PUBLIC UTILITY DISTRICT 3
OF MASON COUNTY
SHELTON, WASHINGTON

BID DOCUMENT NO. M1-2023 -V2

INVITATION, INSTRUCTION TO BIDDERS
BID, CONTRACT FORMS AND
SPECIFICATIONS

SUBSTATION POWER TRANSFORMER

OCTOBER 5, 2023
Updated with Addendum 1
November 22, 2023

CALL FOR BIDS

NOTICE IS HEREBY GIVEN THAT THE BOARD OF COMMISSIONERS OF PUBLIC UTILITY DISTRICT 3 OF MASON COUNTY, WASHINGTON, does hereby invite sealed proposals for supplying a **Substation Power Transformer** as described and in accordance with Bid Document No. **M1-2023**, obtainable from the District upon request.

Proposals for the equipment must be sealed, marked Bid Document No. **M1-2023** and filed with the Purchasing Manager, Jennifer Renecker, at the District's office in Shelton, Washington, by **3:00 p.m. Wednesday, December 06, 2023.** Bids received after the time fixed for receiving Bids will not be considered or accepted. At the time and place named below such Bids will be opened and read, and the Commissioners will proceed to canvass the Bids, and may let a Contract to the lowest responsible Bidder or Bidders of the specifications.

BIDDING DOCUMENTS

Bona fide Bidders may request bidding documents from the District's Purchasing Manager, Jennifer Renecker, 2621 E Johns Prairie Road, P. O. Box 2148, Shelton, Washington (360) 426-8255, email purchaser@masonpud3.org.

Bidding documents may also be found on MRSC Roster Bonfire electronic bidding portal at **https://mrscrosters.bonfirehub.com**. Free vendor registration is required to use this platform.

BID SECURITY AND BONDS

Each Bid shall be accompanied by a certified check, bank cashier's check or bid bond executed by a Washington State licensed surety company, in an amount not less than five percent (5%) of the amount bid. No Bid will be considered unless accompanied by such a bond or security.

REJECTION OF BIDS

The Commissioners reserve the unqualified right in their sole and absolute discretion to waive any informalities and to reject any or all Bids, and to accept the Bid, which in their sole and absolute judgment will, under all circumstances, best serve the interest of the District.

Date: **OCTOBER 5, 2023**

Publish: **OCTOBER 5, 2023**

Bid Opening: **DECEMBER 6, 2023, at 3:00 p.m.**

Bid Opening Location: **Virtual Bid Opening Via Microsoft Teams**

PUBLIC UTILITY DISTRICT 3 OF MASON COUNTY
SHELTON, WASHINGTON

BID DOCUMENT M1-2023
SUBSTATION POWER TRANSFORMER

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PART VII BID FORMS

PART II

INSTRUCTIONS TO BIDDERS

IB-1 PREPARATION AND SUBMISSION OF BIDS

1.1 Each bid shall be made in duplicate on the forms provided for the Bidder's convenience. All copies shall be properly executed, all blank spaces filled in and interlineations, alterations, or erasures, if any occur, shall be initialed and formally explained over the signature of the Bidder. Violation of the requirement may be cause for rejection of the bid. In event of error in any arithmetical extension, the unit price will govern; and in case of errors in addition, the correct sum will govern.

1.2 Each bid shall be enclosed in a sealed envelope distinctly marked "Bid Proposal" and bearing the Bid Document number, title of the work as given, and the name and address of the Bidder, and shall be delivered according to the directions contained in the Invitation for Bids regarding address, date, and hour. If mailed, the bid should be addressed to **Public Utility District No. 3 of Mason County, P. O. Box 2148, Shelton, Washington 98584, Attention: Jennifer Renecker, Purchasing Manager**. For delivery in person, the Bidder may bring the quotation to the District's Operations Center at 2621 E Johns Prairie Road, Shelton, Washington.

1.3 Each bid shall give the full business address of the Bidder, including the street address, if it differs from the mailing address, and shall be signed with the Bidder's usual signature and dated. Bids by partnerships shall list the full names and addresses of all partners and shall be signed with the partnership name followed by the signatures of one or more of the general partners authorized to bind the partnership. Bids by corporations shall be signed with the legal name of the corporation followed by the signature and designation of the President, Vice-president, or other person or persons authorized to bind the corporation in this matter. The State of Incorporation shall be stated. The name of each signatory shall be typed or otherwise clearly imprinted below the signature. When requested by the District, satisfactory evidence of the authority of any signatory on behalf of a partnership or corporation shall be furnished.

1.4 Bids will be considered by item within the Bidding Schedule and award may be made on any item or combination of items at the option of the District.

1.5 It is the responsibility solely of the Bidder to see that the bid is submitted in proper form and in ample time. Any bid received after the stated closing time for receipt of bids will be marked as to date and time received and returned unopened.

1.6 The District reserves the right to extend the time for receiving and opening bids provided that notice of such extension is given prior to the opening of bids to each person or firm having requested a copy of the Bid Document.

IB-2 QUALIFICATION OF BIDDER

2.1 The District, in evaluating its requirements with regard to its financial obligations and power commitments to its customers, has determined that it must take every step

prudent to ensure the prompt delivery, and expeditious repair and servicing of equipment described in the Bid Document. The District has determined that prompt delivery and expeditious repair and servicing of equipment can best be assured if Bidders regularly manufacture such equipment and replacement parts for such equipment and maintain readily available servicing establishments on the North American continent. Therefore, no Bidder shall be considered unless the equipment specified in the Bid Document and replacement parts for such equipment are regularly available within the continental limits of North America, and such Bidder or its subcontractors and/or its suppliers, maintain a readily available servicing establishment on the North American continent.

2.2 The Bidder must have designed, manufactured, and have in successful operation similar equipment. Evidence of the above may be, at the option of the District, required for use in evaluating the Bidder's proposal. If required, this evidence would be submitted in the form of a list of similar fabrications designed and manufactured in the Bidder's plant during the ten (10) years preceding the submission of bid, names of owners of such fabrications, together with sizes and installation dates. The Bidder may further be required to submit a statement of facts with respect to historical background, business and technical organization and financial references.

IB-3 EVALUATION OF BIDS

3.1 Bid evaluation will be considered by bid item and based on furnishing the apparatus complete with all appurtenances, in compliance with the Bid Document.

3.2 All elements or factors, whether specifically provided herein or not, which would affect the final cost to and the benefits to be derived by the District will be considered to determine the award of contract.

3.3 For the purpose of evaluating bids, consideration will be given to any and all expenses to be incurred by the District for engineering required for reviewing and approving manufacturer's designs and drawings, cost of expediting, inspecting, testing and all other costs to the District that may vary between manufacturers.

3.4 The District may accept alternative offers if fully explained. The Commissioners of Mason County Public Utility District No. 3 reserve the right in their sole and absolute judgment to reject any bids, including all alternative offers or bids, without further explanation, and to accept an alternative or bid which will, in their sole and absolute judgment, under all circumstances best serve the interest of the District. The Commission shall be the final authority with regard to whether a bid is responsive to the call for bids and as to whether a Bidder is a responsible Bidder under the conditions of this bid. Specific evaluation criteria are outlined in Bidding Document Spec-17 Evaluation of Bids outlining details.

