



BHARAT HEAVY ELECTRICALS LIMITED

TRANSMISSION BUSINESS HVDC ENGINEERING & SYSTEMS

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DOCUMENT No.	TB-391-562-01A	Rev. No.	00	Prepared	Checked	Approved		
TYPE OF DOC.	TECHNICAL SPECIFICATION			SIGN				
TITLE Auto Changeover Panel for batteries of Diesel Generating Set				NAME	AJ	AR	SKS	
				DATE	03/03/20	03/03/20	03/03/20	
				GROUP	HVDC	W.O. No	86006	
CUSTOMER	Power Grid Corporation of India Ltd (POWERGRID)							
PROJECT	±800kV, 6000MW HVDC Raigarh – Pugalur Terminals							
CA NO.	CC-CS/651-SR2/HVDC-3063/7/G10/CA-I/5817-5821 date: 2017-01-25							
Station	Raigarh & Pugalur							
CONTENTS								
Section	Description					No Of Sheets		
1	Scope, Specific Technical Requirement and Bill of Quantity					2		
2	Equipment Specification (Approved drawing-GA and scheme of auto changeover panel for batteries of DG sets)					8		
Rev No.	Date	Altered	Checked	Approved	REVISION DETAILS			
Distribution				To	HVD C	TBMM	TBQM	Vendor
				Copies	1	1	1	1



SECTION-1

INTENT, DESIGN CRITERIA, SYSTEM REQUIREMENT AND SCOPE

1.1 Intent of specification

- 1.1.1 This specification is intended to cover the following activities and services in respect of Auto changeover panel for batteries of the **1700 KVA DIESEL GENERATING SET**:
- i) Complete manufacturing & testing at works.
 - ii) Providing O & M manuals as per specified format etc. for Owner's review, approval and records.
 - iii) Packing and Loading for safe transportation to site.
 - iv) Transportation, unloading at site.
 - v) Supervision of Erection, Testing, Commissioning, carrying out acceptance test and putting into satisfactory operation of all the equipment.
- 1.1.2 The APPROVED DRAWING of auto change over panel is provided under SECTION 2 of the specification shall be considered as part of this section.
- 1.1.3 The bidder shall be deemed to have understood completely all the tender drawings and documents and quoted accordingly.
- 1.1.4 The Bidder shall be responsible for providing all material, equipment and services, specified or otherwise which are required to fulfil the intent of ensuring operability, maintainability and the reliability of the complete work covered under this specification.
- 1.1.5 In case of any deviation, the bidder shall indicate separately the deviations clause-wise with respect to the specification in the 'Schedule of Deviation'. Deviations in any other form including clarifications / assumptions / etc. will not be considered and it will be construed that the bid conforms strictly to the specification.
- 1.1.7 This specification makes it obligatory for the contractor to arrange / obtain necessary approval / clearance from statutory organizations wherever applicable for the plant / machinery / sub-systems under the scope specified.
- 1.1.8 The panel shall be designed & manufactured to suit the extreme of outside/inside conditions as given in the specification and inside condition of DG set enclosure.
- 1.1.9 The Contract shall be on unit rate basis for the quantities furnished by BHEL. During contract stage, quantities of various items of BOQ may vary to any extent and same rates will be applicable so far the resultant variation in total contract value is within ±30%. Variations beyond ±30% shall be negotiated mutually.



1.1.10 The term 'Owner' appearing in this specification shall refer to **Power Grid Corporation of India Limited (POWERGRID)**, the term 'Purchaser' shall refer to **BHEL** and the term 'Contractor' shall refer to the successful **Bidder**.

1.1.11 **Scheme of operation**

Please refer detailed drawing attached to section-2.

1.2 **Scope of Supply & Services**

The requirements mentioned under this clause are *indicative and minimum* for the system. Any other item/ service required to complete the work for safe and sound operation of system shall be provided and installed by the bidder at no extra cost to the purchaser. The bidder may bring out such requirement(s) suitably.

1.2.1 **Scope of Supply**

Auto changeover panels for batteries of DG Sets as per approved drawing and scheme attached to section-2.

1.2.2 **SCOPE OF SERVICE**

Supervision of ETC for panel shall be under the scope of bidder.

1.3 **Various heads to be quoted for:**

Sl. No.	Description	Quantity for Raigarh	Quantity for Pugalur
1.0	Auto changeover panel for batteries of 1700kVA DG Set	4 Sets	4 Sets
2.0	Supervision of Erection, Testing & Commissioning of Auto changeover panel	4 Sets	4 Sets

1.4 **Test and inspection**

All test and inspection shall be done at vendor works in line with approved drawing.



Section-2

EQUIPMENT SPECIFICATION

GA and Scheme of Auto changeover panel for batteries of DG set.

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Simplifi-ED

A. EXECUTION

- PANELS SHALL BE DUST & VERMIN PROOF, FREE STANDING, FLOOR MOUNTED.

B. SUPPLY CHARACTERISTICS

- CONTROL SUPPLY. : 240V AC/24V DC SUPPLY AS PER CONTROL SCHEME DRAWING.

