SECTION III - VACUUM CIRCUIT BREAKER
TECHNICAL SPECIFICATIONS

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38 KV VACUUM CIRCUIT BREAKER

TECHNICAL SPECIFICATIONS

1. SCOPE

1.1. This specification covers outdoor, medium voltage vacuum circuit breakers together with all associated equipment and material supplied herein.

1.2. Medium voltage vacuum circuit breakers shall be designed and furnished with the standard JEA DC schematic. **See Appendix I**.

2. PROJECT ENGINEER

The project engineer and contact person for technical questions and clarifications concerning this specification is:

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JEA Standards
21 West Church Street
Jacksonville, FL 32202
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3. STANDARDS

All outdoor circuit breakers shall be designed, manufactured, assembled, insulated and tested in accordance with the latest applicable ANSI, NEMA, IEEE, and ASTM standards.

4. RATINGS

BID ITEM 7: 38kV, 200 kV BIL TRANSFORMER VACUUM CIRCUIT BREAKER (WITHOUT RELAYS)

BID ITEM 8: 38kV, 200 kV BIL FEEDER VACUUM CIRCUIT BREAKER (WITHOUT RELAYS)

BID ITEM 9: 38kV, 200 kV BIL TRANSFORMER VACUUM CIRCUIT BREAKER (WITH RELAYS)

BID ITEM 10: 38kV, 200 kV BIL FEEDER VACUUM CIRCUIT BREAKER (WITH RELAYS)

*The below ratings apply to Bid Items 7-10. In cases where relays are required in the breakers, the customer will provide relay specifications and drawings at the time of order. Please incorporate the need to facilitate this activity in the respective breaker's quote (Bid Item 9 and 10).

4.1. Maximum KV RMS *3*8

4.2. Range Factor K 1.0

4.3. Low Frequency Withstand KV

4.3.1. Dry 60Hz. For 1 Min. 80KV RMS

4.3.2. Wet 60Hz. For 10 Sec. 75KV RMS

4.4. Impulse KV, Crest 200 KV

4.5. Continuous Current at 60 Hz. 1200 Amps

4.6. Short Circuit Current (at Rated Max. KV) 25 KA RMS

4.7. Rated Interrupting Time Maximum 3 Cycles

4.8. Rated permissible Tripping Delay Y 2 Seconds

4.9. Maximum Symmetrical Interrupting Capability 25 KA RMS Sym

4.10. Closing and Latching Capability 54 KA Peak

4.11. 3 Second Short Time Current Carrying Capability 25 KA RMS Sym

4.12. Power Requirements:

4.12.1. Control Voltage Close and Trip 125V DC

4.12.2. Motors and Heaters Voltage 230V

4.13. Current Transformers:

4.13.1. Accuracy Class C400

4.13.2. 1200/5 MRBCT

5. MATERIAL AND WORKMANSHIP

5.1. General Details

5.1.1. The workmanship, design, and material shall be of the highest quality and most suitable for the application. The material shall be new, of recent manufacture, and free of defects. The equipment shall be manufactured to conform to the best engineering practices.

5.1.2. All external hardware such as nuts, bolts, washers, hinges, and door handles to be type 316 stainless steel.

5.1.3. All components internal and external shall be checked for security and tightness.

5.1.4. The breaker shall be of outdoor type construction. The breakers shall be floor mounted on a welded hot dipped galvanized steel base with removable legs.

5.1.5. The 38 KV vacuum circuit breakers shall be of single tank construction, three-pole single throw type.

5.1.6. For circuit breakers rated 38 KV, the height from the base line of the circuit breaker to the lowest energized part shall be 114 to 120 inches.

5.1.7. All enclosures shall be sufficiently rigid to prevent warping of doors and latches. Doors shall be hinged and have heavy duty handle type latches. Design of the enclosures shall be such that overlapping metal surfaces are sealed to prevent corrosion.

5.1.8. The manufacturer shall provide a weatherproof aluminum or stainless steel unpainted sheet control cabinet (NEMA 4X or equivalent), with a removable plate in the bottom for conduit entrances.

5.1.9. All cabinet doors and swing panels shall have a minimum of two (2) latch points, with a simple latching device provided on the hinge end to hold door/swing panel in the open position to prevent closure while work is being performed in the cabinet. The cabinet doors shall be capable of being latched open at least 120 degrees from the closed position.

5.1.10. All cabinet doors (except the high-voltage compartment) shall be provided with a handle-latching mechanism, for opening/closing of cabinet doors.

5.1.11. Each and every door latch shall be lockable in the latched position with a pad lock having a 3/8 inch shackle.

5.1.12. The number of bolts required to remove access plates shall be limited to eight (8) stainless steel bolts. If more than eight (8) stainless steel bolts are required another method shall be devised so that easy removal is provided.

5.1.13. All cabinets shall be clean and free of loose parts and debris before leaving the factory.

5.1.14. All circuit breaker support structures or leg extensions to be hot dipped galvanized after fabrication.

5.2. Space Heaters

5.2.1. Each operating mechanism and control enclosure shall be provided with a space heater to prevent condensation within the enclosure. Space heater capacity shall be as required to maintain the enclosure internal temperature above the dew point. An adjustable, automatic thermostat shall be provided for the space heater. The heaters shall be spaced away and thermally insulated from any devices and painted surfaces.

