



OFFICE OF GROUND WATER AND DRINKING WATER

WASHINGTON, D.C. 20460

SOLICITATION OF PUBLIC COMMENT FOR PROJECT-SPECIFIC BUILD AMERICA, BUY AMERICA NONAVAILABILITY WAIVER PROPOSAL

SUBJECT: UNDER EVALUATION: Project-Specific Nonavailability Waiver of Build America, Buy America Act (BABA) Requirements to the City of Columbus, OH, for Electrical Equipment for the Fourth Water Plant Site Preparation Project

Introduction

This solicitation of public comment by the U.S. Environmental Protection Agency (EPA) is to evaluate a BABA waiver request submitted by an assistance recipient based on Nonavailability of product(s) for a single project.

This solicitation of public comment does not represent a final agency decision. The purpose of this proposal is to inquire whether potential BABA-compliant products may be available that were not identified by the assistance recipient or through the EPA's BABA-compliant product research efforts, and whether other factors should be considered in the evaluation of a waiver.

The EPA has completed its market research efforts and was unable to identify BABA-compliant products meeting the performance-based specifications, in sufficient and reasonably available quantities and of a satisfactory quality. The EPA makes every effort to locate BABA-compliant products through its waiver process, and the public comment period provides a meaningful opportunity to vet the Agency's interim research. In the EPA's experience, a viable BABA-compliant product is identified through public comment in many cases. Through this public comment period, commenters may provide information that indicates a waiver may not be needed. For example, if a specified item is found to be domestically available, the EPA would not issue a final waiver.

Public comments are requested for 15 days (specific dates noted on the EPA's website). Please submit comments to BABA-OW@epa.gov. Please include information in the subject of the email identifying it as a public comment on this waiver request, such as "Waiver Comment: Columbus, OH Fourth Water Plant Site Preparation Project" or similar.

Background

The Buy America Preference set forth in section 70914 of the BABA included in the Infrastructure Investment and Jobs Act (Pub. L. No. 117-58), requires all iron, steel, manufactured products, and construction materials used for infrastructure projects under Federal financial assistance awards be produced in the US.

Under section 70914(b), the EPA may waive the application of the Buy America Preference, in any case in which it finds that: applying the domestic content procurement preference would be inconsistent with the public interest; types of iron, steel, manufactured products, or construction materials are not produced in the US in sufficient and reasonably available quantities or of a satisfactory quality; or the inclusion of iron, steel, manufactured products, or construction materials produced in the U.S. will increase the cost of the overall project by more than 25 percent. All waivers must have a written explanation for the proposed determination; provide a period of not less than fifteen (15) calendar days for public comment on the proposed waiver; and submit the proposed waiver to the Office of Management and Budget's (OMB) Made in America Office for review to determine if the waiver is consistent with policy.

Summary

Proposed Waiver: The Environmental Protection Agency is soliciting comments regarding whether to issue a project waiver of the manufactured products requirements of section 70914 of the BABA included in the Infrastructure Investment and Jobs Act (Pub. L. No. 117-58), for electrical equipment used in an infrastructure project funded through the Capitalization Grants for Drinking Water State Revolving Funds. The non-availability waiver is proposed for the Fourth Water Plant Site Preparation project.

Waiver Type: Nonavailability of a BABA-compliant product in sufficient and reasonably available quantities or of a satisfactory quality.

Waiver Level and Scope: Project level waiver for multiple products for a single project. No other project will utilize the waiver.

Proposed Waiver Description: Project-specific nonavailability waiver of BABA manufactured products requirements to the City of Columbus, OH, for three high-voltage electrical components:

1. High Voltage SF6 Dead Tank Circuit Breaker.
2. High Voltage Coupling Capacitor Voltage Transformer (CCVT).
3. High Voltage Surge Arresters.

Project Summary:

The purpose of the Fourth Water Plant Site Preparation Project is to get the site ready for the future Home Road Water Plant. The project includes the installation of a 138 kV electrical substation system including all structures, disconnect switches, bussing, circuit breakers, transformers, switchgear, controls, prefabricated electrical building, and appurtenances. The project needs this substation in order to power the future Home Road Water Plant.

Length of the waiver: From the effective date of the final waiver until project completion, which is estimated to be January 21, 2029.

Summary of Items Covered in the Proposed Waiver (including NAICS):

High Voltage SF6 Dead Tank Circuit Breaker

- NAICS: 335313
- PSC: 5950

High Voltage Coupling Capacitor Voltage Transformer (CCVT)

- NAICS: 335313
- PSC: 5950

High Voltage Surge Arresters

- NAICS: 334513
- PSC: 5925

No BABA-compliant products that meet the project's specifications were identified by the assistance recipient, or through the EPA's market research completed in August 2025.

Description of Efforts Made to Avoid the Need for a Waiver

Both the City of Columbus and the EPA made every effort to obtain BABA-compliant electrical equipment. This is both documented in the waiver request, and in the description of the EPA's extensive research efforts listed below.

Market research concluded on August 8, 2025. The market research process included thorough review of the waiver request submission, examination of domestic manufacturer catalogs and other technical data and marketing materials, personal communication with domestic manufacturers, inquiries of regional project officers, and outreach to contractors and engineers with expertise and familiarity with the project. During market research, the EPA contacted nine (9) high-voltage circuit breaker manufacturers and suppliers of high-voltage circuit breakers, eleven (11) high-voltage transformer manufacturers and suppliers, and ten (10) high-voltage surge arrester manufacturers and suppliers. The EPA identified these manufacturers in an attempt to find all potential BABA-compliant manufacturers of the above-mentioned product(s).

When contacted, one (1) high-voltage circuit breaker manufacturer indicated potential to meet the specifications of the project while being BABA compliant. When contacted by the assistance recipient, the manufacturer declined to confirm that their high voltage circuit breakers comply with either BABA or the technical specifications of the project. Based on the technical evaluation conducted, the claim that BABA-compliant products that meet the project's specification are not available is supported.

Anticipated Impact if No Waiver is Issued

The future Home Road Water Plant will be operated by the electrical substation that this project is constructing. Absent the waiver, the project will be unable to construct a complete and functional electrical substation, thus removing the ability to power the future Home Road Water Plant. This could have implications for the City of Columbus' ability to provide ample safe, reliable drinking water to its residents and impact the public health of the area.

Description of Award

Recipient Name and/or Unique Entity Identifier (UEI): 316400223

Recipient Name: City of Columbus

Recipient Unique Entity Identifier: 316400223

Federal Financial Assistance Identification Number (FAIN): N/A

Federal Financial Assistance Listing Name: 66.468 Drinking Water State Revolving Fund

Federal Financial Assistance Listing Number: 66.468

Federal Financial Assistance Funding amount: \$62,508,000.00

Total Cost of Infrastructure Expenditures: \$107,626,131.41

KRISTEN ATHA
Director



July 29, 2025

Environmental Protection Agency
2110 East Aurora Road
Twinsburg, Ohio, 44087

Dear Deborah Nicholas, P.E.:

Loan recipient Columbus Water & Power is seeking a project-specific, nonavailability waiver of the Build America, Buy America Act for three high voltage products for the Fourth Water Plant Site Preparation Project. The WSRLA Project Number for this project is [REDACTED]. This project is the precursor to the upcoming construction of the Home Road Water Plant, the future fourth water plant of Columbus, Ohio.

