

Appendix -1

Technical Data Sheet, 40MVA, 20/110 KV Tr Bay For Absorption of Solar Energy through Sorobi Substation to national grid

REQUIRED AND GUARANTEED TECHNICAL REQUIREMENTS AND CHARACTERISTICS OF EQUIPMENT

Item- No.	Da Afghanistan Brishna Shirkat (DABS) Srobi Substation 40MVA Step-up Power Transformer.			
	Schedule of Technical Data	Unit	Required	Offered Data
	110 kV Switchyard Equipment			
1	110 kV Circuit Breaker			
	Applicable standard	IEC	62271-100	
	Manufacturer			
	Circuit breaker type	-	Outdoor SF ₆	
	Nominal voltage	kV	110	
	Rated voltage	kV	123	
	Rated frequency	Hz	50	
	Rated lightning impulse withstand voltage (1.2/50 μ s)	kV _{peak}	550	
	Rated power frequency withstand voltage	kV	275	
	Rated short-timer current, 3s	kA	31.5	
	Rated nominal current	A	1250	
	Minimum creep age distance	mm/kV	31	
	Frequency	Hz	50	
	First pole-to-clear factor	-	1.3	
	Rated operating sequence (three-phase auto reclosing)	-	0-0.3s – C0- min – C0	
	Maximum breaking time	ms	60	
	Maximum making time	ms	100	
	Number of tripping coils (Spare)		2	
	Number of closing coils (Spare)		1	
	Protection class	-	IP 65	
	Auto-reclosing		single and three phase	
	Drive	-	single pole	

Item- No.	Da Afghanistan Brishna Shirkat (DABS) Srobi Substation 40MVA Step-up Power Transformer.			
	Schedule of Technical Data	Unit	Required	Offered Data
	110 kV Switchyard Equipment			
	Type of drive	-	spring, electric motor driven and manual	
	Power supply for drive	VDC	110	
	Auxiliary Supply	VDC	110	
	Power supply for heaters	V	230AC	
	Test Requirements			
	Standard applied	IEC IEC	62271-100 62271-1	
	Type tests			
	Dielectric tests according to Spec		yes	
	Measuring of resistance of main contacts according to Spec		yes	
	Temperature rise test according to Spec		yes	
	Short time withstand current and peak withstand current test according to Spec		yes	
	Additional test on auxiliary and control circuits according to Spec		yes	
	Mechanical operation tests on ambient temperature according to Spec		yes	
	Short circuit making and breaking test according to Spec		yes	
	Radio interference tests according to Spec		yes	
	Verification of degree of protection test (IP) According to Spec		yes	
	Single phase test according to Spec		yes	
	Capacitive current switching test according to Spec		yes	

Item - No.	Da Afghanistan Brishna Shirkat (DABS) Srobi Substation 40MVA Step-up Power Transformer.			
	Schedule of Technical Data	Unit	Required	Offered Data
	110 kV Switchyard Equipment			
	Routine tests			
	Dielectric tests on main circuit according to Clause 7.1. IEC 62271-100 and IEC 62271-1		yes	
	Tests on auxiliary and control circuits according to Spec		yes	
	Measurement of resistance of main contacts according to Spec		yes	
	Tightness test according to Spec		yes	
	Design and visual check according to Spec		yes	
2	110 kV Bus bar isolator switch with earthing			
	Applicable standard	IEC	62271-102	
	Manufacturer		to be specify	
	Type		outdoor	
	Type of operation		Double break	
	Nominal voltage	kV	110	
	Rated voltage	kV	123	
	Rated nominal current	A	1250	
	Rated short time current , 3s	kA	31.5	
	Rated short circuit current	kA	100	
	Rated lightning impulse withstand voltage	kV _{peak}	550	
	Rated power frequency withstand voltage	kV	275	
	Rated frequency	Hz	50	
	Minimum creep age distance	mm/kV	31	
	Protection class	-	IP 65	
	Drive	-	3 pole	
	Type of drive	-	Electric motor with manual facility	

Item- No.	Da Afghanistan Brishna Shirkat (DABS) Srobi Substation 40MVA Step-up Power Transformer.			
	Schedule of Technical Data	Unit	Required	Offered Data
	110 kV Switchyard Equipment			
	Power supply for drive	VDC	110	
	Auxiliary Supply	VDC	110	
	Power supply for heater	VAC	230	
	Manual operating facility	yes/no	yes	
	Factory Test requirements			
	Applied standard	IEC IEC	62271-102 60694	
	Type test			
	Dielectric tests on main, auxiliary and control circuits according to IEC 60694		yes	
	Radio interference voltage test according to IEC 60694		yes	
	Measurement of resistance of main current path according to IEC 60694		yes	
	Temperature rise test according to IEC 60694		yes	
	Short time withstand current and peak withstand current test according to IEC 60694		yes	
	Test to verify the degree of protection of the enclosure according to IEC 60694		yes	
	Test to prove satisfactory operational and mechanical endurance according to IEC 62271-102		yes	
	Test to prove satisfactory operation at temperature limits according to IEC 62271-102		yes	
	Test to prove satisfactory operation of position indication devices according to IEC 62271-102		yes	
	Test to prove satisfactory bus transfer current switching capability according to IEC 62271-102		yes	

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Item- No.	Da Afghanistan Brishna Shirkat (DABS) Srobi Substation 40MVA Step-up Power Transformer.			
	Schedule of Technical Data	Unit	Required	Offered Data
	110 kV Switchyard Equipment			
	Routine tests	IEC	62271-102 60694	
	Dielectric tests on the main circuits according to IEC 60694		yes	
	Tests on the auxiliary and control circuits according to IEC 60694		yes	
	Measurement of resistance of main current path according to IEC 60694		yes	
	Design and visual checks according to IEC 60694		yes	
	Mechanical operations test according to IEC 62271-102		yes	



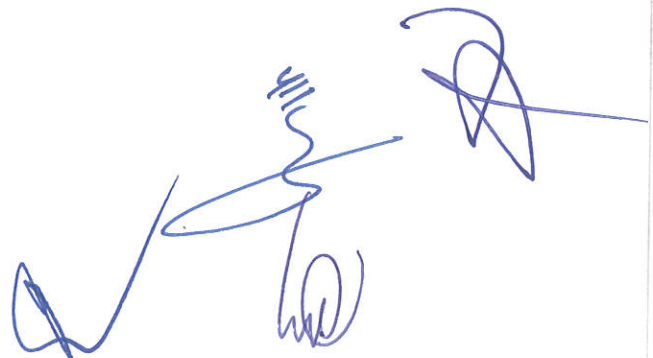
3	110 kV Current Transformers			
	Applicable standard	IEC	61869-2	
	Manufacturer		To be specify	
	Type		outdoor	
	Nominal voltage	kV	110	
	Rated voltage	kV	123	
	Rated current	A	1250	
	Rated short time current 3sec	kA	31.5	
	Rated short circuit current	kA	100	
	CT ratios		200/400/800A/1600/1/ 1/1/1A	
	Rated secondary currents	A	1	
	Class accuracy for protection system	-	5P20	
	Accuracy class for metering		0.2	
	Number of cores		5	
	Rated burden	VA	30	
	Minimum creep age distance	mm/kV	31	

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Item - No.	Da Afghanistan Brishna Shirkat (DABS) Srobi Substation 40MVA Step-up Power Transformer.			
	Schedule of Technical Data	Unit	Required	Offered Data
	110 kV Switchyard Equipment			
	Rated power frequency withstand voltage	kV	275	
	Rated lightning impulse withstand voltage (1.2/50 μ s)	kV peak	550	
	Factory Test Requirements			
	Applicable standard	IEC	61869-2	
	Type tests			
	Temperature rise test according to IEC61869-2		yes	
	Impulse withstand test on primary terminals according to IEC 61869-2		yes	
	Wet tests for outdoor transformers according to IEC 61869		yes	
	Electromagnetic compatibility test according to IEC 61869-2		yes	
	Accuracy test according to IEC 61869		yes	
	Verification of the degree of protection of the Enclosures according to IEC 61869-		yes	
	Enclosure tightness test at ambient temperature according to IEC 61869-2		yes	
	Pressure test for the enclosure according to IEC 61869-2		yes	
	Short time current test according to IEC 61869-2		yes	

