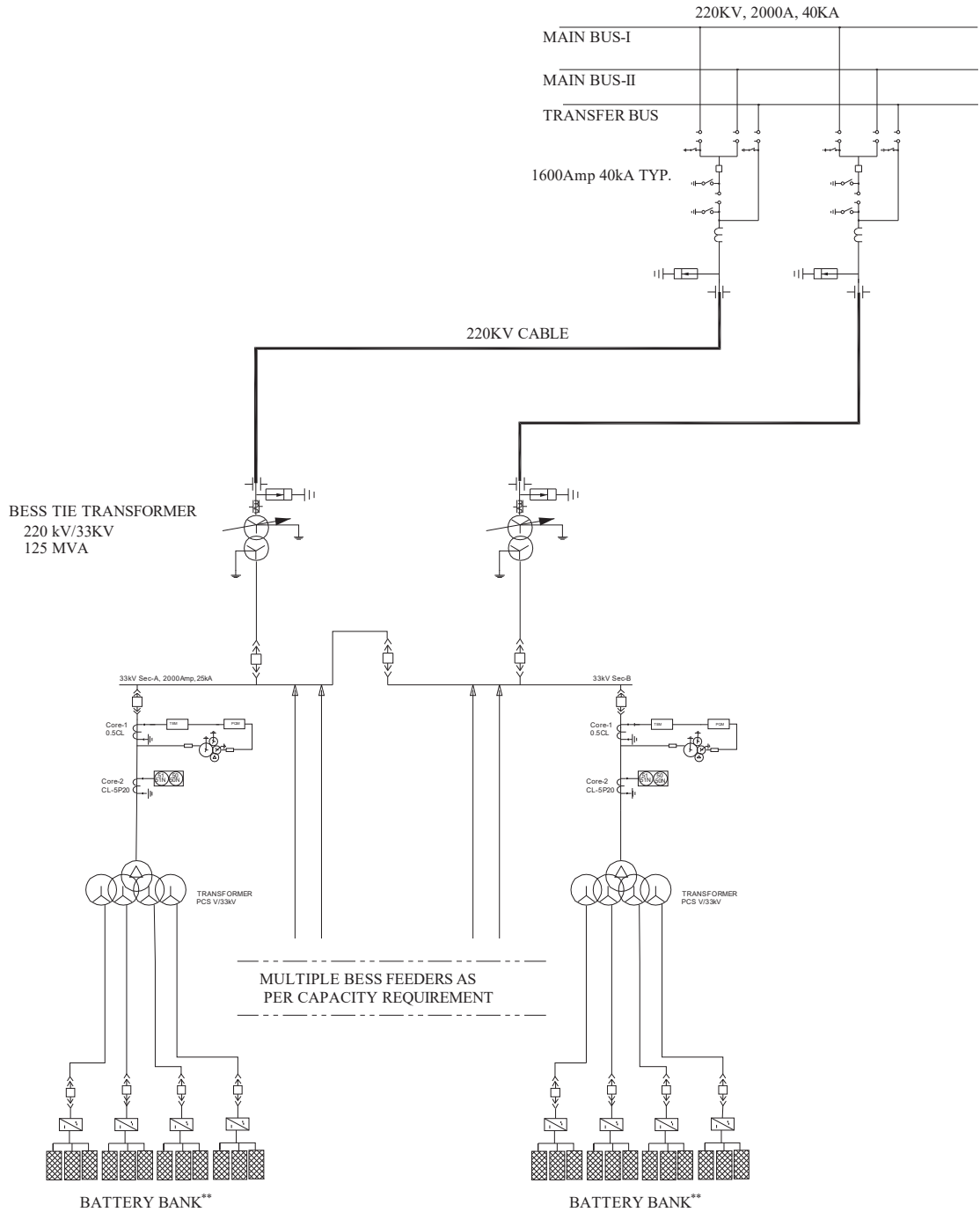


	<div>TENDER DRAWINGS</div>		

**ELECTRICAL
SINGLE LINE DIAGRAM**



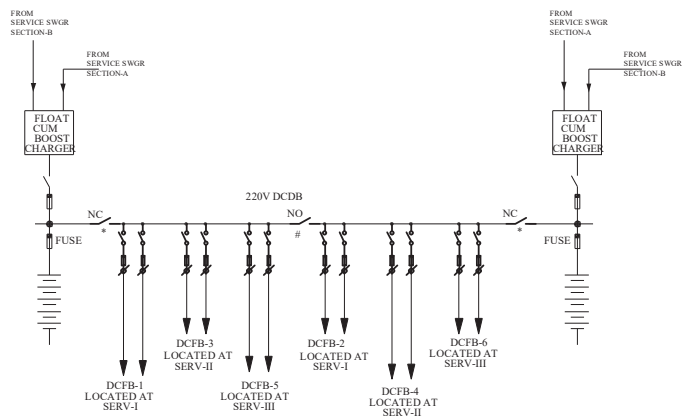
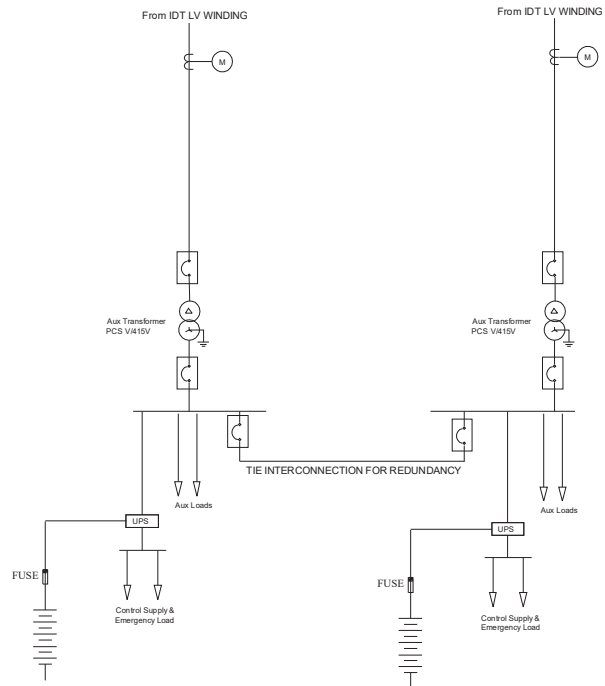
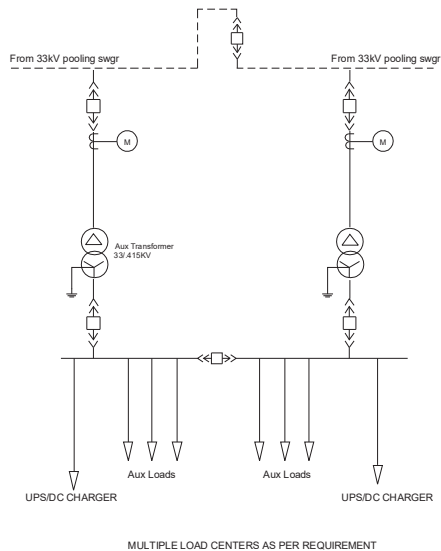
NOTES:-

1. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH TECHNICAL SPECIFICATION.
2. NUMBER OF BESS FEEDERS SHOWN ARE INDICATIVE. SAME SHALL BE PROVIDED AS PER PROJECT REQUIREMENT.
3. SUITABLE METERING ARRANGEMENT AND FACILITY FOR INTERFACE METERING AS PER CEA METERING REGULATION SHALL BE PROVIDED AT POINT OF INTERCONNECTION
4. BIDDER ARE ADVISED TO VISIT RESPECTIVE STATIONS BEFORE SUBMISSION OF BID FOR ASSESSING BAY AVAILABILITY, SCOPE OF WORK RELATED TO SWITCHYARD AND EHV CABLE ROUTE FROM BESS TIE TRF TO SWITCHYARD
5. ADDITIONAL INCOMER FEEDERS SHOWN IN SLD IN 33KV POOLING SWGR SHALL HAVE RATING EQUAL TO THE BESS TIE TRANSFORMER FEEDER. SPARE SHALL BE PROVIDED IN EACH SECTION OF SWITCHGEAR AS PER TECHNICAL SPECIFICATIONS.
6. INDICATIVE SLD FOR AUX POWER SUPPLY ARRANGEMENT IS INDICATED IN SEPARATE SHEET.

LEGEND:

	LIGHTNING ARESTOR
	VT
	EARTH SWITCH
	CT
	CIRCUIT BREAKER
	DISCONNECTOR
	BUSHING CT
	DOUBLE BREAK LINE ISOLATORS
	CIRCUIT BREAKER DRAWOUT TYPE
	TRANSFORMER

										PROJECT		240MW/480MWH BATTERY ENERGY STORAGE SYSTEM (BESS) AT KUDGI STPP							
										TITLE		SINGLE LINE DIAGRAM							
										29-07-23									
										DATE		SIZE		SCALE		DRG. NO.		REV. NO.	
												A1		NTS		9999-000-POE-A-001-2		A	



OUTGOING DC FEEDERS AS PER REQUIREMENT

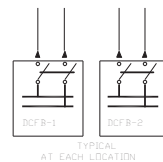
NOTES:-

1. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH TECHNICAL SPECIFICATION.
2. NUMBER OF FEEDERS SHOWN ARE INDICATIVE. SAME SHALL BE PROVIDED AS PER PROJECT REQUIREMENT.
3. THE SELECTION OF LT OUTGOING FEEDERS SHALL BE AS FOLLOWS:
(i) UPTO 400 A - MCCB
(ii) ABOVE 400 A - BREAKER
4. BIDDER SHALL PROVIDE DC SYSTEM/UPS SYSTEM OF ADEQUATE CAPACITY FOR MEETING ALL DC/EMERGENCY AC LOADS.
5. SPARES IN SWITCHGEAR SHALL BE PROVIDED AS PER TECHNICAL SPEC.
6. WHEREVER NO RATING HAS BEEN INDICATED, SIZING SHALL BE CARRIED OUT AS PER SYSTEM REQUIREMENT
FINAL FEEDING ARRANGEMENT TO BE DECIDED DURING DETAILED ENGINEERING.

7. The Bidder may provide any one of the above Auxiliary power supply arrangements

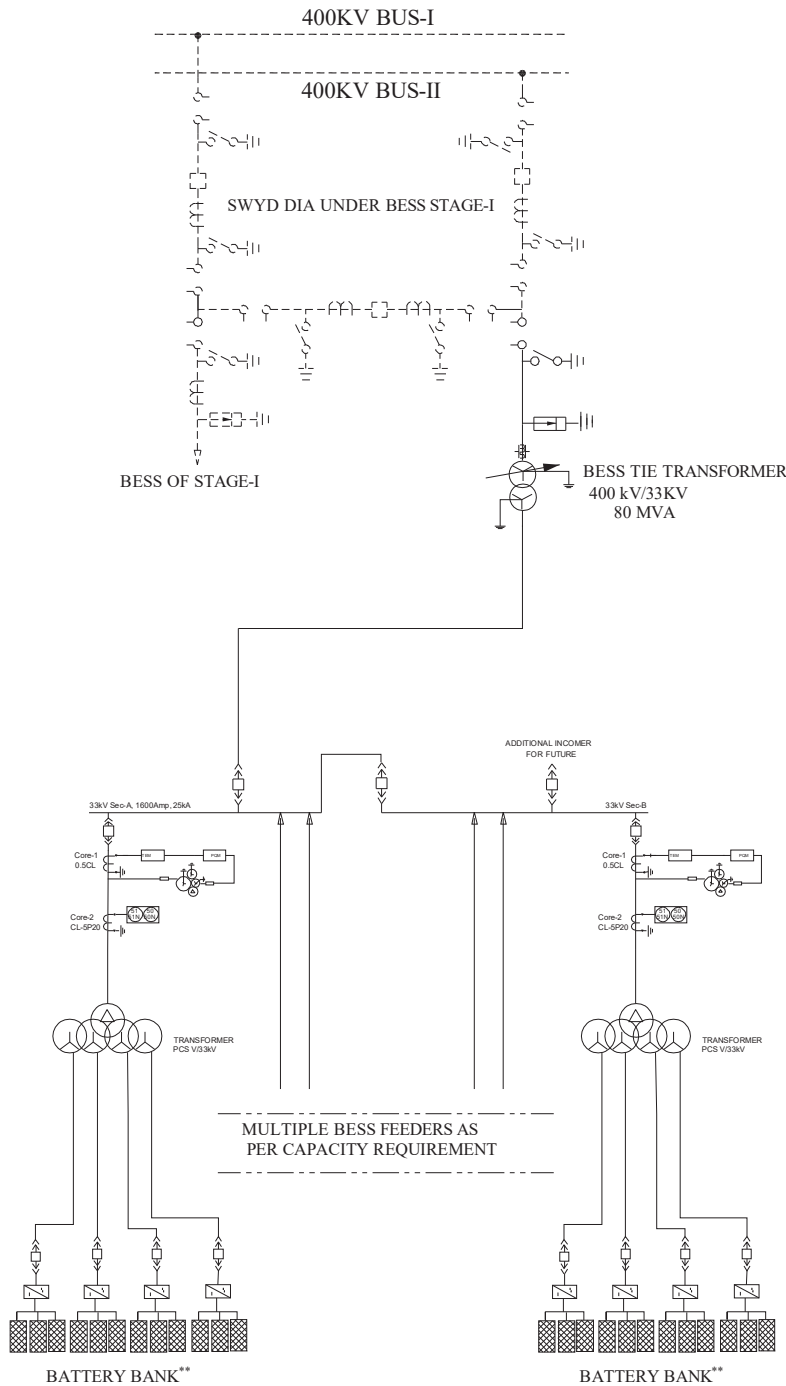
LEGEND:

	LIGHTNING ARESTOR
	VT
	EARTH SWITCH
	CT
	CIRCUIT BREAKER
	DISCONNECTOR
	BUSHING CT
	DOUBLE BREAK LINE ISOLATORS
	CIRCUIT BREAKER DRAWOUT TYPE
	TRANSFORMER



												NTPC Limited <small>(A GOVERNMENT OF INDIA ENTERPRISE) ENGINEERING DIVISION</small>	
										PROJECT BATTERY ENERGY STORAGE SYSTEM (BESS) AUX POWER SUPPLY ARRANGEMENT			
										TITLE SINGLE LINE DIAGRAM			
										DATE 25-07-20			
										SIZE A1			
										SCALE NTS			
										DRG. NO. 9999-000-POE-A-001-3A			
										REV. NO. A			

DRWN	DESIGN	CHGT	M	E	C	CAI	ES	APPD	DATE
Cleared By									
6	1	2	4	2	2	1	1		




NOTES:-

- THIS DRAWING SHALL BE READ IN CONJUNCTION WITH TECHNICAL SPECIFICATION.
- NUMBER OF BESS FEEDERS SHOWN ARE INDICATIVE. SAME SHALL BE PROVIDED AS PER PROJECT REQUIREMENT.
- SUITABLE METERING ARRANGEMENT AND FACILITY FOR INTERFACE METERING AS PER CEA METERING REGULATION SHALL BE PROVIDED AT POINT OF INTERCONNECTION
- BIDDER ARE ADVISED TO VISIT RESPECTIVE STATIONS BEFORE SUBMISSION OF BID FOR ASSESSING BAY AVAILABILITY, SCOPE OF WORK RELATED TO SWITCHYARD AND EHV CABLE ROUTE FROM BESS TIE TRF TO SWITCHYARD
- ADDITIONAL INCOMER FEEDERS SHOWN IN SLD IN 33KV POOLING SWGR SHALL HAVE RATING EQUAL TO THE BESS TIE TRANSFORMER FEEDER. SPARE SHALL BE PROVIDED IN EACH SECTION OF SWITCHGEAR AS PER TECHNICAL SPECIFICATIONS.
- INDICATIVE SLD FOR AUX POWER SUPPLY ARRANGEMENT IS INDICATED IN SEPARATE SHEET.