The City's Management Team (CMT) are Columbus Water & Power's authorized representatives for this project and are submitting this waiver application on our behalf. Should there be any questions or additional information required please reach out directly to the CMT construction manager for this project, Matt Killmeyer at mattkillmeyer@hillintl.com [REDACTED]

Sincerely,

A handwritten signature in blue ink that reads "Mark Eppich".

Mark Eppich, P.E.
Engineer III
Columbus Water & Power

A large black rectangular redaction box covering the bottom portion of the signature area.





Home Road
Water Plant



Fourth Water Plant Site Preparation Project Non-Availability BABA Waiver

City of Columbus Water and Power is seeking a project-specific, nonavailability waiver of the Build America, Buy America Act (BABA) for three high voltage (HV) products. These products include HV SF6 dead tank circuit breakers, HV coupling capacitor voltage transformer (CCVT), and HV surge arresters for the Fourth Water Plant Site Preparation Package. This project involves performing site preparation services entailing general clearing, tree clearing, preliminary grading, stormwater management, roadway improvements, rock blasting excavation and removal. It also includes the installation of a 138 kV electrical substation system including all structures, disconnect switches, bussing, circuit breakers, transformers, switchgear, controls, prefabricated electrical building, and appurtenances. This project is the precursor to the upcoming construction of the Home Road Water Plant, the future Fourth Water Plant of Columbus, Ohio.

Each of these product's ratings are within the Institute of Electrical and Electronics Engineers (IEEE) High Voltage (HV) classification, ranging between 100kV and 230kV. There are limited manufactures of these HV products, and upon market research, there are currently no known manufacturers that can comply with the BABA requirements and maintain the same quality standards described in the project specifications [REDACTED]

[REDACTED] There are no existing 138 KV product waivers present on the EPA site. If no waiver is issued, a complete and functional electrical substation cannot be constructed, thus removing the ability to power the future Home Road Water Plant.

A rigorous, multi-phase due-diligence process was conducted to evaluate domestic availability of these three critical high-voltage components specified. Our objective was to determine whether any U.S.-based manufacturer or assembler could supply equipment satisfying BABA domestic-content threshold without incurring prohibitive cost premiums, unacceptable lead-time extensions, or technical compromises.

The following items are requested to be covered under this waiver:

1. High Voltage SF6 Dead Tank Circuit Breaker-
 - a. Description: A type of electrical switch used to interrupt high-voltage power circuits, characterized by its "dead tank" design where the main contacts and arc-quenching medium (like SF6 gas) are housed in separate, sealed tanks. The main circuit breakers are provided to protect and isolate the overall power distribution system. This also protects the incoming line from [REDACTED]. Each circuit breaker on the medium voltage transformers is provided to protect and isolate the transformers and electrical system. The circuit breaker connection scheme is required to meet the [REDACTED] document on "Requirement of Transmission Connected Facilities"
 - b. Due Diligence:

[REDACTED]



[REDACTED]

- c. Quantity Required: 3
- d. Specification: Section 33 75 19
- e. NAICS: 335313
- f. PSC: 5950 – Coils and Transformers – includes coil assemblies, reactors, transformers (instrument transformers)
- 2. High Voltage Coupling Capacitor Voltage Transformer (CCVT)
 - a. Description: Used in transmission and distribution substations to provide proportional, secondary single-, or three-phase voltages for protection, metering, and control functions. The CCVT has three basic components: a capacitor divider made from a group of high voltage capacitors, a lower voltage grounding capacitor(s), and a voltage transformer/filter element which provides the single-phase secondary voltage. CCVTs are required to provide the necessary signals to achieve the overall protection scheme for the electrical systems. The overall protection scheme is designed in accordance with [REDACTED] Requirements of Transmission Connected Facilities and [REDACTED] Detail Load Study Report.
 - b. Due Diligence:

[REDACTED]
 - c. Quantity Required: 1
 - d. Specification: Section 33 72 01
 - e. NAICS: 335313
 - f. PSC: 5950 – Coils and Transformers – includes coil assemblies, reactors, transformers (instrument transformers)
- 3. High Voltage Surge Arresters
 - a. Description: Surge arresters are the primary protection against atmospheric and switching overvoltage's. They are generally connected in parallel with the equipment to be protected to divert the surge current. They consist of a porcelain tube, MOV blocks, top & flange covers, and line & ground terminals. Surge arresters are required per industry standards and [REDACTED] requirements.
 - b. Due Diligence:



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[REDACTED]

- c. Quantity Required: 3
- d. Specification: Section 33 72 03
- e. NAICS: 334513
- f. PSC 5925 - Circuit Breakers and Cutouts – Includes all circuit breakers and cutout devices

[REDACTED]

After extensive market research, specification review, and formal vendor correspondence [REDACTED] no (zero) domestic suppliers can furnish the three specified components in full compliance with BABA's 55% domestic content threshold without unacceptable cost escalations, schedule delays, or technical concessions. [REDACTED]

[REDACTED] The total project cost is [REDACTED] and the value of products covered under this waiver application is approximately [REDACTED]

Length of the waiver: From the effective date of the final waiver through completion of the project, anticipated to be January 21st, 2029. May 28th, 2027, is the projected date for the longest lead time product that is anticipated to be onsite to avoid significant project schedule disruptions.

Federal Financial Assistance Listing Name: Water Supply Revolving Loan Account (WSRLA) in association with the Ohio and U.S. Environmental Protection Agencies alongside the Ohio Water Development Authority (OWDA) funds this project.

This waiver request was submitted to the EPA by the state of Ohio and applies only to the project in the subject line. All supporting correspondence and/or documentation from contractors, suppliers or manufacturers included as a part of this waiver request was done so by the recipient to provide an appropriate level of detail and context for the submission. There may be documents with project diagrams, schedules, and supplier correspondence in formats that do not meet the Federal accessibility requirements for publication on the Agency's website. Hence, these exhibits have been omitted from this waiver publication. They are available upon request by emailing BABA-OW@epa.gov.

SECTION 33 72 03
SURGE ARRESTERS

PART 1 GENERAL

1.01 SUMMARY

- A. Furnish all labor, materials, equipment and incidentals required to provide surge arresters as shown on the Drawings or specified.

- B. Gapless Metal Oxide Surge Arresters shall be designed to repeatedly limit the voltage surges on 48-62 Hz power circuits (greater than 1 kV) by passing surge discharge current and automatically limiting the flow of system power frequency current.

