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FIRST ANGLE PROJECTION

ALL DIMENSIONS ARE IN MM.

DRG. NO. EP-3-DT-047-001

INVENTORY NO.

REV. NO.	DATE	DESCRIPTION	BY	APPD.	APPROVED	NAME	SIGN.	DATE
1					CHECKED	TRINATH		25.02.17
2					DRAWN			
3					DESIGNED	TRINATH		25.02.17
4								

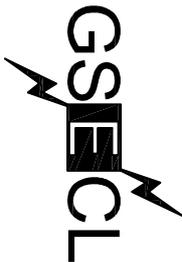
DEVELOPMENT CONSULTANT PVT LTD  
KOLKATA



CUSTOMER CONSULTANT:

PROJECT:  
1x800 MW WANAKBORI THERMAL POWER STATION  
EXTENTION UNIT-8

GUJARATH ELECTRICITY CORPORATION LIMITED  
VADODARA, GUJARAT



CUSTOMER:

<b>DEVELOPMENT CONSULTANTS PRIVATE LIMITED</b>	
Reviewed only for general conformance with contract drawings and specifications. Contractor to be responsible for any errors and for fulfillment of detailed requirements of contract documents.	
ACTION : 2	DATE : 04.04.17
DISTRIBUTED BY : BR	
1 Distributed	4 Approved except as noted. Resubmission required.
2 <input checked="" type="checkbox"/> Approved	5 Disapproved. See accompanying letter.
3 Approved except as noted. Forward final drawing.	6 For information and record only.
<b>SEE COVERING LETTER</b>	
Letter Ref. No.	Date :

**BHARAT HEAVY ELECTRICALS LIMITED**  
ELECTROPOWERCELLS DIVISION BANGALORE

TITLE : DATA SHEET FOR LV SWGR/P MCC/PCC/ MCC/ACDB/DCDB/LMS/LPBS/LT BUSDUCT

JOB NO. CR-14-047

DRG. NO. EP-3-DT-047-001

NO. OF SHEETS 10

SHEET NO. 01

REV. 02

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LT PMCC/MCC/ACDB, 220V DCDB AND BUSDUCT FOR LT SWGR/PMCC/PCC/MCC /DB/BUSDUCT			
	<b>1</b>	<b>LV Switchgear</b>	
	1.1	Make	BHEL-EPD
1	1.2	Type of Construction	PMCC/PCC/MCC/ACDB/DCDB(floor mounted) : Double-front draw out type , compartmentalized. Circuit Breaker panels of PMCC/PCC/MCC: Single front
1			ACDB/DCDB(Wall mounted) : Non Drawout type & Fixed.
			Circuit Breaker panels of PMCC / PCC / MCC shall be of single front construction
	1.3	Mounting	PMCC/PCC/MCC/ACDB/DCDB : floor mounted
1			ACDB & DCDB wall mounted also applicable.
	1.4	Reference standard	IS : 13947 IEC: 60439-1
	1.5	Voltage	415V±10% for AC , 50Hz±5% 220V +10% and -15% for DC
	1.6	Busbar configuration	3-phase . 4-wire for AC Positive-Negative for DC
1	1.7	Short Circuit(SC) rating	AC : 50kA for 1sec DC : 50KA for 1sec
	1.8	Impulse voltage rating (High voltage)	2.5kV(rms) for 1min AC/DC - power circuit
	1.9	Enclosure	
1		Degree of protection	For >1600A : IP-54(IP 42 for main bus bar chamber only) for PCC/PMCC/MCC for <1600A : IP-54 for PCC/PMCC/MCC For other panels except PMCC/MCC, degree of protection is IP-54.
		Minimum thickness of sheet metal	Frames & Load bearing members :2mm Doors & covers : 1.6mm
1	1.10	Working height ( from floor level) Total height of the panel	300mm to 1800mm. Max. 2415mm
	1.11	Draw out type modules in PMCC/PCC/MCC/DCDB/ACDB(ACDB & DCDB FLOOR MOUNTED TYPE)	ACB feeders O/g supply feeders Motor Feeders SFU/MCCB incomer,buscoupler & O/G FEEDERS PT Modules
2		Fixed type modules in PMCC/PCC/MCC/DCDB/ACDB(ACDB & DCDB FLOOR MOUNTED TYPE)	Control Supply transformer Numerical Relays Space heater supply DC control supply Mashalling feeders
	1.12	Draw-out mechanism	Rack-in/out
	1.13	Cable Alley	Width : Min. 250mm (only for non-breaker outgoing modules)

