

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

1	2	3	4	5	6
---	---	---	---	---	---

INDEX

SHT. No.	DESCRIPTION
01	INDEX AND LEGEND
02	CT/CVT DETAILS OF 400KV GIS
03	SCHEDULE OF EQUIPMENT AND SYSTEM DETAILS OF 400 KV GIS SLD
04	SINGLE LINE DIAGRAM OF 400 KV GIS

REFERENCE DRAWING

-	GSECL SINGLE LINE DIAGRAM OF 400KV SWITCHYARD UPTO GENERATOR-7 BAY (EXISTING)
-	GSECL CT/CVT DETAILS OF 400KV SWITCHYARD UPTO GENERATOR-7 BAY (EXISTING)
K9213R-DWG-E-0100	KEY SINGLE LINE DIAGRAM
K9213R-DWG-E-0102	SLD - 400kv GIS & 400KV SWITCHYARD (EXTN.).
DRAWING No.	TITLE OF REFERENCE DRAWING

	TOTAL SHEETS	04
W.O. No.	DEPT.	CODE
	TBEM	422
	NEXT SHEET	02
	SHEET No.	01

REVIEWED	APPROVED	REVIEWED	CHECKED	DRAWN	DESCRIPTION	RELEASE STATUS	REV.	DATE	
				AS	MM/AA	REVISED AS PER COMMENTS DT. 11.09.15	RELEASED FOR APPROVAL	02	30.09.15
				VK	MM/AA	REVISED AS PER COMMENTS DT. 04.05.15	RELEASED FOR APPROVAL	01	08.08.15

	GUJARAT STATE ELECTRICITY CORPORATION LIMITED VADODARA, GUJARAT 1x800 MW Wanakkbori Thermal Power Station Extn. Unit-8		BHARAT HEAVY ELECTRICALS LTD. TRANSMISSION BUSINESS GROUP NOIDA	NAME	SIGN	DATE
					DRN. SK	SD/-
	DEVELOPMENT CONSULTANTS PVT. LTD. CONSULTING ENGINEERS KOLKATA MUMBAI CHENNAI NEW DELHI	TITLE : SINGLE LINE DIAGRAM OF 400KV GIS				
		UNIT : XXXXX	SCALE : NIL	BHEL DWG. NO. : TB-3-375-510-001	REV. 02	

1	2	3	4	5	6
---	---	---	---	---	---

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

LINE FEEDER -1,2, TIE FEEDER -1,2

CT-A							
Core No.	Current Ratio	Accuracy Class	Min. Burden	Min kPV	Max RCT at 75 Deg	Max Im at kPV /2	Purpose
1	2000-1000-500/ 1	0.2S, ISF<5	20 VA	-	-	-	Metering
2	2000-1000-500/ 1	PS	-	2000-1000-500 V	10-5-2.5 Ohms	30-60-120 mA	Busbar Differential / Check
3	2000-1000-500/ 1	PS	-	2000-1000-500 V	10-5-2.5 Ohms	30-60-120 mA	SPARE

CT-B							
Core No.	Current Ratio	Accuracy Class	Min. Burden	Min kPV	Max RCT at 75 Deg	Max Im at kPV /2	Purpose
1	2000-1000-500/ 1	0.2S, ISF<5	20 VA	-	-	-	Tariff Metering
2	2000-1000-500/ 1	PS	-	4000-2000-1000 V	10-5-2.5 Ohms	30-60-120 mA	Main-I Distance Protection
3	2000-1000-500/ 1	PS	-	4000-2000-1000 V	10-5-2.5 Ohms	30-60-120 mA	Main-II Distance Protection

Bus-I VT, Bus-II VT, GT BAY VT

PARTICULARS	SEC 1	SEC 2	SEC 3
RATIO	$\frac{400kV}{\sqrt{3}} / \frac{110V}{\sqrt{3}}$	$\frac{400kV}{\sqrt{3}} / \frac{110V}{\sqrt{3}}$	$\frac{400kV}{\sqrt{3}} / \frac{110V}{\sqrt{3}}$
BURDEN	200 VA	200 VA	100 VA
ACCURACY CLASS	3P	3P	0.2