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Item - No.	Da Afghanistan Brishna Shirkat (DABS) Srobi Substation 40MVA Step-up Power Transformer.			
	Schedule of Technical Data	Unit	Required	Offered Data
	110 kV Switchyard Equipment			
	Routine tests			
	Power frequency voltage withstand test on primary terminals according to IEC 61869-2		yes	
	Partial discharge measurement according to IEC 61869		yes	
	Power frequency voltage withstand test between sections according to IEC 61869-2		yes	
	Power frequency voltage withstand test on secondary terminals according to IEC 61869-2		yes	
	Accuracy tests according to IEC 61869-2		yes	
	Verification of markings according to IEC 61869-2		yes	
	Enclosure tightness test at ambient temperature according to IEC 61869-2		yes	
	Pressure test for the enclosure according to IEC 61869-2		yes	
	Determination of secondary winding resistance according to IEC 61869-2		yes	
	Determination of secondary loop time constant according to IEC 61869-2		yes	
	Test for rated knee point e.m.f and exciting current at knee point e.m.f according to IEC 61869-2		yes	
	Inter-turn overvoltage test according to IEC 61869-2		yes	
	Special tests			
	Chopped impulse withstand test on primary terminals according to IEC 61869-2		yes	
	Multiple chopped impulse withstand test on primary terminals according to IEC 61869-2		yes	
	Measurement of capacitance and dissipation factor according to IEC 61869-		yes	
	Mechanical tests according to IEC 61869-2		yes	

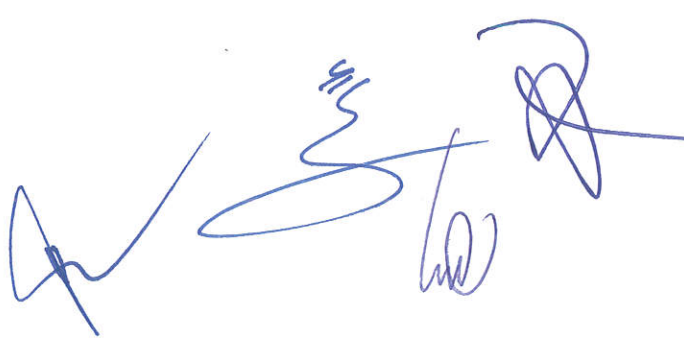


Item- No.	Da Afghanistan Brishna Shirkat (DABS) Srobi Substation 40MVA Step-up Power Transformer.			
	Schedule of Technical Data	Unit	Required	Offered Data
	110 kV Switchyard Equipment			
	Enclosure tightness test at low temperature and high temperature according to IEC61869-2		yes	
	Corrosion tests according to IEC 61869-2		yes	
4	110kV capacitive voltage transformers			
	Applicable standard	IEC	61869	
	Manufacturer		To be specify	
	Type			
	Nominal voltage	kV	110	
	Rated voltage	kV	123	
	Transformation ratio	KV	$\frac{110/\sqrt{3}/0.1}{0.1/\sqrt{3}}$	
	Rated burden secondary windings	VA	50	
	Number of cores		3	
	Accuracy class protection	-	3P	
	Accuracy class measuring	-	0.2	
	Minimum creep age distance	mm/kV	31	
	Rated power frequency withstand voltage	kV	275	
	Rated lightning impulse withstand voltage (1.2/50 μ s)	kV peak	550	

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Item-No.	Da Afghanistan Brishna Shirkat (DABS) Srobi Substation 40MVA Step-up Power Transformer.			
	Schedule of Technical Data	Unit	Required	Offered Data
	110 kV Switchyard Equipment			
	Test Requirements			
	Applicable standard	IEC	60044-2	
	Type tests			
	Temperature rise tests according to IEC 60044-2		yes	
	Short circuit withstand capability test according to IEC 60044-2		yes	
	Lightning impulse test according to IEC 60044-2		yes	
	Wet tests for outdoor transformers according to IEC 60044-2		yes	
	Determination of errors according to IEC 60044-2		yes	
	Measurement of radio interference voltage (RIV) according to IEC 60044-2		yes	
	Routine tests			
	Verification of terminal markings according to IEC 60044-2		yes	
	Power frequency voltage withstand test on primary terminals according to IEC 60044-2		yes	
	Partial discharge measurement according to IEC 60044-2		yes	
	Power frequency voltage withstand test on secondary windings according to IEC 60044-2		yes	
	Power frequency voltage withstand test between sections according to IEC 60044-2		yes	
	Determination of errors according to IEC 60044-2		yes	

Item- No.	Da Afghanistan Brishna Shirkat (DABS) Srobi Substation 40MVA Step-up Power Transformer.			
	Schedule of Technical Data	Unit	Required	Offered Data
	110kV Switchyard Equipment			
	Special tests			
	Chopped impulse withstand test on primary winding according to IEC 60044-2		yes	
	Measurement of capacitance and dissipation factor according to IEC 60044-2		yes	
	Mechanical tests according to IEC 60044-2		yes	
5	110 kV Surge Arresters			
	Applicable standard	IEC	60099-4	
	Manufacturer		To be specify	
	Type		Metal oxide	
	Nominal voltage	kV	110	
	Rated voltage	kV	123	
	Maximum continuous operating voltage (MCOV)	kV	92	
	Rated discharge current	kA	10	
	110 kV Surge Arrester Discharge Counter			
	Manufacturer		To be specified	
	Type		outdoor	
	Counter indication		Digital/and mechanical	
	Protection class		IP 65	
	Number per three arresters		3	



Item - No.	Da Afghanistan Brishna Shirkat (DABS) Srobi Substation 40MVA Step-up Power Transformer.			
	Schedule of Technical Data	Unit	Required	Offered Data
	110 kV Switchyard Equipment			
	Factory Test Requirements			
	Applicable standard	IEC	60099-4	
	Type tests		yes	
	Insulation withstand test on arrester housing according to IEC 60099-4		yes	
	Residual voltage tests according to IEC 60099-4		yes	
	Long duration current impulse withstand test according to IEC 60099-4		yes	
	Operating duty test according to IEC 60099-4		yes	
	Sort circuit test according to IEC 60099-4		yes	
	Arrester disconnectors test according to IEC 60099-4		yes	
	Internal partial discharge test according to IEC 60099-4		yes	
	Moisture ingress test according to IEC 60099-		yes	
	Current distribution test according to IEC 60099-4		yes	
	Bending moment test according to according to IEC 60099-4		yes	
	Environmental tests according to IEC 60099-4		yes	
	Routine tests			
	Measurement of reference voltage according to IEC 60099-4		yes	
	Residual voltage test according to IEC 60099- 4		yes	
	Internal partial discharge tests according to IEC 60099-4		yes	
	Leakage check according to IEC 60099-4		yes	
	Current distribution test for multicolumn arresters according to IEC 60099-4		yes	

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	Schedule of Technical Data	Unit	Required	Offered Data
	110 kV Switchyard Equipment			
Section C1.1 HV Equipment				
6	110 kV Post Insulator			
	Applicable standard	IEC	60168	
	Manufacturer		To be specified	
	Type		porcelain	
	Operating voltage	kV	110	
	Highest voltage of equipment	kV	123	
	Rated power frequency withstand voltage	kV	275	
	Rated lightning impulse withstand voltage (1.2/50 μs)	kV peak	550	
	Minimum creep age distance	mm/kV	31	
	Factory Test Requirements			
	Type tests	IEC	60168	
	Dry lightning impulse tests according to IEC 60168		yes	
	Wet power frequency withstand test according to IEC 60168		yes	
	Mechanical failing load tests according to IEC 60168		yes	
	Sample tests			
	Verification of dimensions according to IEC 60168		yes	
	Temperature cycle test according to IEC 60168		yes	
	Mechanical failing load test according to IEC 60168		yes	
	Porosity test according to IEC 60168		yes	
	Galvanization test according to IEC 60168		yes	

Item- No.	Da Afghanistan Brishna Shirkat (DABS) Srobi Substation 40MVA Step-up Power Transformer.			
	Schedule of Technical Data	Unit	Required	Offered Data
	110 kV Switchyard Equipment			
	Routine tests			
	Visual inspection according to IEC 60168		yes	
	Routine mechanical tests according to IEC 60168		yes	
7	Equipment connections 110 kV Switchyard			
	Manufacturers	-	To be specified	
	Type	-	As per Site	
	Rated current	A	2000	
	Rated short time current 3 sec.	kA	31.5	
	Total cross-section	mm ²	As per Site	
	Aluminum cross-section	mm ²	As per Site	
	Conductor design: number of strands x diameter		To be specified	
	Aluminum	mm	To be specified	
	Conductor diameter	mm ²	As per Site	
	Conductor weight	kg/m	To be specified	
	Theoretical breaking force	kN	To be specified	
	Resistance at 20°C	ohm/km	To be specified	
	Factory Test Requirements			
	Type tests			
	Jointing test		yes	
	Stress strain curves		yes	
	Breaking strength of the conductors	kN/mm ²	yes	

