BHARAT HEAVY ELECTRICAL LIMITED

Specification No.	7302
Item No.	SP/ELEC./1/7/7302
Location	TESTING
Quantity	01 No.

SPECIFICATION CUM COMPLIANCE CERTIFICATE OF STATIC DRIVE (STATIC FREQUENCY CONVERTER)

NOTE:-

1. Vendor must submit complete information against clause no. 13 (Qualifying Condition). The offer meeting this clause would only be processed.
2. The "Offered" Column and where applicable, the "Deviations" & "Remarks" Column of this format shall be filled in by the Vendor and submitted along with the offer. Inadequate / incomplete, ambiguous, or unsustainable information against any of the clauses of the specifications/requirements shall be treated as non-compliance.
3. The offer and all documents enclosed with offer should be in English language only.

NAME & ADDRESS OF THE SUPPLIER :	NAME & ADDRESS OF THE INDIAN AGENT :
TELEPHONE NOS.:	TELEPHONE NOS.:
FAX NOS.:	FAX NOS.:
E-MAIL ADDRESS :	E-MAIL ADDRESS :

SCOPE: DESIGN,SUPPLY, ERECTION & COMMISSIONING OF STATIC DRIVE SYSTEM (STATIC FREQUENCY CONVERTER) COMPLYING WITH SPECIFICATIONS AS BELOW

SNO	DESCRIPTION FOR BHEL REQUIREMENT	SPECIFIED / TO BE CONFIRMED BY	OFFERED	DEVIATIONS	REMARKS
1.0	**PURPOSE & WORKPIECE MATERIAL**				
1.1	Purpose:				
	Static Frequency Converter (SFC) is envisaged for providing power supply to conduct factory acceptance tests in line with IS 2026 & IEC 60076 on Power Transformers including induced over volatge test, PD measurement (ACSD, ACLD /IVPD), Over excitation current measurement, No load loss measurement, voltage impedance measurement, load loss measurement and heat run test etc. The connection of SFC and testing scheme envisaged by BHEL has been depicted in the enclosed Schematic Drawing No.WEX/MGH-SFC001 Sheet: 01 of 02), dated 22.01.2019, wherein SFC has been shown as ablock. The various system components of this SFC block shall be indicated in a SLD with conceived /designed/envisaged capacity of the various items. The SFC with its accessories and allied components shall be sufficient to carry out all tests as per job profile of various test points as indicated in WEX/MGH-SFC001 (Sheet 02 of 02) dated 22/01/2019	Vendor to note, comply & confirm			

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SNO	DESCRIPTION FOR BHEL REQUIREMENT	SPECIFIED / TO BE CONFIRMED BY	OFFERED	DEVIATIONS	REMARKS
1.2	**Quantity : 01 Set**	Vendor to note, comply & confirm			
2.0	**SPECIFICATION:**				
2A)	**ITEMS TO BE PROVIDED BY BHEL AS PER SPECS TO BE PROVIDED BY VENDOR**				
2A.1	**Step Down Transformer**	**In BHEL's scope**			
2A.1.1	The standard Input Power Supply available in BHEL is 3 Phase, 11kV. A Stepdown Transformer may be required for matching the input voltage of Static Frequency Converter. The vendor will have to specify the broad specifications of the transformer suitable for interface with SFC such that the all the routine and type tests as per IS 2026 & IEC 60076 can be performed on transformers in the manufacturing range of BHEL (tentative rating mentioned in drawing no. WEX/MGH-SFC001 Sheet-02). Based on the design/specifications provided by vendor, the Transformer shall be manufactured by BHEL and made available during E&C of SFC. **Broad typical specifications of the Step-down Transformer required by BHEL to manufacture the transformer are listed as below:**	Vendor to note, provide Design/ Specification of the transformer			
2A.1.1.1	Rated Input Primary Voltage: 11 kV.	Vendor to confirm			
2A.1.1.2	Rated secondary voltage (as per frequency converter input voltage)	Vendor to furnish			
2A.1.1.3	Tap Changer (whether required). If yes then whether Off ciruit tapping range, step size,no of steps etc	Vendor to furnish			
2A.1.1.4	Rated Frequency: 50 Hz ± 3%	Vendor to confirm			
2A.1.1.5	Rated Power: (Any overload requirement)	Vendor to furnish			
2A.1.1.6	Duty Cycle @ 50 Hz ± 3% : Continuous	Vendor to furnish			
2A.1.1.7	% Impedance, at rated voltage and if required at extreme taps	Vendor to furnish			
2A.1.1.8	Cooling : ONAN, ONAF OR OFAF	Vendor to furnish			
2A.1.1.9	Vendor to specify if the transformer shall be subjected to harmonics in Voltage/ current. If yes, the % of each of the harmonic spectrum i.e 3rd,5th, 7th etc to be specified	Vendor to furnish			
2A.1.1.10	The transformer shall be tested to be as per relevant standard IS 2026/ IEC 60076	Vendor to confirm & specify if any special test requirement			
2A.1.1.11	All other technical requirements viz temperature rise etc shall be as per IS 2026.	Vendor to confirm			
2A.1.1.12	Any limitation in size. Any specific requirement wrt termination requirement (if any) on terminals viz. oil-air/OIP/Porcelain bushing, cable box or any other specific requirement (if any) to be mentioned	Vendor to furnish			
2A.2	**Step Up Intermediate Transformer**	**In BHEL's scope**			