C. CONSTRUCTION

- DOORS : 2.5 MM C.R.C.A. SHEET STEEL
- FRAME WORK : 2.0 MM C.R.C.A. SHEET STEEL
- PARTITION PLATE : 1.6 MM C.R.C.A. SHEET STEEL
- COVERS : 1.6 MM C.R.C.A. SHEET STEEL
- BASE FRAME : 3.0 MM C.R.C.A. SHEET STEEL
- GLAND PLATE : 3MM C.R.C.A. SHEET STEEL FOR MULTI-CORE CABLE
: 4MM ALUMINUM SHEET FOR SINGLE CORE CABLE
- DEGREE OF PROTECTION : IP-54
- GENERAL FEATURES : 3MM THICKNESS NEOPRENE GASKET SHALL BE PROVIDED INSIDE THE DOORS & COVERS TO MAKE THE PANEL DUST AND VERMIN PROOF.
: PANEL FRONT DOOR SHALL BE PROVIDED WITH DOOR LOCK.
: WHEREEVER NOT SPECIFY REAR BOLTED COVER SHALL BE PROVIDE
- OPERATING HEIGHT : MINIMUM - 300 MM
- CABLE ENTRY : BOTTOM
- SHROUDING : ALL LIVE PARTS WITH POLYCARBONATE SHEET.

D. PAINTING

- PRETREATMENT : THE PANEL SHALL BE PRE-TREATED WITH FOURTEEN TANK PROCESS FOR DEGREASING, WATER RINSING, DERUSTING, ACTIVATION, PHOSPHATING AND PASSIVATION.
- PAINT SHADE (POWDER COATED) : RAL 7035
: BASE FRAME - BLACK
- PAINT THICKNESS : 60 MICRON (MINIMUM)

F. EARTHING

- EARTH : NO SEPERATE EARTHING ONLY PROVIDE AT DG ACOUSTIC COMMON EARTHING
- HINGED DOOR EARTHING : DEVICE MOUNTED HINGED DOORS CONNECTED TO CUBICLES BODY BY MEANS OF 2.5 SQ. MM. BI-COLOUR WIRE (YELLOW/GREEN)

Rangarh Station :		Pugalar Station :		APPRD	S.A	CONTRACTOR : STERLING & WILSON POWERGEN PVT. LTD. (ASSOCIATES OF SHARPOORJI PALLONJI & CO. LTD.)		ADDITIONAL INFORMATION		END USER : POWER GRID CORPORATION OF INDIA LIMITED 1800KV, 6000MM HVDC Rangarh - Pugalar Terminals CC-CS/651-582/INOC-3062/7/010/CA-15817-5821 dated 2017-01-25		DATE			
Pole-1 DG set-S1 P1 AL G1		Pole-1 DG set-S2 P1 AL G1		CHKD	R.K.S					PURCHASER : BHARAT HEAVY ELECTRICALS LTD. TRANSMISSION BUSINESS GROUP		DATE			
Pole-2 DG set-S1 P2 AL G2		Pole-2 DG set-S2 P2 AL G2		DRAWN	A.K.P					SCALE		DATE			
Pole-3 DG set-S1 P3 AL G3		Pole-3 DG set-S2 P3 AL G3		DESC.	NAME	SIGN					CONTROL STATION : RANGARH & PUGALAR		DATE		
Pole-4 DG set-S1 P4 AL G4		Pole-4 DG set-S2 P4 AL G4									DRAWING NO. SWPPL-BHEL-PG-DG-BCOP		DATE		
										TITLE : LEGENDS, GENERAL NOTES, GA, SLD, WIRING DIAGRAM & BOM FOR DG SET BATTERY SUPPLY CHANGE OVER PANEL		SHEET No. 2 OF 2		REV	

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Simplified

H. WIRING

1. TYPE : CONTROL WIRING SHALL BE DONE WITH 1100V
GRADE FRLS PVC INSULATED COPPER FLEXIBLE WIRE.
2. SIZE (CONTROL WIRING) : ALL WIRING DONE BY FRLS PVC INSULATED
1100V GRADE COPPER FLEXIBLE CONDUCTOR
HAVING FOLLOWING CROSS SECTION.
1) CT. CIRCUIT – 2.5SQ.MM. BLACK COLOUR.
2) POTENTIAL & METERING–1.5SQ.MM. COLOUR CODED. (R,Y,B, & N)
3) FOR RELAY / CONTROLLER CIRCUIT – 2.5 SQ.MM. RED/BLACK
3. COLOUR CODE : 1) FOR AC –1.5SQMM CONTROL CIRCUIT : GREY COLOUR.
: 2) DC CIRCUIT– 2.5SQ.MM RED (+VE) & BLACK (–VE)

I. LABELS

1. MATERIALS : AL. ANODIZED
2. LETTERS : PRINTED WHITE LETTERS OF SUITABLE SIZE AGAINST BLACK
BACKGROUND.
3. MAIN NAME PLATE : AS MENTIONED ON G.A DRAWINGS LABELS PROVIDED ON FRONT
SIDE OF PANEL.
4. COMPONENT NAME PLATE : PVC WITH BLACK LETTER