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			provided with thermostat controlled space heater & CFL
	1.14	Shipping section	Lifting hooks or Lifting Rails
			Power Socket in cable alley.
1	1.15	Control terminals	SLIDING ISOLATING CONTACTS/ detachable plug-in type.
	1.16	Gland plate	Multi-core : 3mm for HRCA/CRCA
			Single Core : 4mm for non-magnetic material
	1.17	Gasket	Rubber/EPDM/PU foam
	1.18	Conductor size for door-earthing	2.5sq.mm Copper wire
	2	<b>Bus Bar</b>	
1	2.1	Material	High conductivity Aluminium Alloy
	2.2	Reference standard	IS-5082 / IEC 60439-1
	2.3	Max. temperature rise over 50Deg C ambient	plain bolted joint : 40Deg silver plated joint : 55deg
	2.4	Fault level	50kA rms for 1 sec
1	2.5	minimum clearance	Phase- Phase : 25mm Phase - Earth : 25mm
	2.6	<b>Bus support insulator</b>	
			Non-hygroscopic,Flame retardant,Track resistant type with high creepage and are interchangeable.
1		Type	
		Voltage Class	1.1kV
		Creepage	31mm/kV
	2.8	Color coding	Black sleeved. Intermittent color coding at regular intervals.
	2.9	Earth busbar size & material	50x6mm GI
1	3	<b>Air Circuit Breaker</b>	
	3.1	Reference Standard	IEC 60947-1,-2
	3.2	Service Voltage	415V AC @ 50Hz
	3.3	Short Circuit capacity	Ics = Icu =50kA and Icw =50kA for 1 sec
	3.4	Rated making current	>=2.1*Icu or min 105kA
	3.5	No. of Poles	3pole
	3.6	Ambient temperature	50deg Celsius.
	3.7	Anti-pumping feature	Provided
	3.8	Aux contacts	7NO+7NC
	3.9	opening time of breaker	<=80ms
	3.1	Total closing time	<=100ms
	3.11	Maximum temperature rise over ambient 50Deg C	55deg
2	3.12	Rated operating duty	Continuous
	3.13	Operation cycle	0-3'-CO-3'-O
	3.14	Impulse voltage	2.5kV rms 50Hz for 1 min withstand
	3.15	Closing mechanism	motor wound spring charging
	3.16	Tripping mechanism	Shunt trip
	3.18	<b>Spring charging motor</b>	
		Operating Voltage	220V DC
		permissible voltage variation	(85-110)%
	3.19	<b>Closing coil</b>	
		Operating Voltage	220V DC
		permissible voltage variation	(85-110)%

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	3.20	<b>Tripping coil</b>	
		Operating Voltage	220V DC
		permissible voltage variation	(70-110)%
	3.21	<b>Rated current</b>	As per approved rating
1	4	<b>Fuse</b>	
	4.1	Reference standard	IS: 13703 / IEC: 60269
	4.2	Type	HRC link type
	4.3	breaking capacity	AC : 80kA rms DC : 25kA
	4.4	Voltage	AC : 415V, 240V, 110V DC : 220V
	4.5	Rated current	As per approved rating
	5	<b>Moulded case circuit breaker (MCCB)</b>	
	5.1	Reference standard	As per IEC 60947-2
	5.2	Service voltage	415V AC @ 50Hz
	5.3	Short Circuit capacity	Ics = Icu =50kA for 1 sec
	5.4	No. of poles	3-pole
	5.5	Impulse withstand voltage	min 2.5kV rms
	5.6	Rated insulation voltage	690V
	5.7	IP protection	IP40
	5.8	Pollution Degree	III
	5.9	mechanism	Single throw, air-break
	5.10	Rated current	As per approved rating
1		Interlock	Door interlock will be provided in ON position. Pad locking in ON & OFF position.
	6	<b>MPCB</b>	
	6.1	Reference standard	As per IEC 60947-1,-2, 4-1
	6.2	Service voltage	415V AC @ 50Hz
	6.3	Short Circuit capacity	Icu =50kA for 1 sec
	6.4	No. of poles	3-pole
	6.5	Impulse withstand voltage	min 4kV rms
	6.6	Rated insulation voltage	690V
	6.7	Pollution Degree	III
	6.8	mechanism	Single throw, air-break
	6.9	Rated current	As per approved rating
	6.10	Class of protection	10
	6.11	Utilization category	AC3
		<b>POWER CONTACTOR</b>	
	7	Reference standard	As per IEC 60947- 4-1
	7.1	Service voltage	415V AC @ 50Hz
	7.3	No. of poles	3-pole
	7.4	Impulse withstand voltage	min 4kV rms
	7.5	Rated insulation voltage	690V
	7.6	Pollution Degree	III
	7.7	Class of protection	10/ 10A
	7.8	Utilization category	AC3 for unidirectional drives and AC4 for bi- directional /inching duty drives DC - Class I - category DC2