GT #8, ST #8 BAY

CT-A							
Core No.	Current Ratio	Accuracy Class	Min. Burden	Min kPV	Max RCT at 75 Deg	Max Im at kPV /2	Purpose
1	2000-1000-500/ 1	0.2S, ISF<5	20 VA	-	-	-	Metering
2	2000-1000-500/ 1	PS	-	2000-1000-500 V	10-5-2.5 Ohms	30-60-120 mA	Differential Protn.
3	2000-1000-500/ 1	PS	-	2000-1000-500 V	10-5-2.5 Ohms	30-60-120 mA	Back up O/C & E/F

CT-B							
Core No.	Current Ratio	Accuracy Class	Min. Burden	Min kPV	Max RCT at 75 Deg	Max Im at kPV /2	Purpose
1	2000-1000-500/ 1	0.2S, ISF<5	20 VA	-	-	-	SPARE
2	2000-1000-500/ 1	PS	-	2000-1000-500 V	10-5-2.5 Ohms	30-60-120 mA	Busbar Differential / Check
3	2000-1000-500/ 1	PS	-	2000-1000-500 V	10-5-2.5 Ohms	30-60-120 mA	SPARE

LINE FEEDER-1&2, TIE FEEDER 1&2

PARTICULARS	SEC 1	SEC 2	SEC 3
RATIO	$\frac{400kV}{\sqrt{3}} / \frac{110V}{\sqrt{3}}$	$\frac{400kV}{\sqrt{3}} / \frac{110V}{\sqrt{3}}$	$\frac{400kV}{\sqrt{3}} / \frac{110V}{\sqrt{3}}$
BURDEN	200 VA	200 VA	100 VA
ACCURACY CLASS	3P	3P	0.2

HF Capacitance : 4400pF +10%, -5%

BUS COUPLER BAY

CT-A							
Core No.	Current Ratio	Accuracy Class	Min. Burden	Min kPV	Max RCT at 75 Deg	Max Im at kPV /2	Purpose
1	2000-1000-500/ 1	0.2S, ISF<5	20 VA	-	-	-	Metering
2	2000-1000-500/ 1	PS	-	2000-1000-500 V	10-5-2.5 Ohms	30-60-120 mA	Busbar Differential / SPARE
3	2000-1000-500/ 1	PS	-	2000-1000-500 V	10-5-2.5 Ohms	30-60-120 mA	SPARE

CT-B							
Core No.	Current Ratio	Accuracy Class	Min. Burden	Min kPV	Max RCT at 75 Deg	Max Im at kPV /2	Purpose
1	2000-1000-500/ 1	0.2S, ISF<5	20 VA	-	-	-	SPARE
2	2000-1000-500/ 1	PS	-	2000-1000-500 V	10-5-2.5 Ohms	30-60-120 mA	Busbar Differential / Check
3	2000-1000-500/ 1	PS	-	2000-1000-500 V	10-5-2.5 Ohms	30-60-120 mA	SPARE/ Backup Protn.

CT/CVT DETAILS OF 400KV GIS

W.O. No.	DEPT.	CODE	TOTAL SHEETS	04
	TBEM	422	NEXT SHEET	03
			SHEET No.	02

REVIEWED																				
				AS	MM/AA	REVISED AS PER COMMENTS DT. 11.09.15	RELEASED FOR APPROVAL	02	30.09.15											
				VK	MM/AA	REVISED AS PER COMMENTS DT. 04.05.15	RELEASED FOR APPROVAL	01	27.05.15											
				APPROVED	REVIEWED	CHECKED	DRAWN	DESCRIPTION	RELEASE STATUS	REV.	DATE									