- C. Related Sections:
 - 1. Section 26 05 53, Electrical Identification
 - 2. Section 26 08 00, Electrical Field Acceptance Tests

1.02 REFERENCES

- A. Reference Standards:
 - 1. IEEE C62.11, Standard for Metal-Oxide Surge Arresters for Alternating Current Circuits (>1kV)
 - 2. NEMA LA 1, Standard for Surge Arresters

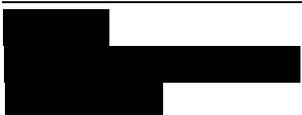
1.03 DEFINITIONS (Not Used)

1.04 SYSTEM DESCRIPTION (Not Used)

1.05 SUBMITTALS

- A. Product Data: Submit copies of manufacturers cut sheets, specifications and technical data for all components being supplied under this Section.

- B. Operation and Maintenance Data:



1. Provide O&M Data in accordance with Section 01 78 23.1, Operation and Maintenance Manual.
2. Submit the following O&M Data:
 - a. Schedule of installed combined metering instrument transformers containing voltage, current rating, location, identification of connected load, model number and serial number.
 - b. Catalog Cut-Sheets for disc/enclosures.
 - c. Installation and Maintenance Manuals.
3. Quality Assurance: Field Test Report

1.06 QUALITY ASSURANCE (Not Used)

1.07 DELIVERY, STORAGE, AND HANDLING

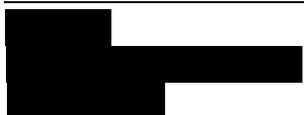
- A. Equipment delivery shall be in accordance with Section 01 65 00, Product Delivery Requirements.
- B. Equipment storage and handling shall be in accordance with Section 01 66 00, Product Storage and Handling Requirements.

1.08	PROJECT/SITE CONDITIONS	(Not Used)
1.09	SEQUENCING	(Not Used)
1.10	SCHEDULING	(Not Used)
1.11	WARRANTY	(Not Used)
1.12	SYSTEM STARTUP	(Not Used)
1.13	INSTRUCTION OF OWNER'S PERSONNEL	(Not Used)
1.14	COMMISSIONING	(Not Used)
1.15	MAINTENANCE	(Not Used)

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. 
- B. 



- C. ██████████
- D. Or approved equal

2.02 EXISTING PRODUCTS (Not Used)
 2.03 MATERIALS (Not Used)

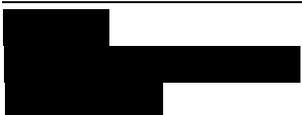
2.04 MANUFACTURED UNITS

A. Surge Arresters

1. Specific Surge Arrester Requirements: Comply with the following data sheet at minimum:

Equipment	Surge Arrester
Quantity	As required
Class	Station
MCOV Rating	84 kV
Rating	108 kV
Nominal System Voltage	138 kV
Maximum System Voltage	145 kV
Housing	Porcelain
Wind Speed	90 MPH
Altitude	Below 3000ft
Seismic Loading	Zone 2A
Ice Loading	½"
Temperature Range	-40 degrees C to +40 degrees C
Humidity Range	0% to 100%
Mounting & Terminals	Standard Base Mounting; NEMA 4 Line Terminal; Clamp Style Ground Connector (For 1/0 – 4/0 Bare Cu Cable)

2. Surge arresters must comply with NEMA LA1 and IEEE C62.11.
3. The surge arresters shall be of the gapless metal oxide type with a pressure relief device whose operation/venting can be discerned/easily visible from the ground without the need for searching for any debris that might arise as a result of venting.
4. The insulators shall be porcelain with a creepage distance suitable for the intended location of installation.
5. The color of the insulator shall be ANSI No. 70 Grey.
6. Surge arresters shall be suitable for outdoor installation.



2.05	EQUIPMENT	(Not Used)
2.06	COMPONENTS	(Not Used)
2.07	MIXES	(Not Used)
2.08	FABRICATION	(Not Used)
2.09	FINISHES	(Not Used)
2.10	SOURCE QUALITY CONTROL	(Not Used)

PART 3 EXECUTION

3.01	ACCEPTABLE INSTALLERS	(Not Used)
3.02	EXAMINATION	(Not Used)
3.03	PREPARATION	(Not Used)
3.04	ERECTION	(Not Used)

3.05 INSTALLATION

- A. Install surge arresters where shown on the Drawings.
- B. Comply with manufacturer's instructions.
- C. Identification meeting the requirements of Section 26 05 53, Electrical Identification, shall be provided.

3.06	APPLICATION	(Not Used)
3.07	CONSTRUCTION	(Not Used)
3.08	REPAIR/RESTORATION	(Not Used)
3.09	RE-INSTALLATION	(Not Used)

3.10 FIELD QUALITY CONTROL

- A. Provide manufacturer's standard field testing of equipment and all components.
- B. Provide third party field testing in accordance with Section 26 08 00, Electrical Field Acceptance Tests.
- C. Test Results:
 - 1. The CMT shall be notified of any equipment failing a field test. The failed equipment shall be replaced at no cost to the OWNER, and retested.



3.11	ADJUSTING	(Not Used)
3.12	CLEANING	(Not Used)
3.13	DEMONSTRATION	(Not Used)
3.14	PROTECTION	(Not Used)
3.15	SCHEDULES	(Not Used)

++ END OF SECTION ++



SECTION 33 72 01

COUPLING CAPACITOR VOLTAGE TRANSFORMER

PART 1 GENERAL

1.01 SUMMARY

- A. Furnish all labor, materials, equipment and incidentals required to provide coupling capacitor voltage transformers as shown on the Drawings or specified.
- B. Related Sections:
 - 1. Section 26 05 53, Electrical Identification
 - 2. Section 26 08 00, Electrical Field Acceptance Tests

1.02 REFERENCES

- A. Reference Standards:
 - 1. ANSI/NEMA standard C93.1

1.03 DEFINITIONS

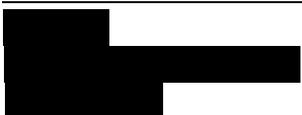
(Not Used)

1.04 SYSTEM DESCRIPTION

(Not Used)

1.05 SUBMITTALS

- A. Product Data: Submit copies of manufacturers cut sheets, specifications and technical data for all components being supplied under this Section.
- B. Operation and Maintenance Data:
 - 1. Provide O&M Data in accordance with Section 01 78 23.1, Operation and Maintenance Manual.
 - 2. Submit the following O&M Data:
 - a. Schedule of installed coupling capacitor voltage transformers containing voltage, current rating, location,



identification of connected load, model number and serial number.

- b. Catalog Cut-Sheets for disc/enclosures.
- c. Installation and Maintenance Manuals.

3. Quality Assurance: Field Test Report

1.06 QUALITY ASSURANCE (Not Used)

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Equipment delivery shall be in accordance with Section 01 65 00, Product Delivery Requirements.
- B. Equipment storage and handling shall be in accordance with Section 01 66 00, Product Storage and Handling Requirements.

