER THERMAL POWER PROJECT (3x660MW)		
	NTPC Limited (A GOVERNMENT OF INDIA ENTERPRISE)		
	OWNER 		
	GITGP 		
	BHARAT HEAVY ELECTRICALS LTD POWER SECTOR TRANSMISSION BUSINESS GROUP MUMBAI P.O. NO. 155/F-102 DATE-09.11.2015		
SIGN _____ DATE _____		SIGN _____ DATE _____	
DEPT CODE _____ N		ISRN ISRN CHB CHD APPO APPO	
DRAWING NO. 4. ME 2310 07		SHEET 1 OF 01 86X.00	
DEPT. _____ SIGN _____ 20/11/15	SCALE _____		
TITLE MOTOR OPERATING MECHANISM FOR 400 KV EARTH SWITCH			



LEGEND	DESCRIPTION	MAKE
HIC	HANDLE INTERLOCK CONTACT	SWITRON/RECOM
M	MOTOR 3Ø 415 V, 1.0 HP	REMI / ELCON / CGL OR ITS EQUIVALENT
CH	CUBICLE HEATER 80 WATTS	KONTAKTIRAMANA ELECT.
S1	A.C. SUPPLY CONTROL SWITCH, 16 A MCB	SCHNEIDER/INDO ASIAN/C&S
S2	D.C. SUPPLY CONTROL SWITCH, 10 A MCB	SCHNEIDER/INDO ASIAN/C&S
OC,CC	OPEN/CLOSE CONTACTORS, 9 A	SCHNEIDER/INDO ASIAN/C&S
PBO,PBC	OPEN/CLOSE PUSH BUTTONS, 4 A	C&S/SCHNEIDER/VAISHNO
LSQ,LSC	OPEN/CLOSE LIMIT SWITCHES, 6 A	C&S/SCHNEIDER/VAISHNO
PBH	MANUAL HANDLE PUSH BUTTONS, 4 A	JAI BALAJIMANI
EPB	EMERGENCY PUSH BUTTON, 4 A	C&S/SCHNEIDER/VAISHNO
HI	HANDLE INTERLOCK COIL, 20 WATTS	SELMECH/GRPS
HL	MANUAL HANDLE KEY INTERLOCK	PSIZEE
LS,PSS,HS	LIGHT SOCKET, HEATER SWITCHES, 5 A	MARU OR ITS EQUIVALENT
CL	CUBICLE LAMP HOLDER	MARU OR ITS EQUIVALENT
PS	POWER SOCKET, 5 A	MARU OR ITS EQUIVALENT
TB	TERMINAL BLOCKS	ELMEX/CONNECTWELL
TH	THERMOSTAT	BESL
IC	INTERLOCKING CONTACTOR, 9A, 220 V, 7W	SCHNEIDER/INDO ASIAN/C&S
EB	EARTH BLADE	GRPS
S3	Ø1 A.C. SUPPLY CONTROL SWITCH, 10 A MCB	SCHNEIDER/INDO ASIAN/C&S

OPERATING INSTRUCTIONS:

1. DON'T OPERATE THE ISOLATOR WHEN THE CIRCUIT BREAKER IS IN 'ON'
2. ISOLATOR OPERATION IS POSSIBLE ONLY WHEN THE INTERLOCK CONDITIONS ARE SATISFIED.
3. FOR MANUAL OPERATION FOLLOW THE FOLLOWING INSTRUCTIONS:-
 - a) BY PRESSING THE PUSH BUTTON (PBH) REMOVE THE CASTLE KEY AND KEEP THE KEY IN HANDLE LOCK AND ROTATE FOR GETTING WAY TO INSERT THE OPERATING HANDLE.
 - b) INSERT THE OPERATING HANDLE AND ROTATE IN CLOCK / ANTI CLOCK WISE DIRECTIONS FOR TO OPEN / CLOSE THE ISOLATOR.
 - c) IF MANUAL OPERATION IS NOT NEEDED RESTORE THE CASTLE KEY IN THE HANDLE INTERLOCK AND ROTATE.

TERMINALS (STUD TYPE)

- a) TB1- 1 TO 4 AND TB1 - 15 TO 19 ARE SUITABLE FOR 16 Sq.MM
- FOR DC/AC POWER SUPPLY (R, Y & B WIRES) REMAINING ALL OTHER TERMINALS ARE SUITABLE FOR 2.5 Sq.MM

NTPC DRG. No. 4410 - 001 - 572 - PVE - B - 0103

GR POWER SWITCHGEAR LTD.,
JEEDEMETILA HYDERABAD-500 055 INDIA

PROJECT NORTH KARNAPURA
OWNER SUPER THERMAL POWER PROJECT (3x660MW)
DESIGNER NTPC Limited
(A GOVERNMENT OF INDIA ENTERPRISE)

DATE	11/20/15
BY	11/20/15
CHKD	11/20/15
APPD	11/20/15

GRITOM BHARAT HEAVY ELECTRICALS LTD
POWER SECTOR TRANSMISSION BUSINESS GROUP
INDIA
P.O. NO. 1158 P 182, DATE: 09.11.2015

TITLE SCHEMATIC DIAGRAM FOR MOTOR CONTROL PANEL (FOR 400 KV EARTH SWITCH)

DRAWING NO. 4. ME 2310 08
SECT 1 OF 01
REV. A



NO CONTACTS



NC CONTACTS



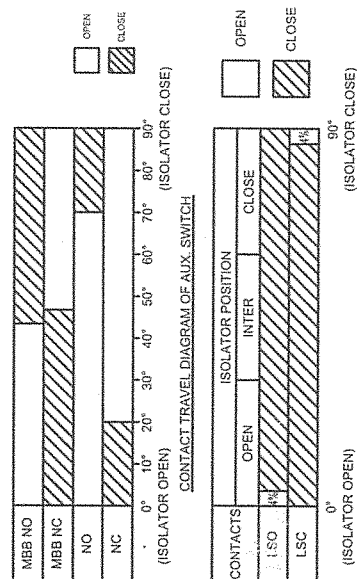
NC CONTACTS

2 MBB



NO CONTACTS

2 MBB


$$(14 \text{ NO} / 14 \text{ NC} + ((2\text{NO} / 2\text{NC}) \text{ MBB}))$$

NTPC	DRG. No.	4410 - 001 - PVE - B - 0103		GR POWER SWITCHGEAR LTD., JEEDIMETLA HYDERABAD-500 055 INDIA	NORTH KARANPURA SUPER THERMAL POWER PROJECT (3x660MW)	NTPC Limited ☐ CORPORATION OF INDIA (GOVERNMENT)	BHARAT HEAVY ELECTRICALS LTD POWER SECTION TRANSMISSION BUSINESS GROUP NOTUDA	PO NO. 115P102 DATE: 08.11.2015	DRWG. NO. 4. HI 2310 09	SHEET 1 OF 01	DATE 15/11/2015	SIGN 	SCALE 20:1	ISPT,	DRAWING NO.	SHEET	OF	01	00

NAME PLATE DETAILS FOR ISOLATOR

MANUFACTURED & SUPPLIED BY	
GR POWER SWITCHGEAR LTD., JEEDIMETLA, HYDERABAD - 500 055	
CUSTOMER :	M/s. NTPC LIMITED
PROJECT :	NORTH KARANPURA SUPER THERMAL POWER PROJECT (3x660MW)
CONTRACTOR :	M/s. BHARAT HEAVY ELECTRICALS LTD.
P.O. NO. :	155 P 162 Dt. : 09.11.2015
TYPE : HCB	SL. NO. : [AS APPLICABLE] YEAR OF Mfg. : 2015
RATING : Un 420	KV : 2000A ; WEIGHT IN KG : 1150
IMPLUSE(UI) : 1425	KV Peak, SWITCHING(Us) : 1050 KV Peak;
P.F. : 520	KV rms; STC(lth) : 50 KA rms; DURATION: 1 Sec;
OPERATING MECHANISM : 3 Ph., 415 V, 1.0 HP MOTOR	
CONTROL VOLTAGE : 220 V DC	