IB-4 EXAMINATION OF DOCUMENTS

4.1 Prospective Bidders who intend to submit proposals should examine with due care the complete Bid Document and any subsequent amendments or addenda thereto issued before bid opening and be informed fully with respect to all conditions which might in any way affect the performance of the work or the cost thereof. Neglecting to do so will be at the sole risk of the Bidder, and no relief can be given for error or omission. The Bid Document consists of:

Part I Call for Bids
Part II Instructions to Bidders
Part III Specifications
Part IV Contract Forms
Part V General Conditions
Part VI Special Conditions
Part VII Bid Forms

4.2 Should the Bidder find discrepancies in or omissions from the Bid Document or should the intent or meaning appear to be obscure or ambiguous, the Bidder should at once forward to the District a written request for interpretation, clarification, or correction thereof before submitting a bid. The Bidder making such a request will be solely responsible for its timely receipt. All such requests must be received not later than ten (10) days before closing time for receipt of bids. Replies will be made only in the form of addenda.

4.3 A Bidder may modify a bid by written request or telegraphic communication, provided that the request is received at the place of opening prior to the closing time for receipt of bids, and in the case of telegraphic communication, provided a written confirmation thereof over the signature of the Bidder is postmarked prior to the said closing time and received within three (3) days after the said closing time.

4.4 A copy of the Bid Document and Bid Forms will be supplied to each Bidder. All documents remain the property of the District and are to be returned if requested by the District.

IB-5 WITHDRAWAL OF BIDS

5.1 A Bidder may, without prejudice, withdraw a bid either personally or by telegraphic or written request, at any time prior to the scheduled closing time for receipt of bids. Bids must be firm for thirty (30) days after date set for receipt of bids or until the Contract is executed, whichever is earlier. Negligence or mistake on the part of the Bidder in preparing the bid confers no right for withdrawal of the bid after the closing time for receipt of bids.

IB-6 REJECTION OF BIDS

6.1 The right is reserved to reject any bid, or all bids and to waive any informality in bids received, as the interest of the District may dictate.

IB-7 BONDS AND INSURANCE CERTIFICATES

7.1 Each Bid shall be accompanied by a certified check or cashier's check payable to the order of Public Utility District 3 of Mason County, Washington, for a sum not less than five percent (5%) of the amount of the total for Bid Comparison, or accompanied by a Bid Bond in an amount not less than five percent (5%) of the amount of the Total Bid with a corporate surety acceptable to the District and also licensed to do business in the state of Washington, or file with the District a yearly bid bond approved by the District's manager, conditioned that the Bidder will pay the District as liquidated damages the amount specified in the bond unless the Bidder enters into a Contract in accordance with the Bid and supplies the Performance and Payment Bond and Certificates of Insurance if required at the time of the execution of the Contract.

7.2 The Bidder to whom the Contract award is made shall supply a Performance and Payment Bond, if required, executed as surety by a corporation authorized to issue surety bonds in the state of Washington, in the form designated by the District and with sureties satisfactory to the District, for one hundred percent (100%) of the Total Bid. The entire cost of the Performance and Payment Bond shall be at the expense of the successful Bidder and the entire cost thereof shall be included in the Bid prices for the various items of work. A specimen form of the Performance and Payment Bond is included in the Contract Forms, Part IV.

IB-8 AWARD OF CONTRACT

8.1 In the award of the contract, all evaluation factors set forth under Evaluation of Bids, part IB-3, will be given full consideration in determining which is the most reasonable and responsible bid for the District to accept.

8.2 The successful Bidder will be notified in writing of the award of Contract within thirty (30) days after official opening of bids. Within ten (10) days after notice of award, the successful Bidder shall deliver to the District the Performance and Payment Bond, if required, together with the executed Contract. These documents will have been forwarded to the successful Bidder with such notification.

IB-9 DISTRICT'S MODIFICATION OF DOCUMENT

9.1 The District expressly reserves the right to modify any provision or part of the Document at any time prior to the date set for receipt of bids. Such revisions, if any, will be in the form of an addenda, which will be issued as set forth in IB-4 Paragraph 4.2 above.

PART III – SPECIFICATIONS

SPECIFICATIONS FOR THREE-PHASE, SUBSTATION POWER TRANSFORMER

24/32/40 MVA Three-Phase 115,000V Delta – 12,470 GRDY / 7,200 V

PART III – SPECIFICATIONS

Spec-1 GENERAL

1.1 APPARATUS TO BE PURCHASED

Power transformer and all equipment shall be of new manufacture only.

This specification covers the requirements for furnishing and delivering the following:

Item 1 Three-phase transformer rated 24/32/40/45 MVA (OA/FA/FA/FA 65ºC) 60 cycles with high-voltage taps on the primary side and an on-load tap changer (OLTC) on the secondary side.

The following items shall be provided separately from Item 1:

Item 2 One spare high-side voltage transformer bushing.
Item 3 One spare low-side voltage transformer bushing.

1.2 STANDARDS

Except as specified otherwise herein in detail, all material and equipment to be provided under this contract document shall conform to the latest adopted and recommended Standards of the Institute of Electronic and Electrical Engineers (IEEE), the American National Standards Institute (ANSI), the American Society for Testing Materials (ASTM), the National Electrical Manufacturers Association (NEMA) and the Occupational Safety and Health Act (OSHA).

1.3 WARRANTY

Failure due to defective design, material and/or workmanship within twenty-four (24) months after being energized or thirty (30) months after delivery, whichever is less, shall be repaired or replaced without cost to the District. Any defect in design, material, and/or construction discovered within this period shall be corrected on all transformers furnished on the order at the Manufacturer’s expense, either by repair or replacement. The District does not by this paragraph waive any remedies it may have beyond this warranty.

1.4 SCOPE

The intent of this specification is to provide the District with a substation transformer meeting the electrical and mechanical requirements specified herein.

The District reserves the right to reject any or all Bid proposals, or any portion of any Bid proposal. Preference considerations may be given to domestic Manufacturers with qualified repair facilities and maintenance and application engineers within the Western Washington area.

1.5 LANGUAGE

The English language shall be used in all drawings, bulletins, and catalog information submittals by the successful Manufacturer.

Engineering field personnel, if required on District's premises during installation or testing, shall speak technical English without need for an interpreter.

Spec-2 TYPE

2.1 GENERAL

The transformer supplied under this specification shall be an OA/FA/FA/FA three-phase 60 Hz, outdoor, oil immersed, substation power transformer suitable for operation in Seismic Zone 3. All insulating components, oil paper, wire, and enamel shall be made of thermally upgraded materials, which are all compatible for today's industry standard 65°C rise above a maximum 40°C ambient transformer.

