

Project	400/220/132/33kV GIS substation at Bakhtiyarpur, Bihar			
Customer	Bihar State Power Transmission Company Limited			
Contractor	GEPDEC Infratech limited & SIEMENS limited consortium			
Document	Guaranteed Technical Particulars of 400kV GIS			
Doc. no.	(4)-G71770-AC347-E228-001-P-091111_E_C1_8162_BAK_0			
Rev no.	Rev 1			
Sl. No.	DESCRIPTION	Transformer/Reactor Bays	Line bays	Tie bays
1	General			
2	Name of manufacturer (OEM)	Siemens Ltd	Siemens Ltd	Siemens Ltd
3	Country of Origin	India	India	India
4	Delivery from (location)	Aurangabad	Aurangabad	Aurangabad
5	Type & Designation	SDQ1	SDQ1	SDQ1
6	Type tested at Name of Laboratory Address of laboratory	Refer type test report	Refer type test report	Refer type test report
7	Installation (indoor or outdoor)	Bays - Indoor, Busduct - Indoor / Outdoor	Bays - Indoor, Busduct - Indoor / Outdoor	Bays - Indoor, Busduct - Indoor
8	Standards applicable	IEC 62271-203	IEC 62271-203	IEC 62271-203
9	No. of Phases	Single phase encapsulated	Single phase encapsulated	Single phase encapsulated
10	Single or Three Phase design	Single phase encapsulated	Single phase encapsulated	Single phase encapsulated
11	Configuration			
i	Number of Feeder bays	4	4	4
ii	Number of transformer bays		4	4
iii	Number of Bus coupler bay	4 (tie bays)	4 (tie bays)	4 (tie bays)
iv	GIS to transformer connection	SF6-Air bushing	SF6-Air bushing	SF6-Air bushing
v	GIS to Feeder connection	SF6-Air bushing	SF6-Air bushing	SF6-Air bushing
vi	Number of VT	Refer Gas SLD (1)-G71770-AC347-E231-001-P-091111_E_C1_8162_BAK_0-Gas SLD	Refer Gas SLD (1)-G71770-AC347-E231-001-P-091111_E_C1_8162_BAK_0-Gas SLD	Refer Gas SLD (1)-G71770-AC347-E231-001-P-091111_E_C1_8162_BAK_0-Gas SLD
vii	Number of SA	Not applicable in GIS	Not applicable in GIS	Not applicable in GIS
	Future extension possibility	Yes	Yes	Yes
12	Service conditions			
i	Ambient Air Temp. in Deg. C	50	50	50
ii	Max Temp. in Deg. C	50	50	50
iii	Min Temp. in Deg. C	-5	-5	-5
iv	Daily Average Temp. in Deg. C	50	50	50
v	Solar Radiation W/sq mtr	1000	1000	1000
vi	Altitude above MSL, in mtr	Less than 1000	Less than 1000	Less than 1000
vii	Pollution class	C3 as per ISO 12944-2	C3 as per ISO 12944-2	C3 as per ISO 12944-2
viii	Creepage distance, in mm/kV	31 mm/kV	31 mm/kV	31 mm/kV
ix	Relative humidity	95%	95%	95%
x	Condensation	≤ 20 mm (max thickness of ice coating)	≤ 20 mm (max thickness of ice coating)	≤ 20 mm (max thickness of ice coating)
xi	Vibration level	Will be furnished in Foundation load report	Will be furnished in Foundation load report	Will be furnished in Foundation load report
xii	Noise level	max 126 dB	max 126 dB	max 126 dB
xiii	Induced Electromagnetic Disturbance, in kV	NA	NA	NA
xiv	Seismic conditions	Zone V	Zone V	Zone V
a	Vertical	Will be furnished separately in Seismic study report	Will be furnished separately in Seismic study report	Will be furnished separately in Seismic study report
b	Horizontal	Will be furnished separately in Seismic study report	Will be furnished separately in Seismic study report	Will be furnished separately in Seismic study report
13	Enclosure			
i	Code of pressure vessel	EN 50052	EN 50052	EN 50052
ii	Type of manufacturing	Aluminium casting	Aluminium casting	Aluminium casting
iii	Design temperature in Deg.C	50 deg.C	50 deg.C	50 deg.C
iv	Material	Aluminium alloy	Aluminium alloy	Aluminium alloy
v	Material grade & applicable standard	IEC 62271-203	IEC 62271-203	IEC 62271-203
vi	Outside diameter in mm	min. 416 mm	min. 416 mm	min. 416 mm
vii	Minimum Wall Thickness, in mm	min. 13 mm	min. 13 mm	min. 13 mm
viii	Painting Shade & Thickness			
a	External	RAL 7032	RAL 7032	RAL 7032
b	Internal	RAL 7035	RAL 7035	RAL 7035
ix	Degree of Protection	IP 4X	IP 4X	IP 4X