5.2.2. Space heaters shall have guards or shields which are thermally isolated and non-conducting to prevent accidental contact with hot element or heater parts.

5.2.3. JEA will provide an auxiliary power supply of 208/240 volts. Space heaters are to be sized and rated for both voltages. The space heaters shall be shipped from the factory connected at 240V with the capability of being easily reconnected at 120V by the customer.

5.2.4. Wiring of the heater circuits shall be such that the heater circuits are separately protected by circuit breakers. See **Appendix I.**

5.3. Fuses and Low-Voltage Circuit Breakers

5.3.1. The manufacturer shall provide knife blade fuses, to be clearly labeled on engraved plastic phenolic type labels (tape type labels are not acceptable) with circuit name and amp rating, for close and trip circuits only. All other circuits shall be protected by circuit breakers. Example: TRIP CIRCUIT #1,15 AMP. See **Appendix I.**

5.3.2. The manufacturer shall supply a spare fuse block which shall be modular type with Bakelite frame and reinforced retaining clips to prevent accidental removal or dropping out due to vibration. The spare fuse block shall contain two (2) spare fuses for the close circuit and two (2) spare fuses for the trip circuit.

5.3.3. Wiring of the closing circuits shall be such that the closing motor is separately protected by circuit breaker from the closing control circuits. See **Appendix I.**

5.3.4. The manufacturer shall install double-pole single throw switches for trip and close circuit isolation.

5.3.5. All surge protection devices shall be easily accessible and provide visual indication upon failure.

5.4. Grounding

Two (2) bolted, tinned bronze type grounding terminals for 7#5 copperweld conductor shall be provided on diagonally opposite corners of the structural frame of the high voltage compartment to provide convenient connection of ground grid lead with routing adjacent to breaker leg. If there are any joints on the frame which, due to aging or painting, could disrupt the continuity of the ground connection to the H.V. cabinet, then the two grounding pads should be located above the joint. See **Appendix III.**

5.5. Marking/Labeling

Pole number identification lettering shall be painted a minimum two (2) inches high directly below the appropriate bushing and shall be in an area which can be clearly visible.

5.6. Colors and Paint

5.6.1. The inside of breaker tanks to be manufacturer's standard color.

5.6.2. The inside of the mechanical housing and relay cabinet to be painted manufacturer's standard color.

5.6.3. The outside of the breaker is to be painted ANSI designation 70 "Sky Grey".

5.6.4. All surfaces shall be properly cleaned and prepared per "Steel Structure Painting Council SSPC-SP5-63" (white metal blast cleaning) and primed prior to the application of the final coat. The prime coat on all surfaces shall be no less than 2.5 mils in thickness. The finish coat shall be no less than 2.5 mils in thickness. The combined thickness of prime and finish coats shall be no less than 5 mils.

5.6.5. Breaker touch up paint and primer shall be provided with each circuit breaker.

5.6.6. The breaker, supporting framework and control cabinet shall be cleaned by shot or sandblasting and immediately after cleaning shall be painted with rust and weather resistant paint. A suitable primer coat to give proper cohesion to the tank surface shall be used followed by at least two (2) coats of alkyd base paint, Edison Grey (ASA 70). The manufacturer if using any paint specification other than Subox or Permanox shall notify the project engineer prior to submittal of the bid.

5.7. Piping and Conduit

5.7.1. The manufacturer shall furnish all piping, fittings, valves and conduits necessary for interconnecting all electrical control systems.

5.7.2. Conduit joints and fittings shall be dust tight and watertight.

5.7.3. Where exposed to possible use for climbing, conduits shall be of adequate size and mounting strength to easily support twice the weight of an average man.

5.7.4. Conduits shall not be filled to more than 50% of capacity.

6. BUSHINGS

6.1. The bushings shall conform to the latest NEMA and ANSI/IEEE standards.

6.2. All bushings shall be composite only.

6.3. The bushings shall be "sky grey" in color as per ANSI standards.

6.4. Each bushing shall be equipped with a tinned bronze, 4-hole NEMA pad terminal. When aluminum terminal pads are provided, bi-metallic transition pads shall be provided for each terminal.

6.5. The bushings shall be rated and have a BIL of 200KV.

6.6. Each and every bushing shall be furnished with a nameplate permanently mounted on the flange such that it can be easily read with the bushing installed. The nameplate shall be stainless steel and stamped with the following information:

6.6.1. Manufacturer's name

6.6.2. Manufacturer's Type Designation

6.6.3. Serial Number

6.6.4. Catalog number

6.6.5. Drawing Number

6.6.6. Year of Manufacture

6.6.7. Rated Voltage

6.6.8. Rated Current

6.6.9. Rated Full Wave Impulse Withstand Voltage

6.6.10. Weight of Bushing

6.7. The manufacturer shall ship the breaker with the bushings installed.

7. CURRENT TRANSFORMERS

7.1. All breakers rated 38 KV shall have one multi-ratio, 1200:5, C400 current transformer per bushing with secondary leads connected to conveniently mounted shorting type terminal blocks in the control cabinet. See **Appendix II.**

7.2. All secondary tap leads of the current transformer shall be copper wire, No. 12 AWG minimum, 600V insulation class and shall be brought out to shorting type terminal blocks complete with engraved phenolic type marking strips, (tape type labels are not acceptable) white having the wire identities in black.