LEGEND:

	LIGHTNING ARESTOR
	VT
	EARTH SWITCH
	CT
	CIRCUIT BREAKER
	DISCONNECTOR
	BUSHING CT
	DOUBLE BREAK LINE ISOLATORS
	CIRCUIT BREAKER DRAWOUT TYPE
	TRANSFORMER

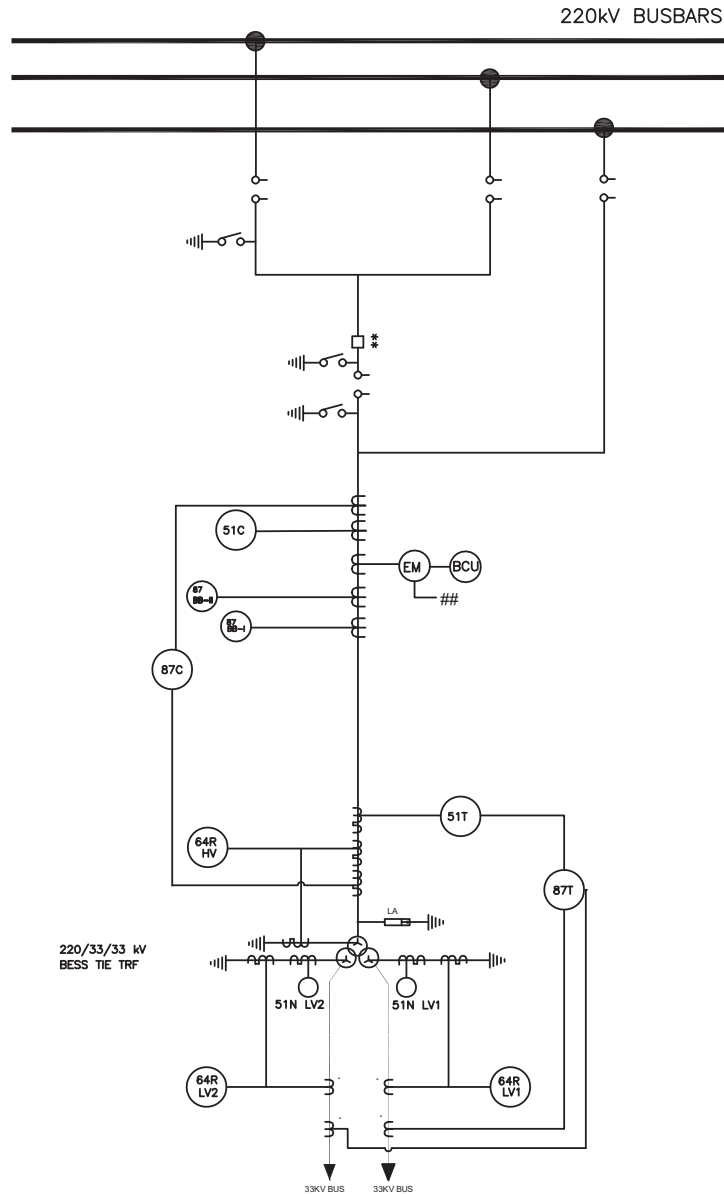
												<div>NTPC Limited <small>(A GOVERNMENT OF INDIA ENTERPRISE)</small></div>	
										PROJECT			
										70MW/140MWH BATTERY ENERGY STORAGE SYSTEM (BESS) AT SIMHADRI STPP- 2			
										TITLE			
										SINGLE LINE DIAGRAM			
										DATE: 25-07-20			
										DRAWN: DESIGN: CHKD: M E C CAI ES APPD: DATE:			
										CLEARED BY:			
										SIZE	SCALE	DRG. NO.	REV. NO.
										A1	NTS	9999-000-POE-A-001-7	A

CLAUSE NO.



**BESS PROTECTION
SINGLE LINE DIAGRAM**

- NOTE- 1. REF CTs SHALL BE OF SAME MAKE AND CHARACTERISTICS (RATIO, KNEE POINT & RESISTANCE).
2. EPC VENDOR TO COORDINATE MATCHING OF REF CTs AT TRANSFORMER AND SWITCHGEAR END.



LEGEND:-

- 50/51 - BACKUP OVERCURRENT PROTECTION
50N/51N - BACKUP EARTH FAULT PROTECTION
87BB-I }
87BB-II } - BUSBAR DIFFERENTIAL PROTECTION
BCU - BAY CONTROL UNIT
EM - ABT COMPLIANT ENERGY METER
87T - ST DIFFERENTIAL PROTECTION
87C - CABLE DIFFERENTIAL PROTECTION
64RHV - HV REF PROTECTION
64RLV - LV REF PROTECTION

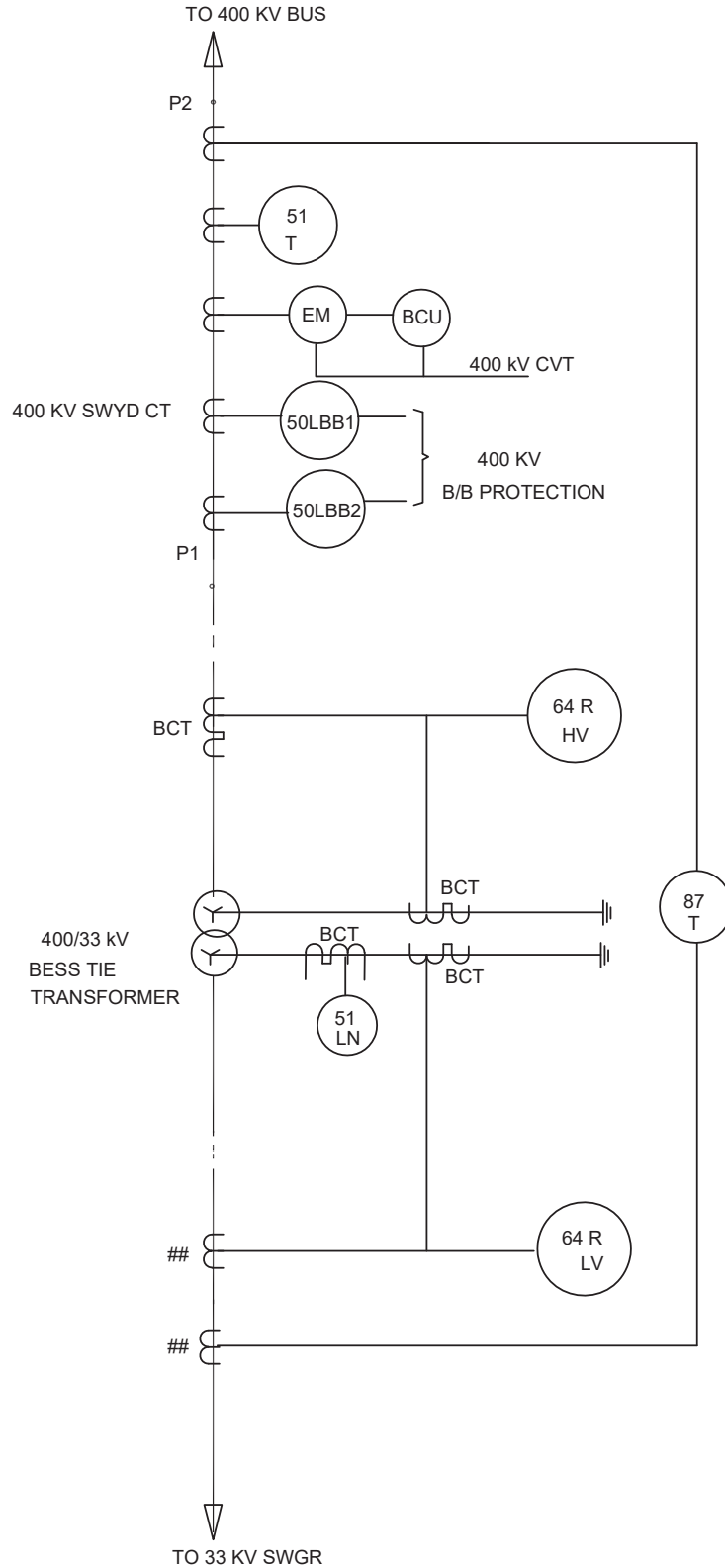
NOTE:

- ## - Voltage input
* - Switchgear CT, to be matched
** - Breaker with CSD

FOR TENDER PURPOSE ONLY

OWNER		NTPC Ltd. (A GOVERNMENT OF INDIA ENTERPRISE) ENGINEERING DIVISION	
TITLE		PROTECTION S.L.D. FOR 220kV/33/33kV BESS TIE TRF (KUDGI)	
REV.NO.	DESCRIPTION	DESIGN	CHKD.
SIZE	SCALE	DRG. NO.	REV. NO.
A4	N.T.S.	BESS-999-POE-J-005	0

- NOTE—
1. REF CTs SHALL BE OF SAME MAKE AND CHARACTERISTICS (RATIO, KNEE POINT & RESISTANCE).
 2. EPC VENDOR TO COORDINATE MATCHING OF REF CTs AT TRANSFORMER AND SWITCHGEAR END.



LEGEND:

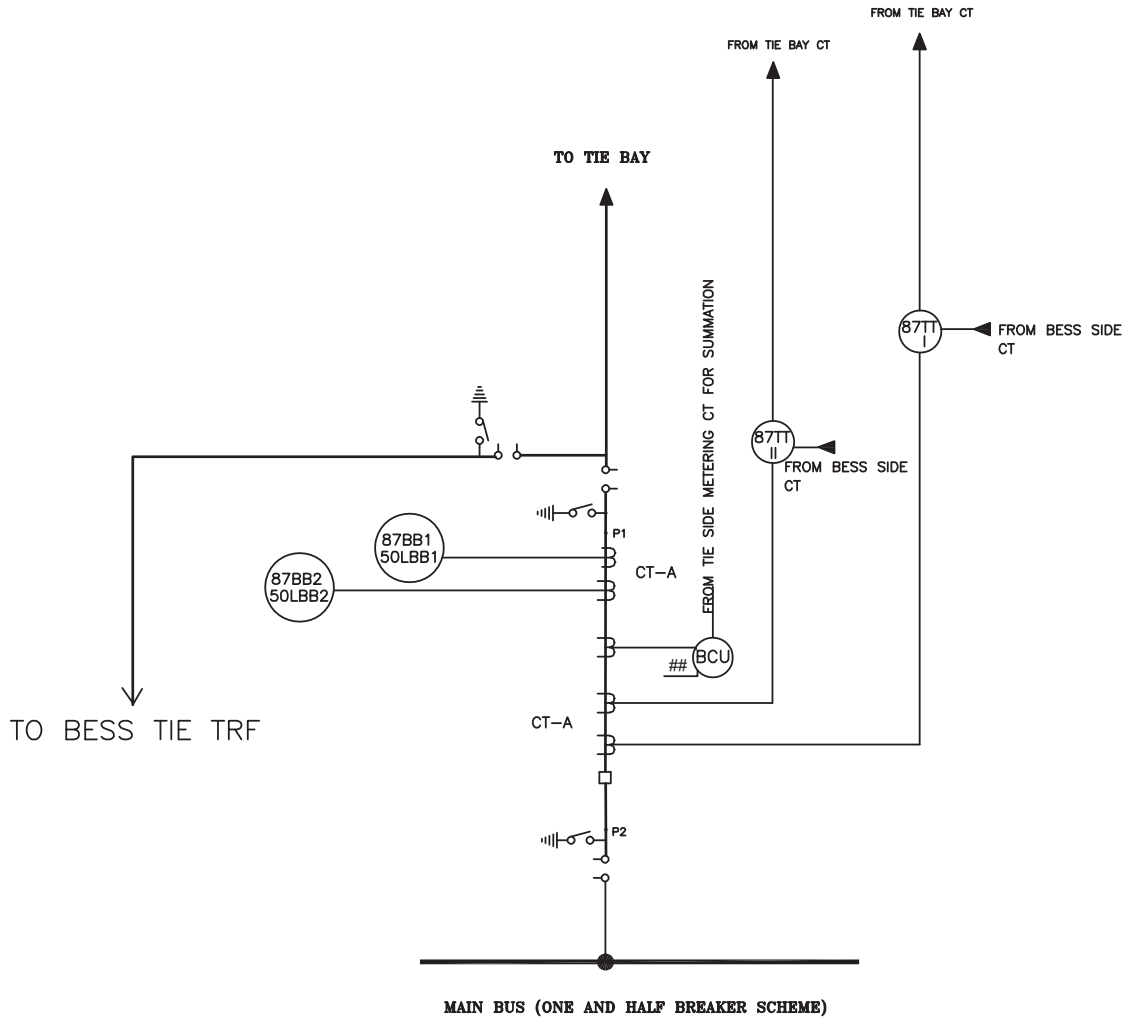
- 87T - TRANSF. DIFFERENTIAL PROT.
- 64R HV/LV- RESTRICTED E/F PROT.
- 50LBB - BREAKER FAILURE PROTECTION.
- EM - ENERGY METER ABT TYPE
- 51 T - TRANSF. BACK UP O/C PROT.
- 51 LN - TRANSF. BACK UP E/F PROT.

NOTE:

CTs LOCATED IN 33 KV SWGR

FOR TENDER PURPOSE ONLY

OWNER		NTPC Ltd. (A GOVERNMENT OF INDIA ENTERPRISE) ENGINEERING DIVISION	
TITLE		PROTECTION S.L.D. FOR 400kV/33kV BESS TIE TRF (SIMHADRI-I)	
REV.NO.	DESCRIPTION	SCALE	DRAWING NO.
		N.T.S.	BESS-999-POE-J-008A
			REV. NO.
			0



LEGEND:-

50/51 - BACKUP OVERCURRENT PROTECTION
 50N/51N - BACKUP EARTH FAULT PROTECTION
 50LBB - BREAKER FAILURE PROTECTION
 50LBBT - BREAKER FAILURE PROTECTION FOR TIE BAY CB
 87TT-I } - "TEE" DIFFERENTIAL PROTECTION
 87TT-II }
 BCU - BAY CONTROL UNIT
 EM - ABT COMPLIANT ENERGY METER
 87ST - ST DIFFERENTIAL PROTECTION
 64RHV - ST HV REF PROTECTION
 64RLV - ST LV REF PROTECTION

NOTE:

- Voltage from selected CVT
 * - To be provided by owner
 ** - Breaker with CSD

FOR TENDER PURPOSE ONLY

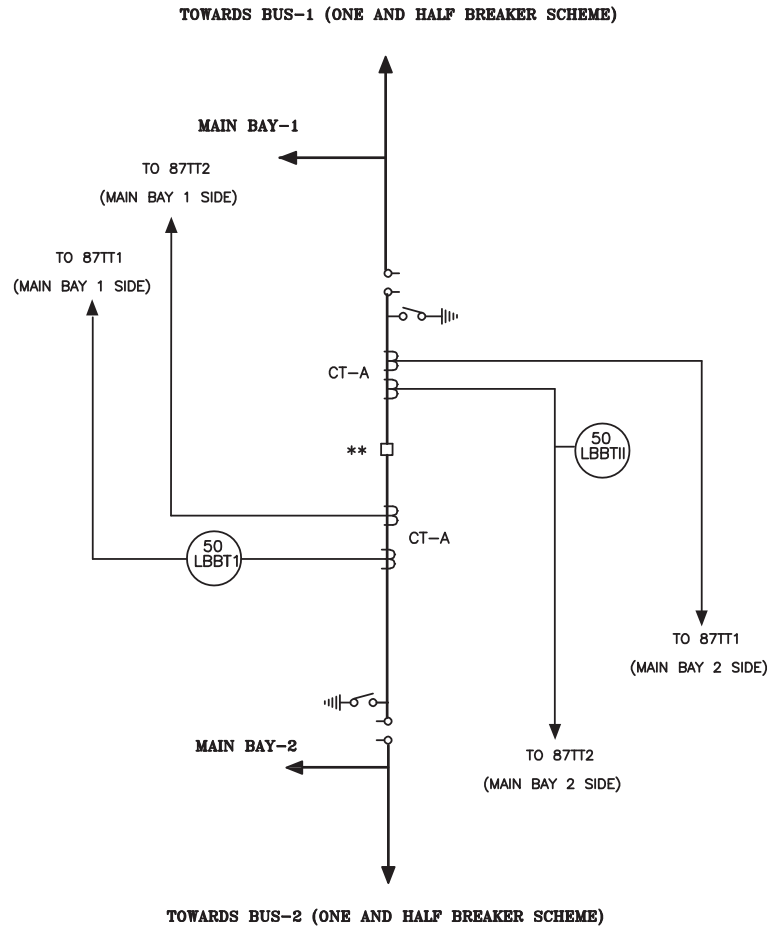
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NTPC

NTPC Ltd.
 (A GOVERNMENT OF INDIA ENTERPRISE)
ENGINEERING DIVISION

TITLE
PROTECTION S.L.D. FOR ONE & HALF BAY

REV.NO.	DESCRIPTION	DESIGN	CHKD.	APPD.	DATE	SIZE	SCALE	DRG. NO.	REV. NO.
						A4	N.T.S.	BESS-999-POE-J-008B	0

BUS BAR arrangement shown is indicative only. For actual arrangement please refer key tender SLD.