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	Schedule of Technical Data	Unit	Required	Offered Data
	110 kV Switchyard Equipment			
	Routine tests			
	For individual wires			
	Appearance and finishing check		yes	
	Diameter check		yes	
	Conductivity check		yes	
	Tensile strength		yes	
	Wrapping		yes	
	For complete conductors			
	Appearance and finishing check		yes	
	Cross section area check		yes	
	Overall diameter check		yes	
	Linear density test		yes	
	Surface condition check		yes	
	Resistance test		yes	
	Tensile breaking strength		yes	
	Weight		yes	
8	Bus bar			
	Applicable standard			
	Type		As per Existing Busbar	
	Manufacturer		To be specified	
	Rated current	A	As per Existing Busbar	
	Rated short time current 3 sec.	kA	As per Existing Busbar	
	Total cross-section	mm ²	As per Existing Busbar	
	Aluminum cross-section	mm ²	As per Existing Busbar	

Item- No.	Da Afghanistan Brishna Shirkat (DABS) Srobi Substation 40MVA Step-up Power Transformer.			
	Schedule of Technical Data	Unit	Required	Offered Data
	110 kV Switchyard Equipment			
	Steel cross section	mm ²	As per Existing Busbar	
	Conductor design: number of strands x diameter		To be specified	
	Aluminum			
	Conductor diameter	mm	To be specified	
	Number of strands	#	To be specified	
	Steel			
	Conductor diameter		To be specified	
	Number of strands	#	To be specified	
	Conductor weight	kg/m	To be specified	
	Theoretical breaking force	KN	To be specified	
	Resistance at 20°C	Ohm/km	To be specified	
	Factory Test Requirements			
	Type tests			
	Jointing test		yes	
	Stress strain curves		yes	
	Breaking strength of the conductors	kN/mm ²	yes	
	Routine tests			
	For individual wires			
	Appearance and finishing check		yes	
	Diameter check		yes	
	Conductivity check		yes	
	Tensile strength	kN/mm ²	yes	
	Wrapping		yes	
	For complete conductors			

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Item- No.	Da Afghanistan Brishna Shirkat (DABS) Srobi Substation 40MVA Step-up Power Transformer.			
	Schedule of Technical Data	Unit	Required	Offered Data
	110 kV Switchyard Equipment			
	Appearance and finishing check		yes	
	Cross section area check		yes	
	Overall diameter check		yes	
	Linear density test		yes	
	Surface condition check		yes	
	Resistance test	Ohm/m	yes	
	Tensile breaking strength	kN/mm ²	yes	
	Weight	Kg/m	yes	
	Factory test requirements			
	Type test report			
	Stress strain curves		yes	
	Breaking strength of the conductors	kN	yes	

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	Schedule of Technical Data	Unit	Required	Offered Data
	110 kV Switchyard Equipment			
	Routine tests			
	For individual wires			
	Appearance and finishing check		yes	
	Diameter check		yes	
	Conductivity check		yes	
	Tensile strength	kN/mm ²	yes	
	Wrapping		yes	
	For complete conductors			
	Appearance and finishing check		yes	
	Cross section area check		yes	
	Overall diameter check		yes	
	Linear density test		yes	
	Surface condition check		yes	
	Tensile breaking strength	kN/mm ²	yes	
	Conductor weight	Kg/m	yes	
10	Insulator String at 110 kV			
	Insulator units			
	Applicable standard	IEC	60383	
	Manufacturer	-	To be specified	
	Type	-	Cap and pin	
	Insulating body material	-	Porcelain	
	Rated electromechanical or mechanical strength	kN	To be specified	
	Max. shed diameter	mm	To be specified	
	Nominal creep age distance	mm	31	

Item- No.	Da Afghanistan Brishna Shirkat (DABS) Srobi Substation 40MVA Step-up Power Transformer.			
	Schedule of Technical Data	Unit	Required	Offered Data
	110 kV Switchyard Equipment			
	Test Requirements			
	Applicable standard	IEC	60383	
	Type tests			
	Verification of dimensions according to IEC 60383 -1		yes	
	Dry lightning impulse test according to IEC 60383-1		yes	
	Wet power frequency test according to IEC 60383-1		yes	
	Electromechanical failing load test according to IEC 60383-1		yes	
	Thermal mechanical performance test according to IEC 60383 -1		yes	
	Sample tests			
	Verification of dimensions according to IEC 60383		yes	
	Verification of displacement according to IEC 60383-1		yes	
	Verification of locking system according to IEC 60383-1		yes	
	Temperature cycle test according to IEC 60383		yes	
	Electro-mechanical failing load test according to IEC 60383-1		yes	
	Mechanical failing load test according to IEC 60383-1		yes	
	Thermal shock test according to IEC 60383-1		yes	
	Puncture withstand test according to IEC 60383 -1		yes	
	Porosity test according to IEC 60383		yes	
	Galvanization test according to IEC 60383-1		yes	
	Routine tests			
	Routine visual test according to IEC 60383-1		yes	

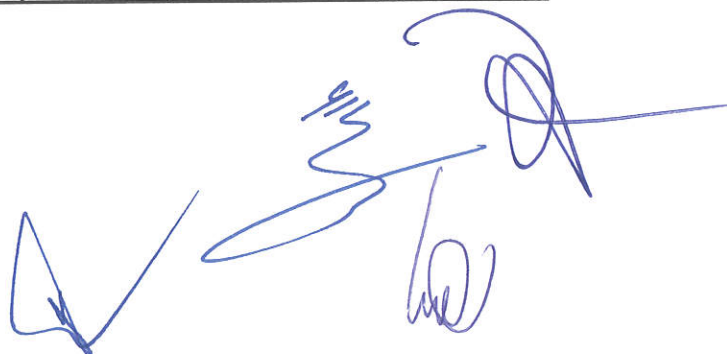
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	Schedule of Technical Data	Unit	Required	Offered Data
	110 kV Switchyard Equipment			
	Routine mechanical tests according to IEC 60383-1		yes	
	Routine electrical tests according to IEC 60383-1		yes	
	Insulator tension strings			
	Applicable standard	IEC	60383	
	Rated voltage	kV	123	
	Rated power frequency withstand voltage	kV	275	
	Rated lightning impulse withstand voltage (1.2/50 μ s)	kV peak	550	
	Number of cap insulators per string	#	To be specified	
	Test Requirements			
	Dry lightning impulse test according to IEC 60383-1		yes	
	Wet power frequency test according to IEC 60383-1		yes	

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Item - No.	Da Afghanistan Brishna Shirkat (DABS) Srobi Substation 40MVA Step-up Power Transformer.			
	Schedule of Technical Data	Unit	Required	Offered Data
	110 kV Switchyard Equipment			
11	Steel structures			
	Applicable standards	DIN	17100	
	Manufacturer		To be specified	
	Material		To be specified	
	Factor of safety in calculation		2	
	Galvanization thickness			
	Steel sections thicker than 5 mm	µm	100	
	Steel sections thicker than 2 mm to 5 mm	µm	80	
	Bolts and nuts	µm	70	
	Bolts and nuts			
	Securing with plain and spring washers		yes	
	Minimum quality according to DIN 267		5.6	
	Test requirements			
	Assembly tests of gantries according to ASTM		yes	
	Galvanization tests		yes	

Item-No.	Da Afghanistan Brishna Shirkat (DABS) Srobi Substation 40MVA Step-up Power Transformer.			
	Schedule of Technical Data	Unit	Required	Offered Data
	Power Transformer Equipment			
12	20/110 kV Power-transformers			
	Applicable standard	IEC	60076	
	Manufacturer		To be specified	
	Type of Transformer	-	Power Transformer	
	Number of phases	#	3	
	Rated frequency	Hz	50	
	Type of insulating		Mineral oil immersed	
	Mineral oil unused according to	IEC	60296	
	Location of use		Outdoor	
	Frequency	Hz	50	
	Type of cooling		ONAN-ONAF	
	Temperature rise over max. ambient temperature (50°C)			
	-top oil	°C	≤55	
	-average winding	°C	≤60	
	-hot spot winding	°C	≤70	
	Rated power	MVA	40	
	HV winding	MVA	40	
	MV winding	MVA	40	
	Rated voltage	KV	123	
	HV winding	KV	110	



Item- No.	Da Afghanistan Brishna Shirkat (DABS) Srobi Substation 40MVA Step-up Power Transformer.			
	Schedule of Technical Data	Unit	Required	Offered Data
	Power Transformer Equipment			
	MV winding	kV	20	
	Highest system voltage			
	HV winding	kV	110	
	MV winding	kV	20	
	On load tap changer			
	Standard applied	IEC	60214-1	
	Voltage ration and tapings	kV	110/20+/-8x1.25%	
	Contact life (Minimum operation)		200,000	
	Regulation			
	HV winding		8 taps of 1.25%	
	Connection of windings			
	Vector group		Bidder To be specified	
	Rated power frequency withstand voltage			
	HV winding	kV r.m.s	460	
	MV winding	kV r.m.s	50	

