ENGINEERING & STANDARDS DEPARTMENT

TECHNICAL SPECIFICATIONS FOR 38KV VACUUM CIRCUIT BREAKER ED2.0 ELECTRONIC CONTROL BOARD

JPS SPECIFICATION NO. 38VCB-CONBOARD-2023

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TS.01 GENERAL REQUIREMENTS

TS.01.1 Scope of Work

The Supplier shall supply, factory test and deliver all equipment and material in accordance with these specifications.

TS.01.2 Work Schedule

The Supplier shall submit within 10 working days of acceptance of the bid a general Work Schedule showing key days required for sub-orders and drawing approvals so that the specified delivery date shall be met.
The schedule shall indicate commencement and completion dates for the principal features of the Works including, but not limited to, manufacture, testing and shipping.

TS.01.3 Information to be Submitted by the Supplier

The Supplier shall submit to the purchaser drawings, design data, operation and maintenance manuals, as may be called for herein, or as the purchaser may reasonably require. The Supplier's drawing and design data shall bear the Supplier's official verification that the information shown thereon has been checked by the Supplier and is correct for use in construction, except for drawings of a preliminary nature furnished for information only, which shall be clearly identified as such.

Where applicable, the following drawings and information are to be supplied with equipment.
1. Equipment diagram
2. Dimensioned outline drawings, details and weights of equipment
3. Equipment type test reports
4. Nameplate diagram
5. Equipment wiring diagrams
6. Manuals for installation, operation and maintenance of the equipment
7. Testing and commissioning procedures

TS.01.5 Installation, Operation and Maintenance Manual

Copies of the installation, operation and maintenance manual shall be furnished by the supplier with each equipment. The manual shall contain the following minimum information:
1. General descriptive information
2. Assembly and/or erection details
3. Operating and Maintenance instruction
4. Instructions for testing and adjustments

5. One copy of each approved drawing including catalog cuts and other pertinent data.
6. Test Certificate(s)
7. Parts identification list for each item of equipment furnished
8. Manufacturer's descriptive information and instructions for all accessory equipment

TS.01.6 Standards

All equipment and materials shall conform to the latest editions of all relevant ANSI standards. Where equipment, components or materials are not covered by appropriate ANSI standards, relevant IEEE, NEMA, ASTM, AISC and AWS shall apply. If equipment or materials conforming to other recognized national standard is offered, the bidder shall provide a copy, in English, of the standard offered and shall itemize the pertinent areas where the standard differs from the requirements of the relevant ANSI standard. The foregoing referenced standards and their abbreviations are as follows:-

NAME	ABBREVIATIONS
American National Standards, Inc.	ANSI
American Society for Testing and Materials	ASTM
National Electrical Manufacturers Ass.	NEMA
Institute of Electrical and Electronic Engineers, Inc.	IEEE
Insulated Cable Engineers Association	ICEA
American Welding Society	AWS
American Institute of Steel Construction	AISC

TS.01.7 System Characteristics

(i)	System Phase to phase voltage	24/12 kV
	Nominal system voltage	24/12 kV
	Maximum operating voltage	25.8 kV
(ii)	System BIL	150 kV
(iii)	Number of phases	3
(iv)	Frequency	50 Hz
(v)	System connection	Wye
(vi)	Method of Grounding	Effectively grounded (solid)

(vii)	Fault level (symmetrical), MVA	300
(viii)	Auxiliary power supply	120 V single-phase 240 V three-phase 125 VDC or 48 VDC

TS.01.8 Environmental Conditions

(i)	Type of Circuit:	Radial
(ii)	Environmental Conditions:	Tropical
(iii)	Altitude	Less than 500 ft (150 m).
(iv)	Ambient Temperatures	Maximum 40°C Average 30°C over 24hrs Minimum 15°C
(v)	Atmospheric Conditions:	Tropical climate subject to direct sunlight, 200 km/hr wind. High salt spray and dust.
(vi)	Seismic Coefficient	0.25g
(vii)	Relative Humidity	Maximum - 100% Average - 50%

TS.01.9 Preparation for Shipment

The Supplier shall prepare all equipment and their components in such a manner as to facilitate handling and to adequately protect them from contamination, corrosion or damage in-transit and shall be responsible for and make good any or all damages due to improper preparation or loading.

Small or fragile pieces shall be carefully boxed or crated or otherwise protected against loss or damage during shipment. Delicate electrical and other parts shall be boxed in weather-proof containers.

It shall be the responsibility of the supplier to take any other precaution required to ensure the arrival of the equipment in an undamaged and satisfactory working condition.