2.2 MVA RATING

The minimum three-phase output rating of the low voltage windings are as follows:

A. Self-cooled (OA) KVA rating @ 55ºC rise above ambient 40ºC = 24 MVA
B. Force-air (FA), one set of fans, KVA rating @ 55ºC rise above ambient 40ºC = 32 MVA
C. Force-air (FA), two sets of fans, KVA rating @ 55ºC rise above ambient 40ºC = 40 MVA
D. Force-air (FA), two sets of fans, KVA rating @ 65ºC rise above ambient 40ºC = 45 MVA

2.3 IMPEDANCE

The transformer impedance shall be 8.5% at the self-cooled rating (IEEE C57.12.36) subject to the ANSI standard tolerance of +/- 7.5% (C57.12.00).

2.4 AUDIBLE SOUND LEVEL

The transformer shall be designed and constructed such that the sound level, when tested by the standard NEMA Standard TR-1 method (IEEE C57.12.90), shall not exceed: 70 dBA at 24 MVA; 72 dBA at 32 MVA; 74 dBA at 40 MVA; and 75 dBA at 45 MVA. These values shall not be exceeded at any step position of the on-load tap changer (OLTC). These values shall not be exceeded in any direction from the transformer.

Spec-3 VOLTAGE AND BIL RATING

3.1 HIGH-VOLTAGE

The high-voltage winding is to be delta connected; be suitable for three-phase operation on a 115,000-volt ungrounded system; be equipped with two 2 ½ percent taps above and two 2 ½ percent taps below the 115,000 volt tap as described in ANSI standard C57.12.50. All the high-voltage taps shall be for use at the full forced cooling rating of the transformer.

3.2 LOW-VOLTAGE

The low-voltage winding shall be rated at 13,090 GRDY/7,558 volts with on-load tap changer suitable for wye connected, three-phase operation on a four-wire, solidly grounded neutral, 12,470/7,200-volt system.

3.3 INSULATING LEVEL

The 115,000-volt nominal voltage winding shall have 115 kV class insulation (450 kV BIL).

A. The 13,090-volt winding shall have 15 kV class insulation (110 kV BIL).

B. The neutral terminal end of winding shall have 15 kV class insulation (110 kV BIL).

3.4 PHASE RELATIONSHIP

The angular displacements between the high-voltage and low-voltage terminal voltage vectors shall be 30 degrees with the low-voltage lagging the high-voltage for a standard H1, H2, H3 rotation.

The terminal designation shall be as defined by IEEE standard C57.12.70. The Manufacturer shall certify that the phasing and polarity of the transformer has been tested and meets the requirements of IEEE standard C57.12.70.

3.5 WINDING MATERIAL

Both the high-voltage and the low-voltage windings shall be constructed using copper material.

3.6 CORE GROUND

Each electrically separate core shall have a ground lead brought to a core ground bushing.

A. The core ground bushing shall be located adjacent to one of the manhole covers to permit isolation of the core ground lead(s) from the bottom of the bushing without draining oil to expose the coils.

B. A removable core grounding link shall be provided from the bushing to the tank to permit routine core ground tests without opening manhole covers. Connection of

the core ground lead(s) to the bottom of the grounding bushing shall be by means of captive hardware. The ground lead(s) to each core shall be clearly labeled.

C. The core ground value is to be written on a tag attached to the core ground terminal.

D. Core and end frame grounding straps shall be indicated on the transformer drawings.

Spec-4 BUSHING AND TERMINALS

4.1 GENERAL

All bushings shall be cover-mounted high-voltage bushings in segment 3, low-voltage bushing in segment 1, per IEEE C57.12.10 for Standard Station Type Transformers. All bushings shall be removable without access to the interior of the transformer. All bushings shall be seated to eliminate breathing. Each bushing shall be capable of withstanding the load of the transformer in accordance with ANSI/IEEE standards and shall meet the standard test(s) for their respective insulation class, as set forth in the applicable NEMA and ANSI/IEEE standards. The color of all bushings shall be ANSI No. 70 Gray.

A. Furnish standard threaded stud-type terminals on all bushings. Silver-plate all contact surfaces of external terminals.

B. All bushings shall meet the requirements of IEEE C57.12.10. The 15 kV bushings shall meet all requirements of IEEE C57.19.01 for bushings for power circuit breakers and outdoor transformers. All bushings shall be oil filled, single piece inside and out with liquid level indication, and provisions for power factor test.

4.2 HIGH-VOLTAGE BUSHINGS

The three (3) high-voltage bushings shall have an insulation classification of 115 kV (550 kV BIL) and be of the draw lead type, shall be equipped with bushing potential taps, suitable for power factor testing, and shall conform to the latest rating and dimension standards of IEEE C57.19.00 and IEEE C57.19.01, or the latest accepted version thereof.

A. Minimum center-to-center clearance between 115 kV bushings shall be fifty-three inches (53”).

B. Excitation and overcurrent ratio curves with instruction books shall be provided.

C. The 115 kV bushings shall be equipped with tin-plated, flat, aluminum, NEMA 4-hole 4” bushing stud connectors.

D. Bushings shall each contain a clear oil site glass rather than a gauge and be clearly visible from the ground.

E. Monitoring shall be provided via Reinhausen MESENSE BM-C and wired to the selected transformer monitoring system.

4.3 LOW-VOLTAGE BUSHINGS

The three (3) low-voltage bushings and one (1) neutral bushing shall have an insulation classification of not less than 15 kV (110 kV BIL) and rated for 3,000 AMPS.

A. The neutral termination of wye connected low-voltage windings shall be in accordance with IEEE C57.12.10. The neutral end of the low-voltage winding shall be brought out through the transformer cover by means of an interchangeable bushing of 15 kV rating. The neutral will be solidly grounded by an external connection.

B. Minimum center-to-center clearance between 15kV bushings shall be twenty-four inches (24”).

C. These 15 kV bushings shall be equipped with tin-plated, flat, aluminum, NEMA 4-hole 4” bushing stud connectors.

D. Bushings shall each contain a clear oil site glass rather than a gauge and be clearly visible from the ground.

4.4 SURGE ARRESTERS

Provide three (3) 96 kV, station class, metal-oxide surge arresters, one (1) to be mounted adjacent to each high voltage line bushing, for protection of the 450 kV BIL winding. The device shall be Eaton Cooper Power System UltraSIL Polymer-Housed VariSTAR Catalog number US0960765245A11 or equivalent.

A. Provide three (3) 15 kV, station class, metal-oxide lightning arresters, one (1) to be mounted adjacent to each low voltage line bushing, for protection of the 110 kV BIL winding. The device shall be Eaton Cooper Power System UltraSIL Polymer-Housed VariSTAR Catalog number UIAA010008A0845A11or equivalent.

B. Provisions shall be made to install high-side arresters in segment 3 and low-side arresters in segment 1 of the transformer.

4.5 BUSHING CURRENT TRANSFORMERS

On high-voltage bushings, provide a total of six (6) Current Transformers (CT); two (2) on each bushing, 600:5 ampere, multi-ratio ANSI accuracy class C400 or better for operation of relays.

A. On low voltage bushings, provide six (6) current transformers; two (2) on each bushing, 2000:5 ampere, multi-ratio ANSI accuracy class C400 or better for operation of meters.

B. Provide one (1) current transformer, 2000:5 ampere, multi-ratio ANSI accuracy class C400 or better mounted on the low side neutral bushing for operation of relays.