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SNO	DESCRIPTION FOR BHEL REQUIREMEN.	SPEC..IED / TO BE ONFIRMED BY	OFFERED	DEVIATIONS	REMARKS
2A.2.1	The Step-Up Intermediate Transformer to transform the output voltage of SFC to intermediate voltage level shall also be required to integrate the SFC into the existing Transformer Testing network. For sizing this transformer, the connection and testing scheme envisaged by BHEL has been depicted in the enclosed Schematic Drawing **No.WEX/MGH-SFC001 Sheet-1, dated 22.01.2019** In the schematic drawing, it can be seen that the output of Step-up Intermediate Transformer will be either directly used alongwith a capacitor bank for testing small transformers (Test Point-3) or shall be connected to another Matching Transformer together with capacitor bank in Test Point 1, 4 & 5. All the Matching Transformer's LV to be fed by SFC, are rated for 11 kV whereas the HV of the same conform to the particular kV class of the JOB (Transformer under Test) under manufacturing range of BHEL.	vendor to note & confirm			
2A.2.2	The typical rating of the Transformers to be tested at Test Point-1, 2, 3, 4 & 5 have also been listed in drawing no. WEX/MGH-SFC001 Sheet-02. With this data, the MVA rating and winding configuration of Step-Up Intermediate Transformer will have to be designed by vendor. At Test Point-3, the typical rating of the envisaged JOB (Transformer under Test) is 40MVA, 11/6.9kV with 12% impedance. For heatrun test of this transformer, the voltage/current requirement is of the order of 2.0 kV/2300 Amps. Hence the Step-up Intermediate Transformer of SFC has to be sized in such a way as to ensure that full power of SFC (4 MVA) is available at voltage of the order of 2.5 kV and balance reactive current requirement shall be met with the connected capacitor bank. As per our understanding two methodologies can be adopted: **Alternative-1**: Step-up Intermediate Transformer having Tap Changer on 11 kV secondary side. Tap changer to have 4-6 taps so as to deliver 3.0 kV- 11.0 kV at the output. The winding design to be such that full 4 MVA SFC power is available at all TAP positions. Any specific Impedance requirement at each tap (if any) to be specified. Vendor to take care of regulation wrt load and pf etc. **Alternative-2:** The Step-up Intermediate Transformer can have two HV Winding per phase connected in SERIES/PARALLEL, together with three phases connected in STAR/DELTA configuration. With this arrangement full 4 MVA SFC power will be available at 3.18kV when windings are connected in PARALLEL DELTA configuration.	vendor to note & confirm			