1.08 PROJECT/SITE CONDITIONS (Not Used)

1.09 SEQUENCING (Not Used)

1.10 SCHEDULING (Not Used)

1.11 WARRANTY (Not Used)

1.12 SYSTEM STARTUP (Not Used)

1.13 INSTRUCTION OF OWNER'S PERSONNEL (Not Used)

1.14 COMMISSIONING (Not Used)

1.15 MAINTENANCE (Not Used)

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. [REDACTED]
- B. [REDACTED]
- C. [REDACTED]
- D. [REDACTED]

2.02 EXISTING PRODUCTS (Not Used)

2.03 MATERIALS (Not Used)

2.04 MANUFACTURED UNITS

A. Coupling Capacitor Voltage Transformer (CCVT)

1. Specific CCVT Requirements: Comply with the following data sheet at minimum:

Equipment	Coupling Capacitive Voltage Transformer single phase
Quantity	3
Min Accuracy Class	0.2
Nominal System Voltage	138KV
Maximum System Voltage	145kV
Basic Impulse Level	650KV
System Frequency	60HZ
No. of Secondary Windings	2
Secondary Voltages	115V-69V
Wind Speed	90MPH
Altitude	Below 3000 ft
Seismic Loading	Zone 2A
Ice Loading	½ "
Temperature Range	-40 degrees C to +40 degrees C
Humidity Range	0% to 100%
Accessories:	Carrier Accessories for PLC coupling

2. CCVT specified with carrier accessories shall be switch selectable for coupling high frequency signals to the power line and shall possess drain coils, gaps, and switch assemblies.
3. CCVT shall be made to be ANSI No. 70 grey.
4. A NEMA 4-hole pad is to be provided for connection of the CCVT primary to the bus.
5. A NEMA 2-hole pad for a ground connection shall be provided at the base for suitably connecting the ground grid to the CCVT.
6. The secondary terminals of the VT shall be brought out into a NEMA 3R terminal box attached to the transformer tank. Bolted links which may be opened for isolation shall be connected in series with each of the leads from the VT secondary and shall be suitably labeled. Provide minimum of three sets of terminals



for each VT secondary windings for external connection to protection and metering devices.

7. Capacitor Stack

- a. Capacitor elements shall be of mixed dielectric material consisting of polypropylene film and kraft paper.
- b. Capacitor units shall be housed in individual insulators.
- c. A cast aluminum cover shall be provided on top of the upper capacitor assembly and shall be fitted with an aluminum terminal.
- d. Capacitor unit shall be hermetically sealed through the means of a stainless-steel diaphragm. Any gas cushion used for each capacitor unit shall not be in direct contact with the insulating fluid. The internal pressure in the CCVT shall remain positive under all services conditions.
- e. Capacitor units shall be provided with an insulated neutral terminal at the ground end, suitable for a high frequency coupling connection. This capacitor neutral terminal shall be connected by a properly insulated conductor to a terminal in the secondary terminal box, which by means of a 2-position bolted link shall be connectable to either a grounded terminal or to the power line carrier (PLC) high frequency coupling equipment terminal. The low voltage terminal of the capacitor divider and the intermediate VT shall be able to withstand a voltage of 2.5 kV (RMS).
- f. Capacitor units shall be provided with potential ground switch.

8. Electromagnetic Unit (EMU)

- a. Electromagnetic unit shall be hermetically sealed.
- b. Electromagnetic unit shall be housed in a cast aluminum base tank with a cast aluminum cover.
- c. Electromagnetic unit shall be housed in an oil-filled tank. Premium naphthenic mineral oil shall be used as the insulating medium.



- d. A sight glass shall be provided at the rear of the tank for oil level monitoring.
- e. An oil drain plug shall be provided on the base tank.
- f. An electrostatic earth screen shall be provided between the primary and secondary windings of the electromagnetic unit to reduce the interwinding capacitance. The screen shall be grounded by a robust flexible connection and disconnecting link within the secondary terminal box. An impulse of the rated value received at the primary terminal shall be so reduced in transfer that its value between the secondary terminals or the secondary terminals connected together, and earth shall not exceed 3 kV peak value.
- g. CCVT shall be provided with suitable ferro-resonant suppression circuits and shall be designed as to minimize transients and oscillations. A contact shall be made available for remote indication/alarm that the ferro-resonant suppression circuit has operated or that it's component/s have failed to aid in quick troubleshooting/restoration.
- h. The secondaries of the electromagnetic unit shall be brought out of the base tank through an oil/air seal block assembly and terminated on separate terminal blocks.

9. Carrier Accessories

- a. CCVT shall be equipped with the following carrier accessories for power line carrier (PLC) service.
 - 1) External carrier grounding switch (CGS)
 - 2) Carrier entrance bushing

10. Secondary Terminal Box

- a. Secondary terminal box shall be warmed by heat transfer from the oil filled tank.
- b. Secondary terminal box shall be sized to accommodate all required connections.
- c. NEMA 3R enclosure.



11. Insulators

- a. Insulator material shall be of high-quality porcelain.
- b. Insulator shall be made to be ANSI No. 70 grey.

2.05	EQUIPMENT	(Not Used)
2.06	COMPONENTS	(Not Used)
2.07	MIXES	(Not Used)
2.08	FABRICATION	(Not Used)
2.09	FINISHES	(Not Used)
2.10	SOURCE QUALITY CONTROL	(Not Used)

PART 3 EXECUTION

3.01	ACCEPTABLE INSTALLERS	(Not Used)
3.02	EXAMINATION	(Not Used)
3.03	PREPARATION	(Not Used)
3.04	ERECTION	(Not Used)
3.05	INSTALLATION	
	A. Install coupling capacitor voltage transformers where shown on the Drawings.	
	B. Comply with manufacturer's instructions.	
	C. Identification meeting the requirements of Section 26 05 53, Electrical Identification, shall be provided.	
3.06	APPLICATION	(Not Used)
3.07	CONSTRUCTION	(Not Used)
3.08	REPAIR/RESTORATION	(Not Used)
3.09	RE-INSTALLATION	(Not Used)
3.10	FIELD QUALITY CONTROL	
	A. Provide manufacturer's standard field testing of equipment and all components.	

B. Provide third party field testing in accordance with Section 26 08 00, Electrical Field Acceptance Tests.

C. Test Results:

1. The CMT shall be notified of any equipment failing a field test. The failed equipment shall be replaced at no cost to the OWNER, and retested.