Item - No.	Da Afghanistan Brishna Shirkat (DABS) Srobi Substation 40MVA Step-up Power Transformer.			
	Schedule of Technical Data	Unit	Required	Offered Data
	Power Transformer Equipment			
	Rated lightning impulse withstand voltage (1.2/50 μs)			
	HV winding	kV _{peak}	550	
	MV winding	kV _{peak}	125	
	Neutral insulation level	kV r.m.s	38	
	Rated nominal current in primary side	A	209.95	
	Rated nominal current in Secondary side	A	1154.73	
	Rated short-timer current, 3s	kA	31.5	
	Short circuit power of the HV network		Infinite	
	Impedance voltage in % at 75 °C winding temperature on middle tap position at full loading			
	HV-MV	%	10	
	Tolerances			
	For penalty	IEC	60076-1	
	For rejection	IEC	60076-1	
	Losses			
	No load losses at nominal voltage and middle tap position	kW	To be Specified	
	Load losses at 75 °C and full load middle tap position	kW	To be Specified	
	No load current	%	To be Specified	
	Creep age distance	mm/kV	31	
	Capability to withstand short circuits test according to IEC 60076-5		yes	

Item- No.	Da Afghanistan Brishna Shirkat (DABS) Srobi Substation 40MVA Step-up Power Transformer.			
	Schedule of Technical Data	Unit	Required	Offered Data
	Power Transformer Equipment			
	Audible noise level	dB(A)	≤65	
	Characteristics of magnetic circuit			
	Type		Core type	
	Material		Cold rolled grain silicon steel	
	Maximum flux density at rated voltage and frequency		≤1.7	
	Characteristics of bushings			
	Applicable standard			
	Type		Core Type	
	Rated current			
	HV	A	209.95	
	MV	A	1154.73	
	Rated voltage			
	HV	kV	110	
	MV	kV	20	
	Highest equipment voltage			
	HV	kV	123	
	MV	kV	24	
	Insulation level		To be specified	

Item- No.	Da Afghanistan Brishna Shirkat (DABS) Srobi Substation 40MVA Step-up Power Transformer.			
	Schedule of Technical Data	Unit	Required	Offered Data
	Power Transformer Equipment			
	Maximum ambient temperature	°C	45	
	Service altitude	meter	1020	
	Main dimensions			
	Length x width x height	m	To be Specified	
	Gross weight	kg	To be Specified	
	Transport weight	kg	To be Specified	
	Volume of oil/weight of oil	kg/m ³	To be Specified	
	Accessories			
	Oil conservator with filling and drainage valve		Yes	
	Buchholz relay		Yes	
	Pressure relieve device		Yes	
	Silica gel air dryer for the transformer		Yes	
	OLTC to be sealed		Yes	
	Oil level indicator with two contacts		Yes	
	Oil thermometer sensor with two contacts		Yes	
	Winding thermometer sensors with two contacts		Yes	
	Auxiliary voltage			
	Power supply for heaters, lighting, OLTC, fans	VAC	400/230	
	Power supply for auxiliary contacts	VDC	110	

Item- No.	Da Afghanistan Brishna Shirkat (DABS) Srobi Substation 40MVA Step-up Power Transformer.			
	Schedule of Technical Data	Unit	Required	Offered Data
	Power Transformer Equipment			
	Set of valves		yes	
	Name plate		yes	
	Connection diagram		yes	
	Designation plate for all devices		yes	
	Control box for transformer and OLTC		yes	
	IP protection for above	IP	65	
	Tap position indicator		yes	
	Fixation on rails via metal wheels		yes	
12.1	Test Requirements			
	Standard applied	IEC	60076-1	
	Type tests			
	Temperature rise test according to IEC 60076- 2		yes	
	Noise level according to IEC 6076-10		yes	
	Routine tests			
	Measurement of DC resistance according to IEC 60076-1		yes	
	Measuring of voltage ratio and phase displacement according to IEC 60076-1 Clause 11.3		yes	
	Measuring of short circuit impedance and load losses according to IEC 60076-1		yes	
	Measuring of No Load losses and current according to IEC 60076-1 Clause 11.5		yes	
	Dielectric routine tests			
	Lightning impulse withstand test according to IEC 60076-3		yes	
	Switching impulse withstand test according to IEC 60076-3		yes	
	Long duration induced AC voltage tests according to IEC 60076-3 Clause 12.4		yes	

Item- No.	Da Afghanistan Brishna Shirkat (DABS) Srobi Substation 40MVA Step-up Power Transformer.			
	Schedule of Technical Data	Unit	Required	Offered Data
	Power Transformer Equipment			
	Separate source AC voltage test according to IEC 60076-3		yes	
	Separate source DC withstand voltage test including PD test according to IEC 61378-2		yes	
	Auxiliary wiring test according to IEC 60076-3		yes	
	Tests on on-load tap changer according to IEC 60076-1		yes	
	Special tests			
	Short circuit test or calculation according to IEC 60076-5.		yes	
13	Auxiliary transformers			
	Applicable standard	IEC	60076	
	Manufacturer			
	Kind of the transformer	-	Distribution transformer	
	Number of phases	#	3	
	Rated frequency	Hz	50	
	Type of insulating		Mineral oil immersed	
	Mineral oil unused according to	IEC	60296	
	Location of use		Outdoor	
	Type of cooling		ONAN	
	Rated power			
	HV winding	kVA	100	
	LV winding	kVA	100	
	Rated voltage	kV	24	
	HV winding	kV	20	
	LV winding	kV	0.4	
	Highest system voltage			
	HV winding	kV	24	

Item- No.	Da Afghanistan Brishna Shirkat (DABS) Srobi Substation 40MVA Step-up Power Transformer.			
	Schedule of Technical Data	Unit	Required	Offered Data
	auxiliary transformers Equipment			
	LV winding	kV	0.4	
	Connection of windings			
	HV winding		delta	
	LV winding		Star with grounded neutral	
	Vector group		Dyn5	
	Rated power frequency withstand voltage			
	HV winding	kV r.m.s	50	
	LV winding	kV r.m.s	10	
	Rated lightning impulse withstand voltage (1.2/50 μs)			
	HV winding	kV _{peak}	125	
	LV winding	kV _{peak}	-	
	Rated nominal current	A	2.886	
	Impedance voltage in % at 75 °C winding temperature at full loading			
	HV-LV	%	4	
	Tolerances			
	For penalty	IEC	60076-1	
	For rejection	IEC	60076-1	
	Losses			
	No load losses at nominal voltage	kW	To be Specified	
	Load losses at 75 °C and full load position	kW	To be Specified	
	Creepage distance	mm/kV	31	
	Off load TC			
	On the secondary winding			
	Tapings and ration	%	+/-5,+/-2.5	

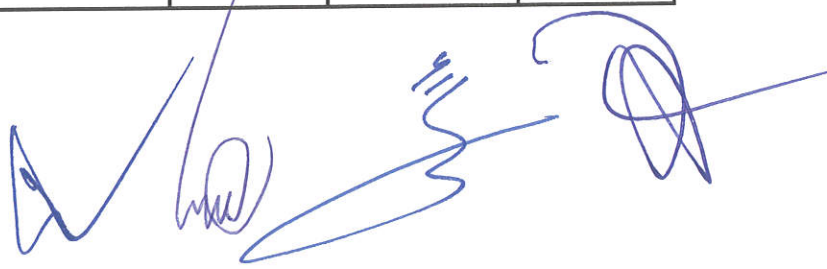
Item- No.	Da Afghanistan Brishna Shirkat (DABS) Srobi Substation 40MVA Step-up Power Transformer.			
	Schedule of Technical Data	Unit	Required	Offered Data
	auxiliary transformers Equipment			
	Noise level	DBA	60	
	Main dimensions			
	Length x width x height	m	To be Specified	
	Gross weight	kg	To be Specified	
	Transport weight	kg	To be Specified	
	Volume of oil/weight of oil	kg/m ³	To be Specified	
	Accessories			
	Sealed transformer		yes	
	Oil thermometer sensor with two contacts		yes	
	Winding thermometer sensors with two contacts		yes	
	Pressure relieve device		yes	
	Name plate		yes	
	Connection diagram		yes	
	Designation plate for all devices		yes	
	Tap position indicator		yes	
	Fixation		To be proposed by the Bidder	
13.1	Test Requirements			
	Standard applied	IEC	60076-1	
	Type tests			
	Temperature rise test according to IEC 60076- 2		yes	
	Noise level according to IEC 6076-10		yes	