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SNO	DESCRIPTION FOR BHEL REQUIREMENT	SPECIFIED / TO BE CONFIRMED BY	OFFERED	DEVIATIONS	REMARKS
2A.2.3	The vendor will have to provide the design/specifications of the Step-up Intermediate Transformer such that the SFC is suitable for routine and type tests as per IS 2026 & IEC 60076 testing all the transformers in the manufacturing range of BHEL (tentative rating mentioned in drawing no. WEX/MGH-SFC001 Sheet-02). The Transformer shall be manufactured by BHEL and made available during E&C of SFC. Broad typical specifications of the Step-up Intermediate Transformer required by BHEL to manufacture the transformer are listed as below:	Vendor to provide Design/ Specification of the transformer for both alternatives. Based on data BHEL will select the alternative			
2A.2.3.1	Rated primary voltage: As per frequency converter output	Vendor to furnish			
2A.2.3.2	Rated secondary voltage at maximum Tap/Configuration: 11 kV	BHEL's requirement			
2A.2.3.3	Rated secondary voltage at minimum Tap/Configuration: 3.16 kV	BHEL's requirement			
2A.2.3.4	Rated Frequency: 50 Hz to 200 Hz	Vendor to furnish			
2A.2.3.5	Rated Power : 4 MVA at all Tap/Configuration	Vendor to furnish			
2A.2.3.6	Duty Cycle @ 50 Hz : Continuous	Vendor to furnish			
2A.2.3.7	Vendor to specify if the transformer shall be subjected to harmonics in Voltage/ current. If yes, the % of each of the harmonic spectrum i.e 3rd,5th, 7th etc to be specified				
2A.2.3.8	Cooling : ONAN, ONAF OR OFAF	Vendor to furnish			
2A.2.3.9	The transformer shall be tested to be as per relevant standard IS 2026/ IEC 60076	Vendor to confirm & specify if any special test requirement			
2A.2.3.10	All other technical requirements viz temperature rise etc shall be as per IS 2026.	Vendor to confirm			
2A.2.3.11	Any limitation in size. Any specific requirement wrt termination requirement (if any) on terminals viz. oil-air/OIP/Porcelain bushing, cable box or any other specific requirement (if any) to be mentioned	Vendor to specify			
2A.2.4	Broad rating of capacitor banks have been indicated in the attached drawing no. WEX/MGH-SFC001. Vendor to comment on its capacity/compatibility with the SFC and the whole system adequacy for testing of all transformers listed in drawing no. WEX/MGH-SFC001 Sheet-02.	Vendor to specify & comment			
2B	**ITEMS TO BE PROVIDED BY VENDOR**				
	The static drive should have the following components and specification				
2B.1	**Static Frequency Converter(SFC)**				
	The Static Frequency Converter should be suitable for conducting all routine and special tests on transformer as per IS 2026 and IEC 60076 part 1 to 3. the source must feed active as well as reactive poweer with variable amplitude and frequency to the test circuit.	vendor to specify offered item, provide specs & catalogue			
2B.1.1	**Input**				
2B.1.1.1	Input Supply Voltage:	Vendor to specify			

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SNO	DESCRIPTION FOR BHEL REQUIREMENT	SPECIFIED / TO BE CONFIRMED BY	OFFERED	DEVIATIONS	REMARKS
2B.1.1.2	Power (kVA)	Vendor to specify			
2B.1.1.3	Frequency : 48.5-51.5 Hz	Vendor to confirm			
2B.1.2	**Output**				
2B.1.2.1	Output Voltage (To be matched with intermediate transformer input)	Vendor to specify			
2B.1.2.2	Output Voltage Imbalance: < 2%	Vendor to confirm			
2B.1.2.3	Output Power: 4000 kVA	Vendor to confirm			
2B.1.2.4	Output Active Power: 2000 kW	Vendor to confirm			
2B.1.2.5	Frequency range: 40 to 200 Hz	Vendor to confirm			
2B.1.2.6	Power factor : 0.1(cap) - 1 - 0.1(ind)	Vendor to confirm			
2B.1.2.7	THD of Output Voltage: <5%	Vendor to confirm			
2B.1.2.8	Partial Discharge Level (IEC60270): < 20 pc.	Vendor to confirm			
2B.1.3	**High Power Switching Cabinet**				
2B.1.3.1	High power switching cubicle shall comprise of active front end line converter. The DC voltage is buffered by a capacitor bank. This DC is then inverted by a micro controller driven PWM based IGBT Converter, generating sinusoidal AC voltage of adjustable frequency and amplitude. This power output is filterd by sine-wave LC filter to achieve pure fundamental sine waveform at all p.f. mentioned in clause no. 2B.1.2.6	Vendor to confirm			
2B.1.3.2	**Temperature Rise:** Suitable power dissipation mechanism (air/water cooled) must be provided to dissipate the heat generated during testing. The capacity of cooling system shall be suitable for operation in the ambient temperature of 0-50°C, during which the inside temperature of power devices should not rise beyond 40°C.	Vendor to confirm			
2B.1.3.3	The test sequence and the supervision of the complete test system shall be controlled by Programmable Logic Controller(PLC)/Micro-controller. The controller must be suitable for single phase and three phase testing of transformer without changing the connections. The control cabinet will communicate with the operator control desk through optical fibre or industry standard communication link suitable for troublefree operation in a enviromnent of high electro-magnetic interferences.	Vendor to confirm			
2B.1.3.4	The Digital Protection & Alarms Signals(OTI, WTI, Buchholtz Relay, PRV etc) from **Input Step Down Transformer** and **Output Intermediate Step up Transformer** will have to be incorporated into the SFC Control System and their status displayed in Operator Interface. The potential free inputs from the respective device shall be provided into the SFC panel by BHEL.	Vendor to confirm			
2B.1.3.5	Basic features of the Controller:				