150

NOTES :

1. ENGRAVED LETTER SIZE : 2.5 mm
2. ENGRAVED LETTERING WHITE ON BLACK BACKGROUND
3. MATERIAL : ALUMINIUM
4. THICKNESS : 2 mm

NAME PLATE DETAILS FOR EARTH SWITCH

MANUFACTURED & SUPPLIED BY	
GR POWER SWITCHGEAR LTD., JEEDIMETLA, HYDERABAD - 500 055	
CUSTOMER :	M/s. NTPC LIMITED
PROJECT :	NORTH KARANPURA SUPER THERMAL POWER PROJECT (3x660MW)
CONTRACTOR :	M/s. BHARAT HEAVY ELECTRICALS LTD.
P.O. NO. :	155 P 162 Dt. : 09.11.2015
TYPE : VB	SL. NO. : [AS APPLICABLE] YEAR OF Mfg. : 2015
RATING : Un 420	KV : 2000A ; WEIGHT IN KG : 1400
IMPLUSE(UI) : 1425	KV Peak; SWITCHING(Us) : 1050 KV Peak;
P.F. : 520	KV rms; STC(lth) : 50 KA rms; DURATION: 1 Sec;
OPERATING MECHANISM : 3 Ph., 415 V, 1.0 HP MOTOR	
CONTROL VOLTAGE : 220 V DC	

150

NTPC DRG. No. 4410 - 001 - 572 - PVE - B - 0103

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

PROJECT	NORTH KARANPURA SUPER THERMAL POWER PROJECT (3x660MW)			
OWNER	NTPC Limited (A GOVERNMENT OF INDIA ENTERPRISE)			
QBTGM	BHARAT HEAVY ELECTRICALS LTD POWER SECTOR TRANSMISSION BUSINESS GROUP NTPC P.O. NO. : 155 P 162 DATE: 09.11.2015			
TITLE		NAME PLATE DETAILS FOR 400 KV ISOLATOR & E.S		
DEPT. SCALE		DRAWING NO.		
SIGN		4. Z 2310 10		
20.11.15		SHEET 1 OF 01 REV. 00		

FIGURE (1)
(ISOLATOR AND E/S. ARE IN OPEN)

FIGURE (2)
(ISOLATOR CLOSE AND E/S. ARE IN OPEN)

FIGURE (3)
ISOLATOR OPEN AND E/S. ARE IN CLOSE)

CONSTRUCTION:

ISOLATOR OPERATING MECHANISM OUT PUT SHAFT IS CONNECTED TO TOP OPERATING MECHANISM OF ISOLATOR (6) THROUGH DOWN OPERATING PIPE OF ISOLATOR (2). TOP OPERATING MECHANISM ONE SIDE IS CONNECTED TO ROTATING INSULATOR STACK (12), THROUGH A LINK TANDEM PIPE (3).

E.S. OPERATING MECHANISM OUTPUT SHAFT IS CONNECTED TO TOP OPERATING MECHANISM OF E.S. (10) THROUGH DOWN OPERATING PIPE OF E.S. (9) TOP OPERATING MECHANISM IS CONNECTED TO TANDEM PIPE OF E.S. THROUGH LINK PIPE (11).

FUNCTION:

WHILE ISOLATOR UNDER OPERATION MODE THE MECHANICAL INTERLOCK PIPE (7) WILL ROTATE ALONG WITH INSULATOR STACK (12)

REFER FIG. (1) :- WHEN ISOLATOR IS IN "OFF" POSITION THE MECHANICAL INTERLOCK PIPE (7) WILL PERMIT THE CLOSE OR OPEN EARTH SWITCH.

REFER FIG. (2) :- WHEN ISOLATOR IS IN "ON" POSITION MECHANICAL INTERLOCK PIPE (7) WILL NOT PERMIT THE EARTH - SWITCH MOVING CONTACT (5) TO CLOSE.

REFER FIG. (3) :- WHEN EARTH SWITCH IS IN "ON" POSITION THE INTERLOCK LEVER (8) WILL NOT PERMIT THE INSULATOR STACK (12) TO CLOSE.

PART LIST:

1. BASE CHANNEL
2. DOWN OPERATING PIPE FOR ISOLATOR
3. LINK TANDEM PIPE
4. TOP OPERATING MECHANISM LINK PIPE
5. E/S. MOVING CONTACT
6. TOP OPERATING MECHANISM FOR ISOLATOR
7. MECHANICAL INTERLOCK PIPE
8. INTERLOCK LEVER
9. DOWN OPERATING PIPE FOR E.S.
10. TOP OPERATING MECHANISM FOR E.S.
11. TOP OPERATING MECHANISM LINK PIPE
12. INSULATOR STACK
13. COUNTER SPRING
14. MOVING CONTACT STOPPER

DOCUMENT NO.: 0370-572-PVE-B-345

NABINAGAR POWER GENERATION CO. PVT. LTD.
(A JV OF NTPC LTD. & BIHAR STATE POWER (HOLDING) CO. LTD.)

400/132 kV SWITCHYARD AT NABINAGR STPP (3X360MW)
& 400 KV SWITCHYARD EXTENSION AT NABINAGR TPP(BRBCL)
NOA Number :CS-0370-572-2-FC-NOA-0009 DATED 12-02-2013



BHARAT HEAVY ELECTRICALS LTD.
TRANSMISSION PROJECTS DIVISION
NEW DELHI

P.O. Number 1 5 3 P 3 9 4 Dated 22 / 03 / 2014

REVISIONS	TITLE:		
	D	C	A

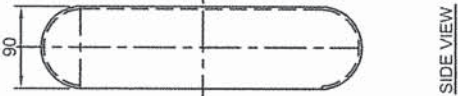
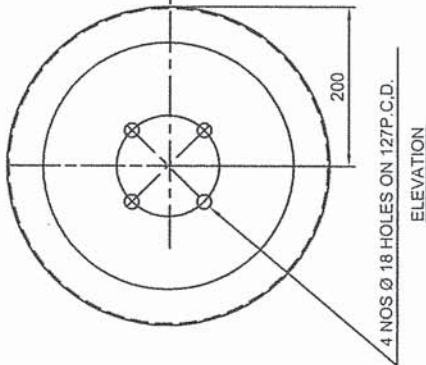
TITLE:

**MECHANICAL INTER LOCK
BETWEEN ISOLATOR
& EARTH SWITCH**

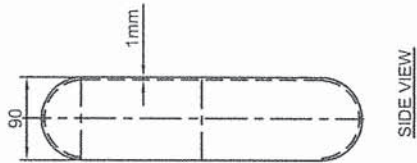
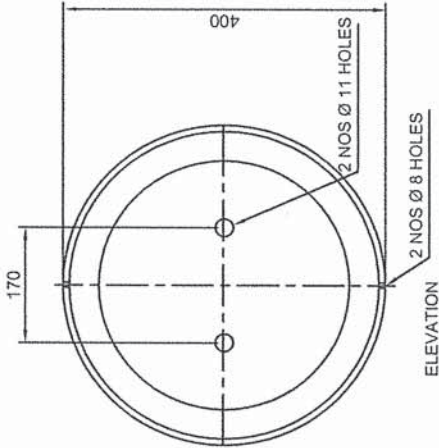
SCALE: N.T.S.	
DATE	24 - 03 - 2014
DRAWN	
CHECKED	
APPROVED	
DRG.NO:	REV
4. HZ 2002 11	