3.11	ADJUSTING	(Not Used)
3.12	CLEANING	(Not Used)
3.13	DEMONSTRATION	(Not Used)
3.14	PROTECTION	(Not Used)
3.15	SCHEDULES	(Not Used)

+ + END OF SECTION + +



SECTION 33 75 19

HIGH VOLTAGE SF6 DEAD TANK CIRCUIT BREAKER

PART 1 GENERAL

1.01 SUMMARY

- A. Furnish all labor, materials, equipment, and incidentals necessary to provide Hot Voltage Circuit Breakers, as indicated on the Drawings specified herein, or otherwise required.
- B. Circuit breaker shall be free standing for outdoor use.
- C. The circuit breaker shall be designed for three-pole gang tripping and closing. Sulfur hexafluoride (SF6) gas shall be the dielectric and interrupting medium. The design of the interrupters shall incorporate the SF6 gas interrupting medium. The circuit breaker design shall be dead tank.
- D. Coordinate with substation control systems supplier for all required controls and monitoring signals related to the circuit breaker system.
- E. Due to the critical nature of this facility and to provide for maximum reliability and responsibility, a single supplier shall have responsibility to provide a complete, coordinated power distribution system and shall supply all of the following:
 - 1. The equipment supplied under Section 33 72 33, Substation Control Systems.
 - a. The supplier under Section 33 72 33, Substation Control Systems shall also have responsibility to provide the following:
 - 1) The equipment supplied under Section 33 72 33.15, Liquid-Filled Power Transformers.
 - 2) The equipment supplied under Section 33 72 63.13, Vertical Break Disconnect Switch.
 - 3) The equipment supplied under Section 33 75 19, High Voltage SF6 Dead Tank Circuit Breaker.
 - 2. The equipment supplied under Section 26 13 12, Power Distribution Control Systems.

- a. The supplier of Section 26 13 12 shall also have responsibility to provide the following:
 - 1) The equipment supplied under Section 26 13 13, Medium Voltage Metal-Clad Switchgear.
 - 2) The equipment supplied under Section 26 54 13, Prefabricated Electrical Building.

F. Related Sections:

1. Section 26 05 53, Electrical Identification
2. Section 26 05 73, Short-Circuit/Coordination Study
3. Section 26 08 00, Electrical Field Acceptance Tests
4. Section 33 72 33, Substation Control Systems

1.02 REFERENCES

A. The equipment shall meet the performance requirements of and be designed, manufactured, and tested in accordance with the latest applicable standards, in effect at the time of the breaker type testing, of

1. American National Standards (ANSI)
2. International Electrotechnical Commission (IEC)
3. Institute of Electrical and Electronics Engineers (IEEE)
4. National Electrical Manufacturers Association (NEMA)
5. American Society of Mechanical Engineers (ASME)
6. IEEE C37.04, Standard Rating Structure for AC HV Circuit Breakers
7. IEEE C37.06 Preferred Ratings for AC HV Circuit Breakers
8. IEEE C37.09 Standard Test Procedure for AC HV Circuit Breakers
9. IEEE C37.010 Application Guideline for AC HV Circuit Breakers

10. IEEE C37.011 Application Guide for TRV for AC HV Circuit Breakers
11. IEEE C37.012 Application Guide for Capacitance Switching
12. IEEE C37.11 Requirements for Electrical Control
13. IEEE C37.90, Standard Relay and Relay Systems Associated with Electric Power Apparatus
14. ANSI/IEEE C57.13 - Requirements for Instrument Transformers.
15. NEMA SG-4, Standards for Power Circuit Breakers
16. NETA, International Electrical Testing Association
17. ANSI Z55.1 - Gray Finishes for Industrial Apparatus and Equipment.

1.03 DEFINITIONS (NOT USED)

1.04 SYSTEM DESCRIPTION

A. Circuit breaker configuration shall be as shown on the Drawings.

1.05 SUBMITTALS

A. Include with each submittal a copy of this specification section, with addenda updates included, and all referenced and applicable sections included, with each paragraph check-marked to indicate specification compliance or marked to indicate requested deviations from specification requirements. Check marks (✓) shall denote full compliance with a paragraph as a whole. If deviations from the specifications are indicated, and therefore requested by the CONTRACTOR, each deviation shall be underlined and denoted by a number in the margin to the right of the identified paragraph, referenced to a detailed written explanation of the reasons for requesting the deviation. The CMT shall be the final authority for determining acceptability of requested deviations. The remaining portions of the paragraph not underlined will signify compliance on the part of the CONTRACTOR with the specifications. Failure to include a copy of the marked-up specification sections, along with justification(s) for any requested deviations to the specification requirements, with the submittal shall be sufficient cause for rejection of the entire submittal with no further consideration

- B. Shop Drawings: The CONTRACTOR shall specifically note: Due to the expected complexity of these shop drawings, the review time for the submittals in this Section will exceed shop drawing review times noted in Section 01 33 00, Submittal Procedures. The CONTRACTOR shall assume that a maximum of eight (8) weeks will be required for the original shop drawing submittal, and that subsequent resubmittals will be reviewed within the review times noted in Section 01 33 00, Submittal Procedures, assuming the original submittal is not rejected.
- C. Shop Drawings: Submit technical information for the equipment proposed, including:
1. Master drawing index
 2. Front view elevation
 3. Floor plan
 4. Top view
 5. Single line diagram
 6. Three line diagram
 7. AC and DC control schematics and interconnection drawings
 8. Wiring diagrams showing numbered terminal points and interconnections to other units. Wiring diagrams shall be of the point-to-point type
 9. Bushing outline
 10. Current transformer secondary excitation and phase angle
 11. Nameplate schedule
 12. Component list/Bill of materials
 13. Conduit entry/exit locations
 14. Assembly ratings including:
 - a. Circuit breaker assembly short circuit withstand rating
 - b. Enclosure internal arc short circuit rating
 - c. Voltage

- d. Continuous current
- e. Basic impulse level for equipment over 600 volts
- 15. Major component ratings including:
 - a. Voltage
 - b. Continuous current
 - c. Interrupting ratings
- 16. Cable terminal sizes
- 17. Control cabinet drawings
- 18. Sequence of operation
- 19. Provide AutoCAD files of all shop drawings on flash drive
- D. Product Data: Provide the following:
 - 1. Manufacturers' specifications, cut sheets, dimensions, and technical data.
- E. Operation and Maintenance Data
 - 1. Provide Operations and Maintenance Manual and Data in accordance with Specification Section 01 78 23.1, Operations and Maintenance Manual.
 - a. Operation and Maintenance Manual
 - 1) Installation, maintenance and operating instruction manuals shall include, but not be limited to, the following items:
 - a) Catalog Cut-Sheets for circuit breakers, controls, instrumentation, fuses and ancillary equipment.
 - b) Detailed installation, operating and maintenance instructions.
 - c) Installation and Maintenance Manuals.
 - d) Wiring Diagrams.



- e) All approved “As-Built” shop drawing information including all wiring and schematic drawings shall be updated to “As-Installed” and include all field modifications.

2. Operation and Maintenance Data:

- a) Schedule of installed circuit breakers containing voltage, connected switchgear/circuit, type, full load amps, running amps, connect equipment, manufacturer and model number
- b) Copies of panel drawings
- c) Installation and maintenance manuals
- d) All approved “As-Built” shop drawing information including all wiring and schematic drawings shall be updated to “As-Installed” and include all field modifications

F. Quality Assurance Submittals:

- 1. Manufacturer’s Qualifications
- 2. Factory test procedures
- 3. Factory test report
- 4. Field test report
- 5. Manufacturer’s certification

G. Standard Operating Procedures

- 1. Submit standard operating procedures manual in accordance with Paragraph 2.05 for review and approval.
- 2. Submit Microsoft word native file with original submittal and all subsequent submittals.
- 3. Submit final Microsoft word native file after final approval.