x	Inductance in H/mt	0.3 µH/m	0.3 µH/m	0.3 µH/m
xi	Capacitance in pF/mt	40 pF/m	40 pF/m	40 pF/m
xii	Resistance in Ohm/mt	9.5 x 10 ⁻⁶ Ω/m	9.5 x 10 ⁻⁶ Ω/m	9.5 x 10 ⁻⁶ Ω/m
xiii	Expansion Bellow	Yes	Yes	Yes
a	Material	High-grade steel	High-grade steel	High-grade steel
b	Min allowable adjustable displacement Longitudinal	1 mm / meter	1 mm / meter	1 mm / meter
	Transverse			
xiv	Sealing system			
a	Type	O rings	O rings	O rings
xv	Estimated life in years	25 yrs	25 yrs	25 yrs
xvi	Barrier			
a	Material	Cast resin EP235	Cast resin EP235	Cast resin EP235
b	Dielectric strength	Same as GIS	Same as GIS	Same as GIS
14	Support Structure			
i	Material	Structural steel	Structural steel	Structural steel
ii	Minimum thickness of galvanizing	86 microns	86 microns	86 microns
iii	Foundation channels / Anchor bolts	Not in Siemens GIS scope	Not in Siemens GIS scope	Not in Siemens GIS scope
15	Grounding			
i	Grounding Material	Not in Siemens GIS scope	Not in Siemens GIS scope	Not in Siemens GIS scope
ii	Grounding of complete GIS	Not in Siemens GIS scope	Not in Siemens GIS scope	Not in Siemens GIS scope
iii	Grounding of individual compartment	Not in Siemens GIS scope	Not in Siemens GIS scope	Not in Siemens GIS scope
iv	Grounding at flange joints	Not in Siemens GIS scope	Not in Siemens GIS scope	Not in Siemens GIS scope
16	System Parameters			
i	Highest System voltage in kV	420	420	420
ii	Rated voltage of System in kV	420	420	420

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Electrical Superintending Engineer
(Planning and Engineering)
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8K 19.06.2020

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iii	Rated voltage of Equipment in kV	420	420	420
iv	Rated Insulation level Phase to Earth and between Phases			
a	One Min Power Frequency withstand voltage kVrms	650	650	650
b	Switching impulse withstand voltage, kVp			
	Phase to Earth	1050	1050	1050
	Between Phases	Not applicable (single phase design)	Not applicable (single phase design)	Not applicable (single phase design)
c	Lightning impulse withstand voltage, kVp	1425	1425	1425
iv	Rated Frequency	50 Hz	50 Hz	50 Hz
v	Rated current in Amp	3150 A	3150 A	3150 A
vi	Rated current at 50 °C (equipment) in Amp	3150 A	3150 A	3150 A
vii	Rated current at 50 °C (bus bar) in Amp	3150 A	3150 A	3150 A
viii	Rated short circuit withstand current kArms	63	63	63
a	Duration in sec	1	1	1
b	Peak, kAp	157.5	157.5	157.5
ix	Enclosure withstand time for an internal fault in sec.	Burn through time = 300 ms	Burn through time = 300 ms	Burn through time = 300 ms
x	Estimated total energy loss at			
	100 % of rated capacity	Will be furnished in Civil proposal drawing	Will be furnished in Civil proposal drawing	Will be furnished in Civil proposal drawing
	75 % of rated capacity	Will be furnished in Civil proposal drawing	Will be furnished in Civil proposal drawing	Will be furnished in Civil proposal drawing
	50 % of rated capacity	Will be furnished in Civil proposal drawing	Will be furnished in Civil proposal drawing	Will be furnished in Civil proposal drawing
	25 % of rated capacity	Will be furnished in Civil proposal drawing	Will be furnished in Civil proposal drawing	Will be furnished in Civil proposal drawing
xi	Measures taken to minimize Over Voltage	1. Continuous enclosure design 2. Bonding of three phases 3. Earthing at regular intervals	1. Continuous enclosure design 2. Bonding of three phases 3. Earthing at regular intervals	1. Continuous enclosure design 2. Bonding of three phases 3. Earthing at regular intervals
xii	Phase labeling	L1-L2-L3	L1-L2-L3	L1-L2-L3
xiii	Auxiliary supply (AC Voltage, Frequency; DC voltage)			
	Operation	220 V DC	220 V DC	220 V DC
	Control	220 V DC	220 V DC	220 V DC
