



# CITY OF FLORENCE, ALABAMA

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*Procurement Department*

*Leigh Anne Kidd, Purchasing Agent*

AN EQUAL OPPORTUNITY EMPLOYER

INVITATION-TO-BID NO. E-R-00648

Bid to Open February 25, 2025

February 6, 2025

Ladies/Gentlemen

In conformance with the competitive bid law of the state of Alabama, please quote F.O.B. Florence, Alabama, prices, terms, and earliest delivery on the following:

- (Qty 2) 46 kV Circuit Breakers to meet or exceed the attached specifications.

Items bid should equal to or exceed the attached minimum specifications. All bidders must list any exceptions to the specifications. If no exceptions are listed, the City shall assume the bidder CAN meet all specifications.

Note:

1. Please submit your bid using the attached Supplier's Quotation Sheet.
2. Payment shall be made within 15 days of delivery and acceptance in accordance with the City of Florence Accounting Department's standard operating procedures.

The following conditions are to apply concerning the purchase of the above items:

P. O. BOX 388 • FLORENCE, AL 35631-0388  
PHONE (256) 740-4661 • lkidd@florenceal.org • FAX (256) 740-8857

1. Bids will be received in the office of the Purchasing Agent, Third Floor, Room 329, City Hall, 110 West College Street, Florence, Alabama 35630, until 1:30 p.m., CST, Tuesday, February 25, 2025, at which time they will be opened and read aloud in the City Auditorium.
2. All bids must be sealed and clearly marked as "Invitation-to-Bid No. E-R-00648, to open February 25, 2025".
3. It is understood that the City of Florence reserves the right to accept or reject any and/or all bids and waive any informalities.
4. In accordance with Section 41-16-50.(a) of the Code of Alabama, in the event a bid is received for an item of personal property to be purchased or contracted for from a person, firm, or corporation deemed to be a responsible bidder, having a place of business within the corporate limits of the City of Florence, Alabama, whose bid is no greater than five percent (5%) greater than the bid of the lowest responsible bidder, the City of Florence may award the contract to such bidder.
5. All bids must be dated and signed by authorized personnel.
6. No prices shall include state or federal excise taxes, state or local sales taxes.

Yours Truly,



Leigh Anne Kidd

Purchasing Agent

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# Specifications for Dead Tank Circuit Breaker (46kV)

City of Florence Utilities – Electricity Department

February 3, 2025

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Clint Cannon  
AL P.E. # 29451



Georgia | Tennessee | Texas | Virginia  
[pdengineers.com](http://pdengineers.com) | (770) 453-1410

## Invitation

Florence Electricity Department will receive bids in their office until 1:30 PM local time February 25, 2025, for two 46kV circuit breakers. Additional specifications or clarifications may be obtained by contacting the Engineer listed below. Please submit your bid to the Owner in a sealed envelope clearly labeled **“Bid No. E-R-00648 opens 02/25/25”**. Electronically submitted bids are NOT acceptable. Bids received after the above-stated time will NOT be considered.

Delivery shall be the earliest availability to the Oakland Substation or the Florence Utilities headquarters for storage/staging if the site is not ready.

All bids shall be submitted to the Owner.

### Owner

City of Florence Utilities - Electricity Department  
P.O. Box 877, Florence, AL 35631  
110 West College Street, Florence, AL 35630

Attn: Ms. Mary McDuffa  
Telephone: (256) 760-6300  
Email: [mmcduffa@florenceal.org](mailto:mmcduffa@florenceal.org)

### Submit Bids

City of Florence, Procurement Office  
110 West College Street – Room No. 329  
Florence, AL 35630

### Engineer

Patterson & Dewar Engineers, Inc.  
P.O. Box 2808, Norcross, GA 30091  
850 Center Way, Norcross, GA 30071

Attn: Mr. Clint Cannon  
Telephone: (770) 453-1410  
Email: [ccannon@pdengineers.com](mailto:ccannon@pdengineers.com)

# Specifications for Dead Tank 46kV Circuit Breakers

## 1. General

These specifications cover substation class high voltage circuit breakers. They cover electrical, mechanical and safety features as well as characteristics of outdoor 60 hertz automatic circuit breakers, with 3.0 cycles (or less) interrupting time.