H. Project Record Documents Submittals: Provide the following that reflect as installed conditions:



1. Final as-left-in-field drawings. All drawings shall incorporate all changes made during the manufacturing process and field startup.
2. Wiring diagrams including three line diagram
3. Certified production test reports
4. Installation information including equipment anchorage provisions
5. Provide updated AutoCAD files of all shop drawings on flash drive.

1.06 QUALITY ASSURANCE

A. Manufacturer's Qualifications:

1. Submit documentation that demonstrates the manufacturer of this equipment has produced similar electrical equipment for a minimum period of five (5) years. When requested by the CMT, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Equipment delivery shall be in accordance with Section 01 65 00, Product Delivery Requirements.
- B. Equipment storage and handling shall be in accordance with Section 01 66 00, Product Storage and Handling Requirements.
- C. Shipping sections shall be designed to be shipped by truck, rail, or ship.
- D. Circuit breakers shall be equipped to be handled by crane.
- E. The circuit breaker shall be shipped fully assembled except for the extension legs, sub frame and bushing terminals.
- F. Follow manufacturer's instructions on SF6 gas requirements for storage and shipping.

1.08	PROJECT/SITE CONDITIONS	(NOT USED)
1.09	SEQUENCING	(NOT USED)
1.10	SCHEDULING	(NOT USED)

1.11 WARRANTY

A. Manufacturer’s Warranty:

- 1. Vendor shall guarantee that all work the Vendor completes is free from defects in design, workmanship, materials, and equipment. Vendor shall repair or reinstall, without cost to the Purchaser, any work, material, or equipment furnished by the Vendor that shall become defective, or not operate in accordance with the design requirements, except for wear and tear, during the progress of work and a period of 60 months after Substantial Completion.
- 2. The warranty shall designate the OWNER as the owner of the equipment, not the Contractor.

1.12 SYSTEM STARTUP (NOT USED)

1.13 INSTRUCTION OF OWNER’S PERSONNEL

A. Provide Instruction of the OWNER’S Personnel in accordance with Section 01 79 13, Instruction of OWNER’S Personnel.

- 1. The instructions shall include recommended procedures and schedules for startup, shutdown, troubleshooting, servicing, and preventive and maintenance,

Training Sessions Required			
Operations	Maintenance	Electrical/ Instrumentation	Total Training Time (Hours)
	2 sessions, 4 hours each		8

1.14 COMMISSIONING (NOT USED)

1.15 MAINTENANCE

A. Spare Parts:

- 1. Provide the following repair parts and accessories for each circuit breaker:
 - a. Bushing – Complete assembly
 - b. Bushing gasket set, shipped in vacuum sealed bag
 - c. Interrupter – Complete assembly

- d. Closing coil
 - e. Trip coil
 - f. Motor
 - g. Desiccant, shipped in vacuum sealed bag or bottle
 - h. SF6 gas cart for maintenance
2. Repair parts shall be packed in sturdy containers bearing labels clearly indicating the contents and equipment with which they are to be used. Deliver repair parts at the same time as the substation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. [REDACTED]
- B. [REDACTED]
- C. [REDACTED]
- D. [REDACTED]
- E. [REDACTED]

2.02 EXISTING PRODUCTS (NOT USED)

2.03 MATERIALS (NOT USED)

2.04 MANUFACTURED UNITS

- A. General: High voltage circuit breakers shall be provided in accordance with the arrangement indicated on the Drawings and shall consist of the circuit breaker, bus system, enclosure and supports.
- B. Specific Circuit Breaker Requirements: Comply with the following data sheet at minimum:

Equipment	Circuit Breaker
Type	Dead Tank
Continuous Current	1200 A
Breaking Current	25 kA minimum

Interrupting Time	3 Cycles
Nominal System Voltage	138 kV
Maximum System Voltage	145 kV
Basic Impulse Level	650 kV
Insulation Type	SF6
System Frequency	60 Hz
Bushing CTs	2 BCT's / Bushing, 1200:5 MR, C800
Number of Trip Coils	2
Number of Close Coils	1
Closing Control Voltage	125VDC
Tripping Control Voltage	125VDC
Spring Change Motor Voltage	120 VAC
Wind Speed	90 MPH
Altitude	Below 3000 ft.
Seismic Loading	Zone 2A
Ice Loading	½"
Temperature Range	-40 degrees C to +40 degrees C

C. Construction:

1. The breakers shall be of dead tank type construction. The breakers shall be capable of one shot, slow and high-speed reclosing. The maximum operating time of the breakers shall not be above 3 cycles.
2. The interrupter tanks for the circuit breaker shall be made of cast aluminum and shall not be painted. The spun aluminum current transformer housings shall not be painted. The control cabinet will be painted ANSI 70 gray. The frame and leg extensions are hot-dipped galvanized steel.
3. The circuit breaker shall have all three poles mounted on a common hot dip galvanized steel frame with legs that bolt directly to the foundation.
4. Ground pads, with provisions for NEMA 2-hole connectors, shall be welded on each side of the enclosure for external ground connections. Enclosure grounding shall not depend on bolted connections or "star washers".
5. All external hardware such as nuts, bolts, washers, hinges, door handles, etc., shall be Type 316 stainless steel.
6. The enclosure shall be provided with lifting eyes for lifting the entire unit during loading and unloading.



7. The circuit breaker shall be shipped completely assembled. Circuit breakers shall be shipped with legs unattached.

D. Circuit Breaker Controls:

1. Trip Circuit Requirements

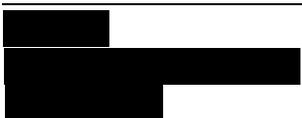
- a. Each breaker shall be equipped with two (2) electrically and mechanically independent trip coils. The failure of one trip coil shall not damage or impair the operation of the other coil. The design must be such that the simultaneous energization of both trip coils shall not prevent the breaker from tripping.
- b. The breaker shall be furnished with two trip coil(s).
- c. Fused disconnect switches/molded case circuit breakers shall be provided for the trip circuits.
- d. Trip circuit operating voltage shall be 125VDC. Trip circuits shall operate properly within the voltage ranges specified in standards, as measured at the circuit breaker.

2. Closing Circuit Requirements

- a. Closing circuit operating voltage shall be 125VDC. Closing circuit shall operate properly within the voltage ranges specified in standards, as measured at the circuit breaker.
- b. A fused disconnect switch/molded case circuit breaker shall be provided for the closing circuit.

3. Breaker Wiring

- a. All control devices and alarms shall be connected to terminal blocks located in the breaker control cabinet.
- b. Current transformer leads shall be connected to short circuiting type terminal blocks located in the breaker control cabinet. The short circuiting strips of these blocks shall be grounded. All CT leads shall be #10 AWG.