	Illumination & heater	240 V AC	240 V AC	240 V AC
17	Delivery conditions			
i	Bays fully assembled at works	Not possible due to transport unit size restrictions	Not possible due to transport unit size restrictions	Not possible due to transport unit size restrictions
ii	Dimensions of longest section for transportation	≤ 5 mtr	≤ 5 mtr	≤ 5 mtr
iii	Weight of heaviest package	≤ 6 Ton	≤ 6 Ton	≤ 6 Ton
iv	Pressure of SF6 gas during transportation	0.5 bar	0.5 bar	0.5 bar
v	SF6 gas monitoring system provided during transportation	No	No	No
18	Bus Bar			
i	Configuration (Single / Double)	One and Half breaker scheme	One and Half breaker scheme	One and Half breaker scheme
ii	Nos of Phases	3	3	3
iii	Material	Aluminium alloy	Aluminium alloy	Aluminium alloy
iv	Size	2200 mm	2200 mm	2200 mm
v	Rating	420 kV	420 kV	420 kV
vi	Current density adopted	Manufacturer's internal data	Manufacturer's internal data	Manufacturer's internal data
vii	Current density as per type test report	Manufacturer's internal data	Manufacturer's internal data	Manufacturer's internal data
viii	Short time current withstand rating in kA	63	63	63
ix	Duration	1	1	1
x	Resistance per phase	$9.5 \times 10^{-6} \Omega/\text{m}$	$9.5 \times 10^{-6} \Omega/\text{m}$	$9.5 \times 10^{-6} \Omega/\text{m}$
xi	Surge impedance	86 Ω	86 Ω	86 Ω
xii	SF6 immersed insulator			
a	Material	Cast resin EP235	Cast resin EP235	Cast resin EP235
b	Dielectric strength	Same as GIS	Same as GIS	Same as GIS
xiv	Maximum Partial Discharges measured at HSV	Less than 5 pC	Less than 5 pC	Less than 5 pC
19	SF6 Gas			
i	Applicable standard	IEC 376, 376 A and 376 B	IEC 376, 376 A and 376 B	IEC 376, 376 A and 376 B
ii	Quantity of SF6 Gas of complete GIS at filling pressure, in kg	Approx 400 kg / bay	Approx 400 kg / bay	Approx 400 kg / bay
iii	Quantity of SF6 Gas of largest compartment GIS at filling pressure, in kg	≤ 250kg	≤ 250kg	≤ 250kg
iv	Nos of Gas compartments	Refer Gas SLD [(1)-G71770-AC347-E231-001-P-091111_E_C1_8162_BAK_0 Gas SLD]	Refer Gas SLD [(1)-G71770-AC347-E231-001-P-091111_E_C1_8162_BAK_0 Gas SLD]	Refer Gas SLD [(1)-G71770-AC347-E231-001-P-091111_E_C1_8162_BAK_0 Gas SLD]
v	Quantity of SF6 Gas of individual compartment GIS at filling pressure, in kg	Will be furnished separately after approval of GIS layout	Will be furnished separately after approval of GIS layout	Will be furnished separately after approval of GIS layout
vi	Maximum permissible dew point, in Deg.C	-5 °C	-5 °C	-5 °C
vii	Composition of Gas			
a	SF6 > 99.90 % by weight	As per IEC 60376	As per IEC 60376	As per IEC 60376
b	Air < 500 ppm by weight (0.25 vol.-%)	As per IEC 60376	As per IEC 60376	As per IEC 60376
c	CF4 < 500 ppm by weight (0.1 vol.-%)	As per IEC 60376	As per IEC 60376	As per IEC 60376
d	H2O < 15 ppm by weight (0.012 Vol.-%)	As per IEC 60376	As per IEC 60376	As per IEC 60376
e	Mineral oil < 10 ppm by weight	As per IEC 60376	As per IEC 60376	As per IEC 60376
f	Acidity, in terms of HF < 0.3 ppm by weight	As per IEC 60376	As per IEC 60376	As per IEC 60376
g	Hydrolysable fluorides in terms of HF < 1 ppm by weight	As per IEC 60376	As per IEC 60376	As per IEC 60376
PRESSURE				
vii	Design pressure			
a	Circuit breaker	7.5 bar	7.5 bar	7.5 bar

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Rev no.	Rev 1			
Sl. No.	DESCRIPTION	Transformer/Reactor Bays	Line bays	Tie bays
b	Other compartments	7.5 bar	7.5 bar	7.5 bar
ix	Rated filling pressure			
a	Circuit breaker	5.6 bar	5.6 bar	5.6 bar
b	Other compartments	5.2 bar	5.2 bar	5.2 bar
x	Type tested pressure			
a	Circuit breaker	≥ 40 bar	≥ 40 bar	≥ 40 bar
b	Other compartments	≥ 40 bar	≥ 40 bar	≥ 40 bar
xi	Routine test pressure			
a	Circuit breaker	15 bar	15 bar	15 bar
b	Other compartments	15 bar	15 bar	15 bar