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	7.9	Coil voltage	AC : 240V DC : 220V
		No. of Auxilliary contacts	As per approved Scheme requirement/Min. as per spec. requirement
	7.10	Rated duty	Uninterrupted
	7.11	Rated current	As per approved rating & as per Type-II coordination for motors
	7.12	Max motor rating upto which contactor is used	110kW
		Contacts	with non-bouncing silver/ silver alloy coated
		<b>AUXILLIARY CONTACTOR</b>	
	<b>7</b>	Reference standard	As per IEC 60947- 4-1
	7.1	Coil Voltage	As per approved drawing and scheme requirement
	7.3	No. of contacts	As per approved Scheme requirement & Min. as per specification
	7.4	Impulse withstand voltage	min 4kV rms
	7.5	Rated insulation voltage	690V
	7.8	Utilization category	AC11
	7.9	Coil voltage	AC : 240V DC : 220V
	7.10	Rated duty	Uninterrupted
	7.11	Rated current	Min. 6Amps
	<b>8</b>	<b>OLR (Over load Relay)</b>	
	8.1	Reference standard	As per IEC 60947- 4-1
	8.2	Service voltage	415V AC @ 50Hz
	8.3	No. of poles	3-pole
	8.4	Rated insulation voltage	690V
	8.5	Impulse withstand voltage	min 4kV rms
	8.6	Class of protection	10/ 10A
	8.7	Utilization category	AC3
	8.8	protections	Overload & single phase protection
	8.9	Rated current	As per Type-II coordination for motors
	8.1 0	Current Transformer	Relays may be direct acting or C.T. operated, depending on current rating. C.T.s shall be included in the scope of supply.
		Reset	Relays will be of manual reset with single change over contact. Resetting of relayt is possible with module door is closed position. Color of resetting push button will be black.
	<b>9</b>	<b>Current Transformers</b>	
	9.1	Reference standard	IS: 2705
	9.2	Type	Resin Cast
	9.3	Basic insulation level	2.5kV rms
	9.4	Class of insulation	E
	9.5	Short circuit withstand	50kA rmsfor 1 sec



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	13.1	Type	Digital
	13.2	Accuracy class	0.5
	13.3	voltage coil rating	AC : 110V DC: 220V
	13.4	case size	96x96sq. mm
	14	<b>Multifunction meter</b>	
	14.1	Reference standard	IEC 62052-11, IEC 62053-22,23
	14.2	Type	Digital
	14.3	Impulse	2kV rms for 1 minute
	14.4	Insulation withstand voltage	6kV
	14.5	Accuracy Class	0.5
	14.7	Aux Power supply	240V AC or 220V DC
	14.8	Communication	RS 485
1	14.9	case size	96x96sq. mm
	15	<b>Transducer</b>	
	15.1	Reference standard	IEC 60688
	15.2	Output	4-20mA dual
	15.3	Accuracy	0.5
	15.4	Aux supply	110V-240V AC/DC
	17	<b>Switches</b>	
	17.1	Reference standard	IEC 60947-5-1
	17.2	Type	TNC : Spring return Others : Stay put
	17.3	Type of handle	TNC : Pistol grip Others : wing type
	17.4	Switching mechanism	air-break
	17.5	Pole - Way configuration	As per the approved drawing
	17.6	Voltage grade	660V
	17.7	Current rating	As per the approved drawing
1		ON/OFF Switch pad locking	For ON/OFF switches of power feeder Handle will have provision for padlocking in ON and OFF position
		Mechanical interlock provision	All position selector switches shall be of lockable type.
	18	<b>Indicating lamps</b>	
	18.1	Type	Clustered LED
	18.2	Voltage	AC : 63.5V/110V/240V/415V DC : 220V
	18.3	Power consumption	2Watt.
	19	<b>Push Button</b>	
	19.1	Type	
	19.2	No. of contacts	2NO+2NC or as per manufacturer standard.
	19.3	Contact Rating	10A at 110V/240V AC 2A at 220V DC
1		<b>NUMERICAL RELAY:</b>	
		Make	Siemens
		Model	Siprotech 7SJ6622 for IC/BC & OG Siprotech 7SJ6611 for Motor O/G