GR POWER SWITCHGEAR LTD.,
JEEDEMETLA HYDERABAD-500 055 INDIA

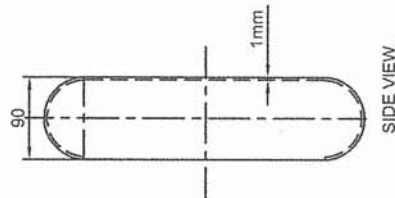
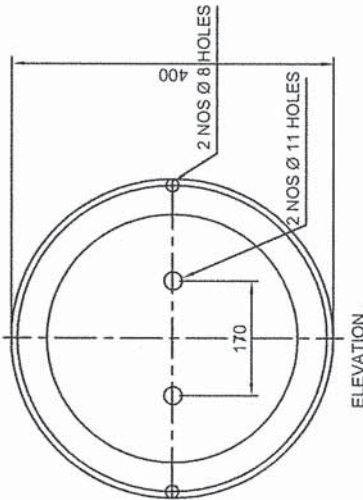
CORONA SHIELD ON INSULATORS



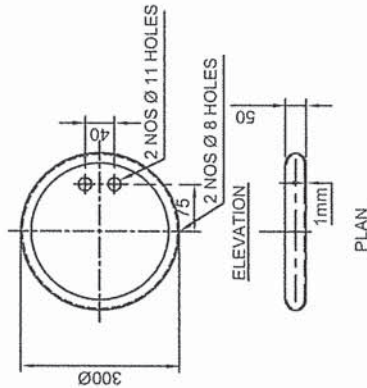
CORONA SHIELD ON FEMALE CONTACTS



CORONA SHIELD ON MALE CONTACTS



CORONA SHIELD ON EARTH SWITCH



NOTES :

1. ALL DIMENSIONS ARE IN MILLIMETERS
2. MANUFACTURING TOLERANCE :
 UPTO 50 mm ±3% 51 TO 100 mm ±2%
 101 TO 300 mm ±1% ABOVE 300 mm ±0.5%

DOCUMENT NO.: 0370 - 572 - PVE - B - 345

NABINAGAR POWER GENERATION CO. PVT. LTD.
 (A JV OF NTPC LTD. & BIHAR STATE POWER (HOLDING) CO. LTD.)

400/132 KV SWITCHYARD AT NABINAGR STPP (3X660MW)
 & 400 KV SWITCHYARD EXTENSION AT NABINAGR TPP(BRBCL)
 NOA Number :CS-0370-572-2-FC-NOA-0009 DATED 12-02-2013



BHARAT HEAVY ELECTRICALS LTD.
 TRANSMISSION PROJECTS DIVISION
 NEW DELHI

P.D. Number 1 5 3 P 3 9 4 Dated 22 / 03 / 2014

TITLE:

CORONA SHIELD DETAILS

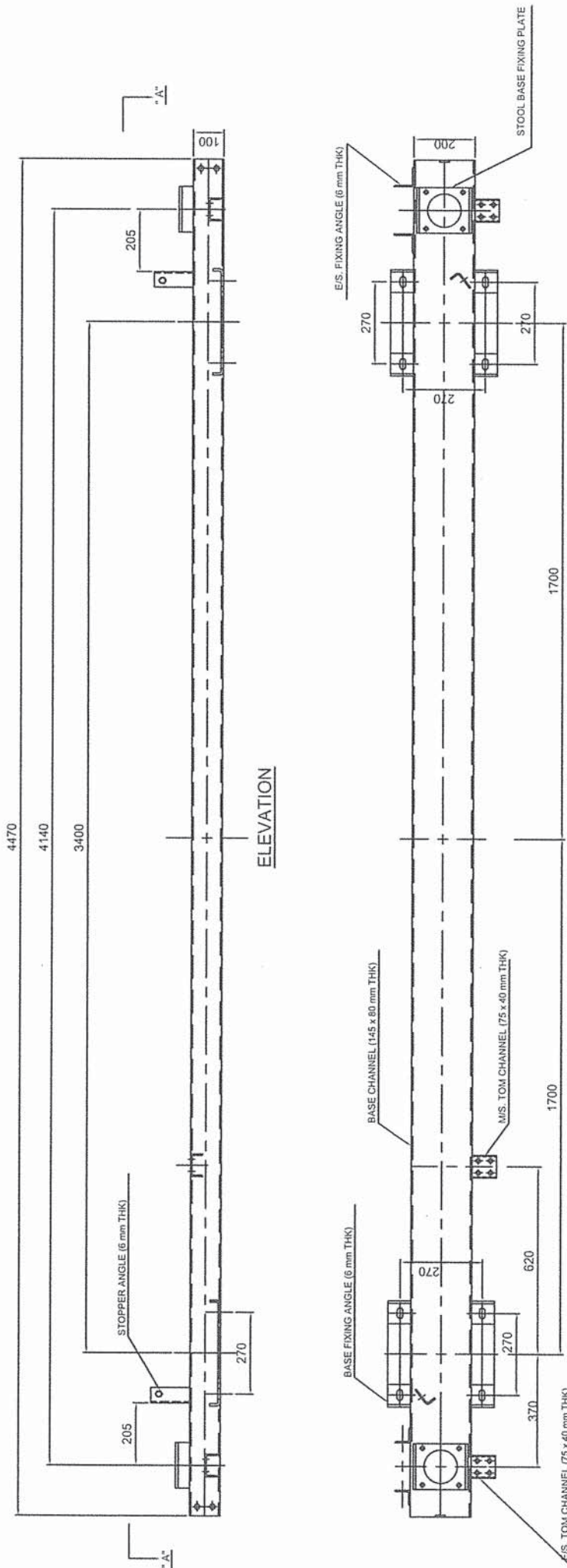
REVISIONS	D	C	B	A

By E-mail on date: 05/05/2014
 By E-mail on date: 12/05/2014

SCALE: N.T.S	DATE	24-03-2014
DRAWN	CHECKED	
APPROVED	DRG.NO:	
REV	4. HO 2002 12	B



GR POWER SWITCHGEAR LTD.,
 JEEDIMETLA HYDERABAD-500 055 INDIA



VIEW AT "A-A"

ALL HOLES ARE $\varnothing 18\text{mm}$
UNLESS OTHERS AS SPECIFIED

DOCUMENT NO.: 0370 - 572 - PVE - B - 345

NABINAGAR POWER GENERATION CO. PVT. LTD.
(A JV OF NTPC LTD. & BHARAT HEAVY ELECTRICALS LTD.)

400/132 KV SWITCHYARD AT NABINAGAR STPP (3X660MW)

& 400 KV SWITCHYARD EXTENSION AT NABINAGAR TPP(BR8CL)

NDA Number :CS-0370-572-2-FC-NOL-0008 DATED 12-02-2013



BHARAT HEAVY ELECTRICALS LTD.
TRANSMISSION PROJECTS DIVISION
NEW DELHI

P.O. Number 1 5 3 P 3 4 Dated 22 / 03 / 2014

REVISIONS

NO	DESCRIPTION	DATE
1	AS PER SPECIFICATION	12-06-2014
2	AS PER SPECIFICATION	12-06-2014
3	AS PER SPECIFICATION	12-06-2014
4	AS PER SPECIFICATION	12-06-2014

SCALE	DATE	DRAWN	CHECKED	APPROVED	REV
1:1	12-06-2014				

400 KV, CB
BASE CHANNEL ASSEMBLY
(FOR 3150 A)

TITLE:

GR POWER SWITCHGEAR LTD.,
JEEDEMETLA HYDERABAD-500 055 INDIA

SCALE: 1:1
DATE: 12-06-2014
DRAWN: [Signature]
CHECKED: [Signature]
APPROVED: [Signature]
REV: [Signature]
A