The power circuit breaker will be used to interrupt faults on the primary and secondary of power transformers in outdoor substations and will be connected to a nominal 46 kV system.

Power circuit breakers must be able withstand operating voltages up to 50 kV.

## 2. Applicable Standards

The manufacturer shall furnish equipment that will comply with all latest applicable standards and regulations of the Occupational Safety and Health Administration (OSHA), ANSI, IEEE and NEMA concerning the design of power circuit breakers. It should be further understood that these standards represent the minimum requirements.

## 3. Ratings

Operating Voltage:	50 kV Maximum
BIL:	250 kV Minimum
Continuous Current:	1200 A
Interrupting Rating:	31.5 kA Minimum
Frequency:	60 Hz
Interrupting Time:	3 cycles

The breaker shall be so designed that it will meet or exceed the appropriate values for outdoor circuit breakers in the ANSI "Schedule of Required Load Current Switching Capability and Life for AC High-Voltage Circuit Breakers."

The manufacturer shall certify that the design shall be such that the nameplate rating shall be maintained during the expected life of this type equipment under normal operating and maintenance conditions.

## 4. SF6 System

The interrupters shall utilize an SF6 gas system. The breaker shall have an SF6 gas monitoring system designed such that an alarm is generated if the pressure drops to a level where intervention is required. At this pressure, the breaker should still be capable of normal operation. However, if the gas pressure drops to a level where safe operation of the breaker cannot be assured, then a second alarm shall be generated and the breaker prevented from operating. This alarm relay system shall have a minimum of two normally open and two normally closed contacts for each alarm level, all wired to terminal blocks for customer use.

## 5. Control Voltages

Closing:	125 VDC
Tripping:	125 VDC
Motor:	125 VDC
Heater:	120/240 VAC

## 6. Mechanism and Controls

The circuit breaker mechanism shall be designed such that it opens and closes all three phase poles simultaneously. Breaker opening/closing times shall be provided with the supplier's quotation.

Circuit breaker shall be equipped with a mechanically and electrically trip free mechanism provided with an anti-pump scheme. Mechanism shall be motor-spring type mounted in a mechanism housing. Provisions for manual tripping/closing and other standard equipment shall be located within this housing. Motors for motor-spring mechanism drive shall be 125-volt DC. Other equipment to be supplied is as follows:

- A. Two 125 VDC trip coils, each in electrically separate circuits. Each trip circuit shall be wired such that the Owner can monitor the integrity of the trip coils with the breaker both in the open and closed positions.
- B. One closing relay, electrically trip-free with seal-in contact.
- C. One latch checking switch (a.k.a. "close spring is not fully charged" alarm or Motor-overflow alarm) with spare contacts wired to terminal blocks for monitoring.
- D. A mechanism position indicator, visible from outside the housing.
- E. Other necessary terminal blocks and wiring. All terminals within the mechanism housing shall be identified/labeled. Terminals for connection to circuits external to the circuit breaker shall be identified and marked as to function e.g., 240 volts AC, 125 volts DC, etc.
- F. Breaker shall be equipped with an external manual trip lever painted red for significance.
- G. Mechanism housing shall be weatherproof.
- H. One ten-stage (or more) auxiliary switch, completely wired to terminal blocks in the control cabinet.
- I. Guarded heaters shall be provided for both the control and mechanism compartments (if separate). The heaters shall be 240 VAC and shall be thermostatically controlled. The heaters shall be properly sized for temperatures expected at the location of the Owner and furnished with thermostat for heater control.
- J. An SF6 pressure gauge, density switch and fill connection shall be provided in the mechanism cabinet. Alarms for SF6 pressure shall be provided as previously described.
- K. Mechanical operations counter.
- L. Control cabinet shall have one 120 VAC, 100W-rated light socket with switch and bulb guard, and one 120 VAC, 15A, GFI duplex receptacle.

All wiring should be properly supported. Glue type stick-on wiring supports are NOT ACCEPTABLE. All wiring shall be labeled at termination ends indicating opposite end connection point (destination).

## 7. Bushings

- A. All bushings shall be of the NEMA standard 46 kV class, 250kV BIL and equipped with external terminal and terminal connector.
- B. Stud connectors shall be supplied by the manufacturer and shall be of the standard stud to 4-hole pad type.
- C. The bushing color shall be light gray ANSI No. 70.
- D. Below each bushing, the bushing number (1-3-5-2-4-6) shall be marked on the bushing CT covers or the frame of the breaker.