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	<b>20</b>	<b>Electromechanical Relay</b>	
	20.1	Reference standard	IEC 60255
	20.2	Rated Voltage	220V DC
	20.3	No. of contacts	As per approved scheme requirement
	20.4	Rated current of contacts	5A
	20.5	Insulation voltage	2.5kV rms for 1min
	20.6	Inpulse voltage	4kV
	<b>21</b>	<b>Local Motor starter</b>	
1	21.1	Reference standard	IS 13947/ IEC 60947-4-1
	21.2	Rated Voltage	415V AC @50Hz
	21.3	Rate current	As per approved drawing
	21.4	Degree of protection	IP54
	21.5	Thermal overload relay	As per the motor rating
	21.6	Enclosure material	CRCA sheet steel
	21.7	Sheet thickness	2mm or As per manufacturer's standard.
	21.8	Push button	START :Spring return STOP : Mushroom head, press to lock, lockable
	21.9	Current rating of contacts	As per motor rating
		contact material	non-bouncing silver/ silver alloy
2	21.1	Auxilliary Contact Details	1C/O for OLR
	<b>22</b>	<b>Local push button station</b>	
	22.1	Reference Standard	
	22.2	Rated Voltage	240V AC / 415V AC @ 50Hz
	22.3	Enclosure material	CRCA shet steel for Non-flame proof Die cast aluminium for flame proof
	22.4	Thickness of Enclosure	1.6mm for sheet steel 3mm for die cast aluminium
	22.5	Requirement of Canopy	Yes for outdoor applications
	22.6	Degree of protection	IP-55 for indoor. IP-65 for outdoor.
	22.7	Push button	START :Spring return STOP : Mushroom head, press to lock, lockable
	22.8	Current rating of contacts	min 10A at 240V AC
	<b>23</b>	<b>MCB</b>	
	23.1	Reference Standard	IEC 60947-2
	23.2	Rated Voltage	110V AC or 240V AC @50Hz 220V DC
	23.3	Fault level	min 9kA
	23.4	Rated current	As per the approved drawing
	<b>24</b>	<b>Timer</b>	
	24.1	Reference Standard	
	24.2	Coil voltage	240V AC, 220V DC
	24.3	Type	Electronic
	24.4	Fucntion	ON delay OFF delay instantaneous