C. Polarity marks for current transformers will be physically located away from the transformer. All current transformer secondary leads shall be terminated and identified at a common terminal board (refer to Section 5) in a weatherproof housing at a convenient location on the side of the transformer.

D. All CT wiring shall be AWG #10 stranded FEP insulated copper conductor in rigid conduit.

E. All CT terminal blocks shall be equipped with short circuiting bars.

F. A bushing current transformer nameplate of the diagrammatic type shall be located adjacent to the indexed terminal block and shall include a diagram of connections, the accuracy class, and secondary tap identification and corresponding turn ratio to primary amperes.

G. Current transformers shall comply with the requirements of IEEE C57.13 or the latest accepted version thereof. Certified current transformer connection diagrams and current transformer open circuit secondary saturation, ratio, and phase angle correction curves shall be provided for each current transformer.

Spec-5 INTERCONNECTION CABINET, CONDUITS, WIRING, AND AND TERMINAL BLOCKS

5.1 CABINETS AND CONDUITS

A. All cabinets shall be weatherproof and constructed of sheet metal sufficiently rigid to prevent warping of doors and to assure positive operation of doors and latches.

B. All cabinets' doors shall have provisions for automatically securing them in the open position at greater than 90 degrees. This provision shall be on the lower part of the door so that it is accessible. Interior hinged panels with controls mounted on them shall be provided with suitable stops such that accidental tripping of switches is minimized when the panels are in the open position.

C. All transformer's control, power, monitoring, and alarm wiring shall terminate inside the transformer's main interconnection cabinet. Additionally, the transformer's main interconnection cabinet shall allow sufficient space for termination of District-furnished control and power circuits.

D. Bottom-entry of District-furnished conduits into the interconnection cabinet is preferred, and the interconnection cabinet bottom shall have a removable aluminum cover plate for control conduit entrance.

E. The primary preferred location of the interconnection cabinet shall be located on Segment 1 of the transformer per IEEE C57.12.10 for Standard Station Type Transformers above the existing conduit location shown on "Appendix A" to facilitate ease of entry of existing substation control enclosure conduit system into the interconnection cabinet. The secondary preferred location would be on Segment 4 located as close to the existing conduit location as possible as shown on "Appendix A".

F. A 120-volt AC lamp with door-operated switch in the interconnection cabinet shall be provided. Lamp light bulb shall be protected with metal cage or impact resistant safety glass type globe. Circuit feeding the receptacle shall be overcurrent protected with the appropriately sized breaker.

G. One (1) 120-volt AC, 20 amps, single-phase GFCI receptacle shall be installed in interconnection cabinet and shall be accessible from outside the cabinet. The receptacle shall be covered with a “while in use” weatherproof cover. Circuit feeding the receptacle shall be overcurrent protected with the appropriately sized breaker.

H. One (1) 240-volt AC, 30 amps, three (3) wire twist lock type receptacle shall be installed in control cabinet and shall be accessible from outside the cabinet. The receptacle shall be covered with a “while in use” weatherproof cover. Circuit feeding the receptacle shall be overcurrent protected with the appropriately sized breaker.

I. All control switches, push buttons, fuses, breakers, shorting-type terminal blocks, and other devices requiring District interface shall be mounted at a height and location to be easily accessible. Such devices shall be located less than six (6) feet, but more than three (3) feet, above the transformer base.

J. All welds on the exterior of all cabinets shall be full welds. Spot, tack, or skip welds are not acceptable for attaching hinges, brackets, grounding bosses, etc. Designs which minimize pockets and crevices where corrosion may occur are preferred.

K. The cabinet door(s) shall be gasketed and have stainless steel hinges and hinge pins, a pad lockable handle, and 3-point latching system. A pocket on the door suitable for storing the instruction book shall be provided.

L. The bottom of the main interconnection cabinet shall be a minimum of eighteen inches (18”) above the base of the transformer. All circuit breaker switches and terminals mounted in interconnection cabinets shall be no more than forty-eight inches (48”) above the base of the transformer. The cabinet shall be furnished with a removable aluminum conduit plate with gasket in the bottom.

M. All conduits on the transformer shall be supported by way of bracket or conduit straps such that their position is not deformed if a worker steps or pulls on them.

5.2 CONTROL WIRING

A. All current transformer, temperature detection and alarm wiring shall be run in rigid conduit to terminal blocks inside terminal cabinet(s).

B. All devices furnished under these specifications and requiring electrical connections shall be designed for wiring into electrical enclosures with terminal blocks. Terminal blocks shall be furnished for conductors requiring connection to circuits external to the specified equipment and where equipment parts replacement and maintenance will be facilitated.

C. Splices will not be permitted in control wiring or instrument leads.

D. All spare contacts on temperature monitoring, pressure monitoring, controls, and similar devices shall be wired to accessible terminal blocks for future external connection.

E. All wiring leaving an enclosure shall leave from terminal blocks and not from other devices in the enclosure.

F. Auxiliary equipment such as terminal blocks, auxiliary relays, or contactors shall be readily accessible. Auxiliary equipment shall be located in compartments, enclosures, or junction boxes in such arrangement that a serviceman will have direct access to the equipment without removal of barriers, cover plates, or wiring.

G. A shorting-type terminal block shall be installed at an accessible location for each set of current transformers supplied with the equipment furnished under these specifications. No other shorting-type terminal blocks are required unless specified otherwise. Blocks will need to accept up to AWG #10 conductor.

H. All electrical cables shall be conservatively selected for the electrical and environmental conditions of the installations and shall be of the best construction for the service where unusual service conditions are encountered. Oil-resistant and proper temperature application cable shall be used throughout.

I. All control panel, CT wiring, instrument, and cabinet wiring shall be stranded copper conductor with Fluorinated Ethylene Polyethylene (FEP) insulation rated 600 volts.

J. Except where required to be otherwise to perform satisfactorily in the service, all electrical conductor shall be Class B, stranded copper, minimum AWG #14 (AWG #10 for CTs) or larger. Type MI cable is not acceptable.

K. General Service power and control cables integral to the equipment furnished shall be rated for the maximum service voltage but not less than 600 volts.

L. Control conductor terminal connectors shall be compression-type connectors properly sized for the conductor and the terminal. The connectors shall be constructed of copper and shall be tin plated. The interior surface of the connector wire barrel shall be serrated. The exterior surface of the connector wire barrel shall be furnished with crimp guides.

M. Non-insulated terminal connectors are acceptable for conductors terminated on devices equipped with individual fitted covers.

N. Pre-insulated ring-type terminal connectors shall be used on all current circuits. All other terminal connectors for conductors smaller than AWG #8 shall be pre-insulated ring-type.

O. Pre-insulated terminal connectors shall include a vinyl sleeve color coded to indicate conductor size. Pre-insulated terminal connectors shall include a metallic support sleeve bonded to the vinyl insulating sleeve and designed to grip the conductor insulation.

P. Ring-type connectors shall meet UL Standard 310 or UL Standard 486A-486B. Spade, Fork, or U-type connectors are not acceptable.