## 8. Bushing Current Transformers

- A. Equip each bushing with two multi-ratio, five tap, bushing current transformer with distributed windings.
  - 1-3-5 bushings:  
2 sets – 1200/5 ratio, C400 relay accuracy class
  - 2-4-6 bushings:  
2 sets – 1200/5 ratio, C400 relay accuracy class
- B. All leads from the bushing current transformers shall be terminated on Penn-Union Type 6006 or Marathon type 1500 (or approved equivalent) shorting-type CT terminal blocks in the relay/wiring cabinet. Thumb screws and shorting bar must be included.
- C. Grounds must be run from the ground bar to the 6<sup>th</sup> pole (the G terminal) of each CT shorting block.
- D. Each set of CTs are to be wired to GE PK-2 shorting blocks. See “**Test Switch and PK Block**” section for part details.

## 9. Construction

- A. All sheet metal shall be of suitable quality and thickness to provide rigid enclosures and cabinets with smooth surfaces.
- B. Bolts, cap screws, nuts, unpainted metal, etc. exposed to the weather shall be made of non-corrosive stainless-steel material.
- C. All mechanism and relay cabinets shall have hinged doors with a three point, handle operated latch and shall be fully gasketed with non- sticking material.
- D. All enclosures and cabinets shall be waterproof and dust tight. All filters shall be removable, washable and of sufficient density to prevent dust from entering the enclosure.
- E. All mechanism and relay cabinets shall have at least one minimum 8” x 14” control conduit entrance area located below the terminal blocks.
- F. The minimum height from the base line of the breaker to the lowest energized part of the breaker shall be 10.0 feet.



- G. Provide four copper-faced or stainless steel grounding pads with two - 1/2" x 13 tapped holes on 1-3/4" centers, two welded to the breaker frame on diagonally opposite corners, one on the mechanism cabinet and one on the control cabinet (if separate from mechanism cabinet). Grounding pad on the control cabinet shall be directly connected (with #10 AWG wire) to the **grounding bar** located inside the cabinet.
- H. All parts of the breaker shall be thoroughly cleaned, primed and painted before final assembly. The color of the finish paint shall be Outdoor Light Gray, ANSI No. 70. Inside of cabinets shall be white.
- I. Lifting eyes or hooks shall be provided and arranged so that slings will not damage bushings.

## 10. Standard External Accessories

No accessories are required for this order.

## 11. Relay, Ammeters, and Transducers

No relays are required for this order.

## 12. Switches, indicating lamps, and wiring

- A. Each control circuit shall be equipped with a 2-pole, fused knife switch or a low voltage circuit breaker for connecting and disconnecting the following circuits:
  - 1. Close circuit
  - 2. Trip circuit #1
  - 3. Trip circuit #2
  - 4. Motor circuit
  - 5. Heater circuit(s)

**Note: The trip coils shall be "slugged" and shall not be fused. Fuses shall be provided for initial testing/commissioning only.**
- B. The breaker control shall be supplied with an auxiliary switch with ten- stages or more following the breaker interrupting contacts. Ten (10) spare poles are to be supplied and wired to terminal blocks, five (5) "a" and five (5) "b".
- C. Lamps indicating breaker position (Open/Closed) shall be LED array, GE type ET-16. LEDs shall be white, while caps shall be colored red or green. (Open = Green, Closed = Red) The two red LEDs shall be wired to each trip circuit, and the one green LED wired to a 52b contact.
- D. A Control Switch shall be provided and shall be Electroswitch series 2445 or equal.
- E. All control wiring shall be minimum #14 AWG type SIS.
- F. All CT wiring shall be minimum #12 AWG type SIS.
- G. If a hinged (swing) panel is used, all connections considered "By Customer/Others" must be made to terminal blocks located on a stationary frame (not to the swing panel).
- H. All wiring shall be labeled at termination ends indicating opposite end connection point (destination).
- I. All equipment shall be mounted, wired and ready for operation.

### 13. Test Switch & PK Block

CTs shall be connected from shorting terminal blocks to a GE PK-2 style test block, #6422120G4. When pulled, this block should short the CT's to ground and leave the outgoing (load) side open. PK hardware (shorting strips, screws, etc.) must be included. Grounds must be run from the ground bar to the 6<sup>th</sup> (unused) pole of each PK block, on the CT source side. Load side connections must be wired to terminal blocks on the back panel of the breaker.