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SNO	DESCRIPTION FOR BHEL REQUIREMENT	SPECIFIED / TO BE CONFIRMED BY	OFFERED	DEVIATIONS	REMARKS
2B.1.3.5.1	Controls switching of test circuits. Provides status of active system configuration. Provides alarm information in case of malfunctions. Displays measured values (e.g. A, kV, etc.) and test status. Provide emergency switching-off of power supply in case of interlock and predefined trips	Vendor to confirm			
2B.1.3.5.2	Automatic and online active phase-symmetry control to guarantee that each phase of test voltage is symmetric to each other and fulfils IEC limits.	Vendor to confirm			
2B.1.3.5.3	Automatic and online active voltage saturation control to guarantee that no saturating transformer core especially during no-load occurs.	Vendor to confirm			
2B.1.3.5.4	Automatic and online active distortion control to guarantee that distortion of output voltage, especially at no-load testing is within IEC limits.	Vendor to confirm			
2B.1.4	**High Voltage Filters:**				
2B.1.4.1	High Voltage Filters shall be provided to achieve the Partial Discharge Level specified in Point 2B.1.2.8 above. The PD performance shall be proven by vendor during the factory acceptance test.	vendor to specify offered item, provide specs & catalogue			
2B.1.5	**Control Desk**				
2B.1.5.1	The Switching Cabinet Controller shall allow remote control of the supply through fibre-optic/ethernet link connected portable Laptop having required application software.	Vendor to confirm			
2B.1.5.2	2 Nos. Laptop (Dell/HP/Lenovo/Equivalent) shall be supplied along with licensed application software, Licensed WINDOWS OS, Licensed Antivirus software & Licensed MS Office of minimum three years validity. Instrument software, Original WINDOWS CD, Original Antivirus software CD, Original MS Office CD shall be supplied alongwith LAPTOP.	Vendor to confirm			
2B.1.5.3	The SFC will be operated from either of the two portable Laptop placed at anyone of the four Control Desk 1, 2, 3 & 4 shown in the enclosed Schematic Drawing **No.WEX/MGH-SFC001, dated 22.01.2019**. The distance of the Control Desk from the High Power switching cabinet shall be approximately 200m. The Data cable for connecting Laptop to the SFC switching cabinet shall be wiried parallelly to all the four control desk. A Potential Free Input of the Control Desk selected by TEST ENGINEER for control of SFC, shall be made available to the vendor. The vendor will have to devise a interlock mechanism and ensure that the SFC control is ENABLED for the selected Control Desk only.	Vendor to note & confirm			
2B.1.5.4	The application software shall be high end graphical interface having all advanced and safety features. It shall have ergonomically designed display of measured values of Voltage, Current, Power Factor, Active Power, Reactive Power, Frequency, Alarms Indicator, Interlock, Emergency Stop etc	Vendor to confirm			
2B.2	**Cables**				

SNO	DESCRIPTION FOR BHEL REQUIREM[illegible]	S[illegible]IED / TO BE CONFIRMED BY	OFFERED	DEVIATIONS	REMARKS
2B.2.1	All the cable required for connecting the Control desk-1, 2, 3 & 4 to the switching cabinet (distance 200m each) together with ethernet/fibre-optic switch shall be in vendor scope.	Vendor to confirm			
2B.2.2	BHEL intends to connect SFC with Step Down Transformer and Step-Up Intermediate Transformer through multiple lengths of single Core 300 Sq.mm Copper Cable. These cables are available with BHEL. Vendor to verify suitability and confirm. All these cables shall be routed through heavy duty G.I coduit suitable for electromagnetic enviroment. The vendor will have to supply conduits along with adequate quantity of required fitting and junction box. etc.	Vendor to confirm			
2B.3	**SAFETY ARRANGEMENTS:**				
	Following safety features in addition to other standard safety features should be provided on the instrument:				
2B.3.1	The SFC with its allied components and instruments should have adequate and reliable safety interlocks / devices to avoid damage to the system, workpiece and the operator due to the malfunctioning or mistakes. These shall include system interlock, Emergency -Stop, flash-detection, overcurrent protection, manually settable trip levels. The SFC with its allied components and Instruments should have adequate protection against damage/faliure during fault in the job under test like earth fault, short ckt,	Vendor to confirm			
2B.3.2	All electronics parts are housed in suitable enclosures.	Vendor to confirm			
2B.4	**ENVIRONMENTAL PERFORMANCE OF THE SYSTEM:**				
	The Instrument shall conform to following factors related to environment :				
2B.4.1	If any safety / environmental protection enclosure is required it should be built in the system by the vendor.	Vendor to confirm			
2B.4.2	Licensed programming software of PLC & SCADA (if applicable) with interfacing cable for accessing & troubleshooting of the PLC & SCADA program , the PLC make shall be Siemens,ABB,Allenbradley, schneider. Software program backup with facility to upload and download.	Vendor to confirm			
3.0	**ACCESSORIES:**				
3.1	Vendor to furnish list and details of accessories if any	Vendor to specify			
4.0	**SPARES:**				
4.1	All necessary spares for two years trouble-free operation. Spares are optional and price to be quoted item wise separately.	Vendor to Confirm			
5.0	**DOCUMENTATION :** **4 copies of each of the following in English language (both in hard copies and soft copies in pen drive) shall be supplied along with the system**	Vendor to Confirm			
5.1	Detailed GA Drawing, catalogues, photographs of all instrument/accessories along with the offer.	Vendor to Confirm			
5.2	Instruction manual with circuit diagrams and schematics.	Vendor to Confirm			