REQUIRED AND GUARANTEED TECHNICAL REQUIREMENTS AND
CHARACTERISTICS OF EQUIPMENT

Item- No.	Da Afghanistan Brishna Shirkat (DABS) Srobi Substation 40MVA Step-up Power Transformer.			
	Schedule of Technical Data	Unit	Required	Offered Data
	20 kV Switchyard Equipment			
14	20 kV switchgears for auxiliary supply and distribution			
	Applicable standard	IEC	62271-200 60694	
	Manufacturer		To be specified	
	Type of switchgear	-	Indoor	
	Number of phases	#	3	
	Number of bus bars	#	1	
	Nominal voltage	kV	20	
	Rated voltage	kV	24	
	Rated frequency	Hz	50	
	Rated power frequency withstand voltage	kV r.m.s	50	
	Rated lightning impulse withstand voltage (1.2/50 μ s)	kV peak	125	
	Basic Insulation Level (Bil)	KV	24/50/125	
	Rated short-timer current, 3s	kA	25	
	Rated peak withstand current	kA	62.5	
	Rated current for busbar	A	2000	
	Rated current for Outgoing from Switchgear to Power Transformer	A	2000	
	Rated current for incomer from OHL Switchgear	A	1250	
	Feeder for auxiliary transformers	A	1250	
	Pre-wired		Yes	
	Floor-mounted		Yes	
	Steel sheet thickness	mm	> 2	
	Protection class		IP 65	
	Maximum height	mm	To be specified	
	Maximum width	mm	To be specified	
	Maximum depth	mm	To be specified	

	Front-door material			
	Coloring		RAL 7035	
	Auxiliary Voltage	VDC	110	
	Protocol		IEC 61850	
	Protection system		O/C, E/F, S/C, O/V, U/V	
	Interlock		Mech. & Elec.	
	Metering		KWH and Power Analyzer (A-meter, Volt meter, PF) meter	
	Indications		VCB test, Services , Open , Close	
	Type of drive	-	spring, wound-up by electric motor or manual	
	Power supply for drive	V	110 DC	
	Power supply for auxiliary contacts	V	110 DC	
	Power supply for heaters	VAC	230	

Item- No.	Da Afghanistan Brishna Shirkat (DABS) Srobi Substation 40MVA Step-up Power Transformer.			
	Schedule of Technical Data	Unit	Required	Offered Data
	20 kV Switchyard Equipment			
13 MV Equipment				
	Circuit breaker			
	Applicable standard	IEC	62271-100	
	Manufacturer			
	Type		Vacuum	
	Rated current busbar	A	2000	
	Rated current for Outgoing from Switchgear to Power Transformer	A	2000	
	Rated current for incomer from OHL Switchgear	A	1250	
	Feeder for auxiliary transformers	A	1250	
	Rated short-timer current, 3s	kA	25	
	Rated short circuit current	kA	62.5	
	Rated operating sequence (three-phase auto reclosing)	-	0-0.3s –C0- 3 min – C0	
	Maximum breaking time	ms	60	
	Maximum making time	ms	100	
	Number of tripping coils		2	
	Number of closing coils		1	
	Protection class	-	IP 65	
	Auto-reclosing		three phase	
	Drive	-	3 pole	
	Type of drive	-	spring, wound- up by electric motor and manual	
	Power supply for drive	V	110 DC	
	Power supply for auxiliary contacts	V	110 DC	
	Power supply for heaters	VAC	230	



Item- No.	Da Afghanistan Brishna Shirkat (DABS) Srobi Substation 40MVA Step-up Power Transformer.			
	Schedule of Technical Data	Unit	Required	Offered Data
	20 kV Switchyard Equipment			
C1.4 MV Equipment				
	Earthing switch			
	Rated current	A	2000,1250	
	Rated short time current	kA	25	
	Rated peak withstand current	kA	62.5	
	Current transformer			
	Rated primary current	A	1250	
	Transformer Ratio	A	200-400-800/1A	
	Secondary currents	A	1	
	Rated burden	VA	20	
	Number of secondary windings	#	3	
	Accuracy class Protection		5P20	
	Accuracy class Metering		0.2	
	Voltage transformers			
	Primary voltage	kV	20/√3	
	Secondary voltage	V	100√3 110/3	
	Number of windings	#	3	
	Accuracy class Metering/Protection	%	0.2/P3	
	Type of metal enclosed switchgear		LSC2A	
	Class of partitions and shutters		PM	
	IAC classification required for It 3 seconds	kA	25	
	IAC classification required for Ip	kA	62.5	
	IAC classification required for		F	
	Test Requirements			
	Standard applied	IEC IEC /	62271-200 60694	

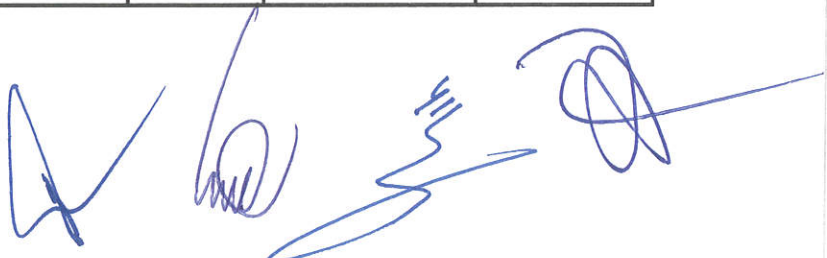
Item- No.	Da Afghanistan Brishna Shirkat (DABS) Srobi Substation 40MVA Step-up Power Transformer.			
	Schedule of Technical Data	Unit	Required	Offered Data
	20 kV Switchyard Equipment			
13 MV Equipment				
	Mandatory Type tests			
	Verification of insulation level according to Spec		yes	
	Measuring of resistance of main contacts according to Spec		yes	
	Temperature rise test according to Spec		yes	
	Short time withstand current and peak withstand current test for the main circuit and earthing switch according to Spec		yes	
	Test to proof making and breaking capacity of the switching devices according to Spec		yes	
	Mechanical operation tests of the switching devices according to Spec		yes	
	Test to verify the protection of persons against access to hazardous parts and the protection of equipment against foreign object according to Spec		yes	
	Test to verify the protection of persons against dangerous electrical effects according to		Yes	
	Tests to assess the effects of arcing due to internal faults according to Spec		yes	
	Electromagnetic compatibility test according to Spec		yes	
	Routine tests			
	Dielectric tests on main circuit according to IEC 60964		yes	
	Tests on auxiliary and control circuits according to IEC 60964		yes	
	Measurement of resistance of main contacts according to IEC 60964.		yes	
	Design and visual check according to IEC 60964		yes	
	Mechanical operations tests according to IEC 62271-200		yes	
	Tests after erection on site according to IEC 62271-200		yes	

REQUIRED AND GUARANTEED TECHNICAL REQUIREMENTS AND CHARACTERISTICS OF EQUIPMENT

14	MV power cables for all substations			
	Applicable standard	IEC	60502 part2	
	Manufacturer		To be specified	
	Type of cable		Single core	
	Insulation material		XLPE	
	Rated voltage Uo/U	kV	12/20	
	Highest voltage	kV	24	
	Category of cable		A	
	Maximum conductor temperature normal operation	°C	90	
	Maximum conductor temperature after short circuit	°C	250	
	Conductor material		Copper	
	Rated current	A	To be specified	
	Cross Section from Switchgear to Power Transformer	Sqmm	300/3Phase	
	Cross Section from OHL to Switchgear	Sqmm	300	
	Cross Section for Auxiliary Transformer	Sqmm	50	
	Nominal thickness of insulation at rated voltage	mm	5.5	
	Weight	Kg/m	To be specified	
	Accessories			
	Cable termination			
	Applicable standard	IEC	60502	
	Type		single- core, one-piece insulator, push-on type	
	Insulation material		silicone rubber	
	Conductor connection		compression type	
14.1	Test requirements			
	Applied standard	IEC	60502- 2011	
	Routine tests on manufactured length			
	Measurement of resistance of conductor according to Clause 16.2		yes	



	Partial discharge test according to Spec		yes	
	Voltage test according to Spec		yes	
	Sample tests			
	Conductor examination according to Spec		yes	
	Check of dimensions according to Spec		yes	
	Voltage test according to Spec		yes	
	Hot set test according to Spec		yes	
	Type tests			
	Partial discharge test according to Spec		yes	
	Bending tests followed by partial discharge tests according to Spec		yes	
	Tan δ measurement according to Spec		yes	
	Heat cycle voltage tests followed by partial discharge test according to Spec		yes	
	Impulse voltage test followed by voltage test according to Spec		yes	
	Voltage test for 4 hours according to Spec		yes	
15	0.4 kV LV power cables			
	Applied standard	IEC	60502-1	
	Manufacturer		To be specified	
	Type of cable		To be Specified	
	Insulation material		XLPE	
	Rated voltage U ₀ /U	kV	0.6/1	
	Highest voltage	kV	1.2	
	Category of cable		A	
	Maximum conductor temperature normal operation	°C	70	
	Maximum conductor temperature after short circuit	°C	160	
	Conductor material		Copper	
	Nominal thickness of insulation at rated voltage	mm	To be Specified	