- c. All terminal blocks shall have screw type connectors and all wiring terminations shall be made using ring tongue connectors.
- d. All terminal blocks shall be adequate to receive #10 AWG control cable terminals.
- e. All control wiring will be #14 minimum type SIS.
- f. Legible sleeve type wire markers shall be provided at each end of wires over six inches in length.

4. Auxiliary Switches

- a. The manufacturer shall supply multi-contact auxiliary switches.
- b. Up to 16 contacts, "a" and "b" shall be made available for OWNER'S use.

5. Trip and Close Devices

- a. A local trip and close pushbutton shall be provided in the breaker control cabinet.
- b. The breaker shall be equipped with a position indicator that is visible from the outside of the cabinet.
- c. The breaker shall have an electrical operations counter.

E. Bushings:

- 1. Bushings shall be hollow, one-piece composite (silicon-rubber), 650 kV BIL, filled with SF6 gas common to the breaker tanks.
- 2. Bushings shall be ANSI 70 Light Gray in color.
- 3. Terminals shall be 4-hole NEMA pads suitable for OWNER connections, with cable bus connectors to be furnished by others.

F. Bushing Current Transformers:

- 1. The circuit breaker shall have a quantity of 12 multi-ratio, bushing-type current transformers, 2 per bushing. Ratio shall be 1200:5. Bushing current transformers shall conform to the following requirements:



- a. CT's shall conform to ANSI Standard C.57.13-2008, or latest revision thereof. The accuracy shall be C800.
 - b. Continuous Thermal Current Rating Factor (R.F.) of 2.0.
2. Current transformers shall be designed to permit addition or removal in the field without removal of bushings. Current transformer leads shall be continuous without junctions or splices to maintain the lowest possible resistance and decrease possible failure points. Current transformers, which are integral and encapsulated in urethane material, are not acceptable.

G. SF6 Gas System:

1. The Manufacturer shall furnish a complete SF6 gas system free of jointed plumbing in order to reduce leakage points for each circuit breaker. The SF6 gas system shall be designed such that there is one gas circuit per circuit breaker. The gas system for all phases shall be tied together such that gas pressure is shared by all phases.
 - a. The gas system shall be designed to automatically maintain the moisture content of the SF6 at an adequate level for proper operation.
 - b. The monitoring system shall be temperature compensated.
2. The Manufacturer shall furnish gas pressure gauges and gas density monitors.
 - a. Density monitors shall be located external to the mechanism cabinet or frame in order to reduce vibration, which may cause shifting in set points over time.
 - b. The pressure switches can be installed in the same SF6 gas line or on separated lines. The contacts of these pressure switches shall be wired such as either one of the contacts intended for a specific function shall trigger the event without depending on the other contact.
3. All the SF6 gas lines, as well as all the valves used in the SF6 gas system shall be stainless steel type 316 and should be manufactured specifically for SF6 handling. All fittings shall be braised or O-ring connections.

4. The Manufacturer shall provide gas-sampling valves in places that will be safe to take samples while the breaker is energized. Furthermore, the location and operation of these sampling valves should be in a way that will not cause false trips to occur.
5. Isolating valves for the SF6 pressure switches, gauges, density monitor, etc., shall be provided to be able to replace any one of the subject components without having to remove the SF6 gas from the breaker.
6. SF6 breakers shall be equipped with a temperature compensated SF6 gas monitoring system with 2 operating points.
 - a. The first operating point shall alarm via SCADA when the operating pressure falls below the manufacturer's recommended normal operating range. Auxiliary contacts should be provided for remote monitoring.
 - b. The second point shall trip and lock out the breaker via breaker protection relay. The second point shall be set above the minimum pressure at which the breaker can maintain its full short circuit interrupting rating. Auxiliary contacts should be provided for remote monitoring.
 - c. The SF6 system shall be equipped with a visual indication gauge on control cabinet with alarm contacts.

H. Operating Mechanism:

1. The breaker operating mechanism shall be electrically trip free with anti-pump feature. An anti-pump relay shall inhibit multiple close-open operations in the event that a continuous close signal is applied.
2. The mechanism shall be spring-charged stored-energy with electrical charging motor.
3. The mechanism shall be designed with an integral, manual charging handle. Charging handle shall be removable.
4. The mechanism shall be mechanically and electrically trip free and non-pumping for both manual and automatic operations.
5. The breaker shall monitor spring charge with alarm function.



6. The breaker operating mechanism shall be mounted internal of the breaker control cabinet.
7. Manual slow closing device. This device shall be located outside of the operating mechanism box.
8. Provide a Local – Remote control switch with contacts wired to the close coil and all trip coils. Switch mounted on the control cabinet front and provided with lockable cover.
9. Provide a breaker control switch with red and green indicating lights for local close and trip. Switch mounted on the control cabinet front and provided with lockable cover.
10. The breaker shall have provisions to mimic the local/remote switch and trip/close control switch listed above. The mimic control switches will be installed at the relay control panel inside control building.

I. Control Cabinet and Control Wiring:

1. The breaker shall be equipped with a weatherproof NEMA 4X control cabinet. Each cabinet shall be equipped with the following:
 - a. Construction
 - 1) The Control Cabinet shall have hinged doors with three-point latching system and mechanical stops to allow doors to remain open when necessary and mounted with anti-vibration pads. All external circuits will enter the bottom of the cabinet through conduit. The cabinet shall be provided with a gasketed removable blank bottom plate that can be drilled or punched in the field for entry of the conduits.
 - 2) The Control Cabinet shall be provided ground bus and grounded via minimum 4/0 copper conductor to tank grounding pad. All hinged doors and panels shall be electrically bonded to the cabinet using flexible braided conductors.
 - 3) All openings shall be equipped with fine mesh filters and stainless steel rodent/insect screens.



- 4) A storage holder for the breaker drawings shall be provided on the inside of the cabinet door.
- 5) A mechanical position indicator, visible from outside the enclosure shall be furnished to indicate the opened and closed positions of the circuit breaker:
 - a) The word "OPENED" or "O" in white letters shall be displayed on a green background.
 - b) The word "CLOSED" or "C" in white letters shall be displayed on a red background.
- 6) The spring-charged mechanism indicator shall display:
 - a) The word "CHARGED" in black letters on a yellow background.
 - b) The word "DISCHARGED" in black letters on a white background.

b. Electrical

- 1) Single thermal-magnetic molded-case circuit breakers suitable for the control voltage (208V single phase), and for low-voltage alternating-current power to control devices, motor, heater, and light circuits shall be provided within the control cabinet.
- 2) The control cabinet shall be equipped with thermostatically controlled heaters to prevent condensation from accumulating inside.
- 3) A door operated light shall be provided.
- 4) One (1) 120V AC, 20A, GFI single phase duplex receptacle shall be provided. An additional 120V AC, duplex receptacle shall also be provided.
- 5) 16 spare auxiliary contacts (8 N.O. & 8 N.C.).
- 6) Provide all necessary power supplies or control power transformers within control panel.