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SNO	DESCRIPTION FOR BHEL REQUIREM[illegible]	S[illegible]IED / TO BE CONFIRMED BY	OFFERED	DEVIATIONS	REMARKS
5.3	Operation and Maintenance manual along with circuit diagrams, schematics for trouble shooting and Ladder diagram of PLC (PDF Copy) with comments & description in English,PLC Backup file ,SCADA Back up file. (If applicable)	Vendor to Confirm			
5.4	Test & Guarantee Certificate.	Vendor to Confirm			
5.5	Calibration certificate to be submitted from laboratory having tracebility with NABL or equivalent lab	Vendor to Confirm			
5.6	If SCADA System is offered than a ghost image hard disk of system is to be given for restoring P.C. in case of hard disk failure.	Vendor to Confirm			
6.0	**SYSTEM INSPECTION:(Pre-dispatch inspection.)**				
6.1	Inspection at suppliers works before dispatch.	Vendor to Confirm			
6.2	BHEL inspection team of Three Engineers/Members shall witness at supplier's works for mutually agreed period the following: (a) All System Calibration and Factory Acceptance Test. (b) Demonstration of all Features & Programming of system & accessories etc. (c) Electrical, Electronic(PLC & SCADA System) & Maintenance aspects of system & accessories.	Vendor to specify & confirm			
6.2.1	**Acceptance Test to be performed at supplier works-**				
6.2.1.1	No load Test at 100% rated voltage and rated frequency for 12 Hrs with PD Measurement	Vendor to Confirm			
6.2.1.2	Over excitation test at 110% rated volatge and rated frequency for 01 Hr with PD Measurement	Vendor to Confirm			
6.2.1.3	HVAC Test at rated voltage and frequency up to 200 Hz for 01 Hrs	Vendor to Confirm			
6.2.1.4	Full load test at rated current and frequency up to temperature stablization in line with applicable standard but duration should not be less than 24 Hrs.	Vendor to Confirm			
6.2.1.5	THD/ Harmonics measurement at output voltage.	Vendor to Confirm			
6.3	Air-fare, boarding & lodging for the inspection shall be borne by BHEL.	Vendor to Confirm			
6.4	Competent, English speaking experts shall be arranged by the vendor during inspection.	Vendor to Confirm			
7.0	**INSTALLATION & COMMISSIONING (At BHEL Works)**				
7.1	Supplier to take full responsibility for carrying out Erection of supplied equipment, Start-up and Commissioning at BHEL works. Following shall be part of E&C activities	Vendor to Confirm			
7.1.1	Demonstration of all features of the static drive system & all accessories to the satisfaction of BHEL for their efficient and effective use.	Vendor to confirm			
7.1.2	Vendor to submit Quality and Test Plan and seek their approval from BHEL before raising the inspection on offered system.	Vendor to confirm			