J. TEST OFFERED FOR INSPECTION

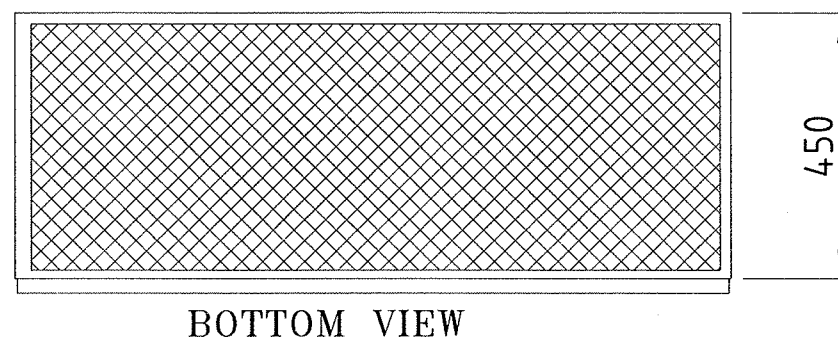
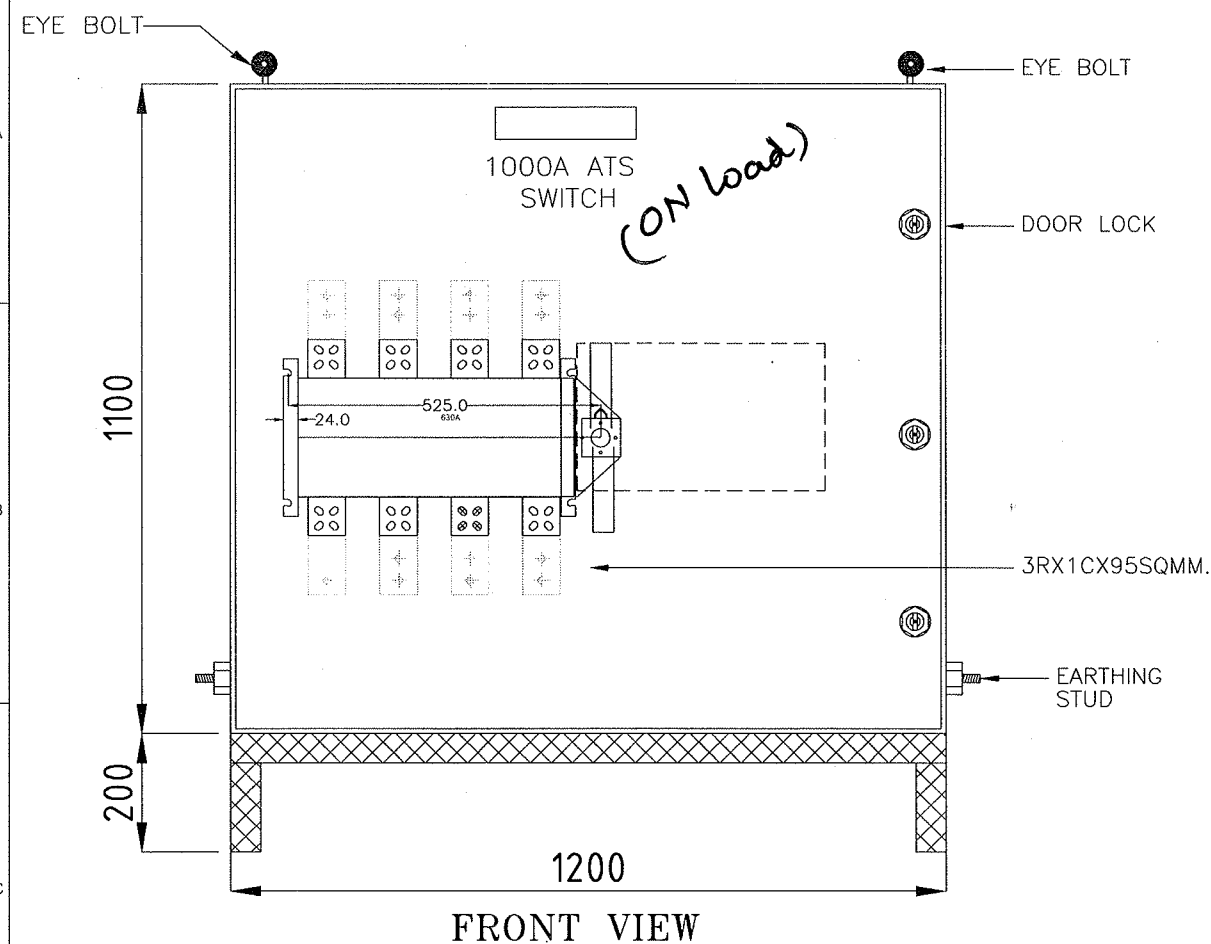
1. : DIMENSIONAL CHECK
2. : BILL OF MATERIALS CHECK
3. : OPERATIONAL/FUNCTIONAL TEST

2
07/11/19

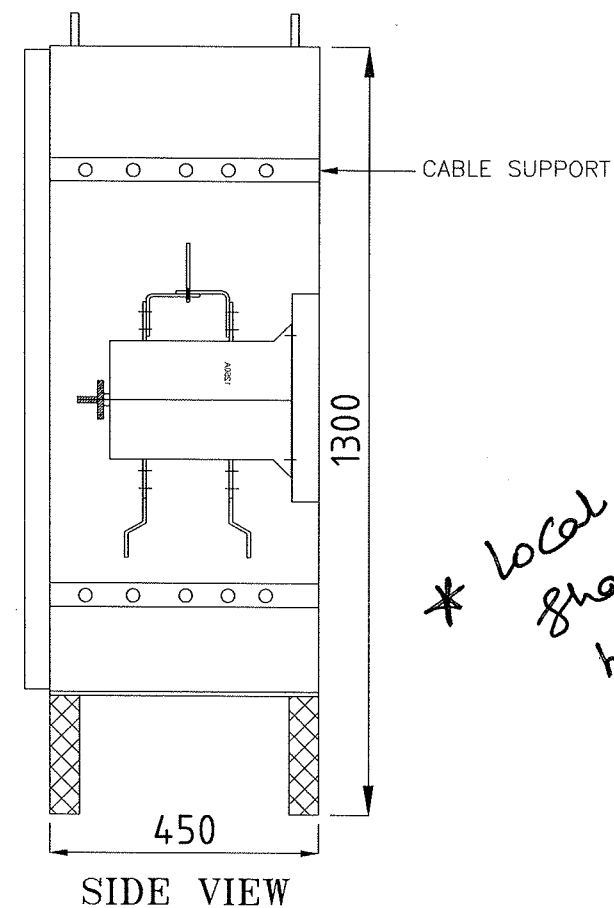
Raigarh Station Pole-1 DG set-S1 P1 AL G1 Pole-2 DG set-S1 P2 AL G2 Pole-3 DG set-S1 P3 AL G3 Pole-4 DG set-S1 P4 AL G4		Pugalur Station Pole-1 DG set-S2 P1 AL G1 Pole-2 DG set-S2 P2 AL G2 Pole-3 DG set-S2 P3 AL G3 Pole-4 DG set-S2 P4 AL G4		APPRD CHKD DRAWN DESC.	S A R.K.S A.K.P NAME	SIGN	CONTRACTOR : STERLING & WILSON POWERGEN PVT. LTD. (ASSOCIATES OF SHAPPOORJI PALLONI & CO. LTD.)		ADDITIONAL INFORMATION	END USER : POWER GRID CORPORATION OF INDIA LIMITED 800KV, 6000MW HVDC Raigarh - Pugalur Terminals DC-CS/651-SR2/MDC-3063/7/010/CA-/5817-5821 dated 2017-01-25		PURCHASER : SHARAT HEAVY ELECTRICALS LTD. TRANSMISSION BUSINESS GROUP	DATE 25.02.19	26.09.19	26.09.19
							REV. DATE 1. 07/11/19	SCALE NTS.	DATE CODE	CONTROL STATION: RAIGARH & PUGALUR	DRAWING NO. SUPPL-BHEL-PG-DG-BCOP	REV. 00			
TITLE: LEGENDS, GENERAL NOTES, G.A. SLD, WIRING DIAGRAM & BOM FOR DG SET BATTERY SUPPLY CHANGE OVER PANEL										SHEET No. 3 OF 3					