Q. All terminal blocks, terminals, conductors, relays, breakers, fuse blocks, and other auxiliary devices shall be permanently labeled to coincide with the identification indicated on the drawings.

R. All terminals provided for termination of external circuits shall be identified by inscribing circuit designations.

S. All other wiring terminations shall be identified by printing on conductor identification sleeves. A conductor identification sleeve shall be provided on each end of each internal conductor. All wire terminations shall be identified by destination, device ID, and terminal number. Example 2-D5-10 (Cell #2 - Device ID D5 – terminal #10).

T. Wire identification numbers may also be used but shall not take the place of the termination identification. Conductor identification sleeves shall be not less than one-half inch (1/2”) long. Conductor identification shall be permanent, unaffected by heat, solvents, or steam, and not easily dislodged. Adhesive labels are not acceptable.

U. Multiple connectors terminated on the same terminal position shall be separated by one-eighth inch (0.125”) thick brass spacers.

V. All connections requiring disconnect plug and receptacle-type devices shall be provided with factory-terminated conductors on each plug and receptacle. Plugs and receptacles shall be factory wired into junction boxes containing terminal blocks for external connections. All conductors on the disconnect portion of plug-receptacle assemblies shall be in a common jacket.

W. All temporary wiring installed in the factory for equipment testing shall be removed prior to shipment of the equipment.

5.3 TERMINAL BLOCKS

A. Terminal blocks shall be furnished with white marking strips and, where permitted by the safety codes and standards, shall be without covers. The terminal block numbers shall be marked one (1) through twelve (12) and shall correspond to the terminal numbers. Spare, unused terminals shall be furnished on each terminal block for circuit modifications and for termination of all conductors in a multi-conductor control cable. Not less than two (2) spare, unused terminals shall be furnished for every ten (10) terminals used.

B. Terminal blocks for external connections shall be grouped in the instrument and control compartment for easy accessibility unrestricted by interference from structural members and instruments. Sufficient space shall be provided on each side of each terminal block to allow an orderly arrangement of all leads to be terminated on the block. Arrangement of circuits on terminal blocks shall be such that all connections for one (1) circuit, plus any spare conductors, shall be on adjacent terminals. Blocks will need to accept up to AWG #10 conductor.

C. Fuses shall not be mounted on terminal blocks. Neither step-type terminal blocks nor angle mounting of terminal blocks will be acceptable.

D. All terminal blocks shall be rated 600 volts minimum and shall have strap screw terminals. Terminal blocks for AWG #10 and smaller 600-volt insulated conductors shall meet UL Standard 1059.

E. Terminal blocks shall be appropriately sized for larger wire size or higher voltage, insulated, incoming conductors as necessary.

Spec-6 TRANSFORMER OPERATING SYSTEM

For the purposes of transformer monitoring, control, and regulation, a Reinhausen ETOS Embedded Transformer Operating System shall be installed, or an SEL-2414 Transformer monitor shall be installed along with a Reinhausen MD-III OLTC drive and TAPCON 250 OLTC control .

6.1 OPERATING SYSTEM CABINET

A. Shall be weathertight enclosure with swing open door. Door shall be installed with a mechanical hold-open device when door is swung open beyond 90°.

B. Inside of cabinet door shall include a fold-down shelf suitable for supporting a laptop computer when door is open.

C. Provide 10” Reinhausen MCONTROL touchscreen panel inside ETOS cabinet for complete ETOS control and functionality, or access to the SEL-2414 display screen and pushbuttons alongside the TAPCON 250 screen and controls.

D. Shall accept a single phase, 240-volt AC circuit for operation.

E. Provide a single phase, 240-volt AC cabinet heater with thermostat capable of maintaining a non-condensing atmosphere from 32°F to 90°F.

F. Communicate with the District’s SCADA system via DNP3 communication protocol over Ethernet via an RJ-45 interface.

G. Provide position display with mechanical counter and status indicator lights for the OLTC on the control panel.

H. Provide for manual operation of the LTC via the control panel on the ETOS or TAPCON 250.

I. The primary preferred location of the selected transformer monitor and control cabinet would be on Segment 2 above the existing conduit location shown on “Appendix A” to facilitate ease of entry of existing substation control enclosure conduit system into the operating system cabinet. The secondary preferred locations would be on Segment 1 or Segment 4 respectively, located as close to the existing conduit location as possible as shown on “Appendix A”.

6.2 The Selected Transformer Monitoring system shall be wired to provide the following functions:

- Voltage regulation control via On-Load Tap Changer (OLTC) and OLTC monitoring. See Section 14.
- Transformer monitoring See Sections 7 & 8.
- High voltage bushing monitoring. See Section 4.2.
- Cooling system monitoring and control. See Section 8.8.
- Online Dissolved Gas Analyzer. See Section 8.12.

Spec-7 ALARMS AND CONTROL CIRCUITS

A. The following list of alarms shall be provided and shall be connected to the selected transformer monitoring system:

- Loss of AC Supply
- Loss of DC Supply
- Loss of Cooler Supply
- Sudden Pressure Relay
- Oil Temperature (Set to alarm at 90ºC)
- Winding Temperature (Set to alarm at 120ºC)
- Oil level – Main Tank
- Oil Level – LTC Tank
- Pressure Relieve Valve – Main Tank
- Pressure Relieve Valve – LTC Tank
- Nitrogen Bottle Pressure (Low)
- Transformer Pressure (High)
- Transformer Pressure (Low)

B. Control, and alarm circuits shall be provided with terminal blocks for connection to external circuits.

C. The terminal blocks shall have circuit identification and shall be located in the control cabinet to provide external circuit connections from a common raceway entrance.

Spec-8 ACCESSORIES

All accessory indicating devices shall be provided with vibration damping between them and the supporting structure and be labeled with permanent labels large enough to be read by a person standing on the ground.

8.1 PRESERVATION

A. Preservation shall be of the sealed tank oil preservation nitrogen gas blanket system.

B. Pressure-vacuum gauge and bleeder device shall be mounted on the side of the main tank.

C. Nitrogen gas control equipment shall be fully automatic in operation and shall maintain an adequate supply of nitrogen gas under positive internal pressure by means of an approved pressure regulator which controls the pressure between one-half (1/2) and five (5) PSI for normal operating conditions.

D. The Nitrogen gas control equipment shall be mounted on the side of the main tank, complete with necessary pressure reducing valves, relief valves, high- and low-pressure alarms with non-grounded circuit closing contacts suitable for operation at 125 volts DC.

E. The equipment shall be enclosed in a weatherproof housing and sufficient gas for the initial charge, as well as one (1) spare cylinder of gas provided for the transformer. A minimum mounting height of forty-eight (48) inches is required for all controls and indicators. The spare cylinder shall remain the property of the District and shall be marked by the Manufacturer. The enclosure shall be able to accommodate a minimum of two (one live and one spare) standard 200 Cu Ft gas bottles.

8.2 PRESSURE RELIEF

A. The transformer main and LTC tanks shall be equipped with an adequate number of pressure relief devices to ensure the transformer's internal pressure is maintained within safe operating limits.