LEGEND:-

50/51 - BACKUP OVERCURRENT PROTECTION
50N/51N - BACKUP EARTH FAULT PROTECTION
50LBB - BREAKER FAILURE PROTECTION
50LBBT - BREAKER FAILURE PROTECTION FOR TIE BAY CB
87TT-I }
87TT-II } - "TEE" DIFFERENTIAL PROTECTION
BCU - BAY CONTROL UNIT
EM - ABT COMPLIANT ENERGY METER

NOTE:

- Voltage from selected CVT
* - To be provided by owner
** - Breaker with CSD (in case of ST/Reactor Bay)

FOR TENDER PURPOSE ONLY

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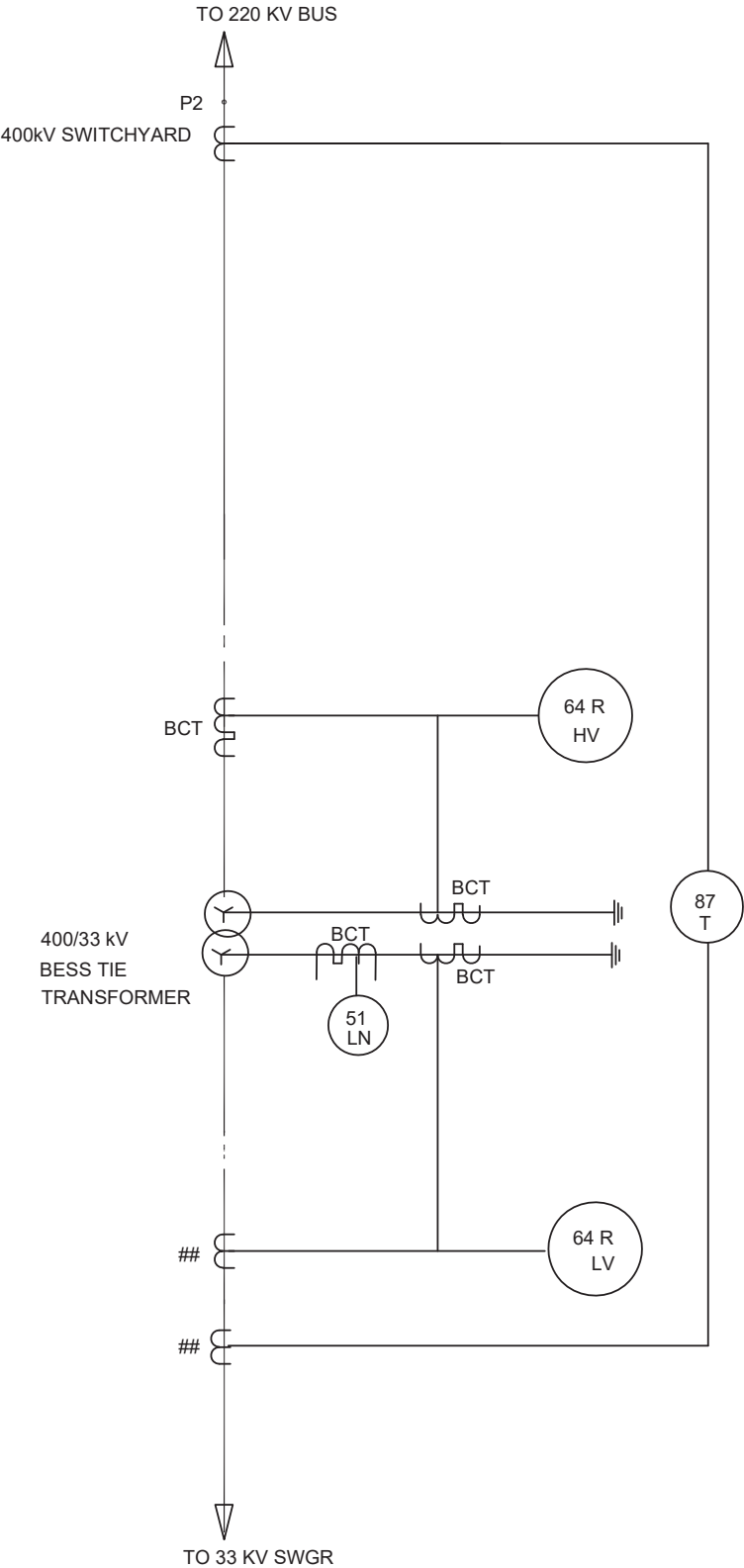
NTPC Ltd.
(A GOVERNMENT OF INDIA ENTERPRISE)
ENGINEERING DIVISION

TITLE

PROTECTION S.L.D. FOR TIE BAY

REV.NO.	DESCRIPTION	DESIGN	CHKD.	APPD.	DATE	SIZE	SCALE	DRG. NO.	REV. NO.
						A4	N.T.S.	BESS-999-POE-J-008C	0

- NOTE- 1. REF CTs SHALL BE OF SAME MAKE AND CHARACTERISTICS (RATIO, KNEE POINT & RESISTANCE).
2. EPC VENDOR TO COORDINATE MATCHING OF REF CTs AT TRANSFORMER AND SWITCHGEAR END.



LEGEND:

- 87T - TRANSF. DIFFERENTIAL PROT.
64R HV/LV- RESTRICTED E/F PROT.
50LBB - BREAKER FAILURE PROTECTION.
EM - ENERGY METER ABT TYPE
51 T - TRANSF. BACK UP O/C PROT.
51 LN - TRANSF. BACK UP E/F PROT.

NOTE:

CTs LOCATED IN 33 KV SWGR

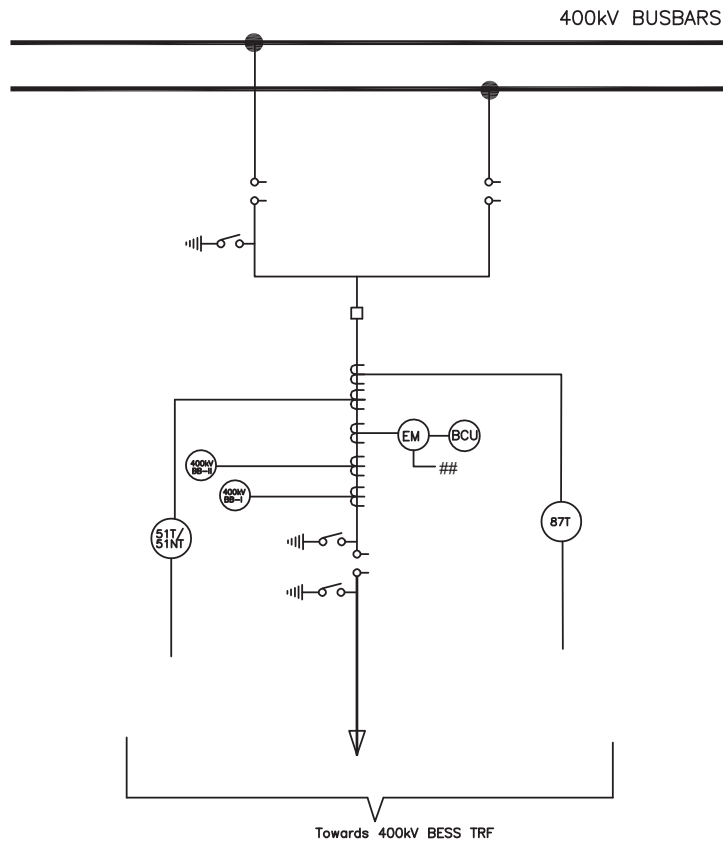
FOR TENDER PURPOSE ONLY

OWNER		NTPC Ltd. (A GOVERNMENT OF INDIA ENTERPRISE) ENGINEERING DIVISION	
TITLE		PROTECTION S.L.D. FOR 400kV/33kV BESS TIE TRF (SIMHADRI)	
REV.NO.	DESCRIPTION	SCALE	DRAWING NO.
		A4	BESS-999-POE-J-009A
			REV. NO.
			0

BUS BAR arrangemnet shown is indicative only.For actual arrangement please refer key tender SLD.

NOTE-

1. REF CTs SHALL BE OF SAME MAKE AND CHARACTERISTICS (RATIO, KNEE POINT & RESISTANCE).
2. EPC VENDOR TO COORDINATE MATCHING OF REF CTs AT TRANSFORMER AND SWITCHGEAR END.



LEGEND:-

- 50/51 - BACKUP OVERCURRENT PROTECTION
50N/51N - BACKUP EARTH FAULT PROTECTION
87BB-I }
87BB-II } - BUSBAR DIFFERENTIAL PROTECTION
BCU - BAY CONTROL UNIT
EM - ABT COMPLIANT ENERGY METER
87ST - ST DIFFERENTIAL PROTECTION
87C - CABLE DIFFERENTIAL PROTECTION
64RHV - ST HV REF PROTECTION
64RLV - ST LV REF PROTECTION

NOTE:

- ## - Voltage input
* - To be provided by owner
** - Breaker with CSD

FOR TENDER PURPOSE ONLY

OWNER		NTPC Ltd. (A GOVERNMENT OF INDIA ENTERPRISE) ENGINEERING DIVISION	
TITLE		PROTECTION S.L.D. FOR 400kV TRF BAY (SIMHADRI-2)	
REV.NO.	DESCRIPTION	DESIGN	CHKD.
		APPD.	DATE
SIZE	SCALE	DRG. NO.	REV. NO.
A4	N.T.S.	BESS-999-POE-J-009B	0

	<div>SWITCH GEAR</div>		

CLAUSE NO.

TECHNICAL REQUIREMENT



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LEGEND DESCRIPTION

- 52 CIRCUIT BREAKER
- 53 CONTACTOR
- 54 SURGE ARRESTOR
- 55 CURRENT TRANSFORMER
- 56 CORE BALANCE CURRENT TRANSFORMER
- 57 VOLTAGE TRANSFORMER
- 58 TRIPLE POLE IDMTL/DMT O/G PROTECTION
- 59 TRIPLE POLE INSTANTANEOUS O/G PROTECTION
- 60 IDMTL/DMT SENSITIVE/F PROTECTION
- 61 INSTANTANEOUS E/F PROTECTION
- 62 THREE PHASE THERMAL O/L PROTN.WITH O/L ALARM & RESTART INHIBITE FUNCTION
- 63 STALLING/LOCKED ROTOR PROTECTION
- 64 THREE PHASE NEGATIVE PHASE SEQUENCE PROTECTION
- 65 NUMBER OF START LIMITATION / REPETITIVE START PROTECTION
- 66 THE DELAY PROTECTION
- 67 FUSE FAILURE PROTECTION
- 68 3 PHASE MOTOR DIFFERENTIAL PROTECTION
- 69 MCB
- 70 MPOB

LEGEND DESCRIPTION

- 648 RESTRICTED EARTH FAULT PROTECTION
- 649 STAND BY EARTH FAULT PROTECTION
- 650 3 PHASE UNDER VOLTAGE TRANSFORMER DIFFERENTIAL PROTECTION
- 651 3 PHASE UNDER VOLTAGE TRANSFORMER FOR MOTOR TRIPPING
- 652 3 PHASE BUS UNDER VOLTAGE
- 653 NO VOLT PROTECTION FOR BUS
- 654 CIRCUIT BREAKER FAILURE PROTECTION
- 655 LOCKOUT FUNCTION
- 656 3 PHASE CURRENT MEASUREMENT
- 657 NEUTRAL CURRENT MEASUREMENT
- 658 3 PHASE VOLTAGE MEASUREMENT
- 659 RESIDUAL VOLTAGE MEASUREMENT
- 660 ACTIVE POWER MEASUREMENT
- 661 REACTIVE POWER MEASUREMENT
- 662 ENERGY MEASUREMENT
- 663 POWER FACTOR MEASUREMENT
- 664 FREQUENCY MEASUREMENT
- 665 HOUR RUN METER
- 666 MCOB

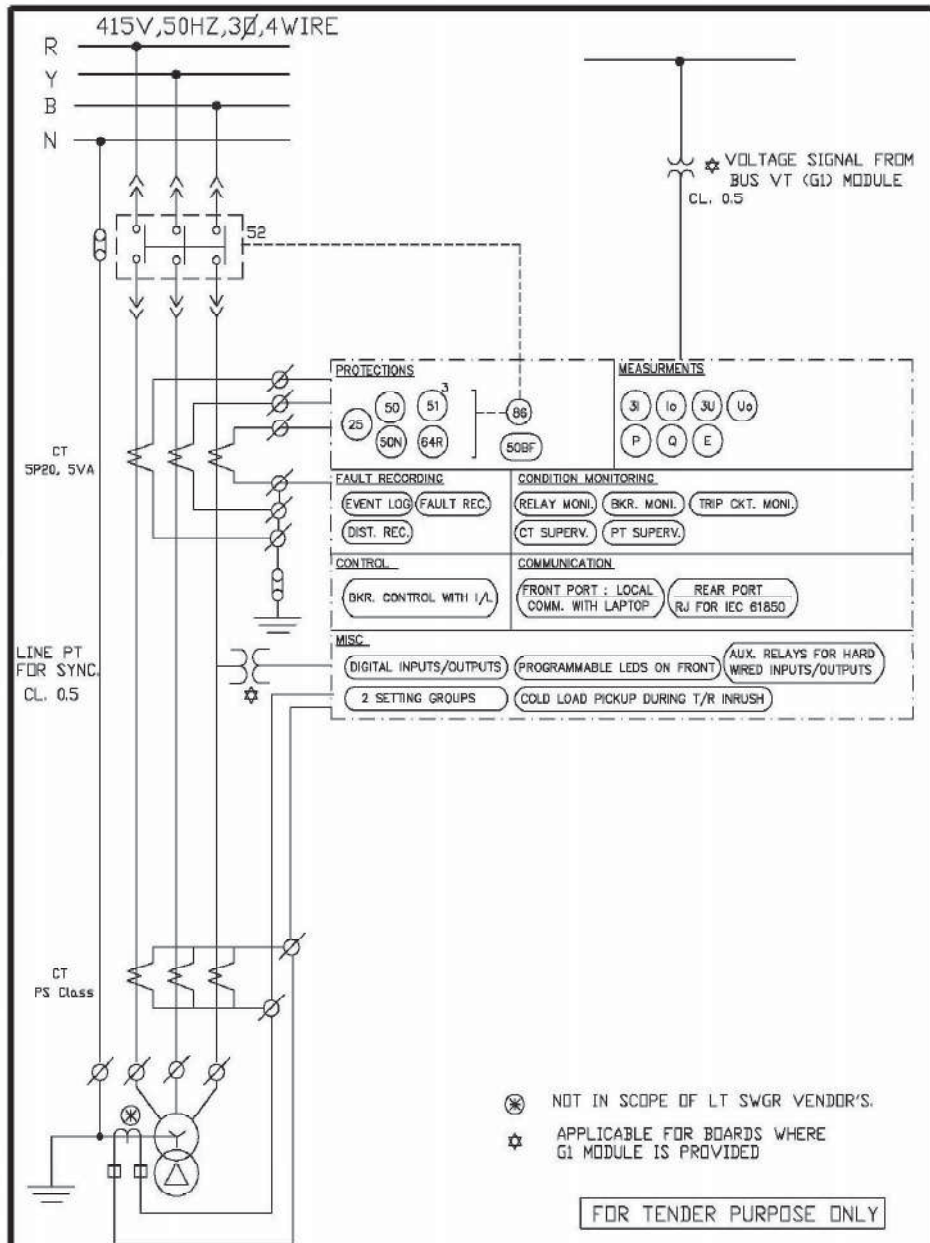
FOR TENDER PURPOSE ONLY

		एन टी पी सी लिमिटेड NTPC Limited (A MEMBER OF NDA ENTERPRISES)	
CLEARED BY		PROJECT	
C	E	M	ES
		TITLE	
		LEGEND DETAIL	
DRN	CON	CHPD	APPC
DATE		SCALE	DRAWING No.
18/05/18			0000-2016-PDE-A-003
			REV
			A