xii	Operating pressure of PRD			
a	Circuit breaker	9.4 - 10.4 bar	9.4 - 10.4 bar	9.4 - 10.4 bar
b	Other compartments	9-10 bar	9-10 bar	9-10 bar
xiii	Alarm Pressure			
a	Circuit breaker	5.2 bar	5.2 bar	5.2 bar
b	Other compartments	4.7 bar	4.7 bar	4.7 bar
c	CB lock out Pressure	5 bar	5 bar	5 bar
d	Over pressure signaling	NA	NA	NA
xiv	Maximum SF6 Gas leakage rate, in % per year	Less than 0.5%	Less than 0.5%	Less than 0.5%
xv	Density Monitor to be provided for each individual gas compartment	Yes	Yes	Yes
20	Circuit Breaker			
i	Applicable standard	IEC 62271-100	IEC 62271-100	IEC 62271-100
ii	Type	SF6 type	SF6 type	SF6 type
iii	Designation	8DQ1	8DQ1	8DQ1
iv	Operating Mechanism type	Spring spring	Spring spring	Spring spring
v	Nos. of phases	3	3	3
vi.a	Rated current in Amp	3150 A	3150 A	3150 A
vi.b	Rated short circuit current	63 kA	63 kA	63 kA
vi.c	R.M.S value of AC component of rated short circuit current(kA rms)	63 kA	63 kA	63 kA
vi.d	Percentage DC component	58%	58%	58%
vi.e	Rate short circuit making current (kA peak)	158 kA peak	158 kA peak	158 kA peak
vi.f	Rated breaking time at nominal voltage	37 ms	37 ms	37 ms
vi.g	Total break time	37 ms	37 ms	37 ms
vi.h	Making time at nominal voltage	64 ± 7 ms	64 ± 7 ms	64 ± 7 ms
vi.i	Short line fault breaking capability	Yes, Refer Type test reports	Yes, Refer Type test reports	Yes, Refer Type test reports
vii	Mechanical Endurance class	M2	M2	M2
viii	Electrical Endurance class	E2	E2	E2
ix	Restrike probability class	C2	C2	C2
x	Rated SC breaking current	63 kA	63 kA	63 kA
xi	Rated SC breaking current - single phase test	As per IEC 62271-100	As per IEC 62271-100	As per IEC 62271-100
xii	Rated Line charging breaking current	400 A	400 A	400 A
xiii	Rated Cable charging breaking current	400 A	400 A	400 A
xiv	Capacitor bank switching capability	400 A	400 A	400 A
xv	Inductive current	As per IEC 62271-100	As per IEC 62271-100	As per IEC 62271-100
xvi	Reactive current	As per IEC 62271-100	As per IEC 62271-100	As per IEC 62271-100
xvii	Out of phase making & breaking current	As per IEC 62271-100	As per IEC 62271-100	As per IEC 62271-100
xviii	Rated short line fault current	As per IEC 62271-100	As per IEC 62271-100	As per IEC 62271-100
xix	TRV characteristic	As per IEC 62271-100	As per IEC 62271-100	As per IEC 62271-100
xx	First Pole to Clear factor	1.3	1.3	1.3
xxi	Nos. of interrupters per phase	1	1	1
xxii	Type of arc control device provided, if any	NA	NA	NA
xxiii	Type of arcing contacts	Finger and pin contact	Finger and pin contact	Finger and pin contact
xxiv	Material of main contact	Al silver plated	Al silver plated	Al silver plated
xxv	Material of Arcing contacts	Cu with copper tungsten	Cu with copper tungsten	Cu with copper tungsten
xxvi	Filter material	MOS 13X	MOS 13X	MOS 13X
xxvii	Timings of operations			
a	- Opening at nominal control voltage	18 ± 2 ms	18 ± 2 ms	18 ± 2 ms
b	- Opening at minimum control voltage	18 ± 10 ms	18 ± 10 ms	18 ± 10 ms
c	- Closing time at nominal control voltage	68 ± 7 ms	68 ± 7 ms	68 ± 7 ms
xxviii	Maximum pole discrepancy time Tripping Closing	Close : max 3 ms Open : max 2 ms	Close : max 3 ms Open : max 2 ms	Close : max 3 ms Open : max 2 ms
xxix	Rated operating duty cycle	0-0.3sec-CO-3min-CO	0-0.3sec-CO-3min-CO	0-0.3sec-CO-3min-CO
xxx	Tripping Coils			
-	- No of coils	2	2	2
-	- Rated Voltage	220 V DC	220 V DC	220 V DC
-	- Rated Current	2.9 A	2.9 A	2.9 A
-	- Rated Watts	638 W	638 W	638 W
-	- Resistance	76 ohm	76 ohm	76 ohm
xxxi	Closing Coil			
-	- No of coils	1	1	1
-	- Rated Voltage	220 V DC	220 V DC	220 V DC
-	- Rated Current	1 A	1 A	1 A
-	- Rated Watts	225 W	225 W	225 W
-	- Resistance	215 ohm	215 ohm	215 ohm
xxxii	Spring Charging Motor			
-	- Rated Voltage	220 V DC	220 V DC	220 V DC
-	- Rated Current	6.3 A	6.3 A	6.3 A