7.3. A four pole test switch with current test jacks shall be included for each set of 3 current transformers (States 204R or equivalent). The customer side of the current transformer shorting blocks shall be wired to the hinged side of the test switch. The receiver side of the test switch shall be shorted. The customer field connections to the current transformers shall be made at the test switch after removing the shorting jumpers. See Appendix II.

7.4. There shall be **no splices** in the current transformer wiring circuits.

7.5. Proper protection shall be provided between current transformers and mounting plates. Bolts and hardware shall be made to prevent rubbing or chafing of the current transformer insulation.

7.6. CT terminal blocks shall have a minimum of 6" working room around the customer termination side with a minimum of 3" working room around the factory connection side.

7.7. Current transformer terminal blocks shall have engraved phenolic type labels identifying bushing CT and CT lead numbers.

7.8. If CT terminations are made within a separate enclosure, access to CT terminal blocks shall not require removal of a bolted panel. A hinge door shall be provided as specified.

7.9. All secondary leads shall be connected to the terminal blocks using ring type compression connectors.

7.10. All taps from multi-ratio current transformers brought to the shorting type terminal blocks shall retain a logical physical orientation.

7.11. Bushing type C.T.'s shall have a stainless steel nameplate affixed to the outside of the circuit breaker or the inside of the cabinet door and shall contain the following information:

7.11.1. Manufacturer's Name

7.11.2. Manufacturer's Type Designation

7.11.3. Manufacturer's Serial Number

7.11.4. Date of Manufacture

7.11.5. Rated Frequency

7.11.6. Rated Maximum Voltage

7.11.7. Rated Impulse Withstand Voltage

7.11.8. Rated Low-Frequency Withstand Voltage

7.11.9. Rated Switching-Impulse Withstand Voltage

7.11.10. Rated Primary Current

7.11.11. Rated Secondary Current

7.11.12. Rated Continuous Thermal Current Factor

7.11.13. Rated 3 Second Short Time Current

7.11.14. Rated Mechanical Short Time Current

7.11.15. Weight of Complete CT

7.11.16. Instruction Book Number

8. OPERATING MECHANISM

8.1. The operating mechanism shall be **spring-open and spring-close only**. The manufacturer shall state how long this mechanism has been in production.

8.2. The breaker shall be electrically operated by a mechanically and electrically trip free mechanism (motor, charged spring) which shall provide for positive opening of all three poles and circuit interruption, whether the tripping impulse is received in the fully closed or partially closed position. Motor compressed spring operated circuit breakers shall be capable of an opening-closing-opening operation at rated short circuit or at related required capabilities, after loss of AC station service power to the operating mechanism.

8.3. The manufacturer shall provide electrical isolation between seal-in contact of closing circuit at the breakers and closing circuit of customer's control circuit. In the case of DC controlled circuit breaker, the input impedance at the trip input shall be low enough to draw a minimum of two (2) amps from the customers 125V DC supply to assure target relay operation.

8.4. The circuit breaker operating mechanism shall be housed in a manufacturer provided weatherproof stainless steel or aluminum (NEMA 4X or equivalent) control cabinet fastened to the circuit breaker with stainless steel hardware and shall include all connections, wiring, linkages for a complete installation along with at least the following items:

8.4.1. The circuit breaker when located 1000 feet from a 125 VDC source with #10 control cable, shall not experience a voltage drop which will cause unsatisfactory operation of the breaker.

8.4.2. A reliable easily read mechanical position indicator shall be furnished to indicate the open and closed positions of the circuit breaker.

8.4.2.1. The word "OPEN" or "O" in white letters, shall be displayed on a green background.

8.4.2.2. The word "CLOSED" or "C" in white letters, shall be displayed on a red background.

8.4.2.3. On spring charged mechanisms, the mechanism indicator shall display:

8.4.2.3.1. The word "CHARGED" in black letters on a yellow background.

8.4.2.3.2. The word "DISCHARGED" in black letters on a white background.

8.4.2.4. The open-close indicators are to be made of baked porcelain or some other suitable material which will stand up to UV deterioration.

8.4.3. One (1) auxiliary switch with twenty (20) spare mechanically adjustable contacts in 15 degree increments for JEA's use in addition to what the manufacturer uses for circuit breaker control. The auxiliary switches shall be wired out to terminal blocks which are grouped together. See **Appendix.**

8.4.4. One (1) *120/240* and *120/208* (dual rated) VAC motor for the operating mechanism. A universal type spring-charging motor (125VAC/VDC) will be acceptable.