LEGEND DRAWING

A3 4E0397

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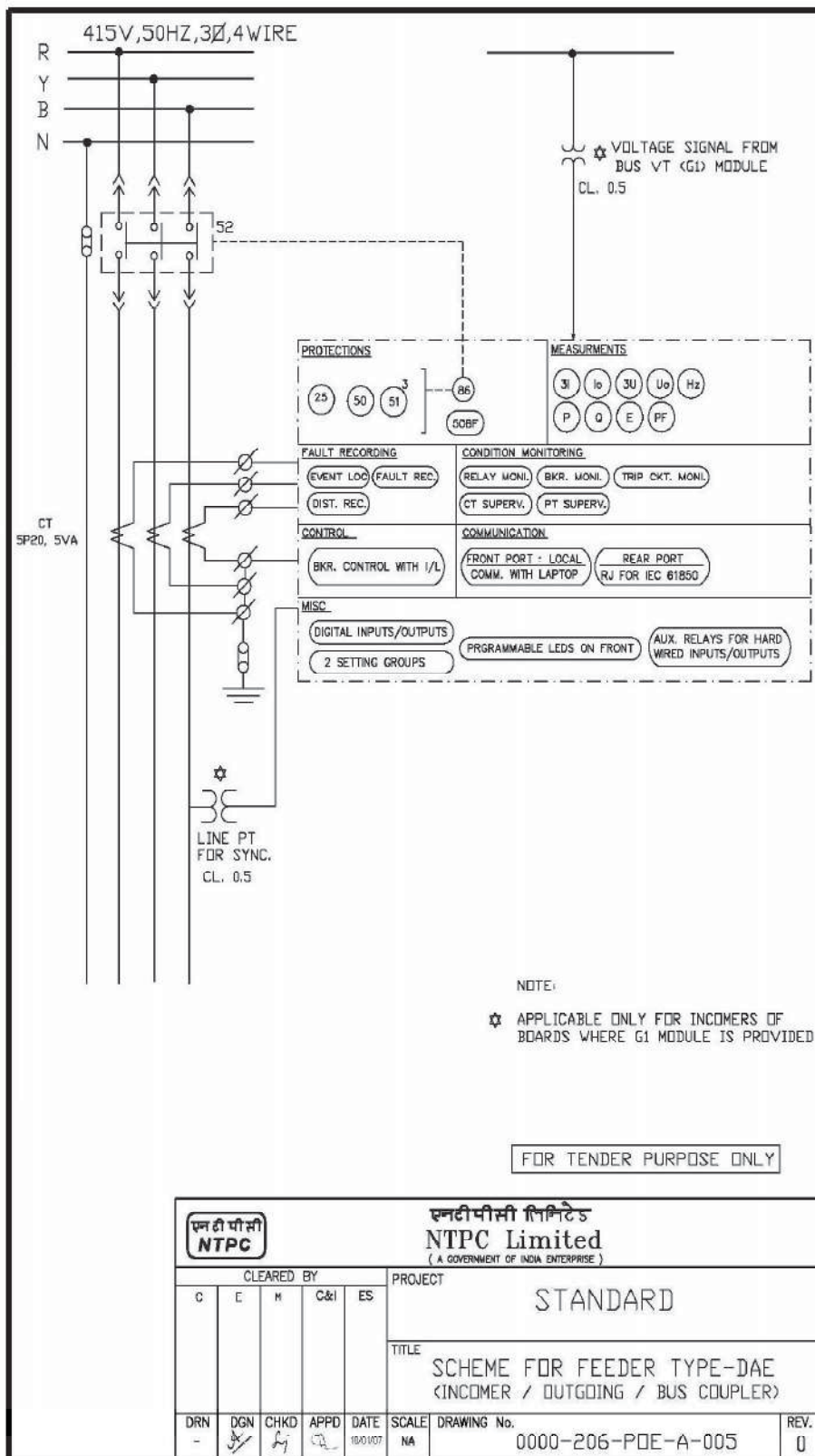


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NTPC

एन टी पी सी लिमिटेड
NTPC Limited
(A GOVERNMENT OF INDIA ENTERPRISE)

CLEARED BY					PROJECT	
C	E	M	C&I	ES	STANDARD	
					TITLE	
					SCHEME FOR FEEDER TYPE-DAET (INCOMER FROM TRANSFORMER)	
DRN	DGN	CHKD	APPD	DATE	SCALE	DRAWING No.
-	✓	✓	✓	10.10.1977	NA	0000-206-PDE-A-004
						REV.
						0

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This drawing and the design it covers are the property of NATIONAL THERMAL POWER CORPORATION LTD and must not be copied, loaned or exhibited without the written permission. Any contravention is liable for prosecution.

NOTES:
1. TERMINALS & CONNECTIONS ARE SERVICE POSITION.
2. THE ARRANGEMENT FOR MAIN AND RESERVE INCOMERS SHALL BE MADE IN SEPARATE MODULES AND THESE MODULES SHALL BE LOCATED IN DIFFERENT PANELS.
3. ALL CONTACTORS SHOULD HAVE COILS SUITABLE FOR 415V AC.

LEGEND:
18A, 42B-415V AC TRIPPLE POLE CONTACTORS
42V, 42Y-415V AC AUXILIARY CONTACTS

ARRANGEMENT FOR MAIN INCOMER

MAIN INCOMER

42A

42V

42A

42V

42A

42V

42A

42V

42A

42V

42A

42V

42A

42V

42A

42V

42A

ARRANGEMENT FOR RESERVE INCOMER

RESERVE INCOMER

42B

42V

42B

42V

42B

42V

42B

42V

42B

42V

42B

42V

42B

42V

42B

42V

42B

FOR TENDER PURPOSE ONLY

PROJECT

CLEARED BY

DESIGN

DATE

SCALE

DRAWING No.

REV.

A

0000-2005-PDE-A-009

SCHEME FOR MODULE TYPE-CC

(INCOMER WITH AUTO CHANGEDOVER)

STANDARD

PROJECT

DATE

SCALE

DRAWING No.

REV.

A

0000-2005-PDE-A-009

SCHEME FOR MODULE TYPE-CC

(INCOMER WITH AUTO CHANGEDOVER)

STANDARD

PROJECT

DATE

SCALE

DRAWING No.

REV.

A

0000-2005-PDE-A-009

SCHEME FOR MODULE TYPE-CC

(INCOMER WITH AUTO CHANGEDOVER)

STANDARD

PROJECT

DATE

SCALE

DRAWING No.

REV.

A

0000-2005-PDE-A-009

SCHEME FOR MODULE TYPE-CC

(INCOMER WITH AUTO CHANGEDOVER)

STANDARD

PROJECT

DATE

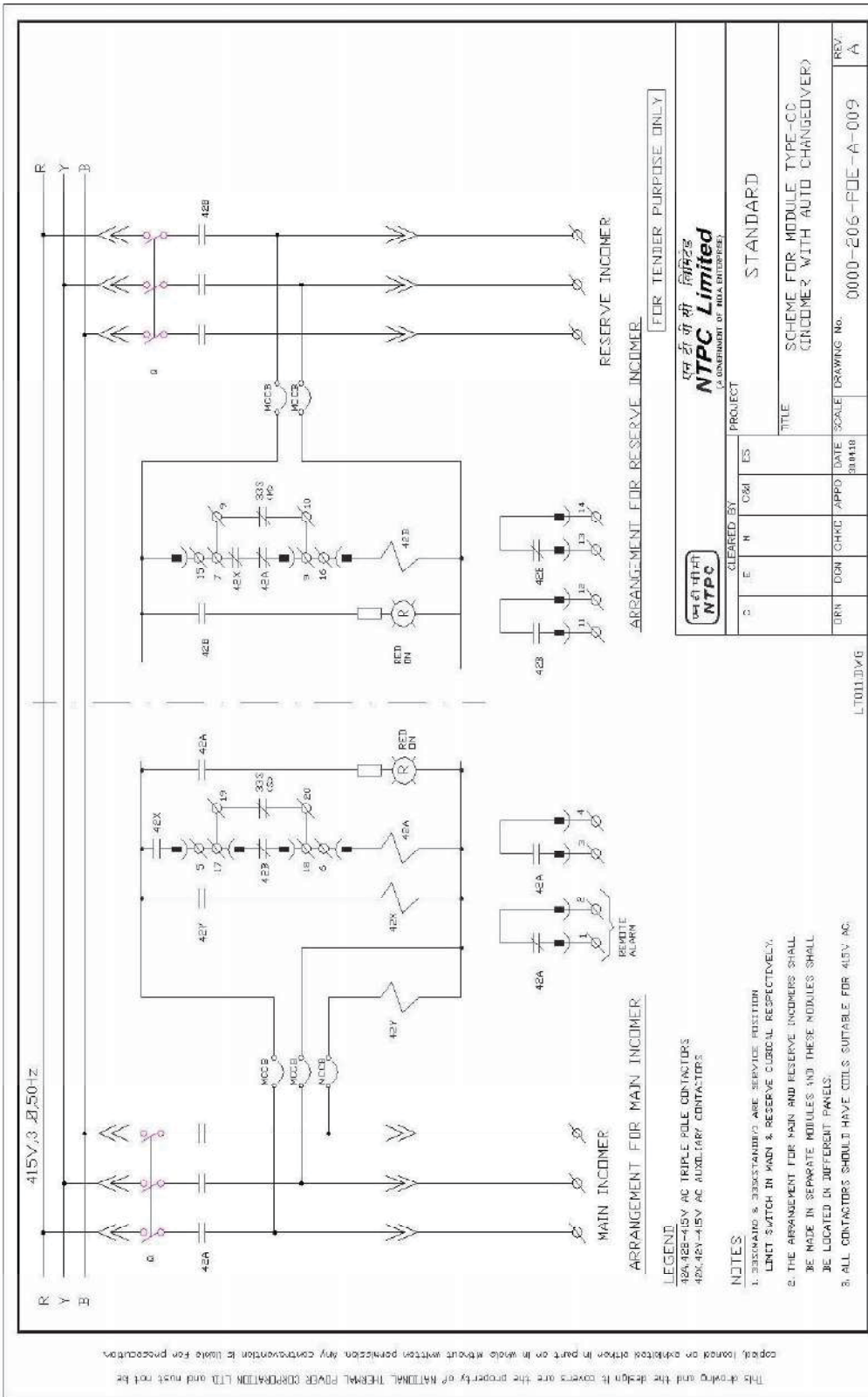
SCALE

DRAWING No.

REV.

A

0000-2005-PDE-A-009

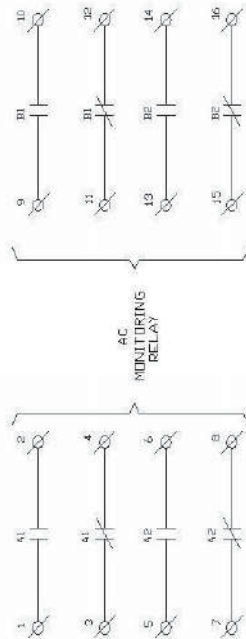


<p>LEGEND</p> <p>18A-12B-415V AC TRIPLE POLE CONTACTORS</p> <p>42B-42V-415V AC AUXILIARY CONTACTS</p>									
<p>NOTES</p> <p>1. TERMINALS & STANDARDS ARE SERVICE POSITION</p> <p>2. LIMIT SWITCH IN MAIN & RESERVE CIRCUIT RESPECTIVELY.</p> <p>3. THE ARRANGEMENT FOR MAIN AND RESERVE INCOMERS SHALL BE MADE IN SEPARATE MODULES AND THESE MODULES SHALL BE LOCATED IN DIFFERENT PANELS.</p> <p>4. ALL CONTACTORS SHOULD HAVE COILS SUITABLE FOR 415V AC.</p>									
<p>PROJECT: STANDARD</p> <p>TITLE: SCHEME FOR MODULE TYPE-CO (INCOMER WITH AUTO CHANGEDOVER)</p>									
DRN	DGN	CHKD	APPR	DATE	SCALE	DRAWING No.	REV.		
				20.05.10		0000-206-FDE-A-009	A		


<p>LEGEND</p> <p>18A-12B-415V AC TRIPLE POLE CONTACTORS</p> <p>42B-42V-415V AC AUXILIARY CONTACTS</p>									
<p>NOTES</p> <p>1. TERMINALS & STANDARDS ARE SERVICE POSITION</p> <p>2. LIMIT SWITCH IN MAIN & RESERVE CIRCUIT RESPECTIVELY.</p> <p>3. THE ARRANGEMENT FOR MAIN AND RESERVE INCOMERS SHALL BE MADE IN SEPARATE MODULES AND THESE MODULES SHALL BE LOCATED IN DIFFERENT PANELS.</p> <p>4. ALL CONTACTORS SHOULD HAVE COILS SUITABLE FOR 415V AC.</p>									
<p>PROJECT: STANDARD</p> <p>TITLE: SCHEME FOR MODULE TYPE-CC (INCOMER WITH AUTO CHANGEDOVER)</p>									
DRN	DGN	CHKD	APPR	DATE	SCALE	DRAWING No.	REV.		
				20.05.10		0000-206-FDE-A-009	A		

A3-420X297

The diagram illustrates a 415/110V bus section with two feeders. The bus is labeled 'BUS SECTION-A' and has four main lines: R, Y, B, and N. Each line passes through a pair of MCCBs (Main Circuit Breakers) before reaching a 415/110V transformer. The transformer's secondary is connected to two feeders, each with its own set of MCCBs. Each feeder is equipped with an AC monitoring relay (RELAY-A1, RELAY-A2, RELAY-B1, RELAY-B2) and a selector switch. The selector switches are labeled 'SELECTOR SWITCH FOR THE OTHER HALF OF SECTION-A FEEDERS'. The diagram also shows a 'CONTROL SUPPLY FOR THE OTHER HALF OF SECTION-A FEEDERS' and a 'CONTROL SUPPLY FOR ON HALF OF SECTION-A FEEDERS'. The ground connection is shown as a red line.



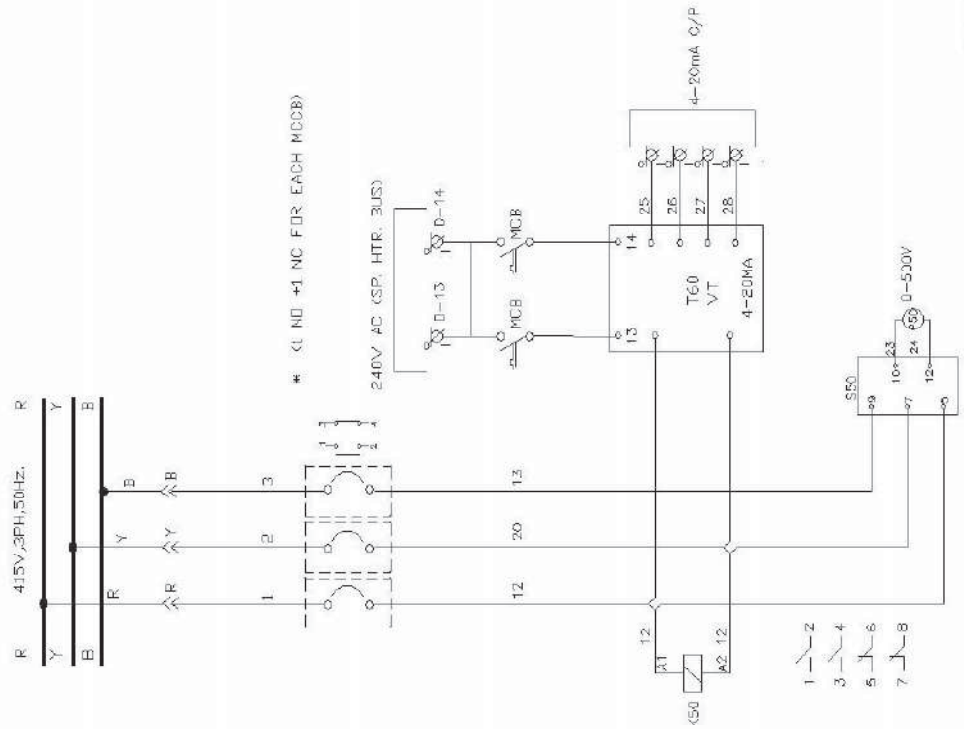
FOR TENDER PURPOSE ONLY

						एन टी सी लिमिटेड NTPC Limited <small>A GOVERNMENT OF INDIA ENTERPRISE</small>					
CLEARED BY				PROJECT							
D	E	M	C&I	ES				TITLE	STANDARD		
DRN	CGH	CHRD	APPD	DATE	SCALE	DRAWING No.		SCHEME FOR MODULE TYPE-CS (CONTROL SUPPLY MODULE)		REV	
				30/1/18		0003-206-FDE-A-010				A.	

LT012DWG

A3 420x252

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* (L NO +1 NC FOR EACH MCB)

FOR TENDER PURPOSE ONLY

Cleared By NTPC		PROJECT		STANDARD	
C	E	I	ES	TITLE	
DRN	DGN	CHND	APRD	DATE	SCALE DRAWING No.
				0000-206-PCE-A-020	REV. A

LT016.DWG

A3 400/257

(M)

415V, 3PH, 4-WIRE 50Hz.

R Y B N

Q

MCB

(M1)

415V, 3PH, 4-WIRE 50Hz.

R Y B N

Q

MCB

(M2)


415V, 3PH, 4-WIRE 50Hz.