BOQ -	ASSY	LOOSE
01.	TERMINAL STUD (50 OD Cu ROD (3150A))	6 Nos.
02.	CORONA SHIELD ON INSULATORS	3 Nos.
03.	MALE CONTACT ASSEMBLY	12 Nos.
04.	CORONA SHIELD ON CONTACTS	6 Stacks
05.	FEMALE CONTACT ASSEMBLY	3 Nos.
06.	INSULATOR STACKS (BHEL SCOPE OF SUPPLY)	3 Nos.
07.	ROTATING SHAFT WITH LEVER ARM AND CLAMP (MILD STEEL HOT DIP GALVANIZED)	1 Nos.
08.	LINK TANDEN PIPE (32 NB CLASS "B" G.I. PIPE)	1 Nos.
09.	BOX CHANNEL (HOT DIP GALVANIZED) STEEL BOX CHANNEL (HOT DIP GALVANIZED)	1 Nos.
10.	UNIVERSAL JOINT ASSEMBLY	1 Nos.
11.	DOWN OPERATING PIPE (50 NB CLASS "B" G.I. PIPE)	1 Nos.
12.	SUPPORTING STRUCTURE (BHEL SCOPE OF SUPPLY)	1 Nos.
13.	OPERATING MECHANISM FOR MAIN SWITCH (MOTOR)	1 Nos.
14.	EARTH SWITCH FIXED CONTACT ASSEMBLY	3 Nos.
15.	EARTH SWITCH MOVING CONTACT ASSEMBLY	3 Nos.
16.	COUNTER BALANCING SPRINGS	1 Nos.
17.	OPERATING PIPE FOR EARTH SWITCH (40 NB CLASS "B" G.I. PIPE)	1 Nos.
18.	OPERATING MECHANISM FOR EARTH SWITCH (MOTOR)	1 Nos.
19.	EARTH SWITCH DOWN OPERATING PIPE (50 NB CLASS "B" G.I. PIPE)	1 Nos.
20.	MECHANICAL INTERLOCK BETWEEN MAIN SWITCH AND EARTH SWITCH	1 Nos.
21.	MECHANICAL STOPPER	6 Nos.

REFERENCE DRAWINGS
FOR MAIN CONTACT ASSEMBLY (3150 A) ----- 4. HSM 2002 03A
FOR EARTH SWITCH CONTACT ASSEMBLY ----- 4. HSE 2002 04
FOR OPERATING MECHANISM FOR ISOLATOR ----- 4. HMS 2002 05
FOR SCHEMATIC DIAGRAM DETAILS (ISOLATOR) ----- 4. HMS 2002 06
FOR OPERATING MECHANISM FOR EARTH SWITCH ----- 4. HES 2002 07
FOR SCHEMATIC DIAGRAM DETAILS (EARTH SWITCH) ----- 4. HES 2002 08
FOR AXU SWITCH DETAILS (FORMSSES) ----- 4. HI 2002 09
FOR MECHANICAL INTERLOCK DETAILS ----- 4. HZ 2002 10
FOR NAME PLATE DETAILS ----- 4. HZ 2002 11
FOR CORONA SHIELD DETAILS ----- 4. HO 2002 12
FOR BASE CHANNEL DETAILS ----- 4. HZ 2002 13A

NOTES :

- ALL DIMENSIONS ARE IN MILLIMETERS
- ALL DIMENSIONS ARE IN MILLIMETERS
- ALL NON-FERROUS CONTACT POINTS ARE SILVER PLATED (25 MICRONS MINIMUM)
- THE INDICATED DIMENSIONS ARE SUBJECT TO THE MANUFACTURING TOLERANCES :

UPTO 50 mm ±1% 51 TO 100 mm ±2%
 101 TO 300 mm ±1% ABOVE 300 mm ±0.5%
 5. SHORT TIME CURRENT RATING 50 KA rms. FOR 1 Sec.
 6. MIN. CREEPAGE DISTANCE 10,500 mm
 7. ROTATING SHAFT WITH LEVER ARM 2 Nos. BALL BEARINGS OF ADEQUATE
 8. APPLICABLE STANDARDS IS: 9921 PART I TO V IEC: 62271-102 / IEC 694
 9. MAX. TERMINAL LOAD SHALL BE AS PER IEC: 62271-102
 10. ALL G.I. PIPES ARE CLASS "B" TYPE AS PER IS: 1239
 11. ALL BOLTS & PINS ARE WITH LOCK WASHERS.
 12. EARTH SWITCH IS INTERCHANGEABLE AT SITE WITHOUT ANY MODIFICATION

WEIGHTS :
 NET WEIGHT OF THE ISOLATOR : 1400 Kgs (Approx.)
 EXCLUDING INSULATOR : 3150A - 400 Nos.

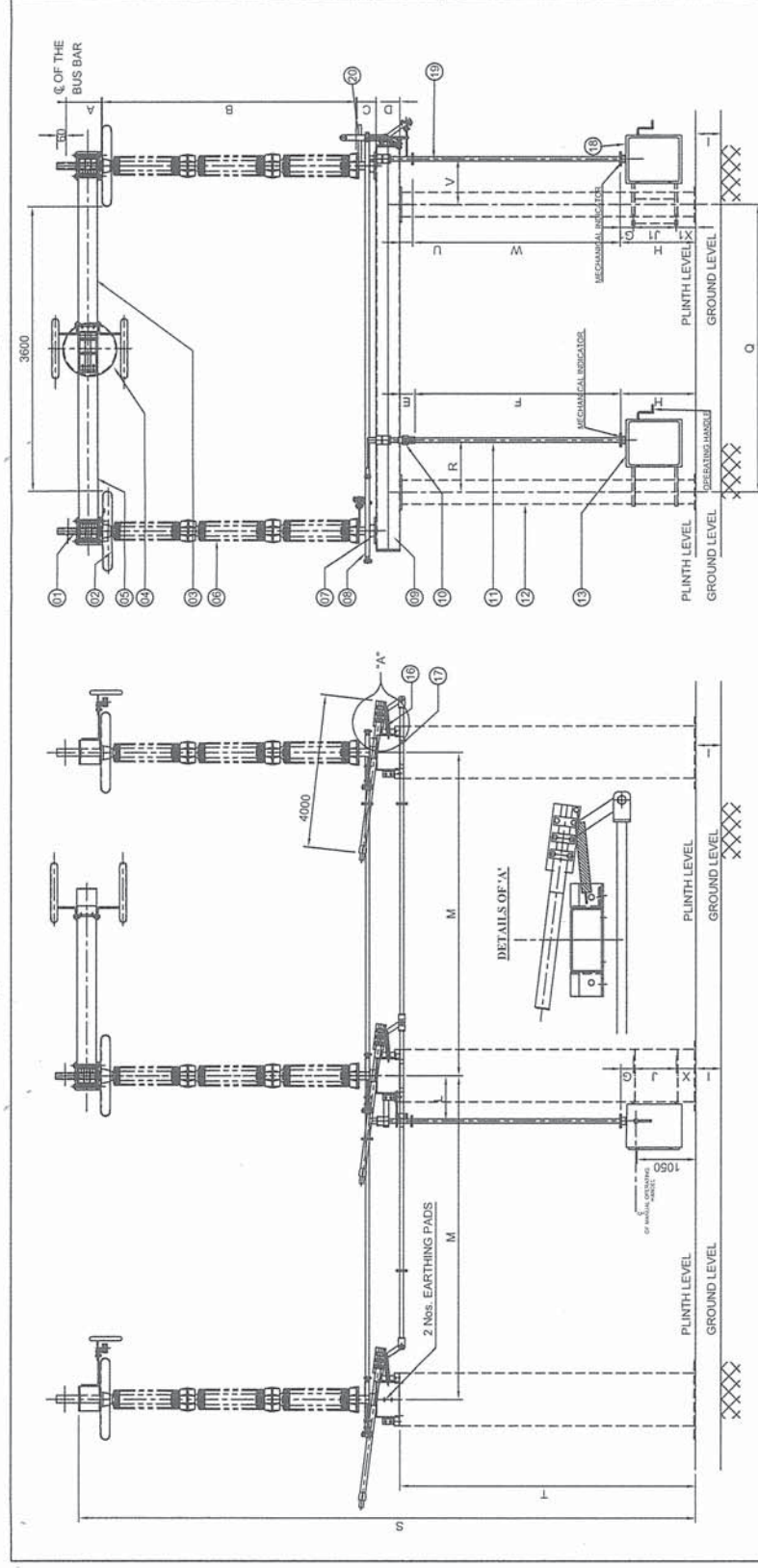
QUANTITY :
 3150A - 400 Nos.