	GUJARAT STATE ELECTRICITY CORPORATION LIMITED VADODARA, GUJARAT 1x800 MW Wanakkbori Thermal Power Station Extn. Unit-8		BHARAT HEAVY ELECTRICALS LTD. TRANSMISSION BUSINESS GROUP NOIDA	NAME DRN. SK SD/- 21/10/14 CHD. SK/RD/VK SD/- 21/10/14 APPD. AS SD/- 21/10/14
	BHHEL SUB VENDORS		TITLE : SINGLE LINE DIAGRAM OF 400KV GIS	
		DEVELOPMENT CONSULTANTS PVT. LTD. CONSULTING ENGINEERS KOLKATA MUMBAI CHENNAI NEW DELHI		UNIT : XXXXX SCALE : NIL BHEL DWG. NO. : TB-3-375-510-001 REV. 02

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

SCOPE OF SUPPLY FOR 400KV GAS INSULATED SWITCHGEAR

ONE (1) SET GAS INSULATED SWITCHGEAR ASSEMBLY
CONSISTING OF FOLLOWING BAYS AND TERMINATION

DETAILS	400KV GIS
BUSBAR RATING AS PER IEC	420 KV, 40 KA / 3 SEC, 2000 A
BUS CONFIGURATION	DOUBLE BUSBAR
BAYS TO BE PROVIDED:	SEVEN BAYS (1GT+ 1ST + 2 LINE FDR. + 2 TIE FDR. + BUS COUPLER) + 2 NOS. BUS PT.
OVER HEAD LINE FEEDERS	TWO NOS, 2000A
125/65/65MVA 400 KV/11.5KV STATION TRANSFORMER FEEDERS	ONE NO, 2000A
966MVA 420KV/27KV GENERATOR TRANSFORMER FEEDERS	ONE NO, 2000A
BUS COUPLER	ONE NO, 2000A
GIS TO EXISTING AIS INTERCONNECTION	TWO NOS, 2000A
FUTURE SPACE PROVISION	ONE BAY EACH ON BOTH SIDES

GIS BOQ:

S.N.	EQUIPMENT	SYMBOL	ABBR.	QTY. (NOS.)
1.	420 KV, 2000 A, 3X1-PH, GROUP OPERATED MOTORISED DISCONNECTOR		89	23
2.	420 KV MOTORISED 3X1-PH, GROUP OPERATED MAINTENANCE EARTHING SWITCH		89E	19
3.	420 KV 3X1-PH, GROUP OPERATED FAST ACTING EARTHING SWITCH		89E	06
4.	420 KV, 1-PH, 3-CORE, 2000A, CURRENT TRANSFORMER		CT	42
5.	420 KV, 2000A, 3X1-PH, METAL ENCLOSED CIRCUIT BREAKER WITH ELECTRICALLY SPRING CHARGED OPERATING MECH., WITHOUT PIR		52	05
6.	420 KV, 2000A, 3X1-PH, METAL ENCLOSED CIRCUIT BREAKER WITH ELECTRICALLY SPRING CHARGED OPERATING MECH., WITH PIR		52*	02
7.	420 KV, 1-PH VOLTAGE TRANSFORMER		PT	09
8.	420 KV, 1-PH SF6/AIR BUSHING			18
9.	420 KV, SF6 BUS DUCT		JL	

POTHEADYARD BOQ

S.NO.	DESCRIPTION	SYMBOL	ABR.	MAIN QTY. (IN NOS.)
1	360KV, 10KA CLASS-3 SURGE ARRESTER (1-PH)		SA	18
2	420KV CAPACITIVE VOLTAGE TRANSFORMER (1-PH) 4400pF		CVT	12
3	420KV CAPACITIVE VOLTAGE TRANSFORMER (1-PH) 4400pF FOR REMOTE END FOR LINE FEEDER 1&2, SUPPLY ONLY		CVT	06
4	420KV WAVE TRAP (1-PH), 2000A, 1.0 mH		WT	12
5	420KV WAVE TRAP (1-PH), 2000A, 1.0 mH FOR REMOTE END FOR LINE FEEDER 1&2, SUPPLY ONLY		WT	06