R Y B N

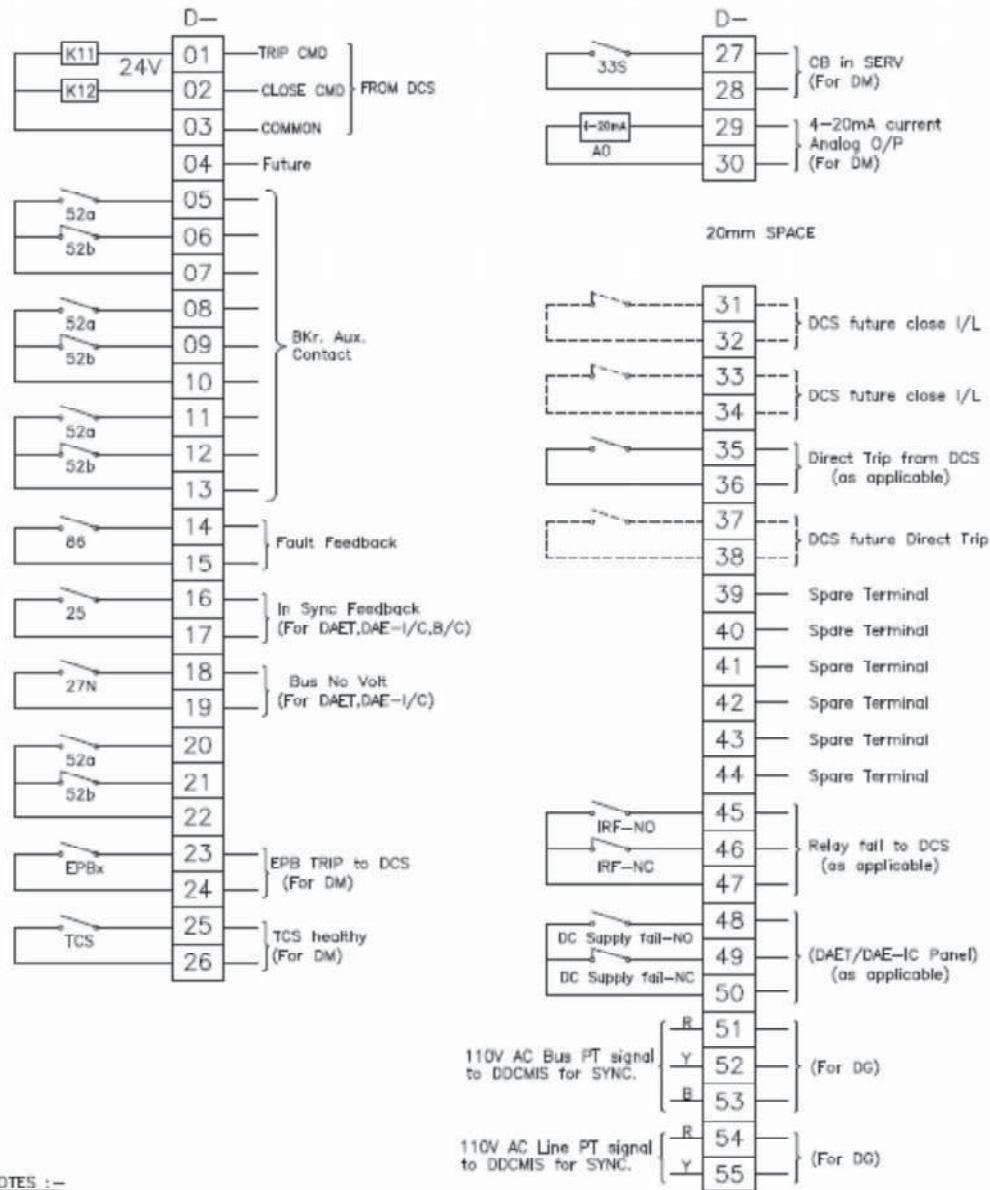
Q

MCB

FOR TENDER PURPOSE ONLY

<div> <div>  </div> <div> <p>एन टी पी लिमिटेड</p> <p>NTPC Limited</p> <p>(A GOVERNMENT OF INDIA ENTERPRISE)</p> </div> </div>				<div> <div> <p>PROJECT</p> </div> <div> <p>STANDARD</p> </div> </div>			
<div> <div> <p>C</p> </div> <div> <p>E</p> </div> <div> <p>M</p> </div> <div> <p>C&I</p> </div> <div> <p>ES</p> </div> </div>				<div> <div> <p>TITLE</p> </div> <div> <p>TYPICAL SCHEMATIC FOR MM1/M2</p> </div> </div>			
<div> <div> <p>DRN</p> </div> <div> <p>DGN</p> </div> <div> <p>CHKD</p> </div> <div> <p>APPD</p> </div> </div>				<div> <div> <p>DATE</p> </div> <div> <p>SCALE</p> </div> <div> <p>DRAWING No.</p> </div> <div> <p>0000-206-POE-A-018</p> </div> </div>			
<div> <div> <p>REV.</p> </div> <div> <p>A</p> </div> </div>				<div> <div> <p>LT016.DWG</p> </div> </div>			

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NOTES :-

1. 52a & 52b shown above are breaker aux. contacts when breaker is in Service position.
2. If any signal (except 52a & 52b signals, future & Spare terminals marked) is not applicable for a module type, associated terminals/terminal nos. may be absent in the panel.
3. If any new signal not covered in this list is required to be wired to DCS during detail engg, new terminal nos as per above philosophy shall be assigned.

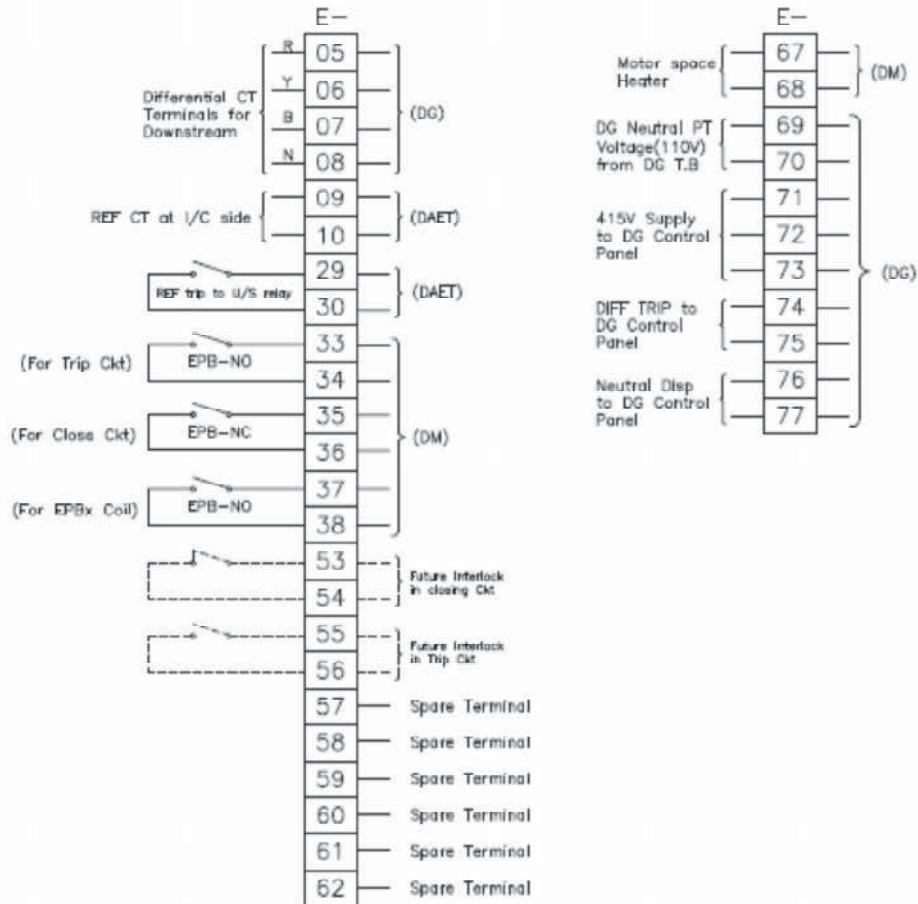
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CLEARED BY					PROJECT	
C	E	M	CM	ES	STANDARD	
					TITLE STANDARD "D" TERMINALS (FOR CABLING BETWEEN SWGR & DCS) FOR LT SWGR	
DRN	DGN	CHKD	APPD	DATE	SCALE	DRAWING No.
-				20.06.18	NA	0000-206-POE-A-022
						REV. A

A4 316X297

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NOTES :-

1. 52a & 52b shown above are breaker aux. contacts when breaker is in Service position.
2. If any signal (except 52a & 52b signals, future & Spare terminals marked) is not applicable for a module type, associated terminals/terminal nos. may be absent in the panel.
3. If any new signal not covered in this list is required to be wired to any other external equipment during detail engg, new terminal nos as per above philosophy shall be assigned.

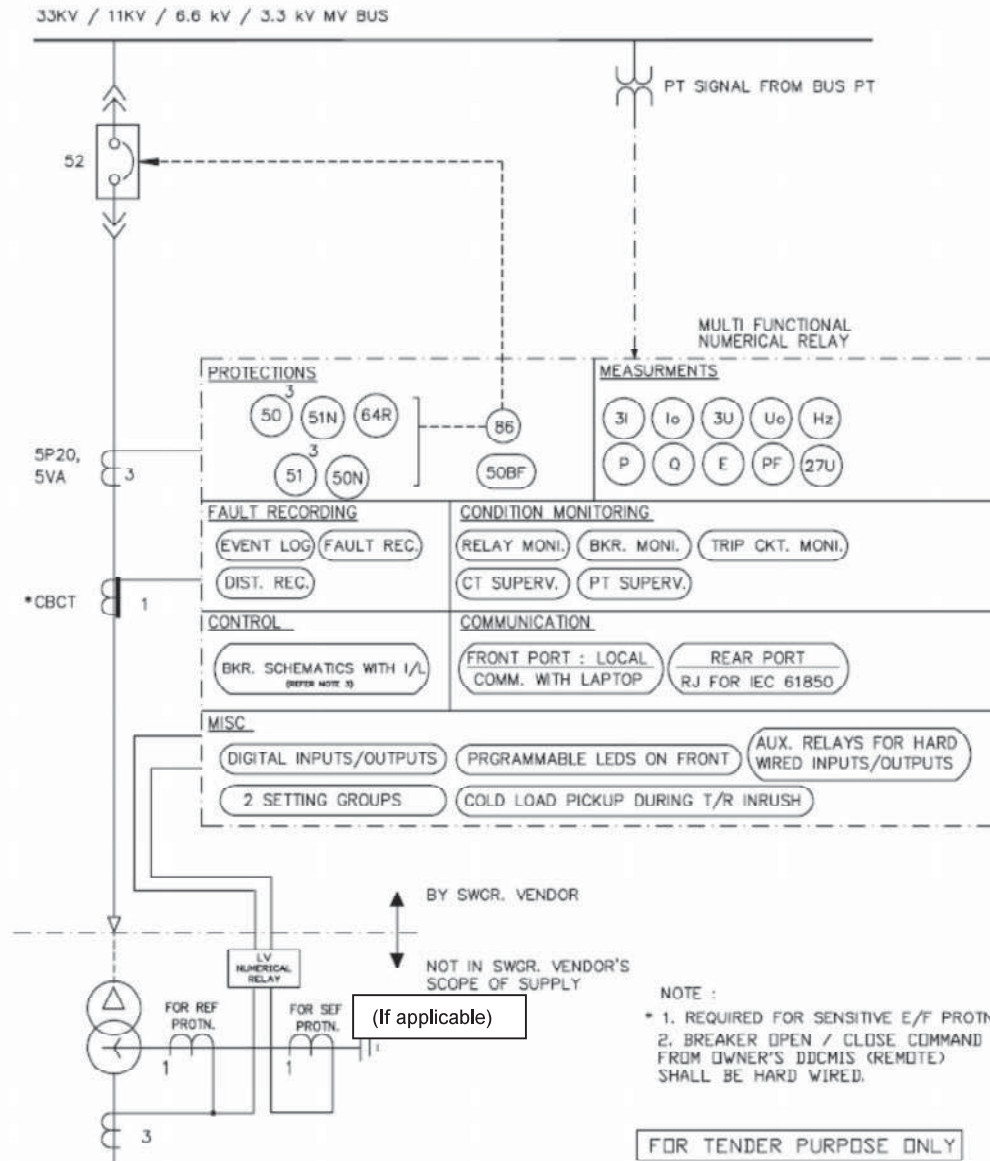
FOR TENDER PURPOSE ONLY



NTPC Limited
(A GOVERNMENT OF INDIA ENTERPRISE)

CLEARED BY					PROJECT	
C	E	M	CM	ES	STANDARD	
					TITLE STANDARD 'E' TERMINALS (FOR CABLING BETWEEN SWGR TO MOTOR, SWGR TO TRF & INTERBOARD CABLING) FOR LT SWGR	
DRN	DGN	CHKD	APPD	DATE	SCALE	DRAWING No.
-				20.06.19	NA	0000-206-POE-A-023
						REV. A

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Cleared BY					PROJECT				
C	E	M	C&I	ES	STANDARD				
TITLE					SCHEME FOR MV SWGR FEEDER TYPE-DB (TRANSFORMER)				
DRN	DGN	CHKD	APPD	DATE	SCALE	DRAWING No.	REV.		
-				10/01/07	NA	0000-205-PDE-A-006	0		

DB.DWG

A4 210X297

33kV / 11kV / 6.6 kV / 3.3 kV MV BUS

52

PT SIGNAL FROM BUS PT

MULTI FUNCTIONAL NUMERICAL RELAY

PROTECTIONS

50 51N 64R 51 50N 87T 86 50BF

MEASUREMENTS

3I Io 3U Uo Hz P Q E PF 27U

PS 3

*CBCT 1

FAULT RECORDING

EVENT LOG FAULT REC. DIST. REC.

CONDITION MONITORING

RELAY MONI. BKR. MONI. TRIP CKT. MONI. CT SUPERV. PT SUPERV.

CONTROL

BKR. SCHEMATICS WITH I/L (ORDER NOTE 3)

COMMUNICATION

FRONT PORT: LOCAL COMM. WITH LAPTOP REAR PORT RJ FOR IEC 61850

MISC

DIGITAL INPUTS/OUTPUTS PROGRAMMABLE LEDS ON FRONT AUX. RELAYS FOR HARD WIRED INPUTS/OUTPUTS 2 SETTING GROUPS COLD LOAD PICKUP DURING T/R INRUSH

LV NUMERICAL RELAY

FOR REF. PROTIN. FOR S/B EF PROTIN.

BY SWGR. VENDOR

NOT IN SWGR. VENDOR'S SCOPE OF SUPPLY

NOTE :

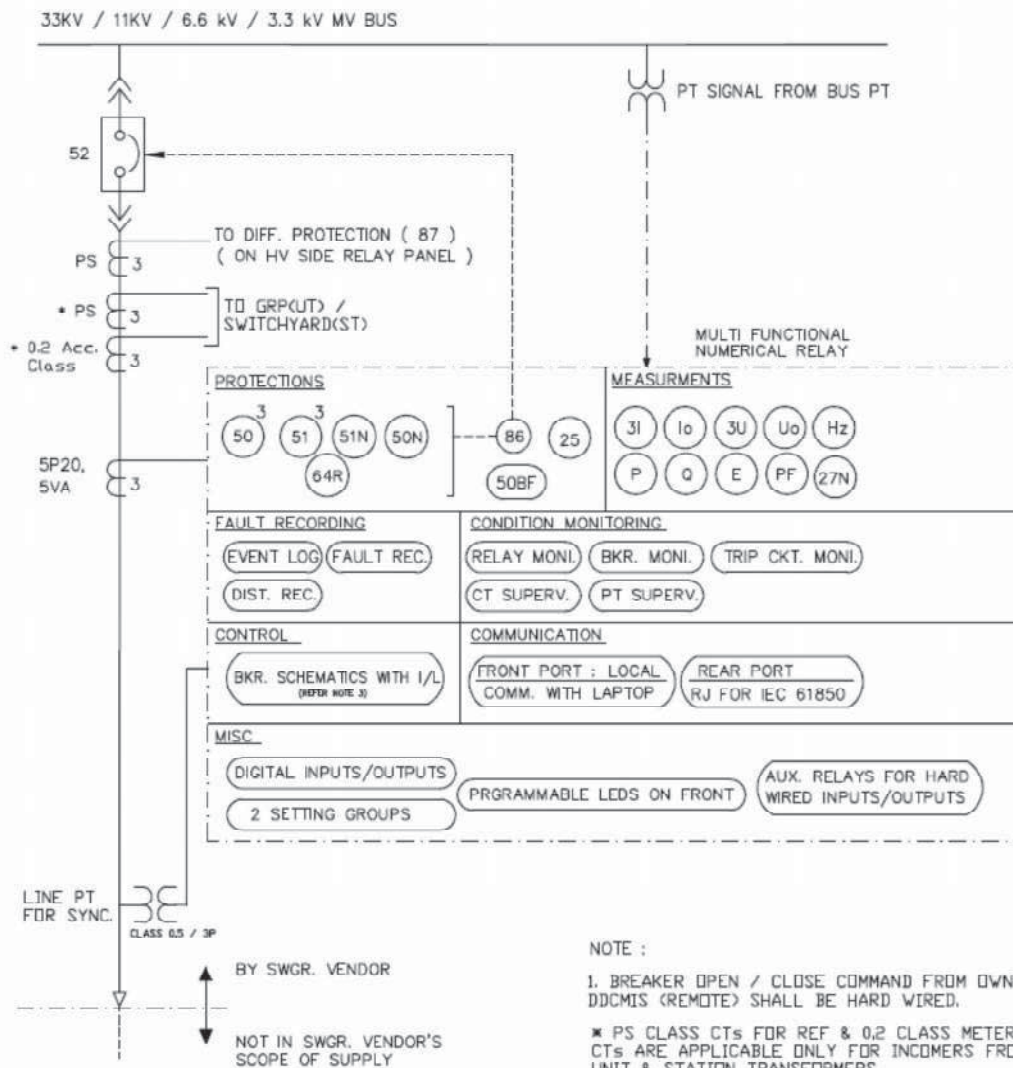
* 1. REQUIRED FOR SENSITIVE E/F PROTIN.