-	- Rated Watts	1386 W	1386 W	1386 W
xxxiii	Spring charging time at rated Aux supply	30 sec	30 sec	30 sec
xxxiv	Spring charging time at min Aux supply	30 sec	30 sec	30 sec
xxxv	Maintenance required after nos. of operation at			
i	No load	10000	10000	10000

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ii	Rated current	6000	6000	6000
iii	25% of rated SC current	Approx 400	Approx 400	Approx 400
iv	50% rated SC current	Approx 60	Approx 60	Approx 60
v	Rated SC current	15	15	15
e	Provision of anti pumping	Yes	Yes	Yes
f	No of operations after switching off of motor Aux. supply	000	000	000
xxvii	Provision of Manual trip	Yes	Yes	Yes
xxviii	Electrical interlocking	Yes	Yes	Yes
xxviii	Padlocking	Yes, on CB Drive cabinet	Yes, on CB Drive cabinet	Yes, on CB Drive cabinet
xxix	Type of Operation counter provided	Yes, Resettable	Yes, Resettable	Yes, Resettable
21	DISCONNECTORS			
i	Applicable standards	IEC 62271-102	IEC 62271-102	IEC 62271-102
ii	Type	80Q1	80Q1	80Q1
iii	Rated current in Amp for			
	- Bus disconnector	3150	3150	3150
	- Line disconnector	3150	3150	3150
	- Transformer disconnector	3150	3150	3150
	- PT disconnector	3150	3150	3150
iv	Maximum Current that can be safely interrupted by the Isolator (Amp)			
	- Inductive	NA	NA	NA
	- Capacitive	0.5 A	0.5 A	0.5 A
v	Rate Short time withstand Current in kA, for 1 sec	63 for 1 sec	63 for 1 sec	63 for 1 sec
vi	Rated peak short time Current, kAp	157.5	157.5	157.5
vii	Rated bus charging current, in Amp	As per IEC 62271-102	As per IEC 62271-102	As per IEC 62271-102
viii	Type of contacts	Contact pin	Contact pin	Contact pin
ix	Material of contacts	Cu silver plated	Cu silver plated	Cu silver plated
x	Current Density at minimum cross section (A/mm ²)	Manufacturer's internal data	Manufacturer's internal data	Manufacturer's internal data
xi	Rated lightning impulse withstand voltage across the open gap, kVp	1425+240	1425+240	1425+240
xii	Rated Power Freq withstand voltage across the open gap, kVrms	815	815	815
xiii	Mechanical Endurance class	M2	M2	M2
xiv	Type of Operating Mechanism	Motor	Motor	Motor
xv	Operating Motor details			
	- Type	DC motor	DC motor	DC motor
	- Rated Voltage	220 V DC	220 V DC	220 V DC
	- Rated Current	1.8 A	1.8 A	1.8 A
	- Rated Watts	286 W	286 W	286 W
xvi	Operating Time			
	- Closing			
	- Opening	≤ 6 sec	≤ 6 sec	≤ 6 sec
xvii	Mechanical indication on drive shaft	Yes	Yes	Yes
22	Maintenance Grounding Switch			
i	Applicable standards	IEC 62271-102	IEC 62271-102	IEC 62271-102
ii	Type	80Q1	80Q1	80Q1
iii	Rate Short time withstand Current in kA, for 1 sec	63 kA for 1 sec	63 kA for 1 sec	63 kA for 1 sec
iv	Rated peak short time Current, kAp	157.5	157.5	157.5
v	Rated lightning impulse withstand voltage across the open gap, kVp	1425+240	1425+240	1425+240
vi	Rated Power Freq withstand voltage across the open gap, kVrms	815	815	815
vii	Type of Operating Mechanism	Motor	Motor	Motor
viii	Operating Motor details			
	- Type	DC motor	DC motor	DC motor
	- Rated Voltage	220 V DC	220 V DC	220 V DC
	- Rated Current	1.8 A	1.8 A	1.8 A
	- Rated Watts	286 W	286 W	286 W
ix	Operating Time			
	- Closing			
	- Opening	≤ 6 sec	≤ 6 sec	≤ 6 sec
x	Mechanical indication on drive shaft	Yes	Yes	Yes
23	Fast Acting Grounding Switch			
i	Applicable standards	IEC 62271-102	IEC 62271-102	IEC 62271-102
ii	Type	80Q1	80Q1	80Q1
iii	Rate Short time withstand Current in kA, for 1 sec	63 kA for 1 sec	63 kA for 1 sec	63 kA for 1 sec
iv	Rated peak short time Current, kAp	157.5	157.5	157.5
v	Rated induced current switching capability Rated capacitive current switching capability	As per IEC 62271-102	As per IEC 62271-102	As per IEC 62271-102
vi	Rated lightning impulse withstand voltage across the open gap, kVp	1425+240	1425+240	1425+240