Item- No.	Da Afghanistan Brishna Shirkat (DABS) Srobi Substation 40MVA Step-up Power Transformer.			
	Schedule of Technical Data	Unit	Required	Offered Data
	MV, LV cables			
16 MV, LV power cables, control cables and cable trays				
	Weight	Kg/m	To be Specified	
	Accessories			
	Cable termination			
	Standard applied	IEC	60502-1	
	Type		To be Specified	
	Insulation material		To be Specified	
	0.4 kV LV power cables three core			
	Applied standard	IEC	50502-1	
	Manufacturer		To be Specified	
	Type of cable		To be Specified	
	Insulation material		XLPE	
	Rated voltage U ₀ /U	kV	0.6/1	
	Highest voltage	kV	1.2	
	Category of cable		A	
	Maximum conductor temperature normal operation	°C	70	
	Maximum conductor temperature after short circuit	°C	160	
	Conductor material		Copper	
	Nominal thickness of insulation at rated voltage	mm	To be Specified	
	Weight	Kg/m	To be Specified	
	Accessories			
	Standard applied	IEC	60502-1	
	Type		To be Specified	
	Insulation material		To be Specified	

Item- No.	Da Afghanistan Brishna Shirkat (DABS) Srobi Substation 40MVA Step-up Power Transformer.			
	Schedule of Technical Data	Unit	Required	Offered Data
	MV, LV cables			
16 HV, MV, LV power cables, control cables and cable trays				
	0.4 kV LV power cables four core			
	Applied standard	IEC	60502-1	
	Manufacturer		To be Specified	
	Type of cable		To be Specified	
	Insulation material		XLPE	
	Rated voltage Uo/U	kV	0.6/1	
	Highest voltage	kV	1.2	
	Category of cable		A	
	Maximum conductor temperature normal operation	°C	70	
	Maximum conductor temperature after short circuit	°C	160	
	Conductor material		Copper	
	Nominal thickness of insulation at rated voltage	mm	To be Specified	
	Weight	Kg/m	To be Specified	
	Accessories			
	Cable termination			
	Standard applied	IEC	60502-1	
	Type		Outdoor, indoor	
	Insulation material		XLPE	
	0.4 kV control cables			
	Applied standard	IEC	60502-1	
	Manufacturer		To be Specified	
	Type of cable		To be Specified	
	Insulation material		XLPE	
	Rated voltage Uo/U	kV	0.6/1	
	Highest voltage	kV	1.2	

Item- No.	Da Afghanistan Brishna Shirkat (DABS) Srobi Substation 40MVA Step-up Power Transformer.			
	Schedule of Technical Data	Unit	Required	Offered Data
	MV, LV cables			
16 MV, LV power cables, control cables and cable trays				
	Category of cable		B	
	Maximum conductor temperature normal operation	°C	70	
	Maximum conductor temperature after short circuit	°C	160	
	Conductor material		Copper	
	Nominal thickness of insulation at rated voltage	mm	To be Specified	
	Weight	Kg/m	To be Specified	
	Accessories		To be Specified	
	Cable termination			
	Standard applied	IEC	60502-1	
	Type		Indoor, outdoor	
	Insulation material		XLPE	
16.1	Test requirements			
	Applied standard	IEC	60502-1-2011	
	Routine tests			
	Measurement of resistance of conductor according to Clause 15.2		yes	
	Voltage test according to Clause 15.3		yes	
	Sample tests			
	Conductor examination according to Clause 16.4		yes	
	Check of dimensions according to Clause 16.5 to 16.8		yes	
	Type tests			
	Insulation resistance at ambient temperature according to Clause 17.1		yes	
	Insulation resistance at maximum conductor temperature according to Clause 17.2		yes	

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Item- No.	Da Afghanistan Brishna Shirkat (DABS) Srobi Substation 40MVA Step-up Power Transformer.			
	Schedule of Technical Data	Unit	Required	Offered Data
	MV, LV cables			
16 , MV, LV power cables, control cables and cable trays				
	Voltage test for 4 hours according to Clause 17.3		yes	
16.2	DC cables			
	Applied standard	IEC	60502-1	
	Manufacturer		To be Specified	
	Type of cable		To be Specified	
	Insulation material		PVC	
	Rated voltage Uo/U	kV	0.6/1	
	Highest voltage	kV	1.2	
	Category of cable		B	
	Maximum conductor temperature normal operation	°C	70	
	Maximum conductor temperature after short circuit	°C	160	
	Conductor material		Copper	
	Nominal thickness of insulation at rated voltage	mm	To be Specified	
	Weight	Kg/m	To be Specified	
	Accessories			
	Cable termination			
	Standard applied	IEC	60502-1	
	Type		To be Specified	
	Insulation material		To be Specified	
16.2.1	Test requirements			
	Applied standard	IEC	60502-1-2011	
	Routine tests			
	Measurement of resistance of conductor according to Clause 15.2		yes	

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Item- No.	Da Afghanistan Brishna Shirkat (DABS) Srobi Substation 40MVA Step-up Power Transformer.			
	Schedule of Technical Data	Unit	Required	Offered Data
	MV, LV cables			
16 MV, LV power cables, control cables and cable trays				
	Voltage test according to IEC		yes	
	Sample tests			
	Conductor examination according to IEC		yes	
	Check of dimensions according to IEC		yes	
	Type tests			
	Insulation resistance at ambient temperature according to IEC		yes	
	Insulation resistance at maximum conductor temperature according to IEC		yes	
	Voltage test for 4 hours according to IEC		yes	
16.3	Lighting cables			
	Applied standard	IEC	60227	
	Manufacturer		To be Specified	
	Type of cable		To be Specified	
	Insulation material		To be Specified	
	Rated voltage U ₀ /U	kV	0.45/0.75	
	Highest voltage	kV	0.75	
	Category of cable		B	
	Maximum conductor temperature normal operation	°C	To be Specified	
	Maximum conductor temperature after short circuit	°C	To be Specified	
	Conductor material		copper	
	Nominal thickness of insulation at rated voltage	mm	To be Specified	
	Weight	Kg/m	To be Specified	
	Accessories			

Item- No.	Da Afghanistan Brishna Shirkat (DABS) Srobi Substation 40MVA Step-up Power Transformer.			
	Schedule of Technical Data	Unit	Required	Offered Data
	MV, LV cables			
16 MV, LV power cables, control cables and cable trays				
	Cable termination			
	Standard applied	IEC	60227-1	
	Type		To be Specified	
	Insulation material		To be Specified	
16.3.1	Test requirements			
	Applied standard	IEC	60227-2-	
	Heat resistant cables			
	Applied standard	IEC	To be Specified	
	Manufacturer		To be Specified	
	Type of cable		To be Specified	
	Insulation material		PVC	
	Rated voltage Uo/U	kV	0.6/1	
	Highest voltage	kV	1.2	
	Ambient temperature	°C	60	
	Max conductor temperature	°C	180	
	Test requirements			
	To be defined by the bidder		To be Specified	
16.3.2	Cable trays			
	Applicable standard	IEC	To be Specified	
	Manufacturer		To be Specified	
	Material		steel	
	Corrosion protection		Hot deep galvanization	

11/11/11

REQUIRED AND GUARANTEED TECHNICAL REQUIREMENTS AND CHARACTERISTICS OF EQUIPMENT

Item- No.	Da Afghanistan Brishna Shirkat (DABS) Srobi Substation 40MVA Step-up Power Transformer.			
	Schedule of Technical Data	Unit	Required	Offered Data
	AC DC installations			
17 AC DC Installations				
17.1	0.4 kV switchgear			
	Applicable standard	IEC	61439-1 and 2	
	Assembly Manufacturer		To be specified	
	Type of switchgear	-	Indoor	
	Number of phases	#	3	
	Number of bus bars	#	1	
	Nominal voltage	kV	0.4+-7.5%	
	Rated voltage	kV	1	
	Rated frequency	Hz	50	
	Rated power frequency withstand voltage	kV r.m.s	To be specified	
	Rated lightning impulse withstand voltage (1.2/50 μs)	kV _{peak}	To be specified	
	Rated short-time current, 3s	kA	10	
	Rated peak withstand current	kA	25	
	Rated current for busbar	A	500	
	Rated current for distribution feeders	A	300	
	Type of drive	-	spring, wound-up by electric motor or manual	
	Power supply for drive	V	110 DC	
	Power supply for auxiliary contacts	V	110 DC	
	Power supply for heaters	VAC	230	