2. BREAKER OPEN / CLOSE COMMAND FROM OWNER'S DDCMS (REMOTE) SHALL BE HARD WIRED.

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A4 210X297

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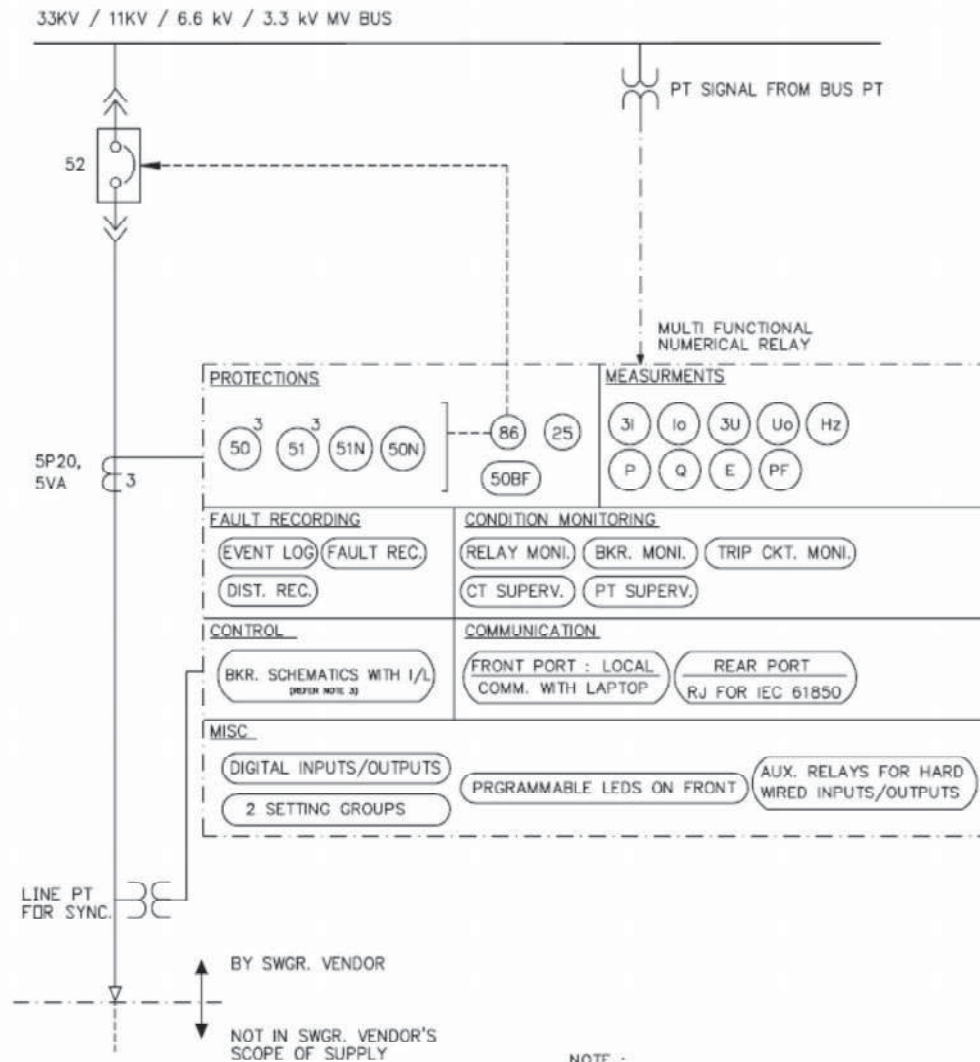
FOR TENDER PURPOSE ONLY

		एनटीपीसी लिमिटेड NTPC Limited (A GOVERNMENT OF INDIA ENTERPRISE)	
CLEARED BY C E M C&I ES		PROJECT STANDARD	
DRN -		TITLE SCHEME FOR MV SWGR FEEDER TYPE-DC (INCOMER)	
DGN [Signature]		DATE 10/01/07	
CHKD [Signature]		SCALE NA	
APPD [Signature]		DRAWING No. 0000-205-PDE-A-008	
REV. 0		A4 210X297	

DC.DWG

A4 210X297

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NOTE :

1. BREAKER OPEN / CLOSE COMMAND FROM OWNER'S DDCMIS (REMOTE) SHALL BE HARD WIRED.

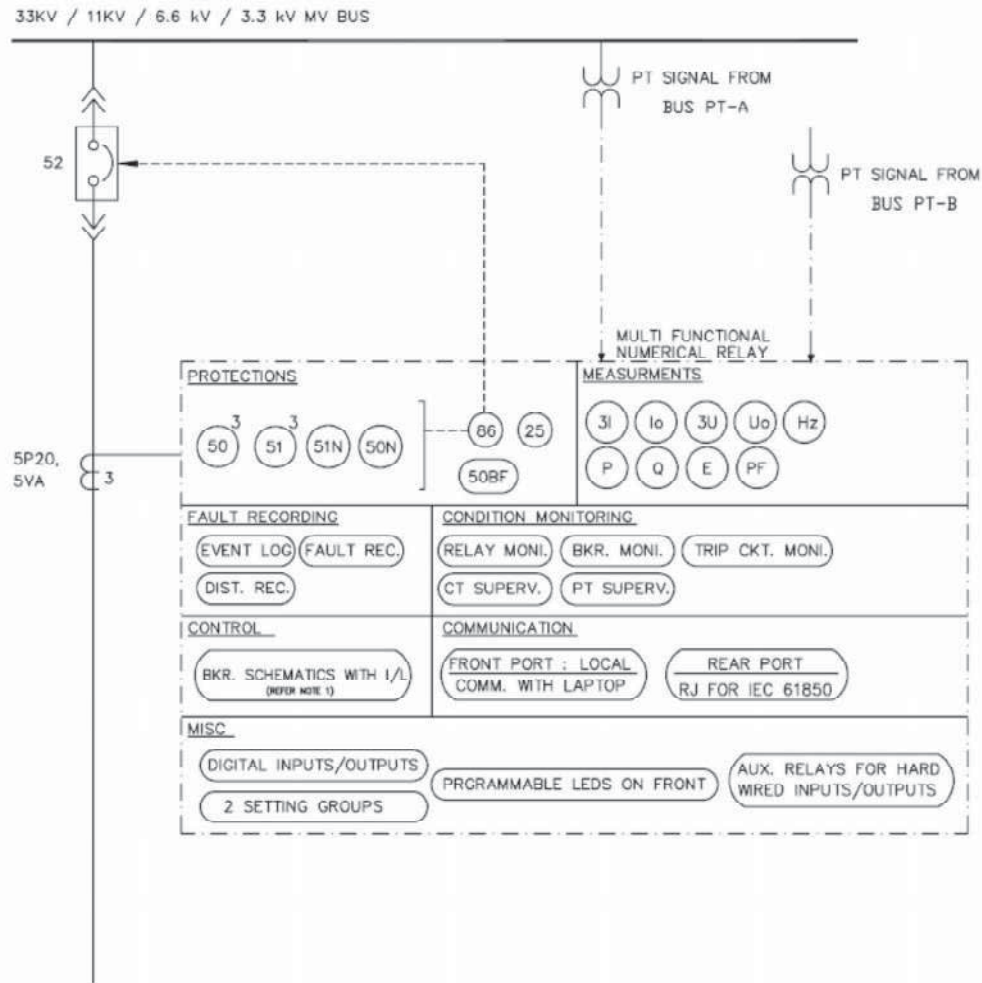
FOR TENDER PURPOSE ONLY

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CLEARED BY C E M C&I ES		PROJECT STANDARD	
ORN -		TITLE SCHEME FOR MV SWGR FEEDER TYPE-DE (TIE FEEDER)	
DGN 	CHKD 	APPD 	DATE 10.01.07
SCALE NA	DRAWING No. 0000-205-PDE-A-009	REV. 0	

DE.DWG


A4 210X297

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NOTE :
1. BREAKER OPEN / CLOSE COMMAND FROM OWNER'S DDCMIS (REMOTE) SHALL BE HARD WIRED.

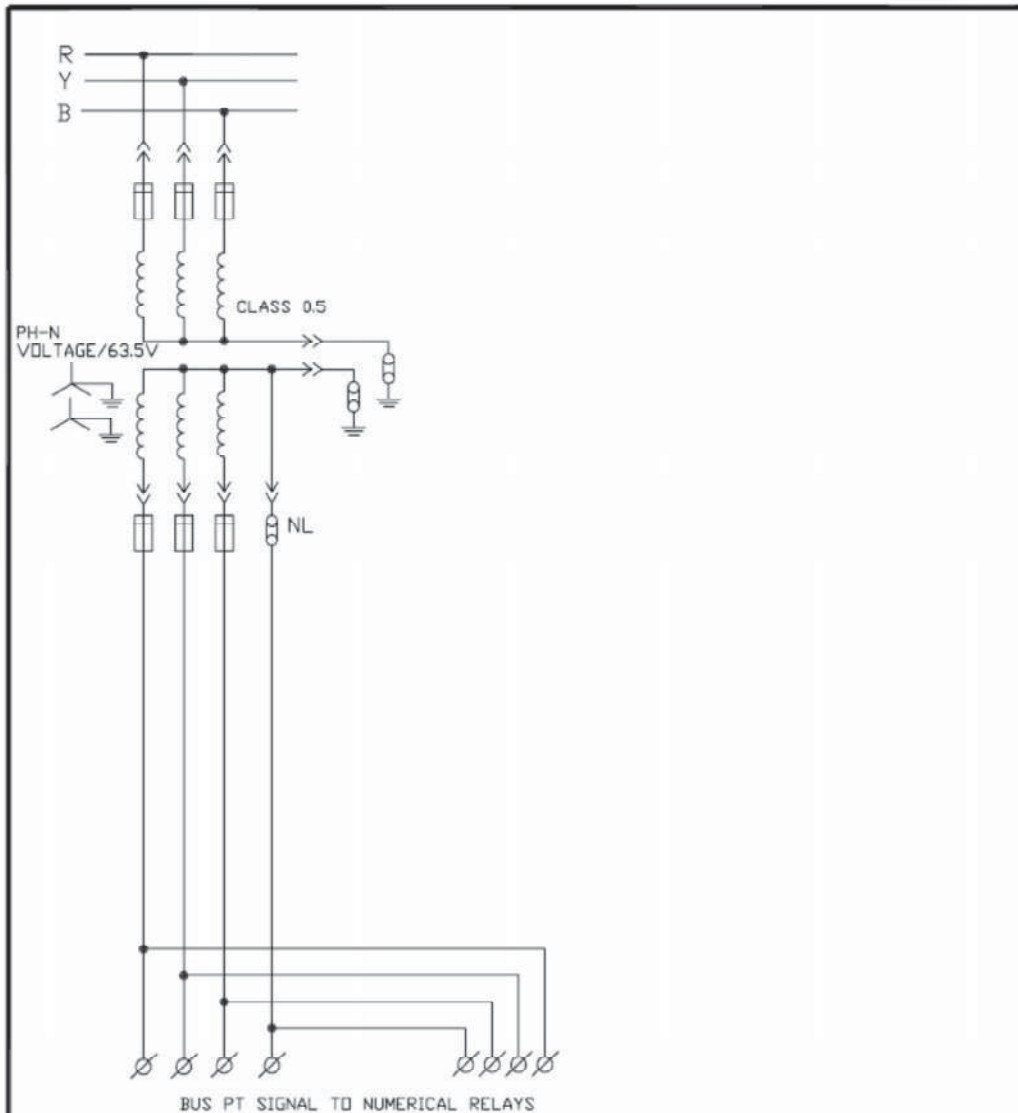
FOR TENDER PURPOSE ONLY

					एनटीपीसी लिमिटेड NTPC Limited (A GOVERNMENT OF INDIA ENTERPRISE)				
CLEARED BY C E M C&I ES					PROJECT STANDARD				
DRN -					TITLE SCHEME FOR MV SWGR FEEDER TYPE-DD (BUS COUPLER)				
DCN Jy					DATE 10/11/07				
CHKD Ji					SCALE NA				
APPD CL					DRAWING No. 0000-205-PDE-A-010				
REV. 0									

DD.DWG

A4 210X297

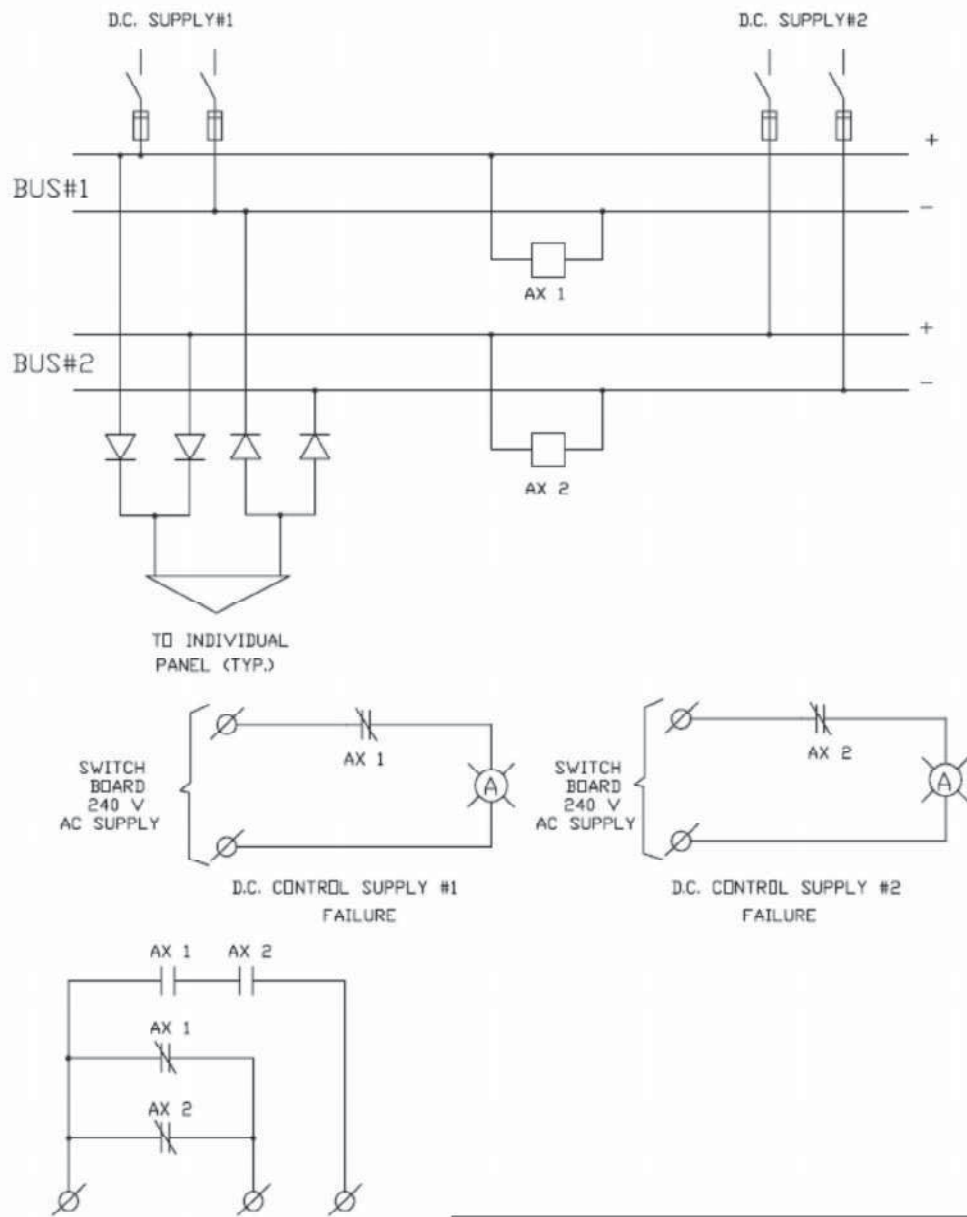
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FOR TENDER PURPOSE ONLY