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SNO	DESCRIPTION FOR BHEL REQUIREMENT	SPECIFIED / TO BE CONFIRMED BY	OFFERED	DEVIATIONS	REMARKS
7.1.3	Successful proving of supplied system by the supplier on BHEL make transformers shall be part of commissioning. Following tests as per IS 2026/IEC60076 are to be necessarily performed on Minimum TWO Nos. BHEL make Power Transformers having rating mentioned in drawing no. WEX/MGH-SFC001 Sheet-02 at BHEL Test Bed during the commissioning of SFC.	Vendor to Confirm			
7.1.3.1	No load loss and no load current measurement at 90%, 100% & 110% of rated voltage at rated frequency at nor tap.	Vendor to Confirm			
7.1.3.2	Current & voltage harmonics measurment at 90%, 100% & 110% of rated volatge.	Vendor to Confirm			
7.1.3.3	Over excitation test at rated voltage and frequency for 12 Hrs.	Vendor to Confirm			
7.1.3.4	Line terminal AC withstand test (LTAC)	Vendor to Confirm			
7.1.3.5	PD measurement (ACSD, ACLD & IVPD)	Vendor to Confirm			
7.1.3.6	Impedance voltage & load loss measurement on min, nor & max tap position.	Vendor to Confirm			
7.1.3.7	Zero phase sequence impedance measurement	Vendor to Confirm			
7.1.3.8	Temperature rise test	Vendor to Confirm			
7.2	Commissioning spares, required for commissioning of the system within stipulated time, shall be brought by the supplier on returnable basis.	Vendor to confirm			
7.3	Calibration of commissioning spares, required for commissioning of the system within stipulated time, shall be brought by the supplier on returnable basis.	Vendor to confirm			
7.3	Time Schedule of Commissioning shall be submitted with the offer.	Vendor to Specify			
7.4	Vendor may note that the E & C charges in this case have been mandatorily fixed at 10% of the total cost. This apportioned price has to be cumpolsorily agreed by all vendors & no deviation shall be acceptable for this.	Vendor to Confirm			
8.0	**TRAINING:**				
8.1	BHEL testing engineer and maintenance person should be trained at BHEL Works for (a) Use of all system Features & Programming of system & accessories etc (b) Electrical, Electronic & Maintenance aspects of system & accessories.	Vendor to Confirm			
9.0	**AMBIENT CONDITIONS & THERMAL STABILITY :**	Vendor to confirm			
9.1	Total System and all supplied items should work trouble free and efficiently under following operating conditions and should give specified accuracies. Input Power Supply: 11 kV, 3 phase, 3-wire system. Frequency: 50 Hz ± 1.5 Hz Operating Humidity : ≤ 10% to 80% Operating Temperature : 5°C to 48 °C (Vendor to confirm that system is suitable for above and details of provisions on the system for the same are to be furnished by Vendor)	Vendor to confirm			

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SNO	DESCRIPTION FOR BHEL REQUIREMENT	SPECIFIED / TO BE CONFIRMED BY	OFFERED	DEVIATIONS	REMARKS
9.2	Thermal Stability of the complete system keeping in view specified Ambient Conditions and accuracy requirements of BHEL components and trouble free operation of the system should be ensured by vendor. (Vendor to confirm that system is suitable for above and details of provisions on the system for the same should be furnished by Vendor)				
10.0	**PACKING:**	Vendor to confirm			
10.1	Air worthy/Sea worthy & rigid packing for all items of complete system, all accessories and other supplied items to avoid any damage/loss in transit. When system is dispatched in containers, all small loose items shall be suitably packed in boxes				
11.0	**GUARANTEE :**	Vendor to confirm			
11.1	24 months from the date of commissioning of the system. In case of Major Rectification /Repair after commissioning, the completed warranty period will be reset and may be extended to further period of 24 month from the date of rectification/ repair.	Vendor to confirm			
11.2	AMC: BHEL may enter into a AMC with the Vendor after completion of the warranty. Hence the vendor is required to quote for monthly rate of AMC of the supplied SFC System which shall be valid for minimum 3 years after completion of warranty. BHEL shall raise Work Order seperately later, if required.	Vendor to quote AMC price seperately in price-bid			
12.0	**GENERAL : The vendor should submit the following information:**	Vendor to specify			
12.1	Equipment Model	Vendor to confirm			
12.2	Detailed catalogues, sketch/ photographs of the m/c and accessories/ attachments should be submitted with the offer.				
13.0	**QUALIFYING CONDITIONS:**	Vendor to confirm			
13.1	Only OEM or their authorised vendors meeting following criteria will be considered who have supplied and commissioned (either directly or through their authorised vendor) at least 1 No. Static Frequency Converter of 4 **MVA or higher** rating for providing direct supply (without MG set) for transformer testing in the past 10 years (from the tender opening date). Such equipment should be working satisfactorily for more than 1 year after commissioning on the date of issue of Performance Certificate as mentioned in the clause 13.1.5 below. Following details from 13.1.1 to 13.1.8 are to be mandatorily furnished-	Vendor to note & confirm			
13.1.1	Name of the customer / company where similar system is installed. (Unpriced Copy of Purchase order should be furnished).	Vendor to furnish			
13.1.2	Name and designation, phone, FAX no. and email address, postal address of the contact person of the customer.	Vendor to furnish			