8.4.5. One (1) 125 VDC close coil, separately fused.

8.4.6. One (1) 120 VAC GFI convenience receptacle to be mounted in an accessible location, separately protected by a circuit breaker. See **Appendix.**

8.4.7. Operation counter to count "trip" operations, shall be located in the mechanism housing so as to be visible from the outside housing and conveniently read from ground level without opening the door of the cabinet. Operation counter shall have a mechanical linkage to the trip mechanism to insure a positive trip indication when the breaker trips.

8.4.8. The manufacturer shall provide a minimum of 6" working room for hands and hand tools around and between terminal board areas used for customer wiring connections in addition to the room for fully installed wires.

8.4.9. The mechanism housing shall be physically mounted such that it is accessible from ground level. Minimum height of cabinet shall be 1'-6" above the top of the breaker foundation. The maximum height of the mechanism cabinet door handle shall be 5’-6” above the top of the breaker foundation. In addition, all items used for normal monthly maintenance (i.e. power disconnect switches, terminal boards, etc. shall be below the 5’-6” level. **Appendix**.

8.4.10. All three phases shall be mechanically connected for simultaneous operation.

8.4.11. The manufacturer shall include the type of circuit breaker proposed for capacitor switching with the bid package.

8.4.12. The manufacturer shall include one (1) hand closing lever for manually closing the circuit breaker per breaker.

9. TERMINAL BLOCKS AND CONTROL WIRING

9.1. Wires to be terminated and individual termination points on terminal blocks shall be clearly marked for circuit identification and shall be terminated on terminal blocks, which are also to be marked for circuit identification (device codes etc.). Labels to be engraved plastic, phenolic type labels (tape, paper, composition, etc. type labels will not be acceptable).

9.2. The terminal block arrangement and location shall be such that incoming and outgoing cables can be supported. Adjacent rows of terminal blocks shall be separated at least 6" edge to edge, and at least 6" from sides, top or bottom of the cabinet for all wiring which will be done in the field by the customer. Wiring which will be done at the factory may be made in a space which is not less than 3".

9.3. If terminal blocks are located within 6" of corners, top or bottom, they shall be offset on a 45 degree angle so as to facilitate easy termination by the customer.

9.4. Terminal blocks shall have an engraved phenolic type white marker strip having the wire identities in black as shown on the manufacturer's certified drawings and shall be supplied for the following:

9.4.1. Control circuits

9.4.2. Current transformer leads

9.4.3. Motor leads

9.4.4. Heater leads

9.4.5. Any other equipment controls, instruments, meters, and relays requiring external connections

9.5. G.E. or Westinghouse heavy duty shorting blocks shall be used for terminating all CT secondaries.

9.6. For easy removal by the customer, terminal blocks shall be secured to a permanently mounted bracket with tapped holes or to a welded nut with which block mounting screws are threaded into.

9.7. Manufacturer shall provide a 24 pole terminal strip. This terminal strip shall be for customers use to interconnect for remote breaker control. One side shall be left open for customer use, the other side will be for manufacturer's connections. The terminal blocks for remote breaker control shall be grouped together.

9.8. All control wiring shall be terminated in the operating mechanism housing with terminal strip designation in accordance with coding shown on wiring diagrams.

9.9. All terminal and device codes shall be shown and properly labeled on the schematic drawings. The device codes shall be permanently labeled on the panel inside of the breaker control cabinet.

9.10. All wiring diagrams shall be drawn with all the devices indicated in their relative physical locations and shall represent the equipment and terminals arranged as they would appear to the person wiring the equipment.

9.11. All control wiring shall be identified at both ends with wrap around markers carrying the same wire marks as shown on the manufacturer's certified drawings and shall be supported in such a manner as to permit visual tracing of all wires. Wiring marking shall be performed by the use of T & B "E-Z Code" self-laminating adhesive material or equal.

9.12. Circuit code labels are not to be installed over crimped connections as a visual inspection of the crimp is required.

9.13. Wiring ductwork shall be of such design to provide access to all wiring. Otherwise, grouping of wires to be exposed and tie-wrapped for neatness.

9.14. All manufacturer's connections to the interconnecting terminal blocks shall be made to one side only, leaving space on the other side for the purchaser's connections.

9.15. The manufacturer shall supply one (1) twelve point terminal block as a spare for customer's use.

9.16. All cabinet wiring other than AC or DC buses shall be AWG #12, tinned copper, 65 strand, G.E. Co. type Vulkene switchboard wire SI-57275, 600 V, gray insulation or approved equal.

10. TERMINAL CONNECTORS

10.1. The manufacturer shall have no more than two (2) conductor terminations per terminal strip pole, nor more than two (2) conductor terminations per relay or component terminal point.

10.2. Non-insulating ring type compression terminal connectors shall be used on all terminals.

10.3. Ring type, solderless, barrel type compression connectors such as Burndy hylug or approved equal shall be used for all terminations and connections within the breaker.

10.4. All terminal block individual termination point studs to utilize *3/32"* thick nuts.

10.5. The manufacturer shall furnish all conduits necessary for interconnecting all electrical control systems within the breaker. Conduit joints and fittings shall be dust and water tight and shall be filled to maximum 50% capacity.