TOTAL SHEETS	04		
W.O. No.	DEPT.	CODE	NEXT SHEET
	TREM	422	04
			SHEET No.
			03

REVIEWED	1	2	3	4	5	6
APPROVED	REVIEWED	CHECKED	DRAWN	DESCRIPTION	RELEASE STATUS	REV.
	AS	MM/AA	REVISED AS PER COMMENTS DT. 11.09.15	RELEASED FOR APPROVAL	02	30.09.15
	VK	MM/AA	REVISED AS PER COMMENTS DT. 04.05.15	RELEASED FOR APPROVAL	01	08.08.15

GUJARAT STATE ELECTRICITY CORPORATION LIMITED
VADODARA, GUJARAT
1x800 MW Warendorf Thermal Power Station Extn. Unit-8

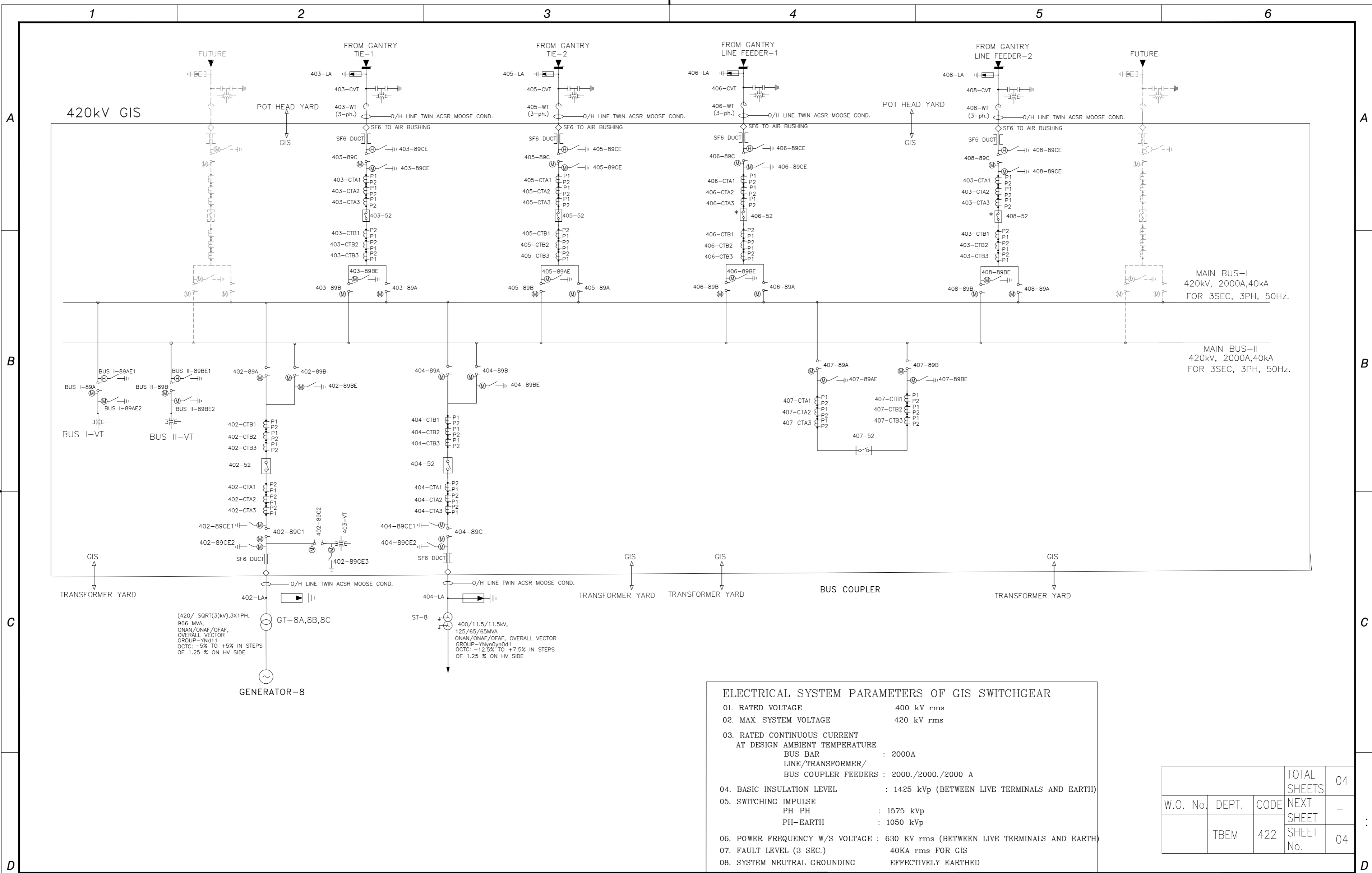
BHARAT HEAVY ELECTRICALS LTD.
TRANSMISSION BUSINESS GROUP
MORDA