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Item- No.	Da Afghanistan Brishna Shirkat (DABS) Srobi Substation 40MVA Step-up Power Transformer.			
	Schedule of Technical Data	Unit	Required	Offered Data
	MV, LV cables			
16 MV, LV power cables, control cables and cable trays				
	Thickness of galvanization	μm	≥100	
16.3.4	Test requirements			
	Visual inspection		yes	
	Galvanization test		yes	


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Item- No.	Da Afghanistan Brishna Shirkat (DABS) Srobi Substation 40MVA Step-up Power Transformer.			
	Schedule of Technical Data	Unit	Required	Offered Data
	AC DC installations			
17 AC DC Installations				
	Current transformer			
	Rated primary current	A	300	
	Secondary currents	A	1	
	Number of secondary windings	#	2	
	Accuracy class Metering/protection		1.5/10P10	
	Dimensions of the individual panels L x W x H	mm	To be Specified	
	Weight of the panels	kg	To be Specified	
17.2	Test Requirements			
	Standard applied	IEC	61439-1,2	
	Verifying tests			
	Strength of material and parts according to IEC		yes	
	Verification of the degree protection of the enclosure according to IEC		yes	
	Verification of Creepage distances according to IEC		yes	
	Effective continuity between parts and PE according to IEC		yes	
	Effectiveness of the assembly for external faults according to IEC		yes	
	Power frequency withstand voltage test according to IEC		yes	
	Impulse withstand voltage test according to IEC		yes	
	Temperature rise test according to IEC		yes	
	Short circuit withstand test according to IEC		yes	
	Electromagnetic compatibility test according to IEC		yes	
	Mechanical operation tests according to IEC		yes	
	Routine verifying tests			



Item- No.	Da Afghanistan Brishna Shirkat (DABS) Srobi Substation 40MVA Step-up Power Transformer.			
	Schedule of Technical Data	Unit	Required	Offered Data
	AC DC installations			
16 AC DC Installations				
	Dielectric tests on main circuit		yes	
	Tests on auxiliary and control circuits		yes	
	Design and visual check		yes	
	Mechanical operations tests		yes	
17.3	DC distribution panels		To be Specified	
	Applicable standard	IEC	61439-1 and 2	
	Assembly Manufacturer			
	Type of switchgear	-	Indoor	
	Number of phases	#	2	
	Number of bus bars	#	1	
	Nominal voltage	DCV	110	
	Rated power frequency withstand voltage	kV r.m.s	2.5	
	Rated short-time current, 3s	kA	6	
	Rated peak withstand current	kA	15	
	Rated current for busbar	A	To be Specified	
	Rated current for distribution feeders	A	To be Specified	
	Power supply for heaters	VAC	230	
	Insulation resistance	mOhm	>125	
17.4	Test Requirements			
	Standard applied	IEC	61439-1,2	

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Item- No.	Da Afghanistan Brishna Shirkat (DABS) Srobi Substation 40MVA Step-up Power Transformer.			
	Schedule of Technical Data	Unit	Required	Offered Data
	AC DC installations			
17 AC DC Installations				
	Verifying tests			
	Strength of material and parts according to ICE		yes	
	Verification of the degree protection of the enclosure according to IEC		yes	
	Verification of Creepage distances according to IEC		yes	
	Effective continuity between parts and PE according to IEC		yes	
	Effectiveness of the assembly for external faults according to IEC		yes	
	Power frequency withstand voltage test according to IEC		yes	
	Impulse withstand voltage test according to IEC		yes	
	Temperature rise test according to IEC		yes	
	Short circuit withstand test according to IEC		yes	
	Electromagnetic compatibility test according to Clause 10.12		yes	
	Mechanical operation tests according to IEC		yes	
	Routine verifying tests			
	Dielectric tests on main circuit		yes	
	Tests on auxiliary and control circuits		yes	
	Design and visual check		yes	
	Mechanical operations tests		Yes	
17.5	110 VDC Battery chargers			
	Applicable standard	IEC	60146	
	Manufacturer		To be Specified	
	Type		indoor	
	Type of controls		Thyristor control	
	Type of cooling		Self-ventilating	



Item- No.	Da Afghanistan Brishna Shirkat (DABS) Srobi Substation 40MVA Step-up Power Transformer.			
	Schedule of Technical Data	Unit	Required	Offered Data
	AC DC installations			
17 AC Installations				
	Regulated voltage primary	V	400+10-15%	
	Rectifier output regulated voltage secondary	DCV	110	
	Output Rated current	A	50	
	Rated frequency	Hz	50	
	Efficiency	%	96	
	IP protection	IP	65	
	Mounted in metal cabinet		yes	
	Charging characteristics		To be Specified	
	Constant voltage range	V		
	Continuous charging voltage per cell and tolerances	V +/-		
	Mode of operation		To be Specified	
	Noise level	d(B)A	To be Specified	
	Main dimensions Height x width x dept	mm	To be Specified	
	Weight	kg	To be Specified	
	Test requirements			
	To be indicated by the Bidder		To be Specified	
17.7	110 VDC Batteries			
	Applicable standard	IEC	60086-1	
	Manufacturer		To be Specified	
	Type		lead acid sealed	
	Voltage per cell	VDC	2	
	Number of cells	#	1	
	Nominal voltage of the battery	VDC	110	
	Installed on wooden rack		yes	
	Capacity	AH	400	
	Battery Rack (anti Acid)	Set	As per Batteries dimensions	
	Set of maintenance tools	///	yes	

	Dimensions of the battery rack		To be Specified	
	Length x width x height	mm	To be Specified	
	Weight of the battery	kg	To be Specified	
	Test requirements			
	To be indicated by the Bidder		To be Specified	

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REQUIRED AND GUARANTEED TECHNICAL REQUIREMENTS AND CHARACTERISTICS OF EQUIPMENT

Item- No.	Da Afghanistan Brishna Shirkat (DABS) Srobi Substation 40MVA Step-up Power Transformer.			
	Schedule of Technical Data	Unit	Required	Offered Data
	Lighting and small power installations			
17 Lighting and small power installations				
17.9	Lighting installation			
	Applied standard	IEC	60968	
	Applied standard	IEC	60969	
	Applied standard	IEC	62560	
	Applied standard	IEC	62612	
	Manufacturer		To be Specified	
	Sub-distribution boards		To be Specified	
	according to specs			
	Illumination according to the specs Section			
	Emergency lighting			
	Operation voltage	VDC	110	
	Lighting intensity	Lux	50	
	Outdoor lighting			
	Lighting intensity	Lux	14	
	Fence lighting		yes	
17.10	Test requirements			
	Measurement of lighting intensity after installation for normal lighting, emergency lighting and outdoor lighting			
18.1	Small power installation			
	Requirement according to Specs			
	Manufacturer		To be Specified	
	Domestic outlets according to Section			
18.2	Test requirements			
	Visual inspection after installation			

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REQUIRED AND GUARANTEED TECHNICAL REQUIREMENTS AND CHARACTERISTICS OF EQUIPMENT

Item- No.	Da Afghanistan Brishna Shirkat (DABS) Srobi Substation 40MVA Step-up Power Transformer.			
	Schedule of Technical Data	Unit	Required	Offered Data
	Earthing and lightning systems			
19 Earthing and lightning protection systems				
19.1	Earthing system			
	Applied standard	IEEE IEC	80 60621	
	Manufacturer		To be specified	
	Calculation of the length of the earthing mesh conductor	IEEE	80	
	Calculation of step voltage	IEEE	80	
	Calculation of touch voltages	IEEE	80	
	Material for electrodes		stranded copper conductor	
	Minimum cross section of the grid conductor	mm2	120	
	Copper clad Earthing rod	mm2	To be specified	
	Mode of connection of copper conductor in the ground		compression or thermo weld	
	Material for fixing the earthing conductor clamps		by compression	
	Material of clamps for earthing conductor connections		tinned copper	
	Material for bolts and nuts		galvanized steel	
	Method of connecting the earthing conductor to the steel structure		bolts, nut, washers and lock washers	
	Total conductor electrode length	m		
	Minimum dept of conductor burring	m	0.8	
	Earthing resistance of the complete substation	Ω	<0.5	
19.2	Test requirements			