<div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 2px; margin-right: 5px;"> एन टी पी सी NTPC </div> <div> एन टी पी सी लिमिटेड NTPC Limited <small>(A GOVERNMENT OF INDIA ENTERPRISE)</small> </div> </div>																							
<div style="display: flex; justify-content: space-between;"> <div> <table border="1" style="width: 100%;"> <thead> <tr> <th colspan="5">CLEARED BY</th> </tr> <tr> <th>C</th> <th>E</th> <th>N</th> <th>C&I</th> <th>ES</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table> </div> <div> <table border="1" style="width: 100%;"> <tr> <td>PROJECT</td> <td>STANDARD</td> </tr> <tr> <td>TITLE</td> <td>SCHEME FOR MV SWITCHGEAR MODULE TYPE - G (BUS PT)</td> </tr> </table> </div> </div>					CLEARED BY					C	E	N	C&I	ES						PROJECT	STANDARD	TITLE	SCHEME FOR MV SWITCHGEAR MODULE TYPE - G (BUS PT)
CLEARED BY																							
C	E	N	C&I	ES																			
PROJECT	STANDARD																						
TITLE	SCHEME FOR MV SWITCHGEAR MODULE TYPE - G (BUS PT)																						
DRN	DGN	CHKD	APPD	DATE	SCALE	DRAWING No.	REV.																
-	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	15/01/07	NA	0000-205-PDE-A-012	0																

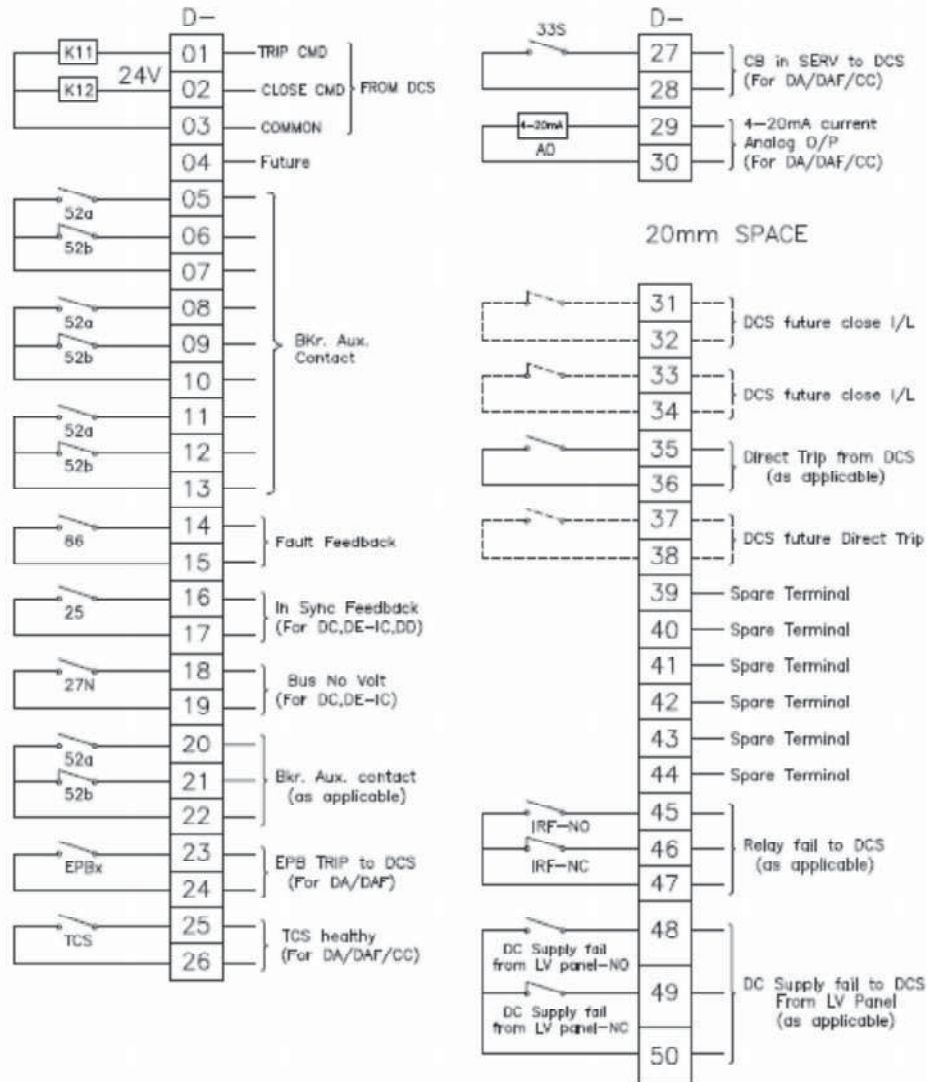
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एन टी पी सी NTPC					नेशनल थर्मल पावर कॉर्पोरेशन लिमिटेड National Thermal Power Corporation Ltd. (A GOVERNMENT OF INDIA ENTERPRISE)				
C					PROJECT				
E					STANDARD				
M					TITLE				
C&I					TYPICAL CONTROL SUPPLY SCHEME FOR MV SWITCHGEAR PANELS				
ES					DRAWING No.				
DRN					0000-205-PDE-A-013				
DGN					REV.				
CHKD					0				
APPD									
DATE									
10/01/07									
SCALE					NA				

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NOTES :-

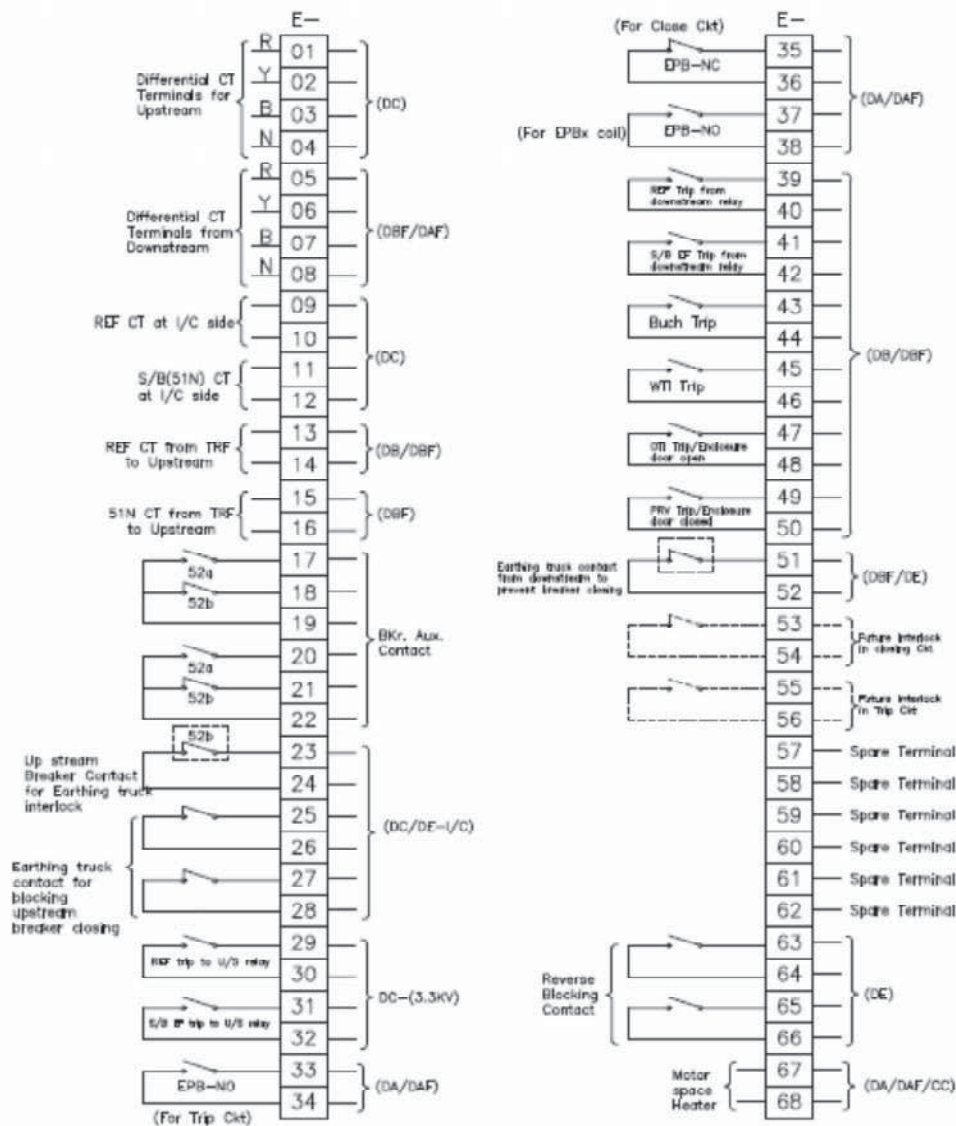
- 52a & 52b shown above are breaker aux. contacts when breaker is in Service position.
- If any signal (except 52a & 52b signals @ D terminal block, future & Spare terminals marked) is not applicable for a module type, associated terminals/terminal nos. may be absent in the panel.
- If any new signal not covered in this list is required to be wired to DCS during detail engg, new terminal nos as per above philosophy shall be assigned.

FOR TENDER PURPOSE ONLY

<div style="display: flex; justify-content: space-between;"> <div> <p>एन टी पी सी</p> <p>NTPC</p> </div> <div> <p>एन टी पी सी लिमिटेड</p> <p>NTPC Limited</p> <p>(A GOVERNMENT OF INDIA ENTERPRISE)</p> </div> </div>														
<div style="display: flex; justify-content: space-between;"> <div> <p>CLEARED BY</p> <table border="1"> <tr> <td>C</td> <td>E</td> <td>M</td> <td>CM</td> <td>ES</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table> </div> <div> <p>PROJECT</p> <p>STANDARD</p> </div> </div>					C	E	M	CM	ES					
C	E	M	CM	ES										
<p>TITLE STANDARD "D" TERMINALS (FOR CABLING BETWEEN SWGR & DCS) FOR MV SWGR</p>														
DRN	DGN	GRD	APPD	DATE										
-				28.06.18										
SCALE	HA	DRAWING No.	0000-205-POE-A-017											
		REV.	0											

AA 210X297

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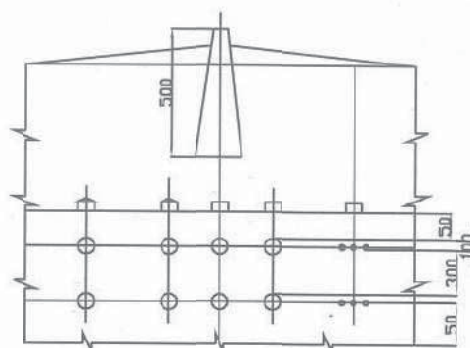
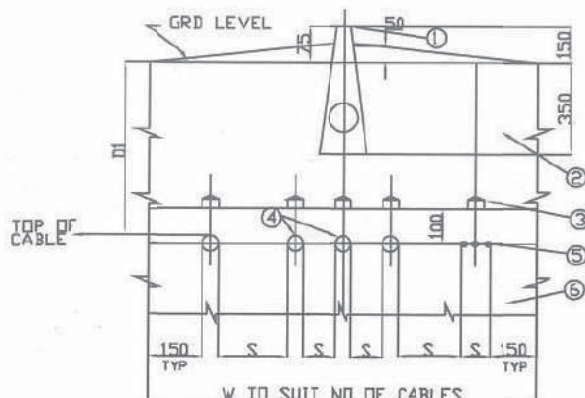


NOTES :-

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2. If any signal (except 52a & 52b signals @ D terminal block/future & Spare terminals marked) is not applicable for a module type, associated terminals/terminal nos. may be absent in the panel.
3. If any new signal not covered in this list is required to be wired to any other external equipment during detail engineering terminal nos as per above philosophy shall be assigned.

FOR TENDER PURPOSE ONLY									
<div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 2px; margin-right: 5px;">NTPC</div> <div style="text-align: center;"> एन टी सी लिमिटेड NTPC Limited <small>(A MEMBER OF NDA GROUP)</small> </div> </div>					<div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 2px; margin-right: 5px;">PROJECT</div> <div style="text-align: center;"> STANDARD </div> </div>				
<div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 2px; margin-right: 5px;">TITLE</div> <div style="text-align: center;"> STANDARD 6" TERMINALS (FOR CABLES BETWEEN SWITCH TO MOTOR, SWITCH TO TRF & INTERLOCKED CABLES) FOR MV SWGR </div> </div>									
<div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 2px; margin-right: 5px;">DRAWN</div> <div style="border: 1px solid black; padding: 2px; margin-right: 5px;">CHKD</div> <div style="border: 1px solid black; padding: 2px; margin-right: 5px;">APPD</div> <div style="border: 1px solid black; padding: 2px; margin-right: 5px;">DATE</div> <div style="border: 1px solid black; padding: 2px; margin-right: 5px;">SCALE</div> <div style="border: 1px solid black; padding: 2px; margin-right: 5px;">DRAWING No.</div> <div style="border: 1px solid black; padding: 2px; margin-right: 5px;">REV.</div> </div>		<div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 2px; margin-right: 5px;">0000-205-POE-A-018</div> <div style="border: 1px solid black; padding: 2px; margin-right: 5px;">0</div> </div>							

	<div>BURIED CABLE</div>		



DIRECTLY BURIED CABLES IN SINGLE LAYER

DIRECTLY BURIED CABLES IN TWO LAYER

LEGEND

- ① — CABLE ROUTE MARKER
- ② — EARTH BACK FILLED & RAMMED
- ③ — PROTECTIVE COVERS
 - a) BRICKS FOR LOW VOLTAGE CABLES
 - b) RCC FOR HIGH VOLTAGE CABLES WITH HOLE AT EACH END TO TIE EACH OTHER WITH G.S. WIRE
- ④ — ARMoured POWER CABLE
- ⑤ — ARMoured CONTROL CABLE
- ⑥ — FINE SAND/RIDDLER SOIL COMPACTED

DIMENSION MIN.	1100V GRADE CABLES	FOR 3.3 KV TO 11KV	ABOVE 11KV & UPTO 33KV
D1	750	900	1050
S	= d BETWEEN CABLES OF SAME CLASS = 300MM BETWEEN CABLES OF DEFT CLASS = 400MM BETWEEN 1/C POWER CABLE AND COMMUNICATION CABLE. = 300MM BETWEEN MULTICORE POWER CABLE & COMMUNICATION CABLE.		

d - OVERALL DIAMETER OF THE BIGGER OF THE TWO CABLES.
D1 - MINIMUM DEPTH OF LAYING FROM GROUND SURFACE TO TOP OF CABLES.