DEVELOPMENT CONSULTANTS PVT. LTD.
CONSULTING ENGINEERS
KOLKATA, KANPUR, GHERNA, NEW DELHI

BHEL SUB VENDORS
BHARAT HEAVY ELECTRICALS LTD.
TRANSMISSION BUSINESS GROUP
MORDA

SINGLE LINE DIAGRAM OF 400KV GIS
UNIT : XXXXX
SCALE : BHEL DWG. NO. TB-3-3/5-510-001
REV. 02

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



ELECTRICAL SYSTEM PARAMETERS OF GIS SWITCHGEAR	
01. RATED VOLTAGE	400 kV rms
02. MAX. SYSTEM VOLTAGE	420 kV rms
03. RATED CONTINUOUS CURRENT AT DESIGN AMBIENT TEMPERATURE	
BUS BAR	: 2000A
LINE/TRANSFORMER/	
BUS COUPLER FEEDERS	: 2000./2000./2000 A
04. BASIC INSULATION LEVEL	: 1425 kVp (BETWEEN LIVE TERMINALS AND EARTH)
05. SWITCHING IMPULSE	
PH-PH	: 1575 kVp
PH-EARTH	: 1050 kVp
06. POWER FREQUENCY W/S VOLTAGE	: 630 kV rms (BETWEEN LIVE TERMINALS AND EARTH)
07. FAULT LEVEL (3 SEC.)	40KA rms FOR GIS
08. SYSTEM NEUTRAL GROUNDING	EFFECTIVELY EARTHED

W.O. No.	DEPT.	CODE	TOTAL SHEETS	04
			NEXT SHEET	-
	TBEM	422	SHEET No.	04

REVIEWED	AS	MM/AA	REVISD AS PER COMMENTS DT.	11.09.15	RELEASED FOR APPROVAL	02	30.09.15	GUJARAT STATE ELECTRICITY CORPORATION LIMITED VADODARA, GUJARAT 1x800 MW Wanakkbori Thermal Power Station Extn. Unit-8	BHARAT HEAVY ELECTRICALS LTD. TRANSMISSION BUSINESS GROUP NOIDA	DRN.	SK	NAME	SIGN	DATE
	VK	MM/AA	REVISD AS PER COMMENTS DT.	04.05.15	RELEASED FOR APPROVAL	01	08.08.15			CHD.	SK/RD/VK	SD/-	21/10/14	
	APPROVED	REVIEWED	CHECKED	DRAWN	DESCRIPTION	RELEASE STATUS	REV.	DATE	APPD.	AS	SD/-	21/10/14		
									TITLE : SINGLE LINE DIAGRAM OF 400KV GIS UNIT : XXXXX SCALE : NIL BHEL DWG. NO. : TB-3-375-510-001 REV. 02					