11. ACCESSORY EQUIPMENT, SPARE PARTS & PM RECOMMENDATIONS

11.1. A list of spare parts shall be included with the bid package. This list shall include a complete description of the part including manufacturer, catalog numbers or part numbers and prices for each item.

11.2. JEA reserves the right to purchase any or all of the spare parts on the spare parts list. Only those parts required to meet inventory requirements will be purchased.

11.3. Prices for the following spare parts shall be included in the bid form as an attachment. The prices will not be used to determine the bid award. The spare parts list is as follows but not limited to:

11.3.1. One (1) hand closing lever for manually closing the circuit breaker

11.3.2. One (1) bushing

11.3.3. Two (2) 125 volt DC closing coils

11.3.4. Two (2) 125 volt DC trip coils

11.3.5. One (1) spring charging motor

11.3.6. One (1) anti-pump relay

11.3.7. One (1) spare switch, auxiliary and motor cutoff

11.3.8. One (1) latch mechanism

11.3.9. One (1) spare bushing gaskets

11.3.10. One (1) spare vacuum bottle

11.3.11. One (1) spare heater and one (1) spare humidistat

11.3.12. One (1) set of special tools for long term major maintenance

11.4. All spare parts shall be crated separately from the breaker.

11.5. Spare Parts Availability and Inventory Set-up Guarantee: Contractor guarantees that spare parts shall be made available for, at least, the life of the product. The inventory of spare parts shall be adequate to support JEA's needs for spare parts.

11.6. A preventative maintenance schedule shall be provided in the proposal. The schedule shall include minor inspections and major overhauls. The manufacturer shall state if bushings or any major part will have to be removed to inspect and replace contacts and interrupters.

12. CIRCUIT BREAKER NAMEPLATE

The circuit breaker shall have a stainless steel nameplate located on the outside of the breaker housing which contains the following information:

12.1. Manufacturer

12.2. Breaker Type

12.3. Date of Manufacture

12.4. Customer Purchase Order

12.5. Mechanism Type

12.6. Serial Number (shall be a dedicated number)

12.7. Rated Maximum Operating Voltage

12.8. Rated Continuous Current

12.9. Rated Short Circuit Current (KA)

12.10. Frequency

12.11. Motor Rating

12.12. Tripping Control Voltage Range

12.13. Closing Control Voltage Range

12.14. Trip Coil Current

12.15. Close Coil Current

12.16. KFactor

12.17. Rated Interrupting Time

12.18. Complete Weight

12.19. Instruction Book Number

12.20. Parts List Number

13. DELIVERY

13.1. The manufacturer shall ship the circuit breakers F.O.B. JEA site, Jacksonville, Florida. The delivery location shall be furnished upon notification of shipment.

13.2. The manufacturer shall assume responsibility for safe arrival of the circuit breakers and handle all claims if damaged in shipment.

13.3. All equipment furnished hereunder which requires packaging shall be clearly labeled with the following:

13.3.1. JEA Purchase Order Number

13.3.2. Substation Name

13.3.3. Item Number which corresponds to the Manufacturer's "Bill of Material"

13.3.4. Description of the contents enclosed

13.4. Any package which contains more than one (1) item shall have a separate packing list attached for the specific contents of that package.

13.5. All packages shall be either on pallets or bundled in an acceptable manner for off-loading.

13.6. The method of packing shall be such as to adequately protect the contents from any damage that might be reasonably encountered in transportation and handling.

13.7. Breakers being shipped with the bushings already installed in the dead tank shall be covered with plastic wrap to prevent damage and contamination during transportation.

13.8. Any equipment which requires protection from the weather shall utilize packing material and packing crates that shall be sturdy enough to provide weatherproof protection for a period of up to one (1) year of outdoor storage without deterioration of the packaging, crates or damage to the contents.

13.9. Any packages that require indoor storage shall be clearly marked.

13.10. Prior to shipment, the Project Engineer shall receive a complete packing list of all the items to be shipped in order for the customer to verify complete shipment.

13.11. All spare parts shall be packaged separately and clearly marked "SPARE PARTS". In addition, they shall be marked with their respective part numbers, descriptive information and JEA P.O. Number.

13.12. All spare parts shall be shipped F.O.B. site:

JEA Commonwealth Service Center
6674 Commonwealth Ave.
Jacksonville FL 32254

14. SERVICES OF A FIELD ENGINEER

14.1. The manufacturer shall provide the services of a Field Engineer at the job site for two (2), eight (8) hour days with the initial order.

14.2. The cost of the Field Engineer shall be quoted separately and shall be included on the Bid Form. This price will not be used in the evaluation of the contract price.

14.3. The Field Engineer shall inspect the equipment to verify that it has been installed properly and shall supervise and assist in placing the breaker in operation.

14.4. The Field Engineer shall be thoroughly knowledgeable and experienced in the installation, operation and maintenance of the specific breaker.