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SNO	DESCRIPTION FOR BHEL REQUIREMENT	SPECIFIED / TO BE CONFIRMED BY	OFFERED	DEVIATIONS	REMARKS
13.1.3	Year of commissioning.	Vendor to furnish			
13.1.4	Application for which the system is supplied with details of accuracies achieved on the job.	Vendor to furnish			
13.1.5	Performance certificate (in English language only) regarding satisfactory performance of the equipment mentioned in clause 13.1 from the customer whose details have been mentioned in clause 13.1.1 to 13.1.4 above.	Vendor to furnish			
13.1.6	Authorisation Letter from Original Equipment Manufacturer (in case of not directly quoted by OEM) for quoting of their system and undertaking for providing support for commissioning and after sales services.	Vendor to furnish			
13.1.7	Reference list of all customers mentioning the customer name, contact details and year of supply, where such system has been supplied till date.	Vendor to furnish			
13.1.8	Service and support for the offered equipment shall be necessarliy be available in Indidia. Vendor to furnish the details of the available service support in India.	Vendor to confirm and furnish			
13.2	BHEL reserves the right to verify information submitted by vendor. In case the information is found to be false/incorrect, the offer shall be rejected.	Vendor to note			

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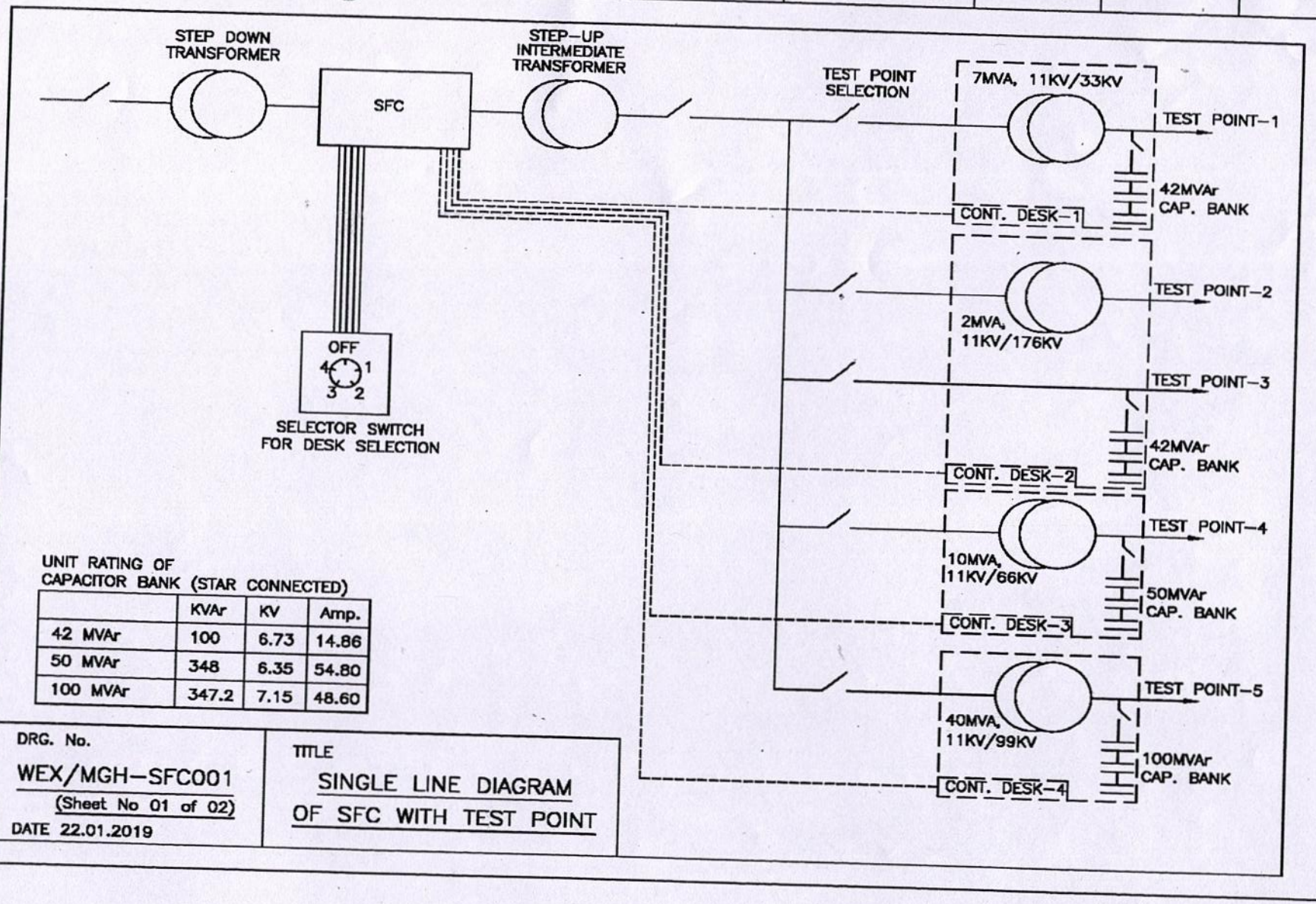
SNO	DESCRIPTION FOR BHEL REQUIREMENT	SPECIFIED / TO BE CONFIRMED BY	OFFERED	DEVIATIONS	REMARKS
14.0					