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Simplified



FRONT



* Local manual operation shall be possible through handle.

QUANTITY

- 8 Nos.
(4NOS. FOR RAIGARH
4NOS. FOR PUGALUR)

PANEL SIZE (HxWxD)

- 1300x1200x450

CABLE ENTRY

- BOTTOM

RECOMMENDED FRONT ACCESS

- 1500

TOTAL WEIGHT (APPROX.)

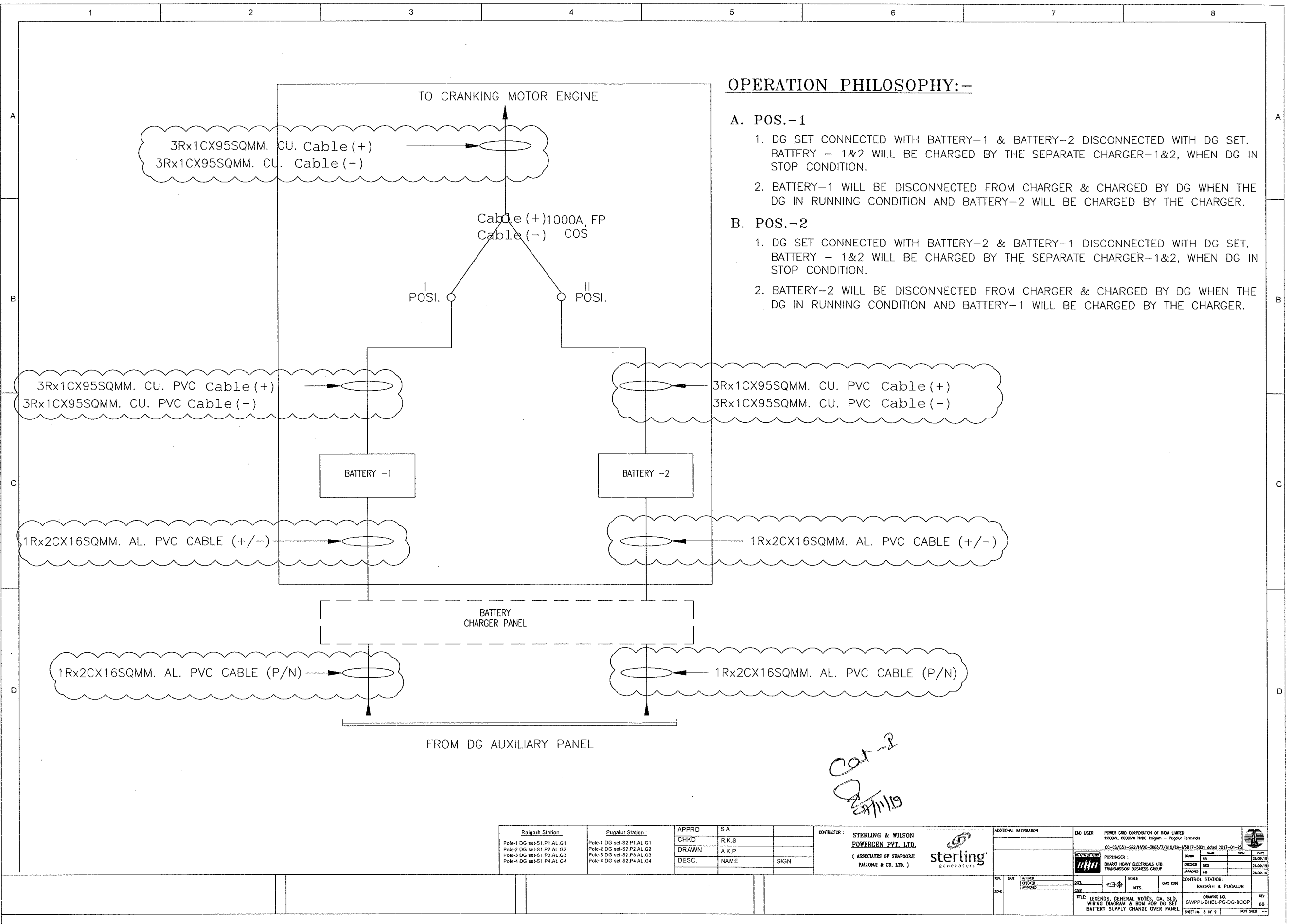
- 100Kgs

Cor 1
2
07/11/19

Raigarh Station		Pugalur Station		APPRD	SA	CONTRACTOR : STERLING & WILSON POWERGEN PVT. LTD. (ASSOCIATES OF SHAPPOORJI PALLONJI & CO. LTD.)		STERLING generators		ADDITIONAL INFORMATION		END USER : POWER GRID CORPORATION OF INDIA LIMITED 800KV, 6000MM HVDC Raigarh - Pugalur Terminals CC-CS/551-S22/HVDC-3063/7/010/CA-1/5817-5821 dated 2017-01-29	
Pole-1 DG set-S1 P1 AL G1		Pole-1 DG set-S2 P1 AL G1		CHKD	R.K.S							PURCHASER : BHARAT HEAVY ELECTRICALS LTD. TRANSMISSION BUSINESS GROUP	
Pole-2 DG set-S1 P2 AL G2		Pole-2 DG set-S2 P2 AL G2		DRAWN	A.K.P							DRAWN : AS	
Pole-3 DG set-S1 P3 AL G3		Pole-3 DG set-S2 P3 AL G3		DESC.	NAME	SIGN						CHECKED : SRS	
Pole-4 DG set-S1 P4 AL G4		Pole-4 DG set-S2 P4 AL G4										APPROVED : AS	
												SCALE : NTS.	
												CADD CODE	
												CONTROL STATION: RAIGARH & PUGALLUR	
												DRAWING NO. SWPPL-BHEL-PG-DG-BCOP	
												REV	
												00	
												SHEET No. 4 of 9	
												NEXT SHEET	

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Simplified



Reigath Station
Pole-1 DG set-S1 P1 AL G1
Pole-2 DG set-S1 P2 AL G2
Pole-3 DG set-S1 P3 AL G3
Pole-4 DG set-S1 P4 AL G4

Pugalar Station
Pole-1 DG set-S2 P1 AL G1
Pole-2 DG set-S2 P2 AL G2
Pole-3 DG set-S2 P3 AL G3
Pole-4 DG set-S2 P4 AL G4

APPRD	SA
CHKD	R.K.S
DRAWN	A.K.P
DESC.	NAME
	SIGN

CONTRACTOR : STERLING & WILSON
POWERGEN PVT. LTD.
(ASSOCIATES OF SHAPORITI
PALLONJI & CO. LTD.)



ADDITIONAL INFORMATION

END USER : POWER GRID CORPORATION OF INDIA LIMITED
8800V, 6000AM HMC Reigath - Pugalar Terminals
CC-CS/651-SR2/HMC-306/7/019/CA-75817-5821 dated 2017-01-25