B. Each pressure relief device shall have an operating semaphore visible from the ground, and two (2) sets of non-grounded hermetically sealed alarm contacts with normally open and normally closed contacts suitable for operation at 125 volts DC and wired to the selected transformer monitoring system.

C. Pressure relief devices shall operate on excessive pressure and shall be designed to reclose automatically to prevent entrance of moisture.

D. Provide one set of spare metal covers and gaskets for use during vacuum filling.

E. Alarm contacts shall be wired into terminal cabinet as specified in Section 5 and to the selected transformer monitoring system.

F. Pressure relief devices shall be Reinhausen MESSKO MRPEC Series large pressure relief device and interface with the selected transformer monitoring system.

8.3 RAPID PRESSURE RISE RELAY

A. The transformer's main tank shall be provided with a rapid pressure rise relay and seal-in relay which can initiate a circuit breaker operation in the event pressure increase rates exceed safe limits.

B. The unit shall be flange mounted and calibrated for use in, and mounted in, the gas space.

C. Provide spare metal cover and gasket for use during vacuum filling.

D. Rapid pressure rise relay shall be a Qualitrol 910 series along with a Qualitrol 909 series seal-in relay.

8.4 TEMPERATURE SENSING

A. Hot-spot winding temperature monitoring shall be via Reinhausen MSENSE FO fiber optic measurement equipment and interface with the selected transformer monitoring system.

B. Oil temperature indicator shall be a Reinhausen MESSKO COMPACT mounted on the tank between four (4) and six (6) feet above the transformer base and equipped with non-grounded circuit-closing hermetically sealed alarm contacts suitable for operation at 125 volts DC and a maximum indicating hand with provisions for resetting. The thermal element shall be housed in a well in the cover or wall of the main tank to permit inspection and replacement without expelling oil or gas from the transformer. The oil temperature alarm shall be set at 90ºC. The indicator shall be wired to the selected transformer monitoring system.

8.5 OIL LEVEL GAUGE

A. The transformer main tank, and each expansion tank if any present, and OLTC tank, shall be equipped with an oil level gauge indicating through the entire operating range of oil level.

B. Oil gauges shall be magnetic-type, weatherproof with laminated UV protecting safety glass, mounted on the side of the main tank.

C. The dials shall be large enough to be read by a person standing on the ground and equipped with three (3) non-grounded SPDT Form A type circuit-closing hermetically sealed contacts suitable for operation at 125 volts DC. The contacts shall be set to close at five (5) degrees before the high mark indicator and ten (10) degrees before the low mark indicator on the indicator dial display.

D. All oil gauge contacts shall be wired into the main control cabinet as specified in Section 5 above, and wired into the selected transformer monitoring system.

E. Gauges shall be Reinhausen MESSKO MMK magnetic oil level indicators.

8.6 GROUND PLATES

Copper-faced, or stainless steel, grounding pads and solderless connectors of adequate size, shall be located on the outside of the base and a reasonable distance above the floor line in accordance with latest ANSI standards.

8.7 NAMEPLATE

A stainless-steel nameplate shall be furnished which shall include the information listed in IEEE Standard C57.12.00, Table 7, Nameplate C, Paragraph 5.12 and the applicable information listed in Paragraphs 5.12.1 through 5.12.3.

In addition to above, the nameplate shall also list the weight of copper used in the winding.

8.8 COOLING SYSTEM

A. The transformer shall be designed for four (4) ratings as noted in Section 2.2 above.

- Self-cooled, (OA), 24 MVA Base Rating
- First stage fans Forced-Air cooled rating, (OA/FA), 32 MVA, 133-1/3% Base Rating
- Second stage fans Forced-Air cooled rating, (OA/FA/FA) 40 MVA,166-2/3% of Base Rating
- Second stage fans Forced-Air cooled rating at 65ºC rise above ambient (OA/FA/FA/FA), 45 MVA, 186-2/3% of Base Rating

B. Radiator type coolers shall be employed and equipped with fans as required to satisfy manufacturer's preferred cooling arrangement.

C. The fans shall be designed to operate automatically from the selected transformer monitoring system, and manually from an ON-OFF switch and in parallel with the automatic control. Fan motors shall be totally enclosed, weatherproof, 240-volt, single phase and shall be provided with individual overload protection. Circuit protection, magnetic contactors, and manual control switch shall be suitably mounted in the weatherproof main control cabinet. Each cooling fan stage shall be provided with a circuit breaker. Each cooling fan shall have an OSHA fan guard. Loss of cooling fans alarm that senses loss of potential to the cooling circuit shall be provided.

D. Each radiator cooling unit shall be mounted on the tank independently, and provided with valves on the tank side so that any cooler can be removed from operation or replaced with the transformer in service.

   Radiators shall be equipped with means for draining the oil from the radiator assembly, lifting eyes, and so designed that they can be handled without the addition of special bracing.

E. All valves and fittings must be accessible with transformer setting on a flat slab.

F. Radiators shall be constructed of corrosion-free hot-dipped galvanized steel alloy.

G. Radiator tubes shall be properly shaped to prevent accumulation of moisture.

H. Radiators which are large and cumbersome as to create maintenance problems shall be evaluated accordingly. Radiators whose total installed width from the transformer attachment flanges to the extreme outside edge exceeds fifty-eight inches (58”) shall be considered oversized and unacceptable.

8.9 THREADED FASTENERS

Screw threads for screws, bolts, nuts, and other threaded parts shall conform to the applicable ASME B1.1 Unified Inch Screw Threads (UN, UNR, and UNJ Thread Forms).

The Manufacturer's standard threads and construction may be used on small parts which, in the opinion of the District’s engineer, are integrally replaceable except that the threads for external connections to these parts shall meet the requirements outlined above.

8.10 SPACE HEATERS

Each enclosure/cabinet furnished shall be provided with space heaters sufficiently sized to prevent condensation of moisture within the enclosure. Space heater capacity shall be as required to maintain the enclosure internal temperature above the dew point. The heaters shall be spaced away and thermally insulated from any devices or painted surfaces.

Space heaters shall be controlled by an adjustable thermostat factory set to close (ON) at 70°F (21°C) and open (OFF) at 80°F (27°C).

8.11 SPARE PARTS

One complete replacement set of gaskets for transformer and LTC shall be provided.

8.12 ON-LINE DISSOLVED GAS ANALYSIS (DGA) SYSTEM

A Reinhausen MSENSE DGA 3 on-line dissolved gas analysis (DGA) system shall be provided and installed. The system shall provide complete gas monitoring via local and remote user interface. The system shall be wired to interface with the selected transformer monitoring system .

Spec-9 FOUNDATION

The foundation for the transformer tank must be constructed in a manner to allow for anchoring onto an existing concrete pad measuring 14’ W x 10’ D. See detailed drawing in Appendix A.

Spec-10 TANKS

10.1 TANK CONSTRUCTION

A. The transformer tank, and all the oil-filled compartments and accessories connected to the transformer tank, shall be designed to withstand full vacuum. The transformer cover shall be crowned or sloped and equipped with one (1) or more manholes.