14.5. At such time as JEA may direct, the Field engineer shall be made available for a period of two (2) days for each type of circuit breaker to instruct JEA's personnel in the proper operation, adjustment, testing and maintenance of the equipment. One (1) day is to be devoted to classroom instruction and one (1) day at the breaker installation location. The training session may be video recorded by JEA. This session shall be separate from the service time as described in the first item of this section and will take place at a later date.

14.6. JEA reserves the right to delete the services of the Field Engineer or any part thereof after purchase under the Purchase Order and deduct that amount from the payment schedule.

15. DRAWINGS, INSTRUCTION BOOKS, TESTS, AND DATA

15.1. Drawings

All drawings, data sheets etc. will be returned to the manufacturer if the following requirements are not met:

15.1.1. The manufacturer shall submit to JEA drawings (24" x 36"), including outline, wiring and schematic diagrams of the control equipment and interconnection diagrams.

15.1.2. The drawings shall be submitted to the Project Engineer for approval prior to manufacture of the equipment. **Manufacturing shall not be started, under any circumstance, until the Project Engineer had approved the drawings.** Approval drawings shall be received within 60 days ARO. A preliminary outline drawing (s) showing dimensions, weights, and center of gravity shall be submitted within 30 days ARO.

15.1.3. The drawings and data necessary shall include, but not limited to, the following:

15.1.3.1. Front View, Side View, Plan View and Assembly Drawings including center of gravity, shear and moment information (loadings).

15.1.3.2. Elementary Control Diagrams

15.1.3.3. Nameplate Information and Ratings.

15.1.3.4. Interconnection Diagrams illustrating terminal blocks of all equipment.

15.1.3.5. Five (5) sets of final drawings.

15.1.3.6. Control cabinet arrangement drawings.

15.1.3.7. Complete "Bill of Material".

15.1.3.8. AC, DC and interconnection drawings shall be provided on separate sheets.

15.1.4. Interconnection diagrams shall show the actual physical arrangement of terminals on terminal blocks for all equipment furnished. The drawings shall also show the drawings in schematic form. Reproducible drawings shall be the same size as the original (24' x 36"). Reduced or **Tabular connection drawings will not be accepted.**

15.1.5. Each drawing shall include the JEA purchase order number and the name of JEA substation.

15.1.6. If the manufacturer's breaker design is upgraded or modified within two (2) years from the date of purchase, the manufacturer shall provide two (2) sets of revised drawings.

15.1.7. All final drawings shall be submitted in both 24" x 36" hard copies and an electronic copy provided on compact disc (CD) Intergraph CAD system (Microstation V8i Select Series 3 or AutoCAD 2015. A DXF, DWG or DGN file type are acceptable. PDF versions of drawings shall also be included on the compact disc.

15.2. Test Data

The manufacturer shall supply:

15.2.1. Information on the power factor of the bushing, when applicable, as individual units and as installed on the circuit breaker.

15.2.2. The results in PDF format of all production tests made on each individual breaker before it is shipped from the factory.

15.2.3. Typical excitation, ratio correction factor and phase angle curves for current transformers.

15.3. Instruction Books

15.3.1. The manufacturer shall supply three (3) instruction books assembled and bound in a three-ring binder with removable cover and edge sheets per Substation location, which shall contain information on receiving, storing, maintenance and assembly of the breaker.

15.3.2. The OEM drawings shall be 11" x 17" drawings and included in the instruction books.

15.3.3. The manufacturer shall supply an instruction book conveniently mounted in the pocket on the door inside of the breaker control panel for each circuit breaker shipped to the customer.

15.3.4. Instruction books shall include, but not be limited to, the following:

15.3.4.1. Table of contents and index tabs.

15.3.4.2. Specifications, Test Data, and Curves.

15.3.4.3. Description of the Equipment.

15.3.4.4. Operating Instructions.

15.3.4.5. Instructions in the methods of receiving, inspection, storage, and handling.

15.3.4.6. Complete installation and maintenance instructions.

15.3.4.7. Assembly drawings.

15.3.4.8. Wiring and schematic drawings.

15.3.4.9. Parts lists.

15.3.4.10. Schedule of required lubricants.

15.3.4.11. Nameplate information and shop order numbers for each item of equipment and component part thereof.

15.3.4.12. Relay instruction books for all annunciators, auxiliary relays, latching relays, overcurrent relays, reclosers, transducers, meters, and any other device installed in the breaker.

15.3.4.13. List of recommended spare parts.

15.3.4.14. Separate sheet defining measurements to be performed by customer on installation of the breaker.

15.3.4.15. Separate sheet providing a summary of all breaker and mechanism adjustment values with allowable limits.

15.3.4.16. List of maintenance tools furnished with the equipment.

15.3.4.17. A flash drive containing a PDF format version of the entire instruction book.

15.3.5. The face sheet of each instruction book is to be identified with the JEA project name, the JEA purchase order number, the product serial number and the product name. The manufacturer's job order number is not an acceptable substitute for the serial number.

16. TYPICAL DEVICES AND AUXILIARY EQUIPMENT

The following items apply to the major items of equipment to be housed within the control cabinet:

16.1. One (1) switch, circuit breaker control, with red and green flags, labels to indicate switch position and indicating lights with resistors. Switch to be G.E. Co. type 16SB1CB210SSM2K, indicating lights to be G.E. Co. type ET-16 or equal with LED bulb for 125 VDC operation.