PURCHASER : BHARAT HEAVY ELECTRICALS LTD.
TAMRASAIGARU BUSINESS GROUP

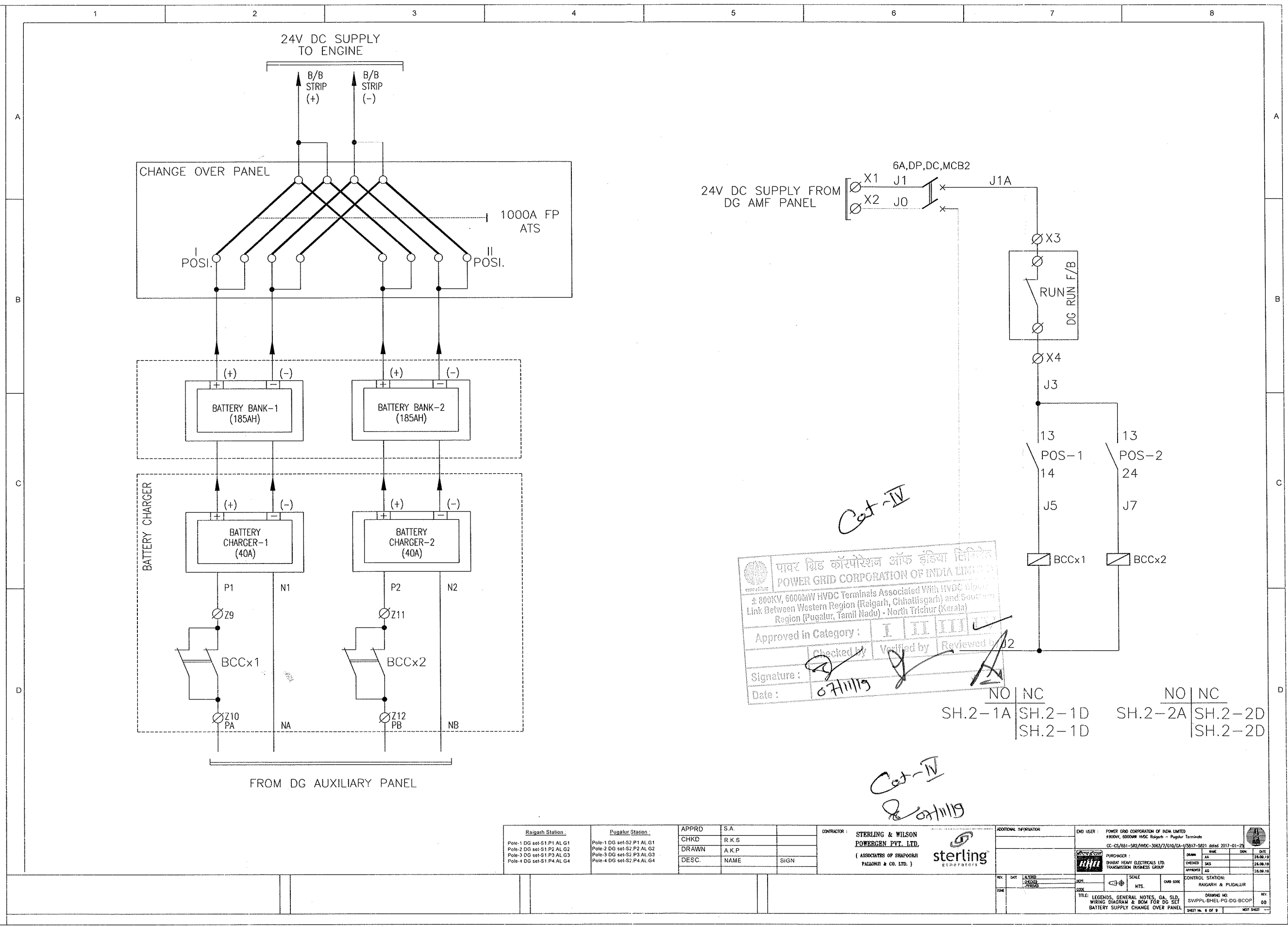
DATE	20.06.19
TIME	20.06.19

TITLE: LEGENDS, GENERAL NOTES, GA, SLD,
WIRING DIAGRAM & BOM FOR DG SET
BATTERY SUPPLY CHANGE OVER PANEL

CONTROL STATION:
RAICHATH & PUGALUR
DRAWING NO.
SVIPPL-0HEL-PG-DG-BCOP
SHEET No. 5 OF 9

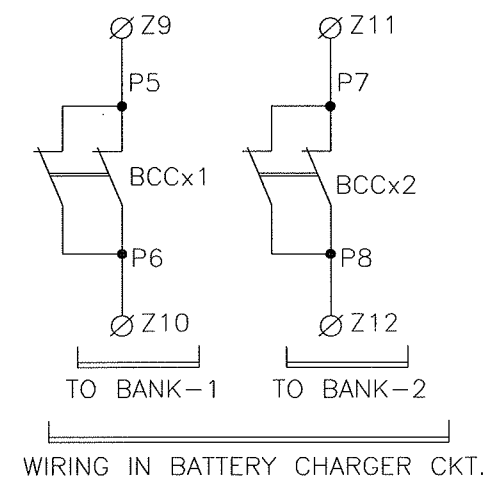
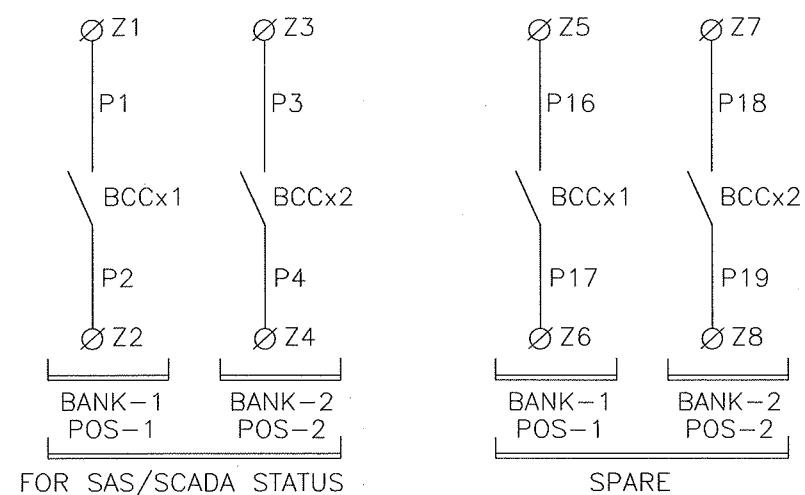
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Simplified