vii	Rated Power Freq withstand voltage across the open gap, kVrms	815	815	815
viii.a	Mechanical Endurance class	M1	M1	M1
viii.b	Electrical Endurance class	E1	E1	E1
ix	Type of Operating Mechanism	Motor charged Spring	Motor charged Spring	Motor charged Spring
x	Operating Motor details			
	- Type	DC motor	DC motor	DC motor
	- Rated Voltage	220 V DC	220 V DC	220 V DC
	- Rated Current	1.8 A	1.8 A	1.8 A
	- Rated Watts	286 W	286 W	286 W
xi	Operating Time			
	- Closing	60 ± 10 ms excluding spring charging time of 6 ± 1 sec	60 ± 10 ms excluding spring charging time of 6 ± 1 sec	60 ± 10 ms excluding spring charging time of 6 ± 1 sec
	- Opening	Yes	Yes	Yes
xii	Mechanical indication on drive shaft	Yes	Yes	Yes
24	Current transformers			
i	Type	80Q1	80Q1	80Q1
ii	Material	Enclosure: Al alloy	Enclosure: Al alloy	Enclosure: Al alloy

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 13.06.2020

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Rev no.	Rev 1			
Sl. No.	DESCRIPTION	Transformer/Reactor Bays	Line bays	Tie bays
iii	Position of Current Transformer	Refer Gas SLD [(1)-G71770-AC347-E231-001-P-091111_E_C1_8162_BAK_0-Gas SLD]	Refer Gas SLD [(1)-G71770-AC347-E231-001-P-091111_E_C1_8162_BAK_0-Gas SLD]	Refer Gas SLD [(1)-G71770-AC347-E231-001-P-091111_E_C1_8162_BAK_0-Gas SLD]
iv	Reference Standard	IEC 61869 - 1/2	IEC 61869 - 1/2	IEC 61869 - 1/2
v	Rated Continuous thermal current	120% of highest tap	120% of highest tap	120% of highest tap
vi	Rated Short Time current	63 kA	63 kA	63 kA
vii	Duration	1 sec	1 sec	1 sec
a	Feeder Bay CT			
i	Metering Core			
	- Ratio			
	- Output Burden			
	- Accuracy Class			
	- ISF			
ii	Protection Core -1			
	- Ratio			
	- Output Burden			
	- Accuracy Class			
	- ALF			
iii	Protection Core -2			
	- Ratio			
	- Output Burden			
	- Accuracy Class			
	- ALF			
b	Transformer Bay CT			
i	Metering Core			
	- Ratio			
	- Output Burden			
	- Accuracy Class			
	- ISF			
ii	Protection Core -1			
	- Ratio			
	- Output Burden			
	- Accuracy Class			
	- ALF			
iii	Protection Core -2			
	- Ratio			
	- Accuracy Class			
	- Minimum Knee Point Voltage at highest ratio			
	- Maximum Excitation Current at V _k			
	- Maximum Resistance at highest ratio			
iv	Protection Core -3			
	- Ratio			
	- Accuracy Class			
	- Minimum Knee Point Voltage at highest ratio			
	- Maximum Excitation Current at V _k			
	- Maximum Resistance at highest ratio			
c	Bus Coupler Bay CT			
i	Metering Core			
	- Ratio			
	- Output Burden			
	- Accuracy Class			
	- ISF			
ii	Protection Core -1			
	- Ratio			
	- Burden			
	- Accuracy Class			
	- ALF			
iii	Protection Core -2			
	- Ratio			
	- Burden			
	- Accuracy Class			
	- ALF			
25	Voltage Transformer			
	Type	8DQ1	8DQ1	8DQ1
	Position of Voltage Transformer	Refer Gas SLD [(1)-G71770-AC347-E231-001-P-091111_E_C1_8162_BAK_0-Gas SLD]	Refer Gas SLD [(1)-G71770-AC347-E231-001-P-091111_E_C1_8162_BAK_0-Gas SLD]	Refer Gas SLD [(1)-G71770-AC347-E231-001-P-091111_E_C1_8162_BAK_0-Gas SLD]

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 Subject to the condition that you are not absolved of
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*Electrical Superintending Engineer
 (Planning and Engineering)
 Bihar State Power Transmission Company Limited
 Vidyut Bhawan, Patna-800021*
8k
13.06.2020

Project	400/220/132/33kV GIS substation at Bakhtyarpur, Bihar			
Customer	Bihar State Power Transmission Company Limited			
Contractor	GEPDEC Infratech limited & SIEMENS limited consortium			
Document	Guaranteed Technical Particulars of 400kV GIS			
Doc. no.	(G71770-AC347-E228-001-P-091111_E_C1_8167_BAK_0			
Rev no.	Rev 1			
Sl. No.	DESCRIPTION	Transformer/Reactor Bays	Line bays	Tie bays
	Reference Standard	IEC 61869 -1 /3	IEC 61869 -1 /3	IEC 61869 -1 /3