DOCUMENT NO. : 0370 - 572 - PVE - B - 345

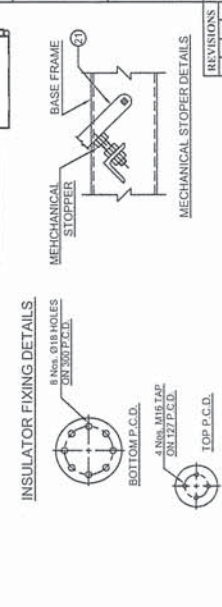
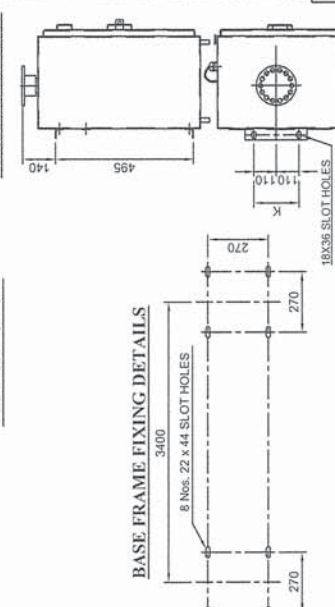
NABINAGAR POWER GENERATION CO. PVT. LTD.
 (A JV OF NPS LTD. & BHAR STATE POWER HOLDING CO. LTD.)
 400/132 KV SWITCHYARD AT NABINAGAR STPP (33660MW)
 & 400 KV SWITCHYARD EXTENSION AT NABINAGAR TPP(BRCL)
 HOA Number CS-0370-572-2-FC-NOA-0009 DATED 12-02-2013

GR POWER SWITCHGEAR LTD.
 TRANSMISSION PROJECTS DIVISION
 NEW DELHI

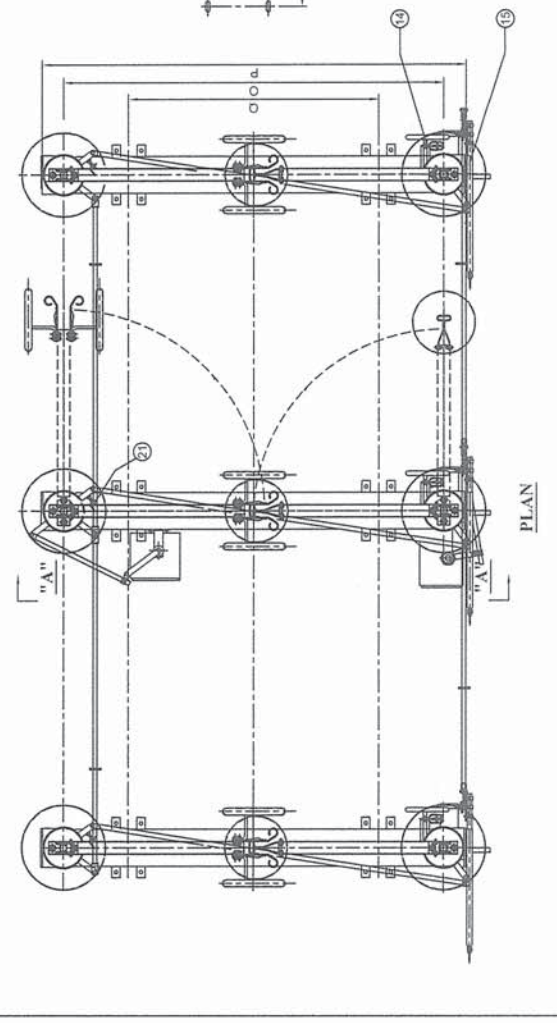
TITLE	G.A. OF 420 KV, 3150 A, TP, HCB ISOLATOR WITH ONE E.S (ES ON MALE SIDE) (MECHANICALLY GANG OPERATED)
SCALE	1:50
DATE	24.03.2014
DRAWN	REV
CHECKED	REV
APPROVED	REV
DRG. NO.	3. HS 2002 01 C



VIEW AT "A-A"



ELEVATION



PLAN

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	K1	G1	J1	X1
230	3650	220	100	180	2420	140	1200	300	495	220	450	7000	270	4140	4400	3400	620	8000	3800	200	370	2400	265	220	140	495	265

BOQ	ASSY	LOOSE
6 Nos.	01. TERMINAL STUD (50 Cu Rod (3150A)	
3 Nos.	02. CORONA SHIELD ON INSULATORS	
12 Nos.	03. MALE CONTACT ASSEMBLY	
6 Sticks	04. CORONA SHIELD ON CONTACTS	
3 Nos.	05. INSULATOR STACKS (BHEL SCOPE OF SUPPLY)	
6 Nos.	06. ROTATING SHAFT WITH LEVER ARM AND CLAMP	
3 Nos.	08. LINK TANDEM PIPE (32 NB CLASS "B" G.I. PIPE)	
1 Nos.	09. BASE CHANNEL (HOT DIP GALVANIZED) STEEL BOX CHANNEL - HOT DIP GALVANIZED	
1 Nos.	10. UNIVERSAL JOINT ASSEMBLY	
6 Nos.	11. DOWN OPERATING PIPE (50 NB CLASS "B" G.I. PIPE)	
1 Nos.	12. SUPPORTING STRUCTURE (BHEL SCOPE OF SUPPLY)	
3 Nos.	13. OPERATING MECHANISM FOR MAIN SWITCH (MOTOR)	
3 Nos.	14. EARTH SWITCH FIXED CONTACT ASSEMBLY	
1 Nos.	15. EARTH SWITCH MOVING CONTACT ASSEMBLY	
3 Nos.	16. COUNTER BALANCING SPRINGS	
1 Nos.	17. OPERATING PIPE FOR EARTH SWITCH (40 NB CLASS "B" G.I. PIPE)	
1 Nos.	18. OPERATING MECHANISM FOR EARTH SWITCH (MOTOR)	
1 Nos.	19. EARTH SWITCH DOWN OPERATING PIPE (50 NB CLASS "B" G.I. PIPE)	
1 Nos.	20. EARTH SWITCH MECHANICAL INTERLOCK BETWEEN MAIN SWITCH AND EARTH SWITCH	
6 Nos.	21. MECHANICAL STOPPER	

REFERENCE DRAWINGS

FOR MAIN CONTACT ASSEMBLY (3150 A)	4. HSM 2002 03A
FOR EARTH SWITCH ASSEMBLY	4. HSE 2002 04
FOR OPERATING MECHANISM FOR ISOLATOR	4. HMS 2002 05
FOR SCHEMATIC DIAGRAM DETAILS (ISOLATOR)	4. HMS 2002 06
FOR OPERATING MECHANISM FOR EARTH SWITCH	4. HES 2002 07
FOR SCHEMATIC DIAGRAM DETAILS (EARTH SWITCH)	4. HES 2002 08
FOR AXI SWITCH DETAILS (FORMS&ES)	4. HI 2002 09
FOR MECHANICAL INTERLOCK DETAILS	4. HZ 2002 10
FOR NAME PLATE DETAILS	4. HZ 2002 11
FOR CORONA SHIELD DETAILS	4. HO 2002 12
FOR BASE CHANNEL DETAILS	4. HZ 2002 13A

NOTES :

- ALL DIMENSIONS ARE IN MILLIMETERS
- ALL FERROUS PARTS ARE HOT DIP GALVANIZED
- ALL NON - FERROUS CONTACT POINTS ARE SILVER PLATED (25 MICRONS MINIMUM)
- THE INDICATED DIMENSIONS ARE SUBJECT TO THE MANUFACTURING TOLERANCES :
 UPTO 50 mm ±3%
 51 TO 100 mm ±2%
 101 TO 300 mm ±1%
 ABOVE 300 mm ±0.5%
- SHORT TIME CURRENT RATING 50 KA rms. FOR 1 Sec.
- MIN. CREEPAGE DISTANCE 10,500 mm
- DOWN OPERATING MECHANISM 2 Nos. BALL BEARINGS OF ADEQUATE DIAMETER IN SEALED HOUSING
- APPLICABLE STANDARDS IS : 9821 PART I TO V IEC : 62271-102 / IEC 694
- MAX. TERMINAL LOAD SHALL BE AS PER IEC : 62271-102
- ALL G.I. PIPES ARE CLASS "B" TYPE AS PER IS : 1239
- ALL BOLTS & PINS ARE WITH LOCK WASHERS.
- EARTH SWITCH IS INTERCHANGEABLE AT SITE WITHOUT ANY MODIFICATION

WEIGHTS :

NET WEIGHT OF THE ISOLATOR : 1400 Kgs (Approx.)
 EXCLUDING INSULATOR : 1400 Kgs (Approx.)