B. The manhole which gives access to the core ground shall be so identified.

C. Manhole covers shall be of flat steel pipe, bolted to a flanged circular opening twenty-one inches (21”) inside diameter, also crowned or sloped sufficiently to prevent water from standing on the top.

D. All gasketed surfaces shall be provided with recess and gasket compression-limit stops.

E. Gaskets shall not be exposed to the weather.

F. Guides shall be provided for the guiding of the assembly of the core and coils when untanking the transformer for inspection.

G. The transformer tank base shall be sufficiently strong and properly constructed to permit skidding or rolling the transformer parallel to either tank centerline.

H. Lifting lugs and jack lugs shall be provided for lifting and jacking up the completely assembled transformer. Lifting eyes for lifting the cover and for lifting the core and coil assembly from the tank shall also be provided. Lifting, moving, and jacking facilities shall be designed to provide a safety factor of at least five (5).

I. There shall be at least twenty-seven inches (27”) clear head room above each jack lug and five inches (5”) clear head room under each jack lug.

J. Four (4) 2" x 3-1/2" weld-on stainless steel grounding pads with two (2) holes horizontally spaced on 1-3/4" centers, drilled and tapped for 1/2"-13 UNC thread, as defined in ANSI B1.1 shall be provided and mounted on all sides of the transformer tank near the base so as not to interfere with jacking facilities.

K. Additional four (4) grounding pads shall be provided on the top of the tank, two (2) near H1 and H3 arresters and two (2) near X1 and X3 arresters.

L. Manufacturer shall furnish all necessary copper bus and connectors to interconnect these arrester pads and lead them down along one side of the transformer to the transformer base to connect to the District’s grounding network.

M. A separate copper bus, or 500 KCMIL copper conductor, shall be provided to bond the X0 bushing to the nearest grounding pad at the base of the transformer.

N. Standard oil-tight drain, sampling, and upper and lower filter press connection valves shall be provided, and all connections shall be oil tight. These valves shall be made of brass or comparable non-corrosive metal.

O. Transformer fall protection and emergency egress capability shall be furnished by means of a Portable Fall Arrest System (PFAS). The PFAS shall be a DBI Sala #8516691 or equivalent with appropriate mounting place welded on and located adjacent to the top manhole cover(s). A DBI Sala #8517565 or equivalent heavy duty storage bag for the PFAS shall be provided.

10.2 PAINTING

All metal surfaces shall be shot-blasted and thoroughly cleaned before the primer coat is applied. The finish coat of ANSI-70 Gray epoxy enamel, a minimum 12 MIL thickness, shall be applied before shipment.

The Manufacturer's paint system must be specified and approved by the District.

Manufacturer's certification will be required to show that the coating system and method of application meet the following minimum requirements (latest revision each case):

A. Salt Fog Resistance - per ASTM B117, 1500 hours.

B. Crosshatch Adhesion – per ASTM D3359, Standard Test Methods for Rating Adhesion by Tape Test Method B.

C. Humidity – per ASTM D2247-15 Standard Practice for Testing Water Resistance of Coatings in 100% Relative Humidity, except at 45°C +/-1°C there shall be no blisters.

D. Impact – per ASTM D2794-93 Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).

E. OUV Exposure Accelerated Weather Test – Exposure rate per ASTM G154-16 Standard Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Nonmetallic Materials; loss of gloss shall not exceed 50% as per ASTM D523-14 Standard Test Method for Specular Gloss.

F. Abrasion Test – Taber Abraser – per ASTM D4060-19 Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser; coating shall survive at least 3000 abrasion cycles.

G. Oil Resistance – As related to probable mineral oil contact. Immerse two (2) test panels in mineral oil for 72 hours, one (1) at room temperature (20° - 25°C) and one (1) at 100º - 105ºC. There shall be no apparent changes, such as color shift, blisters, loss of hardness or streaking.

H. Moisture Condensation Resistance – per ASTM D1735-21 Standard Practice for Testing Water Resistance of Coatings Using Water Fog Apparatus; Prior to and upon completion of exposure test, specimen shall have 100% adhesion to bare metal and between paint layers.

I. Flexibility – Per ASTM D522/522M-17 Standard Test Methods for Mandrel Bend Test of Attached Organic Coatings, 180° bend.

J. Paint Inspection Gauge Adhesion – must provide PSI value.

K. Dry Heat Resistance – per ASTM D2485-18 Standard Test Methods for Evaluating Coatings for High Temperature Service.

L. Direct Impact – per ASTM G14-04 Standard Test Method for Impact Resistance of Pipeline Coatings (Falling Weight Test).

Spec-11 NOMINAL STATION SERVICE SUPPLY VOLTAGE TO TRANSFORMER

- Auxiliary power: 120/240 volts AC, 60 hertz, 1-phase, 4-wire
- LTC potential supply voltage: 120 volts AC, 60 hertz, 1-phase, 2-wire
- Device monitoring contacts: 125 volts DC, 2-wire

Spec-12 TRANSFORMER OIL

The Manufacturer shall supply the dielectric oil for the transformer; however, the transformer shall not be shipped containing dielectric oil.

A. The insulating oil shall be refined mineral oil obtained by fractional distillation of crude petroleum. This oil shall not contain moisture, inorganic acids, alkalis, free sulphur or any other substances, which will adversely affect the electrical insulating properties of the oil.

B. All oil furnished under this specification shall conform to ASTM D3487-16e1 Standard Specification for Mineral Insulating Oil Used in Electrical Apparatus and shall have been tested in accordance with ASTM D117-22 Standard Guide for Sampling, Test Methods, and Specifications for Electrical Insulating Liquids.

C. The supplier shall certify that the insulating oil or any component of the insulating oil is not listed in the Federal Register Volume 45, No. 98, latest revision, 40 CFR Part 261 Subpart D List of Hazardous Waste § 261.30 - 261.35.

D. The transformer and LTC dielectric fluid shall contain less than one (1) part per million (ppm) of PCB (polychlorinated biphenyls).

E. If any oil is to be supplied direct from the refiner to the substation site, the transformer Manufacturer shall require the refiner to provide the District a certified laboratory test report indicating the oil as supplied contains less than one ppm of PCB.

F. Laboratory PCB test shall be performed using the latest state-of-the-art gas chromatograph according to EPA approved standards (40 CFR Part 761).

G. The transformer supplied shall have a legible permanent label firmly attached to the equipment which states the following. This label can be part of the nameplate, or a separate permanent label attached to the tank:

THIS TRANSFORMER'S DIELECTRIC FLUID AS SUPPLIED BY THE MANUFACTURER CONTAINS LESS THAN ONE PPM POLYCHLORINATED BIPHENYL (PCB)

Spec-13 HIGH VOLTAGE SIDE TAP CHANGING

Selection of the high voltage taps shall be made when the transformer is de-energized by means of a tap changer with a hand wheel or lever. The tap changer shall be provided with a tap position indicator and positive means for locking the operating mechanism in any tap position with a pad lock. The tap position indicator shall be clearly visible from the ground.

Spec-14 AUTOMATIC ON-LOAD TAP CHANGER (OLTC) & CONTROLS

14.1 OLTC Main

A. A Reinhausen vacuum OLTC type RMV-II-2000-15 or latest model with voltage regulation of ±10% variation in 16 equal steps both above and below rated voltage for a total of 32 steps at 5/8 % per step (33 steps including Neutral) shall be installed.