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	24.5	No. of contacts	2C/O
	<b>25</b>	<b>Secondary Wiring</b>	
	25.1	Type of insulation	PVC
	25.2	Voltage grade	1100V
	25.3	Conductor material	copper
1	25.4	conductor size	2.5 sq.mm for control circuit 2.5 sq.mm for current circuit 2.5sq. Mm for PT circuit.
	25.5	Identification	Identified with ferrules at both ends
	<b>26</b>	<b>Terminal Block</b>	
1	26.1	Type	Box-clamp with marking strips similar to ELMEX 10 mm <sup>2</sup> or equal
	26.2	Voltage Grade	1100V
		CTTB	Terminals for C.T. secondary leads shall have provision for shorting. CT & VT secondary neutrals will be earthed through removable links so that earth of one circuit may be removed without disturbing others.
	<b>27</b>	<b>Cable Termination</b>	
	27.1	Cable termination provided	YES
	27.2	Power cable	XLPE insulated, FRLSH PVC Sheath
	27.3	Cable lugs	Crimp type material : tinned copper
1	27.4	Cable gland	Double compression type with tapered washer material : Brass
	27.5	Gland plate	CRCA : 3mm non-magnetic material : 4mm
	<b>28</b>	<b>Busduct connection</b>	
	28.1	Entry of busduct	As per approved drawing and layout requirement, however if not mentioned same will be from top.
	<b>29</b>	<b>Ground bus</b>	
1	29.1	Material	Galvanized Iron, The ground bus will be provided with two-bolt drilling with G.I. bolts & nuts at each end to receive 50 x 6 mm G.I. flats.
	29.2	Size	Min. 50x6mm
	<b>30</b>	<b>Name plate</b>	
2	30.1	Material	Anodized aluminium
	30.2	Thickness	1.6mm
	30.3	Size (length x height)	75x20mm for instrument/ meters 150x40mm for panels
	<b>31</b>	<b>Space heater</b>	
1	31.1	Operating mechanism	Thermostat controlled
	31.2	rating	60W

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	31.3	Supply voltage	240V AC
	<b>32</b>	<b>Plug &amp; Socket</b>	
	32.1	Type	5 pin, Industrial
	32.2	Rating	5A
	<b>33</b>	<b>Painting</b>	
2	33.2	finish	RAL 7032
		No. of coats	2 Coats of Powder Coating
	<b>34</b>	<b>Busduct</b>	
	34.1	Reference Standard	IS 8623-2/ IEC 439-2
2	34.2	Type	Non - Segregated, self cooled
	34.3	Installation location	Indoor/Outdoor(Will be provided with top having sloping shape)
	34.4	Rated Voltage	415V±10% for AC, 3Ph
	34.5	Phase	3-Phase, 4-wire
	34.6	Frequency	50Hz±5%
	34.7	Combined Voltage and Frequency Variation	10 %( absolute sum)
	34.8	Space heater service voltage	240 +/-10% , 50Hz +/-5%, 1 Ph
	34.9	One-minute power frequency withstand voltage (for space heater)	2.5kV rms (min)
	34.10	Rated Continuous Current	As per approved drawing; (4000A, 3200A, 2500A, 1600A, 1000A)
	34.11	Maximum temperature rise over 50 Deg.C ambient	
		a) Bus conductor	
		i) With Silver Plated bolted joints	55 deg C
		ii) With Plain or Tin joints	40 deg C
		b) Bus enclosure and structure	Accessible portion : 20deg C Non -accessible portion : 30 deg C
		c) Maximum conductor temperature after short circuit	250 Deg Cent.
	34.12	Insulation level	2.5kV for 1min
	34.13	Rated short time Current	50kA for 1 sec
	34.14	Rated making current (peak)	105kA for 1sec
	34.15	Material of the conductor	Aluminium
	34.16	Material of the enclosure	Aluminium having alloy grade 31000 (56% IACS)
	34.17	Voltage class of Bus support insulator	1.1kv
	34.18	Material characteristics of bus support insulator	Flame retardant, Non hygroscopic, tracking resisatnt & high strength cast resin FRP Creepage distance : 31mm/kV
	34.19	Earth clearance	min 25mm
	34.20	Minimum clearance for busbars	Phase - Phase : 25mm Phase - Earth : 25mm
	34.21	Adapter Terminal Box (optional)	
2		Material of Enclosure	Aluminium/ CRCA
		Thickness of material	3mm

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	34.22	Painting	Conductors and inside surface of enclosures will be treated with matt black paint for efficient heat dissipation. The interior surface finish shall be as per manufacturer's standard. The shade of exterior surface finish shall be light grey shade RAL 7032 for indoor part and battle ship gray shade 632 of IS-5 for outdoor.
	34.3	Shipping length of the bus duct	Max. length of Shipping will be 3meters
	34.4	type of flange joints	Flange joints will be provided with neoprene gaskets.
	34.5	Supporting structure	Galvanized Iron; Support shall be designed to provide tolerance of $\pm 12$ mm. (1/2") in the horizontal and vertical directions.
	34.6	Grounding conductor	50x6 GI Flat will be run through out the length.
	34.7	Inspection door/window	Will be provided.