QUANTITY :

3750 A ----- 13 Nos.

Quantity shall be as per actual requirements

DOCUMENT NO. : 0370 - 572 - PVE - B - 345

NABINAGAR POWER GENERATION CO. PVT. LTD.
 (A N of NTPC LTD. & BIHAR STATE POWER (INCLUDING) CO. LTD.)

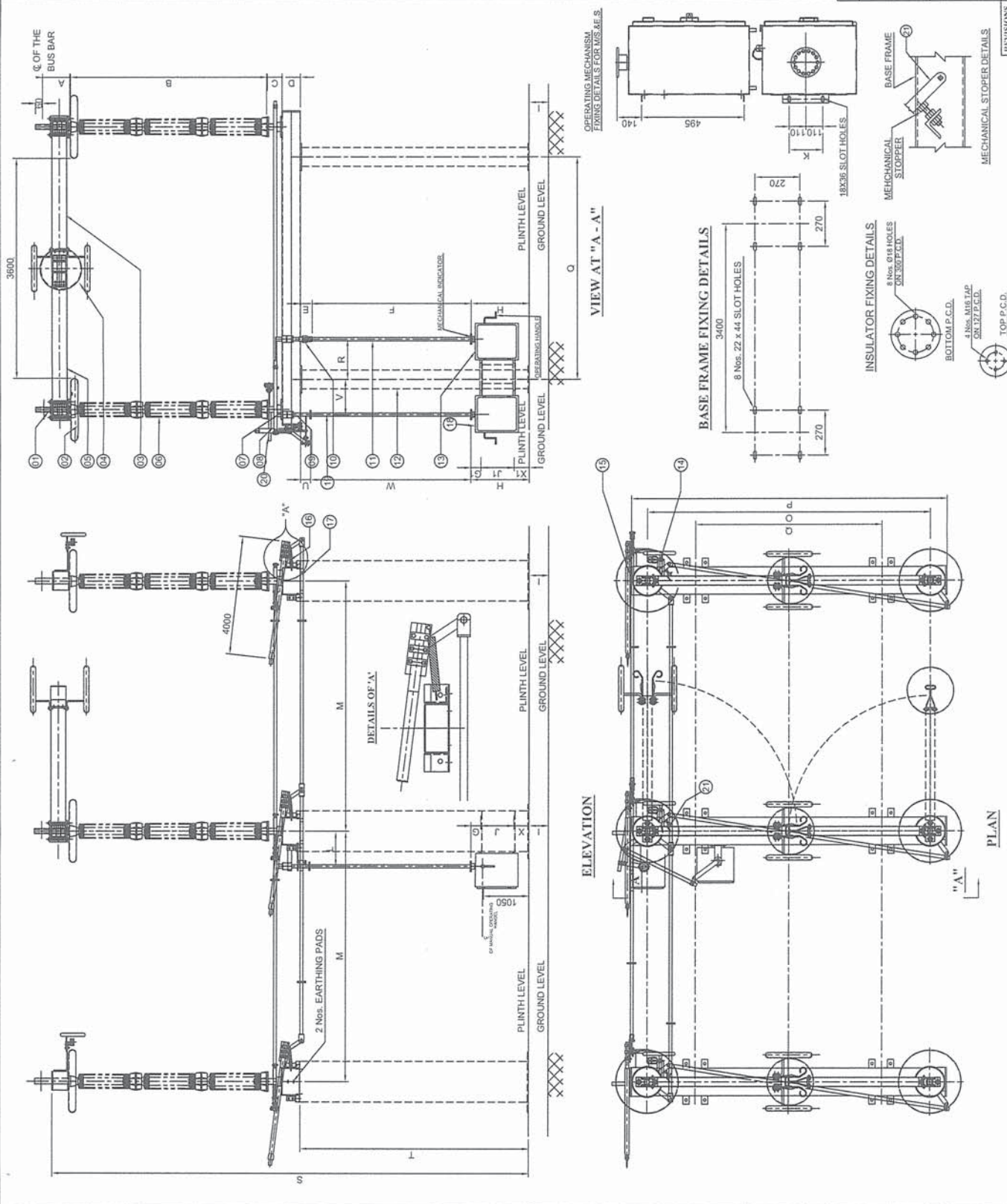
400/132 KV SWITCHYARD AT NABINAGAR STPP (3X660MW)
 & 400 KV SWITCHYARD EXTENSION AT NABINAGAR TPP(BRCL)

MDA Number CS-0370-572-2-FC-NON-0009 DATED 12-02-2013

BHARAT HEAVY ELECTRICALS LTD.
 TRANSMISSION PROJECTS DIVISION
 NEW DELHI

P.O. Number 1 S 3 P 3 9 4 Dated 22 / 03 / 2014

TITLE	SCALE	DATE	REV
G.A. OF 420 KV, 3150 A, TP, HCB ISOLATOR WITH ONE E.S (E/S ON FEMALE SIDE) (MECHANICALLY GANG OPERATED)	1:1	24.03.2014	1
GR POWER SWITCHGEAR LTD., JEEDIMETLA HYDERABAD-500 055 INDIA			3. HS 2002-01A



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	K1	G1	J1	X1
230	3650	220	100	180	2420	140	1200	300	495	220	450	7000	270	4140	4400	3400	620	8000	3800	200	370	2400	265	220	140	495	265

COMPLIANCE REPORT FOR NABINAGAR STPP SWITCHYARD PACKAGE DRAWINGS AND DOCUMENTS COMMENTS

PROJECT:	400/132 kV SWITCHYARD PACKAGE AT NABINAGAR STPP (3X660MW)		
CONTRACT NO.:	NOA Number :CS-0370-572-2-FC-NOA-0009 DATED 12-02-2013		
NTPC DRG. /DOC. NO.:	0370-572-PVE-B-353	REV	2
BHEL DRG./DOC. NO.:		Date of submission of revised documents:	02-08-2014
DRG./DOC TITLE:	400kV Isolator - Data Sheet		
Sl. No.	Comments from NTPC	BHEL Compliance	
1	Make is subject to NTPC-QA approval	Noted	
2	Information for "Literature" may be furnished as per NTPC format	incorporated	

Certification signature by **Digitally signed**
 <kcbedwal@ntpcceoc.com> by **Kantash** Unknown
 Date: 2014.08.19
 09:51:45 IST
 Reason: CAT I
 Location:
 NTPCEOC

CONTENTS

SL. NO.	DOCUMENT TITLE	PAGES
1.	GTP for 400 kV, 2000A HCB Isolator	4
2.	GTP for 400 kV, 3150A HCB Isolator	4

DOC. TITLE	400kV Isolator - Data Sheet	
NTPC DOC NO.	0370-572-PVE-Y-353	Rev-02
NABINAGAR POWER GENERATION CO. PVT. LTD. (A JV OF NTPC LTD. & BIHAR STATE POWER (HOLDING) CO. LTD.) 400/132 kV SWITCHYARD AT NABINAGR STPP (3X660MW) & 400 KV SWITCHYARD EXTENSION AT NABINAGAR TPP(BRBCL) NOA Number :CS-0370-572-2-FC-NOA-0009 DATED 12-02-2013		
	BHARAT HEAVY ELECTRICALS LTD. TRANSMISSION PROJECTS DIVISION NEW DELHI PO No. 153P394 Dated. 22.03.2014	