### 14. Instruction Books and Drawings

Equipment approval drawings to be distributed as follows: 1 set to Owner and 1 set to Engineer. The Engineer will return one print set to manufacturer with comments. Email is preferred.

One complete printed set of instruction books and record drawings shall be included in the breaker door. One digital set of instruction books, record drawings and 1 copy of all CAD generated drawings in AutoCAD or DXF format shall be sent to the Owner and Engineer via email.

### 15. Delivery

Supplier shall deliver breakers as complete as possible to substation sites. Quotation shall indicate approximate time for delivery.

### 16. Proposal

Supplier's quotation shall be specific about any addition or exception to the characteristics described herein.

Dimensional drawings shall be included with proposal, and drawings for approval shall be submitted to Patterson & Dewar Engineers as soon as possible after receipt of order.

### 17. Service

Supplier should include in the base quotation charges for use of manufacturer's service engineer, equipment, etc., to conduct on-site assembly and testing of breaker, if required. This includes such things as gas installation, contact alignment check, bushing installation, adjustments, etc. If such services are not required, manufacturers shall so state in the proposal. Otherwise it will be assumed that they are included in the bid.

### 18. SF6 Tools

The manufacturer shall include in the base quotation all necessary SF6 tools, fixtures and fittings required to fill the breaker – specifically including but not limited to an SF6 regulator, hoses and adapters. The SF6 gas shall be supplied by the manufacturer.

### 19. Test Reports

Test reports of all tests performed on the breaker during manufacture shall be provided to Patterson & Dewar Engineers and the Owner.

## 20. Spare Parts

Prices and manufacturer's part numbers for the following spare parts shall be provided with the bid:

- 2 – Primary bushings
- 3 – C400 class CTs
- 1 – Spring rewind motor
- 1 – Close Coil
- 1 – Trip Coil

## 21. Warranty

Breaker shall be covered by manufacturer's warranty for at least 60 months from date of shipment.

## 22. General Conditions

### Acceptance and Rejection

The Owner reserves the right to reject any or all bids and to waive any informality in bids. The Owner reserves the right to award the bid to the lowest and best bidder, as determined by the Owner and Engineer.

### Price Policy

Quoted prices shall be FOB at the Substation (Manufacturer has the responsibility of unit during shipment). Freight shall be allowed and prepaid.

**City of Florence Utilities**  
**Oakland Substation**

**46kV Dead Tank Circuit Breaker**  
**E-R-00648 Supplier's Quotation Sheet**

**Manufacturer** \_\_\_\_\_

**Base Bid**

Two (2) - 46 kV Circuit Breakers

Unit Price \$ \_\_\_\_\_

Total Cost \$ \_\_\_\_\_

Per unit shipping weight \_\_\_\_\_ lbs.

Delivery (ARO) \_\_\_\_\_ wks.

Approval drawings available (ARO) \_\_\_\_\_ wks.

**Notes / Exceptions**

AUTHORIZED PERSONNEL: \_\_\_\_\_

PRINT NAME: \_\_\_\_\_

DATE SIGNED: \_\_\_\_\_

COMPANY NAME: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

CITY: \_\_\_\_\_ STATE: \_\_\_\_\_ ZIP \_\_\_\_\_

TELEPHONE NUMBER: \_\_\_\_\_

PRINT EMAIL ADDRESS: \_\_\_\_\_



# CITY OF FLORENCE, ALABAMA

Department of Purchasing

## ADDENDUM NO. 1

To: All Bidders  
From: Leigh Anne Kidd, Purchasing Agent  
Date: February 7, 2025  
Subject: Bid Invitation No. E-R-00648

### Clarification

*The Bid Opening date has been rescheduled for Tuesday, March 11, 2025, at 1:30 P.M. CDT, at the location listed in the original Bid Invitation.*

**Per written request, we are extending the bid opening date.**

Issued this 7th day of February 2025.

No other part of the Bid Invitation shall be changed or modified. Thank you for your cooperation in this matter.

Sincerely,

A handwritten signature in blue ink that reads "Leigh Anne Kidd".

Leigh Anne Kidd  
Purchasing Agent