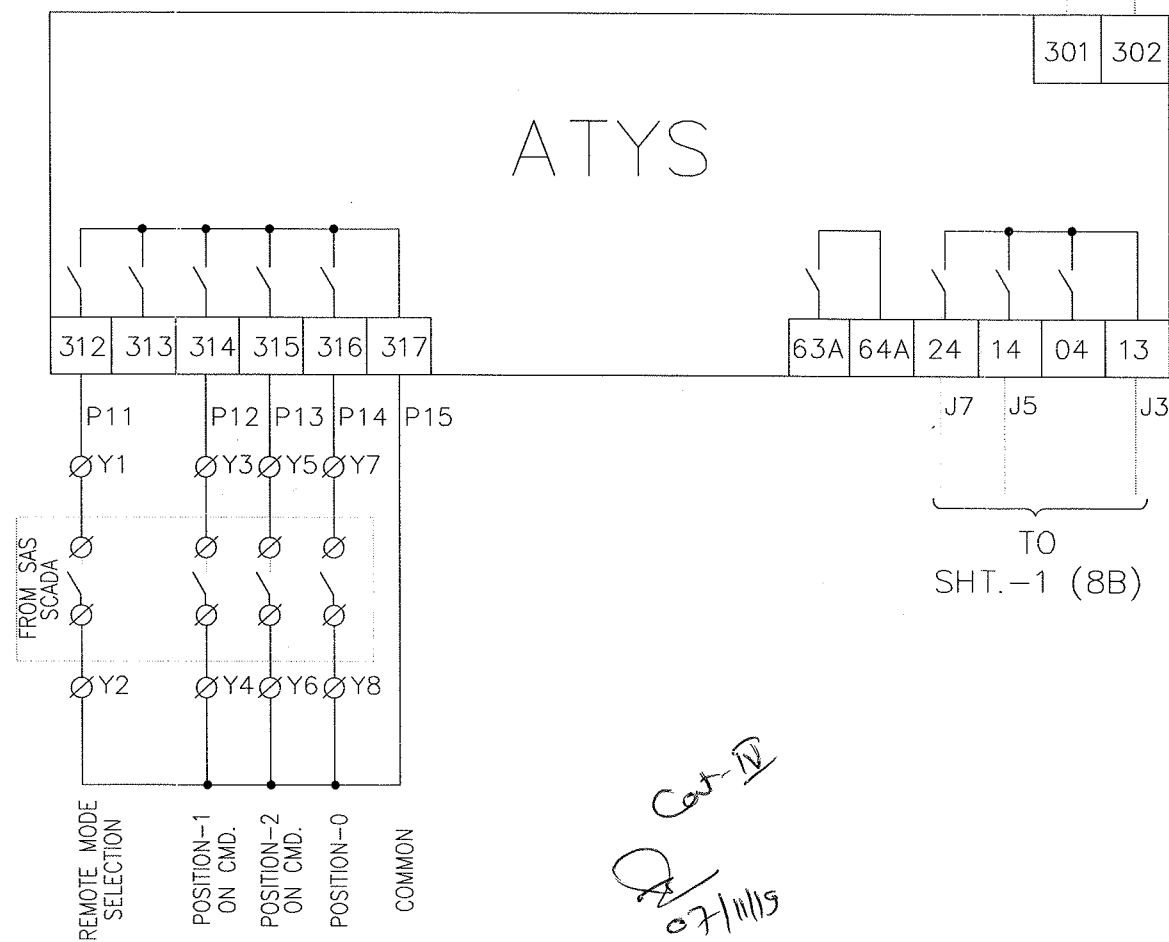
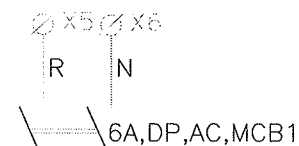


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Simplified



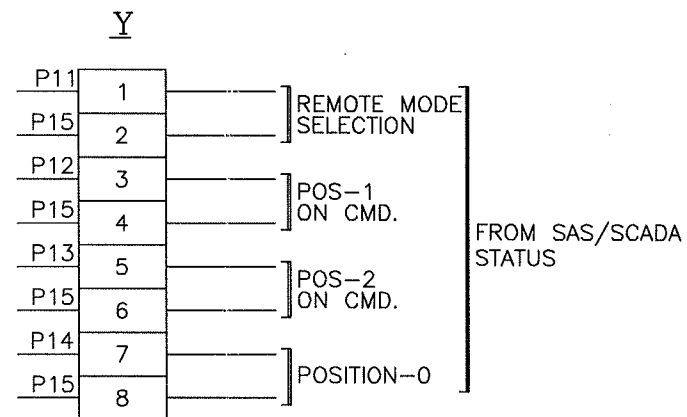
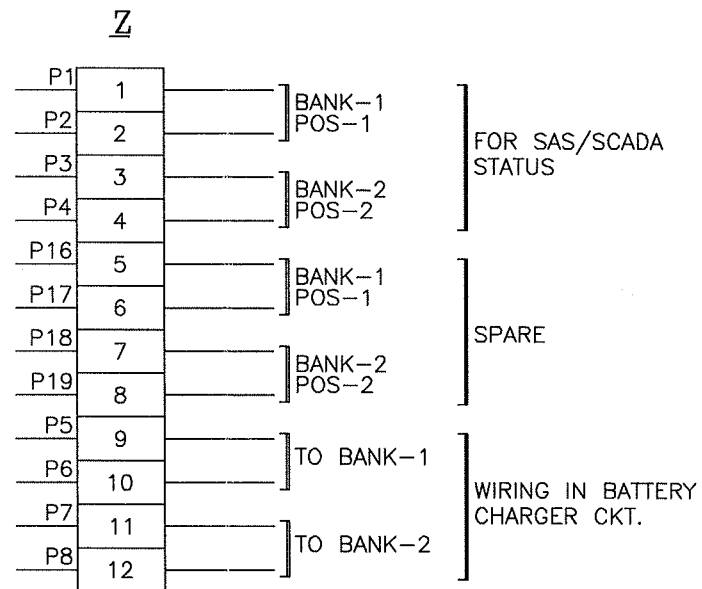
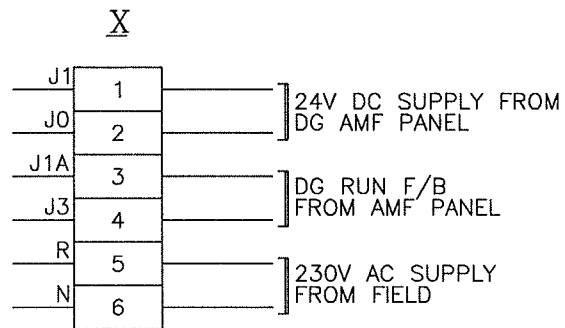
230V AC, 16A, UPS SUPPLY
TO BE PROVIDED BY ABB/BHEL