CUSTOMER	:	NABHINAGAR POWER GENERATION CO. PVT. LTD.
PROJECT	:	400/132KV SWITCHYARD AT NABHINAGAR SUPER THERMAL POWER PROJECT (NPGCPL)
CONTRACTOR	:	M/S. BHEL
PO NO	:	153P394 Dated. 22.03.2014
NTPC DOC NO	:	0370-572-PVE-Y-353
OUR WO NO	:	2002

**GUARANTEED AND TECHNICAL PARTICULARS FOR 420 KV 2000A ISOLATORS AND
ISOLATOR -CUM-EARTHING SWITCHES**

REV-D

S.No.	Description	Data
1	GENERAL	Make is subject to NTPC-QA approval
	a) Name and country of the manufacturer	: GR POWER SWITCHGEAR LIMITED, HYDERABAD - INDIA
	b) Manufacturer's type designation	: HORIZONTAL CENTRE BREAK - "HCB"
	c) Standard applicable	: IS : 9921 Part I to V, IEC 62271-102
	d) Rated Voltage Ur (kV)	: 420 KV
	e) Rated Current (A)	
	i) Under Normal Current	: 2000 Amps
	ii) Under site Conditions at 50 degree C ambient	: 2000 Amps
	f) Rated frequency (Hz)	: 50 Hz
	g) Number of poles	: Three
	h) Whether all 3 poles are ganged mechanically	: Yes
	i) Pole to pole spacing	: 7000 mm
2	GUARANTEED RATINGS	
	a) Rated short time current of isolator	
	i) For 1 sec.	: 50 KA rms
	ii) For 3 secs.	: Not Applicable
	iii) Dynamic current (KA peak)	: 125 KA peak
	b) Opening time of	
	i) Isolator (sec)	: Less than 12 secs.
	ii) Earth Switch (sec)	: Less than 12 secs.
	c) Closing time of	
	i) Isolator (sec)	: Less than 12 secs.

S.No.	Description	Data
	ii) Earth switch (sec)	: Less than 12 secs.
	d) Temperature rise over 50 Deg. C ambient temperature corresponding to maximum continuous current Deg. C.	: Within the limits of Table-III of IEC 62271-1 at an ambient of 50°C PI add the table in the end of document.
3	DIELECTRIC WITHSTAND CAPACITY OF COMPLETE ASSEMBLED ISOLATOR AND EARTH SWITCH	
	a) One minute power frequency withstand test voltage (kV rms).	
	i) against ground (kV rms)	
	- DRY	: 520 KV rms
	- WET	: 520 KV rms
	ii) across open contacts (kV rms)	
	- DRY	: 610 KV rms
	- WET	: 610 KV rms
	b) 1.2/50 micro second impulse withstand test voltage.	
	i) against ground (kV p)	: + / -1425 KV peak
	ii) across open contacts (kV p)	: +/- 14 +/- 1425 KV Peak Impulse on one terminal and pf voltage of +/- 240 kVp of opposite polarity on other terminal).
	c) 250/2500 micro second switching surge withstand voltage (dry & wet)	
	i) against ground (kV p)	: + / -1050 KV peak
	ii) across open contacts (kV p)	: +/- 900 KV peak (+/-900 kVp impulse on one terminal and pf voltage of +/- 345 kVp on other terminal). of opposite polarity
	d) Corona Extinction voltage (KV)	: 320 KV rms
	e) Radio interference level at 1.1 Um 3 in micro volts for Frequency between 0.5 MHz to 2.0 MHz.	: < 1000 micro volts @ 266 KV rms
	f) Total creepage distance to ground	: 10,500 mm
4	OPERATING MECHANISM	
	a) Rated torque of the mechanism	: 85 kgm
	b) Type and Rating (KW) of motor	: Squirrel cage Induction motor, 0.746 Kwatts

REV-D

S.No.	Description	Data
4.1	c) Rated Voltage of motor	: 3 phase, 415 V, 50 Hz, A.C. supply 1.0 HP
	d) Full load current (A)	: 1.92 Amps
	INTERLOCKINGS	
	a) Whether mechanical/ constructional interlock between Isolator and Earth Switch provided.	: Yes, provided.
	b) Details of electrical interlock enclosed for	
	i) Isolator	: Schematic interlock
	ii) Earth Switch	: Mechanical/Schematic interlock/Castle key electro-mechanical interlock provided
	c) Arrangement provided to prevent electrical or manual operation unless interlock conditions are satisfied.	: Yes, provided
	d) Whether interlock coil is continuously rated	: Yes, continuously rated
	e) Rated DC control voltage and variation allowed.	: 220 V DC
4.2	f) Power consumption (W)	: 20 Watts
	CONTROLS	
	a) Rated DC control voltage (V)	: 220 V DC
	b) Limits of voltage	: + 10 / -15%.
5	c) Power consumption of the control coils	: 35 W
	CONSTRUCTIONAL FEATURES	
	a) Whether position of earth switch can be interchanged at site to either side of the pole.	: Yes, can be interchanged
	b) Main contacts	
	i) Type of contacts	: Jaw & Fist type slide-in contacts
	ii) Contact area (cm ²)	: 3.84 cm ² for 2000A
	iii) Material of contacts	: Hard drawn Electrolytic Copper Flat
	iv) Contact pressure (Kg/cm ²)	: 9 kg / finger
	v) Maximum current density under normal current carrying capacity (A/cm ²).	: 2.0 Amps/Sq mm for Copper Flat 1.0 Amps/Sq mm for Aluminum 2.0 Amps/Sq mm for Aluminum rectangular tube 2.5 Amps/Sq mm for Copper tube.
	vi) Thickness of silver plating	: 25 microns

REV-D

S.No.	Description	Data
	c) Auxiliary contacts on Isolator I) Total Number : 28 Nos. + 4 MBB contacts ii) NO : 14 Nos. iii) NC : 14 Nos. iv) Adjustable : Yes. v) Make before break : 2 Nos. NO + 2 Nos. NC vi) Rated Voltage : 220 V DC vii) Rated Continuous current : 10 A viii) Rated DC breaking current with 20 ms time constant : 2 Amps d) Auxiliary Contacts on Earthing Switch I) Total Number : 24 Nos ii) NO : 12 Nos iii) NC : 12 Nos iv) Adjustable : Yes. vi) Rated Voltage : 220 V DC vii) Rated Continuous Current : 10 Amps viii) Rated DC breaking current with 20 ms time constant : 2 Amps e) Whether counter balance spring provided for isolator and earth switch : Yes	
6	Literature Whether the following are enclosed: a) Type test reports : Submitted separately b) OGA drawing for Isolator with & without earth switches : Submitted separately c) Operation manual : Submitted separately d) Details of motor operating mechanism : Submitted separately e) Leaflets & literature bringing out salient feature of equipments offered : Will be furnished later f) Whether details of constructional interlock enclosed. : Submitted separately	

for GR POWER SWITCHGEAR LTD.,



AUTHORIZED SIGNATRY

GR POWER SWITCHGEAR LTD

GUARANTEED TECHNICAL PARTICULARS FOR CONTROL CABINETS

S.No.	Particulars	Data
1	Application	: Outdoor
2	Material of control cabinet sheet	: Painted sheet steel
3	Thickness of sheet (mm)	: 2.5 mm
4	Degree of protection provided	: IP55
5	Standard applicable for control cabinet	: IS-5093/IS-8623, IEC-439
6	Colour shade of finish paint of outside of control cabinet as per IS : 5	: RAL 5012 (Blue)
7	Colour shade of finish paint of inside of control cabinet as per IS : 5	: Epoxy enamel white paint
8	Size of Conductor used in MOM box Control Wiring AC/DC Power supply	: 2.5 sq.mm for Control Wiring 16 sq.mm for AC /DC power supply
9	20 % Spare Terminal Blocks or 24 nos. whichever is higher provided in control cabinet	: YES

for GR POWER SWITCHGEAR LTD.,



AUTHORIZED SIGNATORY

CUSTOMER PROJECT	:	NABHINAGAR POWER GENERATION CO. PVT. LTD.
	:	400/132KV SWITCHYARD AT NABHINAGAR SUPER THERMAL POWER PROJECT (NPGCPL)
CONTRACTOR	:	M/S. BHEL
PO NO	:	153P394 Dated. 22.03.2014
NTPC DOC NO	:	0370-572-PVE-Y-353
OUR WO NO	:	2002