	Rated Over Voltage Factor - Continuous	1.2	1.2	1.2
	Short Time Over Voltage Factor	1.5	1.5	1.5
	Duration	30 sec	30 sec	30 sec
	Partial Discharge Level	Less than 5 pC	Less than 5 pC	Less than 5 pC
	Thermal Rating of Primary Winding	400 VA	400 VA	400 VA
26	Line & Bus VT			
i	Metering Core			
	- Ratio			
	- Output Burden			
	- Accuracy Class			
ii	Protection Core -1	Refer Gas SLD [(1)-G71770-AC347-E231-001-P-091111_E_C1_8162_BAK_0-Gas SLD]	Refer Gas SLD [(1)-G71770-AC347-E231-001-P-091111_E_C1_8162_BAK_0-Gas SLD]	Refer Gas SLD [(1)-G71770-AC347-E231-001-P-091111_E_C1_8162_BAK_0-Gas SLD]
	- Ratio			
	- Output Burden			
	- Accuracy Class			
iii	Protection Core -2			
	- Ratio			
	- Output Burden			
	- Accuracy Class			
27	Enclosed Surge Arrester			
ii	Name of Manufacturer			
iii	Arrester Class & Type (with mfr type designation)			
iv	Applicable Standard			
v	Rated system voltage (kV)			
vi	Rated Arrester Voltage (kV)			
vii	Max continuous operating voltage (MCOV) - (kV)			
viii	i) Nominal Discharge Current (KA) with 8/20 Micro-second wave			
	ii) Max resistive component of cont current at MCOV-mA crest			
	iii) Max capacitive component of cont current at MCOV-mA crest			
ix	Long Duration Discharge Class			
x	Min. Energy Discharge Capability (KJ/KV rating)			
xi	Max. switching current impulse residual voltage (KVP)			
	1000 Amps			
	250 Amps			
xii	Pressure Relief Class KA (rms)			
xiii	High Current short duration impulse withstand level with 4/10 micro-second wave (KA) peak			
xiv	Over-voltage withstand capability - KV			
	a) 100 Seconds			
	b) 10 Second			
	c) 1.0 Second			
	d) 0.1 Second			
	e) Reference Voltage (KV)			
	f) Reference Current (KA)			
xv	Surge counter			
xvi	Leakage monitor			
28	Local Control Cubical			
i	Name of Manufacturer (OEM of GIS)	Siemens Ltd	Siemens Ltd	Siemens Ltd
ii	Location in GIS	Ground mounted	Ground mounted	Ground mounted
iii	Material	CRCA	CRCA	CRCA
iv	Sheet Thickness	3 mm for load bearing part and 2 mm for non load bearing part	3 mm for load bearing part and 2 mm for non load bearing part	3 mm for load bearing part and 2 mm for non load bearing part
v	Degree of Protection	IP4X	IP4X	IP4X
vi	Padlocking arrangement	Yes	Yes	Yes
vii	Major components of LCC			
	- Bay control mimic diagram	Yes	Yes	Yes
	- Control Switches	Yes	Yes	Yes
	- Indicating lamps	Yes	Yes	Yes
	- Position indicators	Yes	Yes	Yes
	- Annunciation scheme	Yes	Yes	Yes
	- Auxiliary relays	Yes	Yes	Yes
	- Contact multiplication relays	Yes	Yes	Yes
	- System parameters display	Yes	Yes	Yes
	- Heater with thermostat	Yes	Yes	Yes
	- Interface terminal blocks for relaying & protection	Yes	Yes	Yes
29	GIS to Line connection			
i	Nos of XLPE cable can be terminated	HV cable connection is not applicable	HV cable connection is not applicable	HV cable connection is not applicable
ii	Type of cable termination required			
30	GIS to Transformer connection			
i	Nos of XLPE cable can be terminated	HV cable connection is not applicable	HV cable connection is not applicable	HV cable connection is not applicable
ii	Type of cable termination required			
31	Maintenance			
i	Maximum down time for replacement or removal of any part	5 days	5 days	5 days
ii	Maximum down time for degassing and re-filling the biggest compartment	12 hours (Depend on site condition)	12 hours (Depend on site condition)	12 hours (Depend on site condition)

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[Signature]
 Electrical Superintending Engineer
 (Planning and Engineering)
 Bihar State Power Transmission Company Limited
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 19.06.2020

Project	400/220/132/33KV GIS substation at Bakhtiyarpur, Bihar			