c. Control Wiring

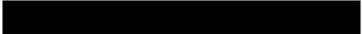
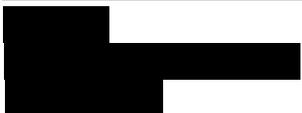
- 1) All OWNER connections to breaker control and auxiliary power devices shall be via molded terminal blocks (██████████ or equal) in the control cabinet.
- 2) All OWNER connections to current transformers shall be via shorting type molded terminal blocks (██████████ or equal) in the control box.
- 3) Terminal blocks for control wiring, where applicable, shall be 12-point, 600V, 30A equipped with strap screw contacts and a white marking strip. All conductors shall have a permanently affixed identification band on each end that clearly identifies the conductor with its representation on the associated schematic and wiring diagrams.
- 4) The control circuit contacts and associated equipment that are meant/specified for use in DC. Circuits shall be suitable for operation at 125V DC.
- 5) All Control wiring shall be minimum 12 AWG except for C.T. circuits which shall be 10 AWG. Wire shall be stranded copper with synthetic insulation, rated at 600V and 105C minimum. No more than two wires shall be terminated at any one terminal point. Insulation compound shall be flame-retardant, oil and moisture retardant, having physical and electric properties appropriate for the application.
- 6) Control and power wiring shall be terminated with heavy duty crimp type ring tongue terminals with an insulating sleeve.
- 7) All electrical devices, including, control relays, alarm/trip contacts, current transformer secondary, etc., which mount on or in the breaker shall be factory wired complete to and within the below named devices and terminals so that the only field connections necessary for operation shall be the main auxiliary power supply conductors for the auxiliary equipment and the



attachment of incoming control conductors and C.T. leads to the terminals. There shall be adequate room inside the control cabinet for connection of all interconnecting wiring without crowding. The CONTRACTOR shall provide all wiring necessary for all equipment specified and wiring for future equipment where such wiring is specified.

J. Nameplate:

1. A stainless steel nameplate shall be provided for each circuit breaker. The nameplate shall be located on the outside of the circuit breaker control cabinet with the following information stamped on it, as per latest ANSI/IEEE C37 Standard.
 - a. Manufacturer's name and address.
 - b. Breaker type and model number.
 - c. Breaker serial number.
 - d. Rated nominal and maximum voltages.
 - e. Rated voltage factor K.
 - f. Rated continuous current.
 - g. Rated symmetrical interrupting capacity at maximum rated voltage.
 - h. Rated frequency.
 - i. Rated BIL.
 - j. Motor rating.
 - k. Operating ranges of control circuit voltages.
 - l. Closing current.
 - m. Tripping current.
 - n. Quantity of insulating medium.
 - o. SF6 normal operating pressure.
 - p. SF6 minimum pressure for interrupting full rated load.



- q. SF6 minimum pressure for interrupting full rated fault current.
 - r. Weight.
 - s. Date of manufacture and purchase order.
2. Provide a stainless steel current transformer nameplate, also inside the control cabinet, with the following data:
- a. Manufacturer.
 - b. Type.
 - c. Serial number.
 - d. Date.
 - e. Rated frequency.
 - f. Rated primary current.
 - g. Rated secondary current.
 - h. Rated continuous thermal current factor.
 - i. Accuracy rating.
 - j. CT ratios.
 - k. CT connections.
 - l. Drawing number of saturation and phase angle, and ratio correction factor curves, if metering accuracy.

2.05 SOURCE QUALITY CONTROL

A. Factory Testing

- 1. Each item shall undergo factory inspection and testing prior to shipment from the factory.
- 2. Perform manufacturer standard quality control and acceptance tests.
- 3. The following tests and inspections shall also be performed if not included as part of the factory standard testing.



- a. Circuit breaker pressure vessels must be tested in accordance with current ASME code requirements and include pressure relief devices as a safety measure. All vessels with volumes that necessitate the ASME pressure vessel testing shall include a “U” stamp placard.
 - b. Manufacturer shall perform leak integrity checks on all cast vessels at manufacturing site using Helium as the tracer molecule under vacuum to ensure leak tightness.
 - c. The circuit breaker shall receive and pass all production tests as per ANSI C37.09, including a 60 Hz. AC HIPOT test on the three- pole breaker.
 - d. A complete wiring and control circuit test and check shall be made with complete verifications of all circuits.
4. The Manufacturer shall submit certified reports of production tests within two to three weeks of the tests being completed satisfactorily.

B. Standard Operating Procedures (SOP)

- 1. At the conclusion of the startup and commissioning, the Contractor shall be responsible to develop a standard operating procedures manual of the electrical system. The SOP manual shall include an overview of the electrical system, descriptions of operating modes and control procedures, equipment start-up and shutdown procedures, operational consideration, monitoring parameters, maintenance requirements and schedule, safety procedures, and regulatory requirements. SOP manual shall include photos and operator terminal interface screens to supplement text and clearly identify SOP requirements. Coordinate SOP manual with other manuals required as part of the Contract Documents.

PART 3 EXECUTION

3.01 ACCEPTABLE INSTALLERS (NOT USED)

3.02 EXAMINATION

- A. Inspect circuit breakers immediately upon delivery to site for damages.

3.03 PREPARATION (NOT USED)
3.04 ERECTION (NOT USED)

3.05 INSTALLATION

- A. Contractor shall be responsible to startup, configure and commission the circuit breakers and all accessories and auxiliary components for a fully functional system.
- B. Install equipment in accordance with manufacturer's instructions and recommendations.
- C. Secure equipment to concrete pad with anchor bolts of sufficient size and number adequate for specified seismic conditions.
- D. Coordinate terminal connections.

3.06 APPLICATION (NOT USED)
3.07 CONSTRUCTION (NOT USED)
3.08 REPAIR/RESTORATION (NOT USED)
3.09 RE-INSTALLATION (NOT USED)

3.10 FIELD QUALITY CONTROL

- A. Factory Assistance: Provide the services of a qualified factory-trained manufacturer's representative to assist the CONTRACTOR in installation and start-up of the equipment specified under this section. The manufacturer's representative shall provide technical direction and assistance to the CONTRACTOR in general assembly of the equipment, connections and adjustments, and testing of the assembly and components contained herein.
- B. Field Testing:
 - 1. Provide manufacturer's standard field testing of equipment and all components.
 - 2. Provide third party field testing in accordance with Section 26 08 00, Electrical Field Acceptance Tests.
 - 3. Test Results:
 - a. The CMT shall be notified of any equipment failing a field test. The failed equipment shall be replaced at no cost to the OWNER, and retested.

3.11 CLEANING (NOT USED)

3.12	DEMONSTRATION	(NOT USED)
3.13	PROTECTION	(NOT USED)
3.14	SCHEDULES	(NOT USED)

3.15 COORDINATION

- A. The System Supplier shall be responsible for providing the coordinating interconnect diagrams showing the electrical connections between all components and equipment of the overall system. The interconnect diagrams are for use by the Electrical Contractor and circuit breaker service personnel during installation and checkout of the equipment.

+ + END OF SECTION + +