TS.02 38kV ED2.0 ELECTRONIC CONTROL BOARD HV

TS.02.01 General

This section of the specification covers the supply of the ED2.0 electronic control board HV to be used with the 38kV vacuum circuit breaker. The ED2.0 electronic control board HV shall comprise of a power supply recharge unit, control unit and FET switching circuit which connects the storage unit capacitors to the magnetic actuator coils.

The power supply recharge circuitry shall adapt whatever input voltage, within the specified range is supplied to maintain an 80 V charge voltage across the capacitors. The Control Unit shall monitor binary inputs and outputs, hardware and software configurations, breaker position (through inductive sensors or auxiliary switches in recent models), capacitor charge, and switches the FET circuit to connect the capacitor voltage to the Magnetic Actuator coils following an open or close command.

The Capacitor Storage Unit shall consist of two, three or four (depending on rating) 0.1 farad Aluminum Electrolytic capacitors connected in parallel.

The control board shall have the form shown in Figure 1 below and shall be ABB R-MAG 38kV Circuit Breaker ED2.0 electronic control board HV or approved equal.

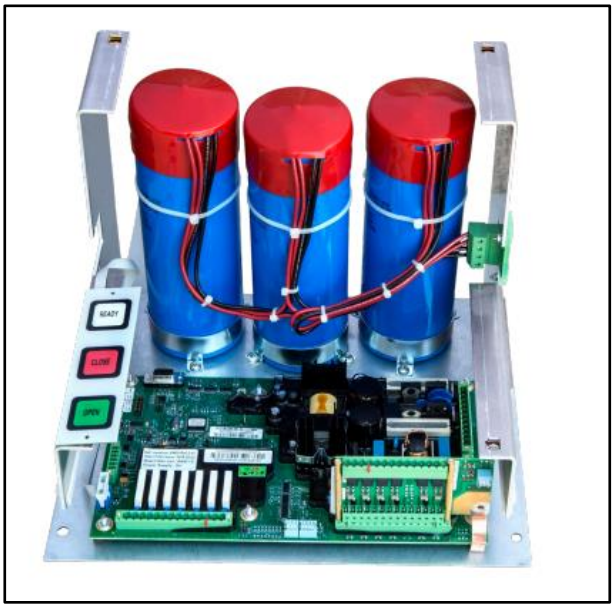

Figure 1. ABB R-MAG ED2.0 electronic control board HV

TS.02.02 Standard and Codes

The ED2.0 electronic control board HV shall comply with the requirements of all applicable ANSI standards. If this specification conflicts in any way with any of the above standards, then this specification shall have precedence and govern. However, the bidder shall point out these conflicts in his bid.

TS.02.03 Main Features

The ED2.0 electronic control board HV shall control the magnetic actuator, receive trip/close signals, monitor position, be capable of local/remote control, monitors and alarms. In addition, the control board shall monitor control power, position sensors and continuity of the trip and close coils.

The control board shall have low power requirements, that is 93W normal and less than 1A at 125VDC during capacitor charging. It shall be fabricated with a plug and play design for rapid replacement in the field.

The control board shall be designed to constantly supervise the main components of the R-MAG circuit breaker (magnetic actuator, capacitors and board. It shall be incorporated with two (2) NO/NC contacts (Unit Ready and Not-Ready output contacts) to provide alarms under the following conditions:

1. Drop off auxiliary supply voltage
2. Low voltage on capacitor
3. Unstable connection between the electronic board and actuator
4. Correct position of main contacts after a trip/close command
5. Failure in electronic board.

TS.02.04 Ratings for Circuit Breaker

The ED2.0 electronic control board HV shall be compatible with circuit breakers having the following ratings:

- Nominal system voltage	25.8-kV
-Type of circuit breaker	Vacuum
- Rated maximum voltage	38-kV
- Rated frequency	50 Hz
- Rated lightning impulse withstand level	200-kV
- Min. Continuous current	600 A or 1200A (as determined by designs)
- Short circuit interrupting current	25-kA
- Maximum interrupting time	5 cycles
- Rated control voltage	125 V dc

TS.02.05 Ratings for Control Board

The ED2.0 electronic control board shall cover all control power requirements for high voltages, 77-280 VDC or 85-264 VAC.

TS.02.06 Spare Parts

The bidder shall recommend and price any spare parts considered necessary.

TS.02.07 Factory Tests

The ED2.0 electronic control board HV shall be completely assembled at the factory, and shall be subjected to all routine and type tests in accordance with IEC/ANSI Standards. If the Supplier can supply certified copies of type tests on identical equipment, the Purchaser may waive such tests entirely.