16.2. One (1) switch, recloser cutoff, rotary type, G.E. Co. type 16SB1 BB210SSM16K or Westinghouse type W, style No. 1530009. Device No. 79CO.

16.3. LED indicating lights on each circuit breaker shall be as follows:

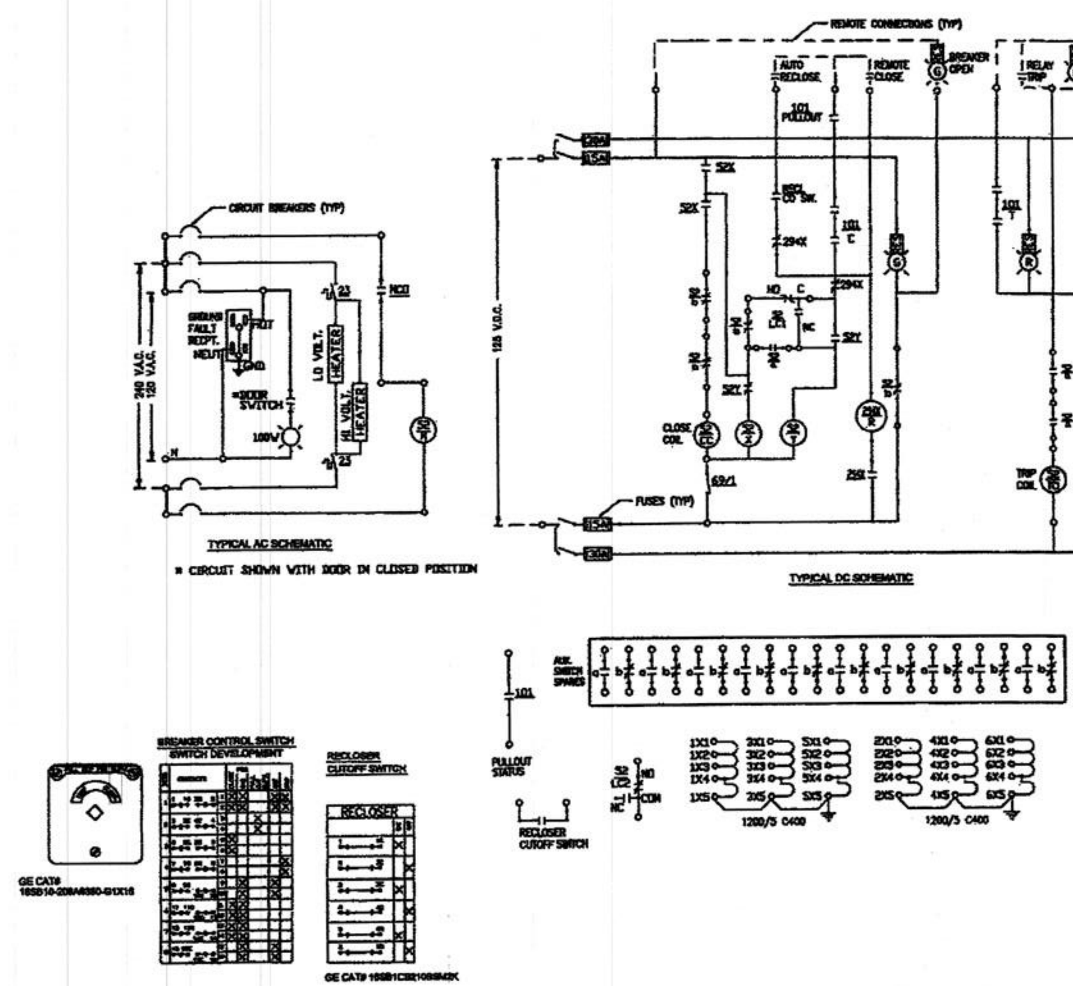
16.3.1. Red to indicate ·CLOSED" position.

16.3.2. Green to indicate ·OPEN" position.

17. APPENDICES

17.1. Typical drawings are for illustration purposes only. Project specific drawings will be provided at the time of the submittal of the purchase order.

17.2. Breaker specific drawings depicting relays installed within the breaker application will be provided at the time of the submittal of the purchase order.