GUARANTEED AND TECHNICAL PARTICULARS FOR 420 KV 3150A ISOLATORS AND ISOLATOR -CUM-EARTHING SWITCHES

REV-D

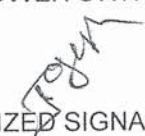
S.No.	Description	Data
1	GENERAL	Make is subject to NTPC-QA approval
	a) Name and country of the manufacturer	: GR POWER SWITCHGEAR LIMITED, HYDERABAD - INDIA
	b) Manufacturer's type designation	: HORIZONTAL CENTRE BREAK - "HCB"
	c) Standard applicable	: IS : 9921 Part I to V, IEC 62271-102
	d) Rated Voltage Ur (kV)	: 420 KV
	e) Rated Current (A)	
	I) Under Normal Current	: 3150 Amps
	ii) Under site Conditions at 50 degree C ambient	: 3150 Amps
	f) Rated frequency (Hz)	: 50 Hz
	g) Number of poles	: Three
	h) Whether all 3 poles are ganged mechanically	: Yes
	I) Pole to pole spacing	: 7000 mm
2	GUARANTEED RATINGS	
	a) Rated short time current of isolator	
	I) For 1 sec.	: 50 KA rms
	ii) For 3 secs.	: Not Applicable
	iii) Dynamic current (KA peak)	: 125 KA peak
	b) Opening time of	
	I) Isolator (sec)	: Less than 12 secs.
	ii) Earth Switch (sec)	: Less than 12 secs.
	c) Closing time of	
	I) Isolator (sec)	: Less than 12 secs.

S.No.	Description	Data
	ii) Earth switch (sec)	: Less than 12 secs.
	d) Temperature rise over 50 Deg. C ambient temperature corresponding to maximum continuous current Deg. C.	: Within the limits of Table-III of IEC 62271-1 at an ambient of 50° C
3	DIELECTRIC WITHSTAND CAPACITY OF COMPLETE ASSEMBLED ISOLATOR AND EARTH SWITCH	PI add the table in the end of document.
	a) One minute power frequency withstand test voltage (kV rms).	
	i) against ground (kV rms)	
	- DRY	: 520 KV rms
	- WET	: 520 KV rms
	ii) across open contacts (kV rms)	
	- DRY	: 610 KV rms
	- WET	: 610 KV rms
	b) 1.2/50 micro second impulse withstand test voltage.	
	i) against ground (kV p)	: + / -1425 KV peak
	ii) across open contacts (kV p)	: +/- 1425 KV Peak +/- 1425 KV Peak Impulse on one terminal and pf voltage of 240 kVp of opposite polarity on other terminal).
	c) 250/2500 micro second switching surge withstand voltage (dry & wet)	
	i) against ground (kV p)	: + / -1050 KV peak
	ii) across open contacts (kV p)	: +/- 900 KV peak (+/-900 kVp impulse on one terminal and pf voltage of 345 kVp on other terminal).
	d) Corona Extinction voltage (KV)	: 320 KV rms
	e) Radio interference level at 1.1 Um 3 in micro volts for Frequency between 0.5 MHz to 2.0 MHz.	: < 1000 micro volts @ 266 KV rms
	f) Total creepage distance to ground	: 10,500 mm
4	OPERATING MECHANISM	
	a) Rated torque of the mechanism	: 85 kgm
	b) Type and Rating (KW) of motor	: Squirrel cage Induction motor, 0.746 Kwatts
	c) Rated Voltage of motor	: 3 phase, 415 V, 50 Hz, A.C. supply 1.0 HP

S.No.	Description	Data
4.1	d) Full load current (A) : 1.92 Amps INTERLOCKINGS a) Whether mechanical/ constructional interlock between Isolator and Earth Switch provided. : Yes, provided. b) Details of electrical interlock enclosed for I) Isolator : Schematic interlock ii) Earth Switch : Mechanical/Schematic interlock/Castle key electro-mechanical interlock provided c) Arrangement provided to prevent electrical or manual operation unless interlock conditions are satisfied. : Yes, provided d) Whether interlock coil is continuously rated : Yes, continuously rated e) Rated DC control voltage and variation allowed. : 220 V DC f) Power consumption (W) : 20 Watts	
4.2	CONTROLS a) Rated DC control voltage (V) : 220 V DC b) Limits of voltage : + 10 / -15%. c) Power consumption of the control coils : 35 W	
5	CONSTRUCTIONAL FEATURES a) Whether position of earth switch can be interchanged at site to either side of the pole. : Yes, can be interchanged b) Main contacts I) Type of contacts : Jaw & Fist type slide-in contacts ii) Contact area (cm²) : 5.00 cm² 3150A iii) Material of contacts : Hard drawn Electrolytic Copper Flat iv) Contact pressure (Kg/cm²) : 9 kg / finger v) Maximum current density under normal current carrying capacity (A/cm²). : 2.0 Amps/Sq mm for Copper Flat 1.0 Amps/Sq mm for Aluminum 2.0 Amps/Sq mm for Aluminum rectangular tube 2.5 Amps/Sq mm for Copper tube. vi) Thickness of silver plating : 25 microns	

S.No.	Description	Data
	c) Auxiliary contacts on Isolator	
	I) Total Number	: 28 Nos. + 4 MBB contacts
	ii) NO	: 14 Nos.
	iii) NC	: 14 Nos.
	iv) Adjustable	: Yes.
	v) Make before break	: 2 Nos. NO + 2 Nos. NC
	vi) Rated Voltage	: 220 V DC
	vii) Rated Continuous current	: 10 A
	viii) Rated DC breaking current with 20 ms time constant	: 2 Amps
	d) Auxiliary Contacts on Earthing Switch	
	I) Total Number	: 24 Nos
	ii) NO	: 12 Nos
	iii) NC	: 12 Nos
	iv) Adjustable	: Yes.
	vi) Rated Voltage	: 220 V DC
	vii) Rated Continuous Current	: 10 Amps
	viii) Rated DC breaking current with 20 ms time constant	: 2 Amps
	e) Whether counter balance spring provided for isolator and earth switch	: Yes
6	Literature	
	Whether the following are enclosed:	
	a) Type test reports	: Submitted separately
	b) OGA drawing for Isolator with & without earth switches	: Submitted separately
	c) Operation manual	: Submitted separately
	d) Details of motor operating mechanism	: Submitted separately
	e) Leaflets & literature bringing out salient feature of equipments offered	: Will be furnished later
	f) Whether details of constructional interlock enclosed.	: Submitted separately

for GR POWER SWITCHGEAR LTD.,


 AUTHORIZED SIGNATRY

GR POWER SWITCHGEAR LTD

GUARANTEED TECHNICAL PARTICULARS FOR CONTROL CABINETS

S.No.	Particulars	Data
1	Application	: Outdoor
2	Material of control cabinet sheet	: Painted sheet steel
3	Thickness of sheet (mm)	: 2.5 mm
4	Degree of protection provided	: IP55
5	Standard applicable for control cabinet	: IS-5093/IS-8623, IEC-439
6	Colour shade of finish paint of outside of control cabinet as per IS : 5	: RAL 5012 (Blue)
7	Colour shade of finish paint of inside of control cabinet as per IS : 5	: Epoxy enamel white paint
8	Size of Conductor used in MOM box Control Wiring AC/DC Power supply	: 2.5 sq.mm for Control Wiring 16 sq.mm for AC /DC power supply
9	20 % Spare Terminal Blocks or 24 nos. whichever is higher provided in control cabinet	: YES

for GR POWER SWITCHGEAR LTD.,



AUTHORIZED SIGNATORY