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Item- No.	Da Afghanistan Brishna Shirkat (DABS) Srobi Substation 40MVA Step-up Power Transformer.			
	Schedule of Technical Data	Unit	Required	Offered Data
	Earthing and lightning systems			
19 Earthing and lightning protection systems				
	Measurement of earthing resistance after installation		yes	
	Measurement of earthing resistance before commissioning		yes	
19.3	Lightning protection system			
	Applied standard	IEC	62305 and VDE 185	
	Manufacturer			
	Design		Rolling sphere principle	
	Material		Steel rods	
	Cross section	mm2	50	
	System coverage		whole substation area	
	The system to comply with the specification		yes	
19.4	Test requirements			
	Visual inspection after installation		yes	
	Continuity tests after installation		yes	

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REQUIRED AND GUARANTEED TECHNICAL REQUIREMENTS AND CHARACTERISTICS OF EQUIPMENT

Item- No.	Da Afghanistan Brishna Shirkat (DABS) Srobi Substation 40MVA Step-up Power Transformer.			
	Schedule of Technical Data	Unit	Required	Offered Data
	Protection and Control			
20 Protection and Control				
	General			
	Relays	-	Digital (Numeric)	
	the BCU has Energy Analyzer should be supporting TCP Modbus and RTU Modbus		IEC 60870-5-104 IEC 61850	
	standard	-	IEC 60255	
	maximum ambient temperature for rated accuracy	°C	40	
	maximum temperature by storage	°C	60	
	maximum humidity	%	80	
	electromagnetic compatibility tests	-	EN 50081 EN 50082-1 IEC 60255-6	
	insulation tests	-	IEC 60255-5 IEC 60870- 2-1	
	mechanical tests (vibration and shock stress)	-	IEC 60255-2-1 IEC 60068-2	
	other: all other Norms as specified on technical document	-	IEC	
	Contact rating			
	make and carry for 0.2 s	VA		
	break			
	operation indicator			
	manufacturer references	year	3	
	Panels			
	standard	-	IEC 60529	


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Item- No.	Da Afghanistan Brishna Shirkat (DABS) Srobi Substation 40MVA Step-up Power Transformer.			
	Schedule of Technical Data	Unit	Required	Offered Data
	Protection and Control			
20 Protection and Control				
	protection class	-	IP 65	
	pre-wired	-	Yes	
	floor-mounted	-	Yes	
	steel sheet thickness	mm	> 2	
	maximum height	mm	2000	
	maximum width	mm	800	
	maximum depth	mm	600	
	front-door material	-	Glass	
	coloring	-	RAL 7035	

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Item- No.	Da Afghanistan Brishna Shirkat (DABS) Srobi Substation 40MVA Step-up Power Transformer.			
	Schedule of Technical Data	Unit	Required	Offered Data
	Protection and Control			
20 Protection and Control				
	Power Transformer differential protection (87T)			
	Type		To be specified	
	Manufacturer		To be specified	
	Operating principle		To be specified	
	Rated values		To be specified	
	phase current	A	1	
	System frequency	Hz	50	
	Auxiliary Voltage	VDC	110	
	Current settings			
	ranges of values of restrained protection	I/I _{no}	0.05 – 2.00	
	ranges of values of unrestrained protection	I/I _{no}	0.5 – 35.00	
	ranges of times	sec	0.00 – 30.00	
	Integrated functions		yes	
	back-up overcurrent (eventual directional)		yes	
	back-up earth fault (eventual directional)		yes	
	breaker-failure		yes	
	others		yes	
	Remote communication		yes	
	protocol	-	IEC 61850	
	transmission rate	Baud	9600	
	Power Transformer restricted earth fault protection (87N)			
	Type		To be specified	
	Manufacturer		To be specified	
	Operating principle		To be specified	
	Rated values		To be specified	
	phase current	A	1	
	System frequency	Hz	50	
	Auxiliary Voltage	VDC	110	

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Item- No.	Da Afghanistan Brishna Shirkat (DABS) Srobi Substation 40MVA Step-up Power Transformer.			
	Schedule of Technical Data	Unit	Required	Offered Data
	Protection and Control			
20 Protection and Control				
	Current settings			
	ranges of values of restricted protection	I/I _{nO}	0.05 – 2.00	
	ranges of values of unrestricted protection	I/I _{nO}	0.5 – 35.00	
	ranges of times	sec	0.00 – 30.00	
	Remote communication			
	protocol	-	IEC 61850	
	transmission rate	Baud	9600	
	Busbar (Bus Arrangement) differential protection (ANSI: 87BB)		Relay Team	
	Type	-	To be specified	
	Manufacturer	-	To be specified	
	Place of manufacture	-	To be specified	
	Rated values		To be specified	
	System frequency	Hz	50	
	phase current	A	1	
	Auxiliary voltage	VDC	110	
	Settings			
	ranges of values of restricted protection	I/I _{nO}	0.05 – 2.00	
	ranges of values of unrestricted protection	I/I _{nO}	0.5 – 35.00	
	ranges of times	sec	0.00 – 30.00	
	CT supervision			
	Operating time	ms		
	DC burden	W		
	AC burden	Ohm		
	Remote communication			
	protocol	-	IEC 61850	
	transmission rate	Baud	9600	
	Back-up overcurrent protection (ANSI:			

Item- No.	Da Afghanistan Brishna Shirkat (DABS) Srobi Substation 40MVA Step-up Power Transformer.			
	Schedule of Technical Data	Unit	Required	Offered Data
	Protection and Control			
20 Protection and Control				
	50/51&50N/51N)			
	Type	-	To be specified	
	Manufacturer	-	To be specified	
	Place of manufacture	-	To be specified	
	Rated values			
	System frequency	Hz	50	
	phase current	A	1	
	Auxiliary voltage	VDC	110	
	Settings			
	ranges of current values	A	0.10 – 35.00	
	ranges of times	sec	0.00 – 30.00	
	minimum number of DTL stages for 50/51	-	2	
	minimum number of IDMT stages for 50/51	-	2	
	minimum number of DTL stages for 50N/51N	-	2	
	minimum number of IDMT stages for 50N/51N	-	2	
	Remote communication			
	protocol	-	IEC 61850	
	transmission rate	Baud	9600	
	Voltage protection (ANSI: 27/59)			
	Manufacturer		To be specified	
	Place of manufacture		To be specified	
	Rated values			
	System frequency	Hz	50	
	Auxiliary voltage	VDC	110	
	Settings			
	Remote communication			
	protocol	-	IEC 61850	
	transmission rate	Baud	9600	

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Item- No.	Da Afghanistan Brishna Shirkat (DABS) Srobi Substation 40MVA Step-up Power Transformer.			
	Schedule of Technical Data	Unit	Required	Offered Data
	Protection and Control			
20 Protection and Control				
	Breaker failure protection (ANSI: 50BF)			
	Manufacturer		To be specified	
	Place of manufacture		To be specified	
	Rated values			
	System frequency	Hz	50	
	phase current	A	1	
	Auxiliary voltage	VDC	110	
	Settings			
	ranges of current flow monitoring	A	0.05 – 20.00 or 0.25 - 100	
	ranges of times	sec	0.00 – 30.00	

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Item- No.	Da Afghanistan Brishna Shirkat (DABS) Srobi Substation 40MVA Step-up Power Transformer.			
	Schedule of Technical Data	Unit	Required	Offered Data
	Protection and Control			
20 Protection and Control				
	Synchro check Relay (25)			
	Manufacturer		To be Specified	
	Place of manufacture		To be Specified	
	Rated values			
	frequency	Hz	50	
	Auxiliary voltage	V	110	
	Settings			
	ΔU measurement	V	1 - 60	
	Δφ measurement	degree	2 -80	
	Remote communication			
	protocol	-	IEC 61850	
	transmission rate	Baud	9600	
	Transmission medium		FOC	
	Transmission rate	MBit/s	100	
	Ethernet switches			
	Number of Ethernet switches			
	Manufacturer			
	Location of manufacturing site			
	Type			
	Management		Port Monitoring; RMON; SNMP	
	Alarm indication		Diagnostics LEDs	
	Security		Disabling of Ports; Authentication (IEEE802.1x)	
	Number of optical ports		≥ 10	
	Minimal distance covered	m	> 100 m	



Item- No.	Da Afghanistan Brishna Shirkat (DABS) Srobi Substation 40MVA Step-up Power Transformer.			
	Schedule of Technical Data	Unit	Required	Offered Data
	Protection and Control			
20 Protection and Control				
	Service unit			
	A PC with all Protection Relay and SCADA system Software and Backup.		Laptop	
	Manufacturer		To be specified	
	Power supply from UPS	VAC	230	
	Graphic Dedicate	GB	8	
	RAM	GB	16	
	Hard disk	GB	≥ 1000 SSD	
	Screen size	inch	14	
	Pixels		1280 x 1024	
	Generation		12	
	Chair	set	1	
	Disk	set	1	

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