Customer	Bihar State Power Transmission Company Limited			
Contractor	GEPDEC Infratech limited & SIEMENS limited consortium			
Document	Guaranteed Technical Particulars of 400KV GIS			
Doc. no.	(4)-G71770-AC347-E228-001-P-0911 E_C1_8167_BAK_0			
Rev no.	Rev 1			
Sl. No.	DESCRIPTION	Transformer/Reactor Bays	Line bays	Tie bays
iii	Time between two refilling of SF6 gas.	1 hour (Depend on site condition)	1 hour (Depend on site condition)	1 hour (Depend on site condition)
iv	Recommended period for overhauling	25 yrs	25 yrs	25 yrs
v	Operation and Maintenance manual attached	Will be furnished separately	Will be furnished separately	Will be furnished separately
vi	Nearest local service centre	Aurangabad	Aurangabad	Aurangabad
vii	Minimum time of availability of local service.	1 day (Only travelling time to site)	1 day (Only travelling time to site)	1 day (Only travelling time to site)
viii	Availability of spares at local service centre	Yes (Depending on procurement lead time of material)	Yes (Depending on procurement lead time of material)	Yes (Depending on procurement lead time of material)
ix	List of recommended spares attached?	NA	NA	NA
x	List of recommended special tools, etc attached?	NA	NA	NA
xi	List of commission spares attached?	NA	NA	NA
xii	List of maintenance spares attached?	NA	NA	NA
Annexure-1				
GA drawing and GTP of SF6 Air Bushing				
32	Compliance to following Specification Clauses			
a	While furnishing the proof for the total break time of complete circuit breaker, the contractor may specifically bring out the effect of non-simultaneity between poles and show how it is covered in the total break time. The values guaranteed shall be supported with the type test reports	Refer Mechanical endurance type test reports of CB (RP-1617-053307). Maximum value of pole discrepancy obtained after 10000 operations are <3ms for closing and <2ms for tripping. This is well within the tolerances on total break time.		
b	Withstanding all dielectric stresses imposed on it in open condition at lock out pressure continuously (i.e. shall be designed for 2 p.u. across the breaker continuously, for validation of which a power frequency withstand test conducted for a duration of at least 15 minutes is acceptable	Refer type test report for power frequency test at lock out pressure (RP-1516-026643). Siemens GIS fully complies to this clause.		
b	In the interrupter assembly there shall be an adsorbing product box to minimize the effect of SF6 decomposition products and moisture	Refer single line diagram which clearly indicates that each compartment is equipped with static moisture absorbant filters. Siemens GIS fully complies to this clause.		
d	Provision of operational analyzer to record travel, speed and making measurement of operating timings etc. after installation at site. The contractor shall supply three set of transducer for each substation covered under the scope	We have provision in our GIS for operational analyzer to record travel, speed and making measurement of operating timings etc. after installation at site and we will supply 3set of Transducer for Bakhtiyarpur Project as per Technical Specification.		
e	Drawing showing contacts in close, arc initiation, full arcing, arc extinction and open position	It is practically not possible to furnish such details in drawing. Type test reports of CB already contains cross sectional view of interrupter.		

* Firm shall supply same type tested model (8DQ1) for the Bakhtiyarpur project without any price implication to BSPTCL.

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BWV
Electrical Superintending Engineer
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19.06.2020

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