UNIT RATING OF CAPACITOR BANK (STAR CONNECTED)

	KVAr	KV	Amp.
42 MVAr	100	6.73	14.86
50 MVAr	348	6.35	54.80
100 MVAr	347.2	7.15	48.60

DRG. No.	TITLE
WEX/MGH–SFC001 (Sheet No 01 of 02) DATE 22.01.2019	SINGLE LINE DIAGRAM OF SFC WITH TEST POINT

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SNO	DESCRIPTION FOR BHEL REQUIREMEN	SPEC IED / TO BE CONFIRMED BY	OFFERED	DEVIATIONS	REMARKS
15.0					

TYPICAL RATING OF TRANSFORMERS BEING TESTED IN EACH TEST POINTS

S.No	TEST POINT	MVA	VOLTAGE RATING		Irms		Z %	Z(KV)	TYPE OF TESTS
			HV	LV	HV	LV			
1	TEST POINT-1(33KV)	110	132	11.5	481.139		22.00	29.04	Load loss test, Heat Run, No Load Loss(having 11KV LV Wdg), Noise Level, Harmonics.
		83.3	220	92.943	218.61	517.46	12.00	26.4	
2	TEST POINT-2 (176KV)	160	220/132	33	419.903	699.839			No Load Loss, ACLD(PD), ACSD(PD), Noise Level, Harmonics
		40	400/√3	132/√3, 33	173.2	174.96	12.50	28.87	
		160	220	66	419.903	1399.68	15.00	33	
3	TEST POINT-3(11 KV)	40	11	6.9	2099.52	3347.06	12.00	1.32	Load Loss Test , Heat Run Test
		50	21	11.5	1374.68	2510.29	11.50	2.415	
		50	69	11	418.38	2624.4			
		33.5	11	7.07	1758.35	2735.76	17.00	1.87	
		70	27	11.5	1496.88	3514.41	15.00	4.05	
		125	21	11.5	3436.71	6275.73	24.00	5.04	
4	TEST POINT-4 (66KV)	160	220	132 , 33	419.903	699.839			Load Loss Test , Heat Run Test
		160	220	66	419.903	1399.68	15.00	33	
		250	230	15.75	627.57	9164.56	14.50	33.35	
		240	240	15.75	577.37	8797.98	14.00	33.6	
		245	236	15.75	599.39	8981.27	15.00	35.4	
		195	230	15.75	489.51	7148.36	13.50	31.05	
		315	240	16.5	757.79	11022.46	14.50	34.8	
		188	235	15.75	461.89	6891.75	12.50	29.375	
		250	230	15.75	627.57	9164.56	14.50	33.35	
5	TEST POINT-5 (99KV)	135	400	11.5	194.861	3388.89	26.50	53	Load Loss Test , Heat Run Test, No Load Loss , Noise Level, Harmonics , ACLD , ACSD
		70	400/√3	13.8	303.1	5072.46	12.50	28.87	
		250	230	15.75	627.57	9164.56	14.50	33.35	
		240	240	15.75	577.37	8797.98	14.00	33.6	
		245	236	15.75	599.39	8981.27	15.00	35.4	
		315	240	16.5	757.79	11022.46	14.50	34.8	
		250	230	15.75	627.57	9164.56	14.50	33.35	

DRG. NO	TITLE
WEX/MGH-SFC001 (Sheet No 02 of 02) DATE- 22.01.2019	**SINGLE LINE DIAGRAM OF SFC WITH TEST POINTS**

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