Raigarh Station		Pugalar Station		APPRD	S A	CONTRACTOR : STERLING & WILSON POWERGEN PVT. LTD. (ASSOCIATES OF SHAPPOORJI PALLOTHI & CO. LTD.)	ADDITIONAL INFORMATION		END USER : POWER GRID CORPORATION OF INDIA LIMITED 8800V, 6000MM INDC Raigarh - Pugalar Terminals CG-05/651-582/AMC-3063/619/CB/17/1581 dated 2017-01-24			
Pole-1 DG set-S1 P1 AL G1		Pole-1 DG set-S2 P1 AL G1		CHKD	R K S		PURCHASER : BHARAT HEAVY ELECTRICALS LTD. TRANSMISSION BUSINESS GROUP		DATE: 28.08.19			
Pole-2 DG set-S1 P2 AL G2		Pole-2 DG set-S2 P2 AL G2		DRAWN	A K P		DRAWN: AA		DATE: 28.08.19			
Pole-3 DG set-S1 P3 AL G3		Pole-3 DG set-S2 P3 AL G3		DESC	NAME		CHECKED: SKS		DATE: 28.08.19			
Pole-4 DG set-S1 P4 AL G4		Pole-4 DG set-S2 P4 AL G4		SIGN			APPROVED: AG		DATE: 28.08.19			
							REV. DATE		CONTROL STATION: RAIGARH & PUGALLUR			
							L1, L2, L3, N, PE		DRAWING NO. SWPPL-BHEL-PG-OG-BCOP			
							TIME		SHEET No. 7 OF 9			
									TITILE: LEGENDS, GENERAL NOTES, GA, STD. WIRING DIAGRAM & BOM FOR DG SET BATTERY SUPPLY CHANGE OVER PANEL			

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Simplified-ED



Cat-12
2
07/11/19

Rasipur Station
Pole-1 DG set-S1 P1 AL G1
Pole-2 DG set-S1 P2 AL G2
Pole-3 DG set-S1 P3 AL G3
Pole-4 DG set-S1 P4 AL G4

Pugalur Station
Pole-1 DG set-S2 P1 AL G1
Pole-2 DG set-S2 P2 AL G2
Pole-3 DG set-S2 P3 AL G3
Pole-4 DG set-S2 P4 AL G4

APPRD	S.A.
CHKD	R.K.S
DRAWN	A.K.P
DESC.	NAME
	SIGN

CONTRACTOR : **STERLING & WILSON
POWERGEN PVT. LTD.**
(ASSOCIATES OF SHARADHA
PALLADI & CO. LTD.)



ADDITIONAL INFORMATION

END USER : POWER GRID CORPORATION OF INDIA LIMITED
28000V, 6000MVA HVDC Rasipur - Pugalur Transmission
CC-05/AS1-002/HDC-3003/7/2010/03-7/2017-001 dated 2017-01-25

PURCHASER : BUNNY HENRY ELECTRICALS LTD.
THIRUVIDAIYAR BUSINESS GROUP

REVISION	DATE	BY	CHKD
01	28.08.19	AS	AS
02	28.08.19	AS	AS

TITLE: LEGENDS, GENERAL NOTES, GA, SLD,
WIRING DIAGRAM & BOM FOR DO SET
BATTERY SUPPLY CHANGE OVER PANEL

DRAWING NO.
SWPPL-SHIEL-PG-DG-BCOP

DO

SHEET No. 8 OF 9

REVISED

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BILL OF MATERIALS

SL. NO.	DESCRIPTION OF MATERIALS	CATALOGUE NO.	MAKE	QTY. FOR ONE C/O	C/O PANEL QTY. FOR RAIGARH	C/O PANEL QTY. FOR PUGALUR
01	ATS, FP, RATING-1000A, 230V AC, CONTROLLER-ATyS	95234100SL	SOCOMEK	1	4 Nos.	4 Nos.
02	AUX. CONTACTOR, MODEL-K, CONTACTS-2NO + 2NC, COIL VOLTAGE-24V DC	CA3KN22BD	SCHNEIDER	2		
03	MCB, VOLTAGE-DC, CHARACTERISTICS-C-CURVE, TYPE-C 60H-DC, DP,6KA, RATING-6A	A9N61526	SCHNEIDER	1		
04	MCB, VOLTAGE-AC, CHARACTERISTICS-C-CURVE, TYPE-x C60, DP,10KA, RATING-6A	A9N2P06C	SCHNEIDER	1		
05	CONTR TERMINAL, SIZE-2.5 SQ.MM.	CTS-2.5UN	CONNECTWEL	25		

Cost - IV
07/11/19

Raigarh Station : Pole-1 DG set-S1 P1 AL G1 Pole-2 DG set-S1 P2 AL G2 Pole-3 DG set-S1 P3 AL G3 Pole-4 DG set-S1 P4 AL G4		Pugalur Station : Pole-1 DG set-S2 P1 AL G1 Pole-2 DG set-S2 P2 AL G2 Pole-3 DG set-S2 P3 AL G3 Pole-4 DG set-S2 P4 AL G4		APPRD CHKD DRAWN DESC	SA R K S A.K.P NAME	SIGN	CONTRACTOR : STERLING & WILSON POWERGEN PVT. LTD. (ASSOCIATES OF SHANPOOCHI PALLONCHI & CO. LTD.)		ADDITIONAL INFORMATION	END USER : POWER GRID CORPORATION OF INDIA LIMITED JABOTU, KODAKKALAI ROAD, RAIGARH - Pugalur Taluk CO-05/051-002/1000-3000/7/010/0A-1/0017-001 dated 2017-01-25		PURCHASER : SHANPOOCHI ELECTRICALS LTD. TRANSMISSION BUSINESS GROUP	DATE BY CHKD BY DATE	SCALE NTS.	DWG CODE RANGARH & PUGALUR	CONTROL STATION: RANGARH & PUGALUR	DRAWING NO. SVIPPL-BHEL-PG-DG-BCOP	REV NO
TITLE: LEGENDS, GENERAL NOTES, & S.D. WIRING DIAGRAM & ROW FOR DG SET BATTERY SUPPLY CHANGE OVER PANEL										SHEET No. 8 OF 9		NOT SHWT						