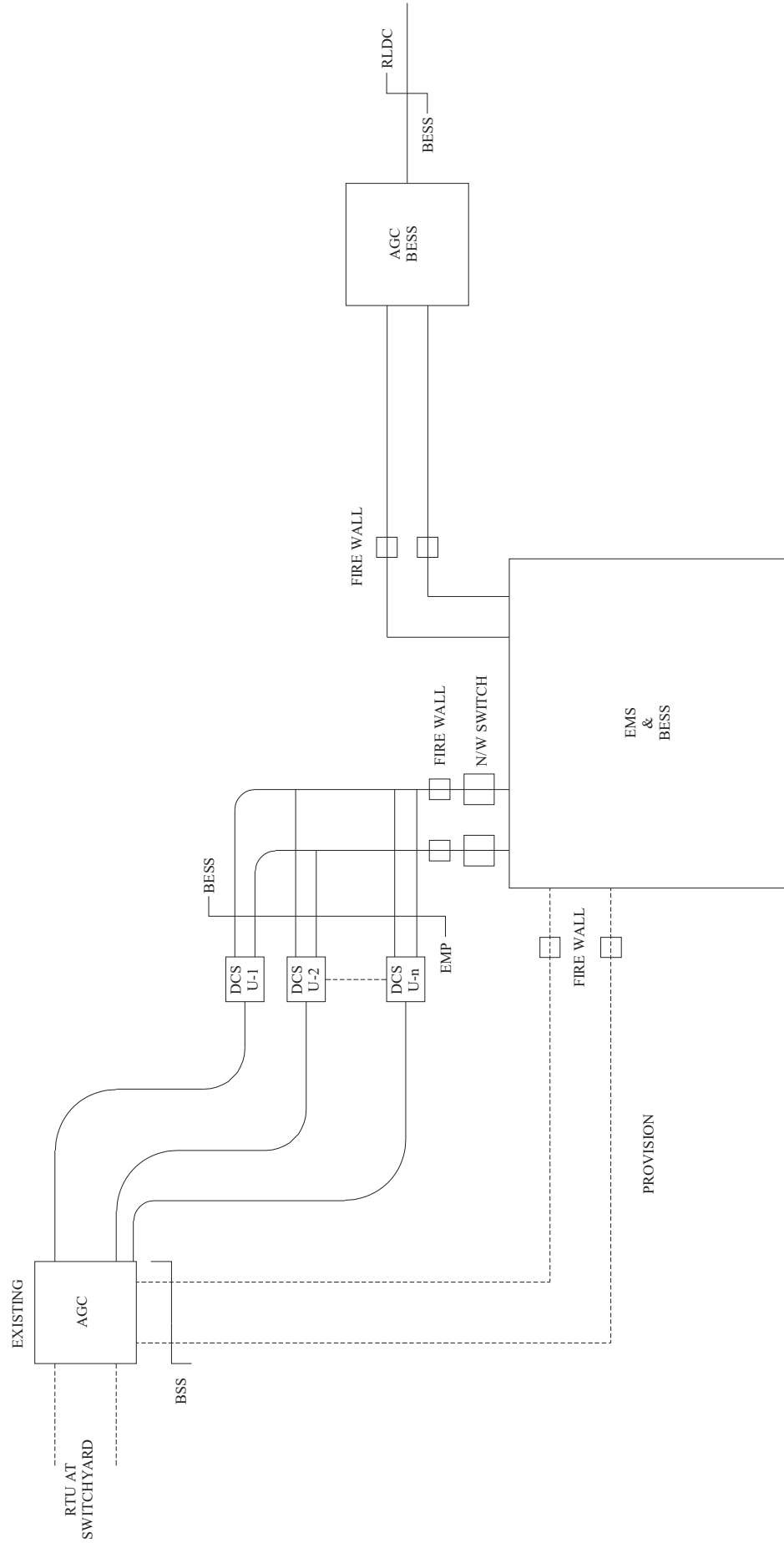
NOTE

- SINGLE CORE CABLES SHALL BE RUN IN TREFOIL FORMATION AND SHALL BE BOUND BY SELFLOCKING CABLE TIES AT EVERY 750 MM.
- CABLE IDENTIFICATION TAG SHALL BE TIED AT BOTH ENDS OF THE CABLE.
- IF THE MINIMUM CLEARANCE AS INDICATED THE ABOVE TABLE FOR CABLES OF DIFFERENT CLASSES ARE NOT FEASIBLE BRICK BARRIERS SHALL BE USED BETWEEN ADJACENT CABLES
- G.I./HUME/HDPE. PIPES SHALL BE PROVIDED FOR ROAD CROSSING AT A MINIMUM DEPTH OF 600 FROM THE GRADE LEVEL AS DECIDED BY NTPC.
- ALL DIMENSIONS ARE IN mm

RC	FOR TENDER PURPOSE	1/3	1/3	RKG	-	W	-	-	-	AS	05.07.10
RB	FOR TENDER PURPOSE	RKG	RKG	SG	-	SS	-	-	-	AS	05.11.2006
RA	FOR TENDER PURPOSE	-	-	-	-	-	-	-	-	-	17.01.2000
REV. NO.	DESCRIPTION	DRAWN	DESIGN	CHKD	M	E	C	C&I	ARCH	APPD	DATE
CLEARED BY											
<div style="display: flex; justify-content: space-between;"> <div> <p>NTPC LTD. (A GOVERNMENT OF INDIA ENTERPRISE) ENGINEERING DIVISION</p> </div> <div> <p>PROJECT</p> <p>STANDARD</p> </div> </div>											
<p>TITLE</p> <p>BURIED CABLES TRENCH FOR HT & LT CABLES</p>											
SIZE	SCALE	DRG. NO.							REV. NO.		
A4	NTS	0000-211-POE-A-050							RC		

	<p>TYPICAL INTERFACE OF BESS WITH EXISTING SYSTEM</p>		

TYPICAL INTERFACE OF BESS WITH EXISTING SYSTEM



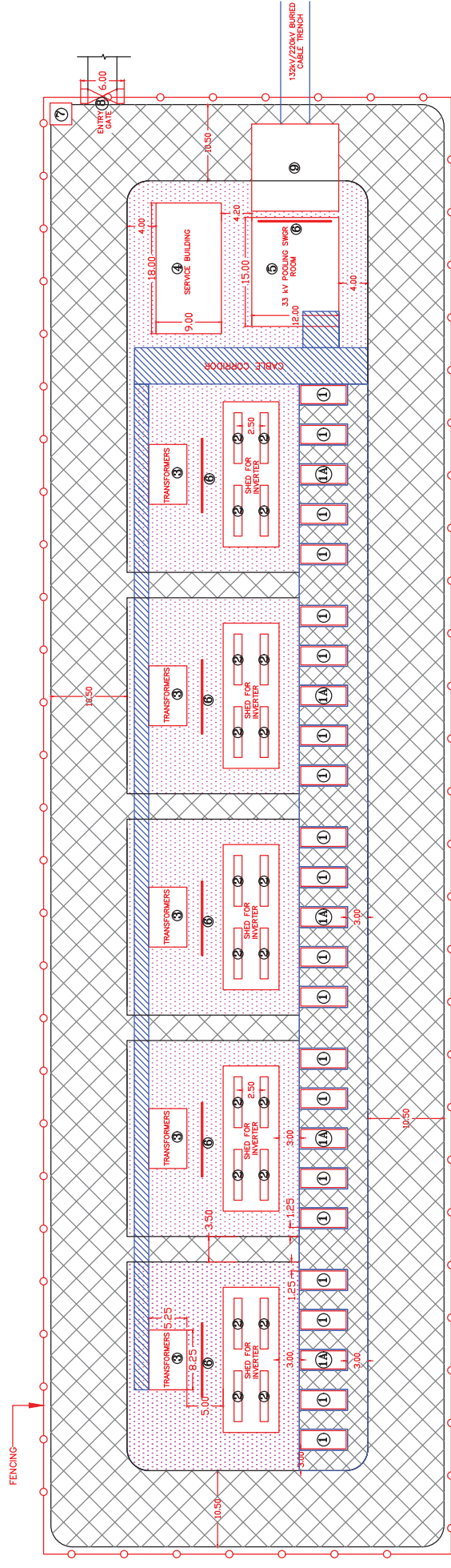
NOTES:-

1. TERMINAL POINT FOR DCS CONNECTIVITY SHALL BE EMPLOYER'S DCS/EXISTING AGC SWITCH/CONTROL PANEL.
2. ONE OWS OF EMS SYSTEM SHALL BE PLACED AT UNIT CCR EXACT DETAILS SHALL BE FINALIZED DURING DETAILS EGG.

TYPICAL INTER CONNECTION OF BESS WITH EXISTING SYSTEM

	<div>TYPICAL LAYOUT FOR BESS PLANT</div>		

TYPICAL LAYOUT FOR BESS PLANT (50 MW, 100 MWh)
(2.75 ACRE)



NOTES:-

- NOTES:**
1. APPROACH TO AREA IDENTIFIED FOR BESS TO BE PROVIDED FROM NEAREST EXISTING ROAD.
 2. THE CABLE ROUTE SHOWN IS INDICATIVE AND TO BE FINALIZED AS PER SITE CONDITION.
 3. NIPFS IS CONSIDERED FOR FIRE PROTECTION OF INVERTER TRF & BESS TIE TRF.
 4. FIRE WALL TYPICAL IS SHOWN, DETAILS WILL BE SITE SPECIFIC.
 5. ONE (1) 33 kV POOLING SWGR ROOM PER BLOCK UPTO 240 MW/480 MWh.
 6. FINISHED FLOOR LEVELS / TOP OF FOUNDATION / TOP OF RAIL WILL BE 500MM (MINIMUM) ABOVE THE FINISHED GROUND LEVEL.

LEGEND:

- | ITEM NO. | DESCRIPTION | UNIT | QUANTITY | UNIT PRICE | TOTAL |
|----------|--|------|----------|------------|-------|
| 1. | HEAVY DUTY PAVING FOR VEHICULAR MOVEMENT | SQM | 6133 | | |
| 2. | LIGHT DUTY PAVING | SQM | 2806 | | |
| 3. | CABLE CORRIDOR | | | | |

1	BATTERY CONTAINER(20X8 FEET) (2.5MW, 5MWh)
1A	ADDITIONAL CONTAINER
3	INVERTER (PCS)
3	TRANSFORMERS
4	SERVICE BUILDING
5	33 kV POOLING SWGR ROOM
6	FIRE WALL
7	SECURITY CABIN
8	ENTRY GATE
9	BESS TIE TRANSFORMER

FOR TENDER PROPOSE

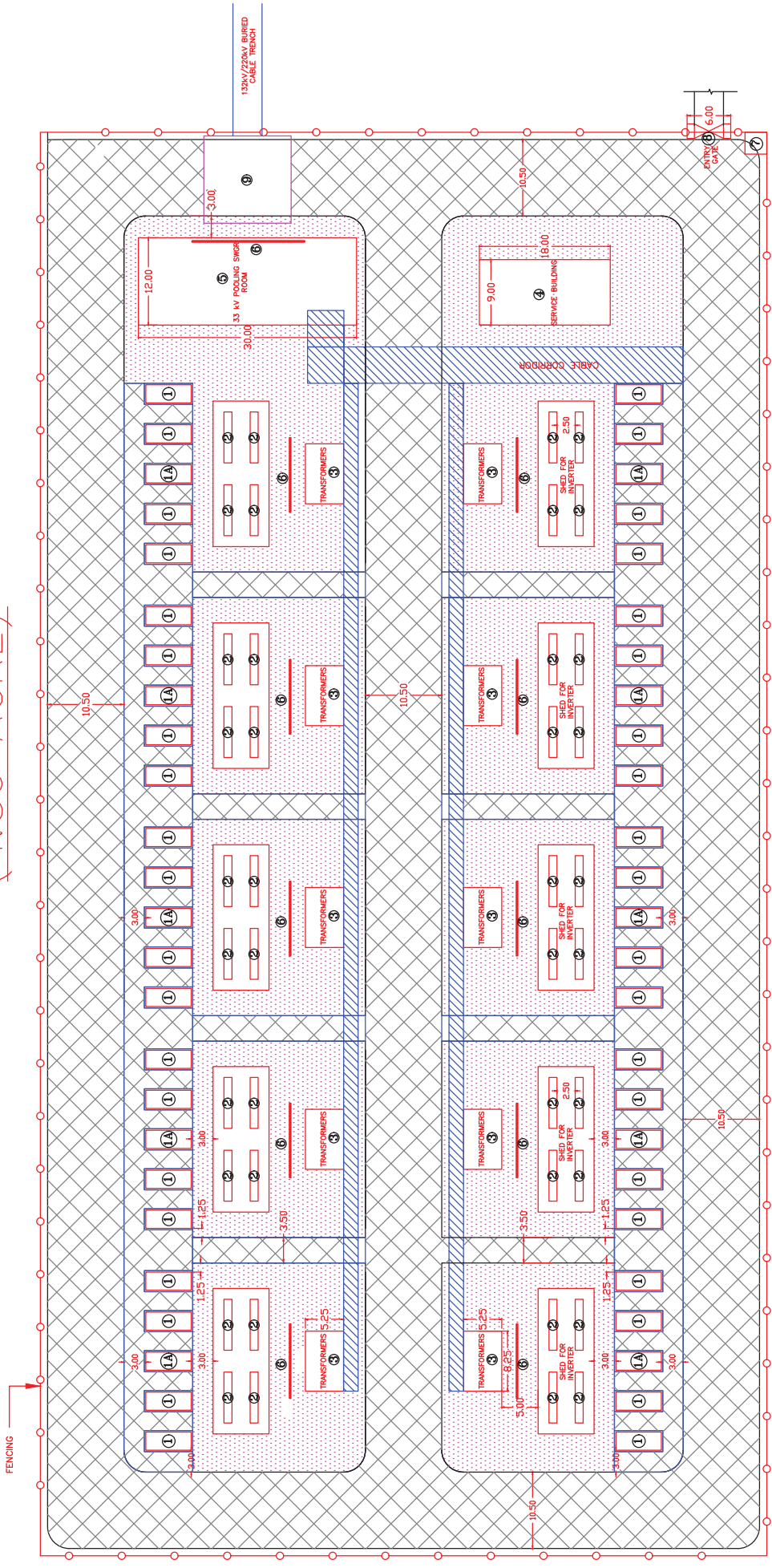


NTPC Limited

PROJECT BATTERY ENERGY STORAGE SYSTEMS

TILE										TITLE TYPICAL LAYOUT FOR BESS PLANT (50 MW, 100 MWt)										REV. NO.	A
										SCALE		SHEET NO.									
										SIZE		DATE		APP'D		1 : 4000					
										M	E	C	CM	ES							
A. FOR TENDER PROVIDED										DRAWING DESIGN CODE											
REMARKS										DESCRIPTION											

TYPICAL LAYOUT FOR BESS PLANT (100 MW, 200 MWh) (4.80 ACRE)



- NOTES:-**
1. APPROACH TO AREA IDENTIFIED FOR BESS TO BE PROVIDED FROM NEAREST EXISTING ROAD.
 2. THE CABLE ROUTE SHOWN IS INDICATIVE AND TO BE FINALIZED AS PER SITE CONDITION.
 3. NIPPS IS CONSIDERED FOR FIRE PROTECTION OF INVERTER TRF & BESS TIE TRF.
 4. FIRE WALL TYPICAL IS SHOWN, DETAILS WILL BE SITE SPECIFIC.
 5. ONE (1) 33 kV POOLING SWGR ROOM PER BLOCK UPTO 240 MW/480 MWh.
 6. FINISHED FLOOR LEVELS / TOP OF FOUNDATION / TOP OF RAIL WILL BE 500MM (MINIMUM) ABOVE THE FINISHED GROUND LEVEL.

- LEGEND:**
1. HEAVY DUTY PAVING FOR VEHICULAR MOVEMENT — 8165 SQM
 2. LIGHT DUTY PAVING — 5641 SQM
 3. CABLE CORRIDOR

BATTERY	
1	CONTAINER(20X8 FEET) (2.5MW/5MWh)
1A	ADDITIONAL CONTAINER
3	INVERTER (PCS)
3	TRANSFORMERS
4	SERVICE BUILDING
5	33 kV POOLING SWGR ROOM
6	FIRE WALL
7	SECURITY CABIN
8	ENTRY GATE
9	BESS TIE TRANSFORMER

	<div>TECHNICAL DATA SHEET</div>		

TECHNICAL DATA SHEET		
A. BATTERY ENERGY STORAGE SYSTEM (BESS)		
SN	Parameters	
1	Battery Technology	
2	BESS Footprint (Sq.m)	
3	Useful energy capacity (available at Point of Interconnection) at rated DoD as per battery design over entire design life of 12 years (Year wise useful capacity shall be provided in the datasheet)	
4	Rated AC power at Point of Interconnection	
5	Gross BESS capacity	
6	Depth of Discharge	
7	Design Life/Cycle Life	
8	Battery Round Trip ac-dc-ac efficiency at metering point	
9	Response time	
10	Charging/ discharge Rate	
11	Minimum Battery Protection Features of Module and BMS	
12	Minimum metering and monitoring of module/tray BMS	
13	Minimum metering and monitoring functions of BMS	
14	Data Communication	
15	Ventilation System inside the Container	
16	Power Factor range at POI/metering point (minimum)	
B. INVERTER		
SN	Parameters	
1	Maximum Input Voltage DC	
2	Nominal output voltage frequency	
3	Continuous operating frequency range	
4	AC Voltage Range	
5	Euro efficiency	
6	Number of MPPT	
7	Operating power factor range	
8	Current harmonics	
9	Current THD value	
10	Operating ambient temperature	
11	Humidity	
12	PCU designed DC fault current level	
13	PCU designed AC fault current level	
14	Whether following functions/protections provided in PCU: (YES/NO)	
	Shut Down on Over Voltage both at input & output Automatic,	
	Automatic protection against over Frequency,	
	Automatic protection against Surge voltage induced at output due to external source,	
	Short Circuit Protection by Circuit Breaker and Electronics protection against sustained fault.	
	Automatic Protection against the lightening fault.	
	protection against DC reverse polarity in the inverter.	
	Anti-islanding protection	
	Synchronization feature	
C. INVERTER DUTY TRANSFORMER		
SN	Parameters	
1	Rating (MVA)	
2	Vector Group	