LEGEND

- 52X—CLOSING RELAY
- 52Y—ANTI-PUMP RELAY
- 52/M—CLOSING MOTOR (CHARGES CLOSE SPRINGS)
- 52/CC—CLOSE COIL
- 52/TC—TRIP COIL
- 101—CONTROL SWITCH
- 69—MANUAL RESET LOCKOUT SWITCH
- 52/LC—LATCH CHECK SWITCH (SHOWN LATCHED)
- MCO—MOTOR CUT OFF SWITCH
- 23—THERMOSTAT

APPENDIX I

NO.	REVISIONS TO DRAWING	BY	DATE	APPROVED	ENGINEERING	BY	DATE
					DESIGNED		
					CHECKED		
					APPROVED		
					DRAFTING	BY	DATE
					PRELIMINARY		
					FINAL DESIGN		
					AS BUILT		

DC ELEMENTARY 38KV BREAKER

JEA

SCALE NONE

PROJECT DESIGN SEGMENT 20410

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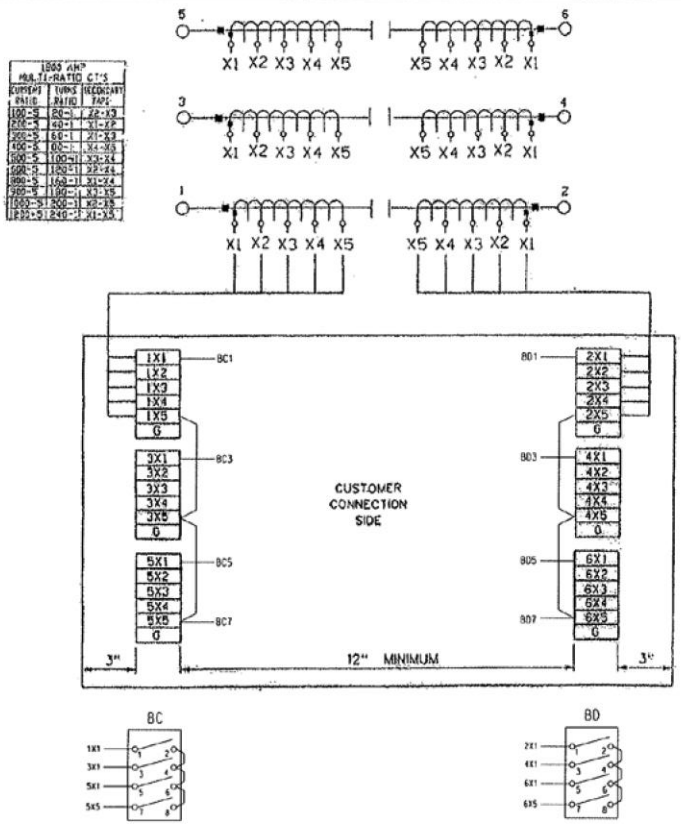


NOTES :

1. MANUFACTURER TO LEAVE A MINIMUM OF 6" WORKING ROOM AROUND TERMINAL BLOCKS ON CUSTOMER CONNECTION SIDE.
2. MANUFACTURER SHALL HAVE NO LESS THAN 3" OF WORKING ROOM ON FACTORY CONNECTION SIDE OF TERMINAL BLOCKS.

APPENDIX II

NO.	REVISIONS TO DRAWING	BY	DATE	APPROVED

ENGINEERING	BY	DATE
DESIGNED		
CHECKED		
APPROVED		
DRAFTING	BY	DATE
PRELIMINARY		
FINAL DESIGN		
AS BUILT		

38KV BREAKER CT TERMINAL BLOCK CONNECTION - TYPICAL

JEA

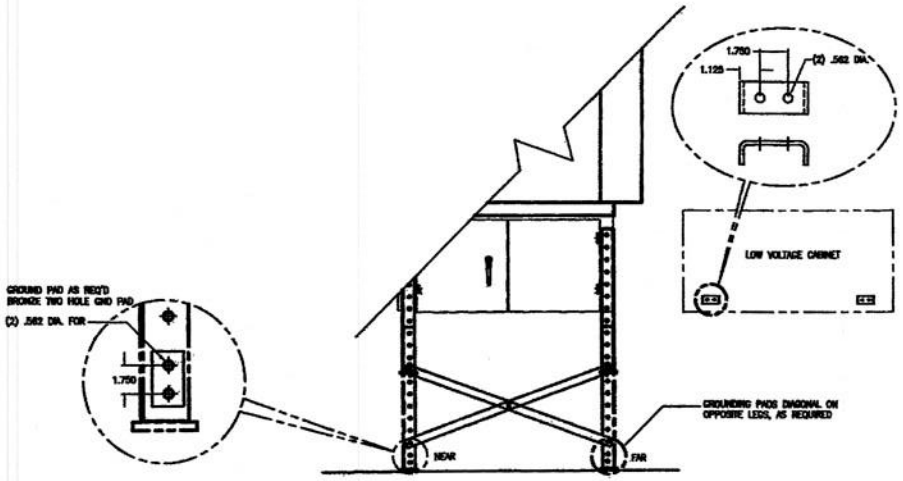
SCALE NONE

PROJECT DESIGN SEGMENT 20410

DESIGN FILENAME

DRAWING NO.

SHEET NO.



38KV GROUNDING TYPICAL DETAILS

APPENDIX III

NO.	REVISIONS TO DRAWING	BY	DATE	APPROVED

ENGINEERING	BY	DATE
DESIGNED		
CHECKED		
APPROVED		
DRAFTING	BY	DATE
PRELIMINARY		
FINAL DESIGN		
AS BUILT		

38KV BREAKER GROUNDING DETAIL

JEA

SCALE NONE

PROJECT DESIGN SEGMENT 20410

DRAWING NO.

SHEET NO.

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