B. The transformer shall be capable of supplying rated MVA for all steps above nominal and current equal to rated MVA at nominal kV for all steps below nominal.

C. The load tap changer shall be installed in a separate tank which shall be accessible for inspection and maintenance.

D. The barrier separating the load tap changer from the transformer main tank shall be designed to withstand full vacuum from either side. The barrier shall not allow dissolved gasses, from the OLTC compartment, into the main transformer tank.

E. The LTC nameplate shall indicate the vacuum capability of the barrier.

F. The current and potential circuit for the load tap changer control shall be electrically isolated from the 120/240-volt, single-phase auxiliary power source.

G. The load tap changing drive motor and all necessary control relays shall be capable, if need be, of operating from a 120/240 volt, single-phase, 60 hertz, three wire source.

H. The load tap changing equipment shall consist of a liquid immersed tap selector with a vacuum interrupting switch. All current carrying contact parts are to be full wiping. The drive mechanism shall be a Reinhausen TAPMOTION MD-IV direct motor drive unit and controlled via the Reinhausen ETOS Embedded Transformer Operating System, or a Reinhausen TAPMOTION MD-III drive mechanism and controlled by the TAPCON 250. The following accessories shall be provided:

1. A removable cover for access to the compartment for maintenance and inspection.

2. Maintenance access - If the main maintenance access is on a vertical wall of the load tap changer compartment the Manufacturer shall install at least one (a) removable access cover on the top cover of the device. If the major maintenance access is from the top of the load tap changer, the Manufacturer shall install at least one (1) removable access cover, conveniently located on the vertical face of the device.

3. A lower drain valve with sampling device located in the bottom of the compartment to provide complete oil drainage.
4. An upper filter valve located near the top of the compartment.
5. See Section 8.5 for specification on magnetic liquid level gauge with alarm contacts.
6. A Reinhausen Messko MPREC self-resealing type pressure relief device complete with visual indicator and alarm contacts wired to the selected transformer system shall be installed.
7. A hand crank for manual operation of driving mechanism, electrically interlocked to prevent operation of motor while the hand crank is engaged.
8. A protective system employing the "current" rather than potential method to guard against the possibility of developing an arc across the tap selector if an interrupter should fail to open properly during a tap change. Also, the system shall return the mechanism to its last operating position, open the control circuit, and provide an alarm.
9. OLTC drive motor shall be single phase 120 or 240 VAC.
10. A local position indicator shall be calibrated L (lower) - N - R (raise) from the left end to the right end of the scale. Position indicator to be located so that it will be visible to an operator at the control switch for the drive motor and located five feet (5') above the transformer base. Indicator shall be mechanically driven directly from the drive mechanism without auxiliary devices. Indicator drag hands shall have an electric reset.
11. The dehydrating breather mechanism shall be a Reinhausen MESSKO MTRAB DB100.

14.2 LTC CONTROL LINE-DROP COMPENSATOR

Current shall be supplied via a CT exclusively dedicated to the purpose.

Spec-15 MANUFACTURING, FACTORY ASSEMBLY, TESTS, CORE & COIL INSPECTION AND CERTIFIED TEST REPORTS

15.1 GENERAL

A. The transformer shall be completely assembled and then tested as follows in accordance with IEEE Standard Test Code for Transformers C57.12.90. The District may elect to witness all or some of the tests:

1. All parts shall be marked for ease of field assembly.

2. The District reserves the right to witness assembly and all transformer testing. Written notice shall be received by the District at least twenty-one (21) days prior to testing to allow District to arrange for test witnessing if so desired. Notice of testing shall include a schedule of daily tests expected to be performed. Certified test reports are required whether witnessed by the District or not.

3. The District reserves the right to perform a pre-tank inspection. Written notice shall be received by the District at least twenty-one (21) days prior to tanking to allow District to arrange for inspection if so desired.

4. The Manufacturer shall notify the District of any unusual event or damage occurred during the fabrication of the transformer and of all tests which do not meet the specified standard values. The District reserves the right at its option to inspect such damages or test failures. Corrective measures to overcome such damage or failure shall be subject to acceptance by the District.

5. Core ground test to be performed after completion of all other tests and prior to shipment.

6. Exciting current at rated voltage and frequency and 110% rated voltage.

B. Ratio tests on the rated voltage connection and on all tap connections. In addition, the following ratio tests shall be performed:

1. At all connection positions of the tap changer for de-energized operation with the load tap changer on the rated-voltage position; and

2. At all load tap changer positions with the tap changer for de-energized operation on the rated-voltage position.

C. Polarity, angular displacements, and phase sequence at nominal voltage on rated voltage connections.

D. Impedance, voltage, and load loss at rated current and rated frequency on the rated voltage connection and at tap extremes. Also, the impedance of the transformer shall be tested at the maximum and minimum rated voltage positions and at the neutral position of the load tap changer.

E. Sweep Frequency Response Analysis (SFRA) test.

15.2 TESTS

The transformer shall receive standard commercial tests in accordance with IEEE C57.12.90. The temperature tests as specified shall be made at the 65^{o}C rise supplementary self-cooled and forced-cooled ratings.

15.2.1 DIELECTRIC TESTS

The following dielectric test shall be performed:

a. Impulse Test: Each transformer shall receive a complete impulse test to demonstrate its impulse insulation level. The test shall consist of one (1) reduced full wave, two (2) chopped waves, and one (1) full wave applied to each terminal, one at a time without 60-hertz excitation.

b. Applied Potential Tests: These tests shall be applied to demonstrate the insulation strength from the windings to the core and the tank.

c. Induced Voltage Tests: These tests shall be made as specified in the above Standard, sufficient voltage being applied to the low-voltage terminals to induce the specified test voltage for 7,200 cycles the high-voltage terminals.

d. The Insulation Resistance shall be determined for each winding.

e. Partial discharge measurements shall be made and reported at five (5) minute intervals at 100% of the 180 kV 3-phase induced test voltage. These measurements are to be taken during the regular induced test. Measurements are to be made by the bushing capacitance tap. Partial discharge measurements by the charge detection method shall be made simultaneously.

15.2.2 LOSS TESTS, REGULATION, AND EFFICIENCY

a. Exciting Current and Excitation Loss values shall be measured at 100% of rated voltage.

b. The Impedance shall be determined at rated current with the taps set for nominal voltage ratings.

c. The Regulation shall be determined in accordance with the ANSI Standards, for unity power factor and nine-tenths (.9) power factor, and eight-tenths (.8) power factor.

d. The Efficiency and Losses shall be determined in accordance with ANSI Standards at 25%, 50%, 75% and 100% of rated load.

e. The load losses are to be tested and guaranteed with the no load tap changer in the B or 2 (117,875V) position with the LTC in the following tap positions: neutral position and positive and negative tap position No. 1, 2, 7, 8, 15 and 16.

f. Losses will be evaluated as covered by Section 15.2 of these specifications.

g. The resistance of the windings shall be measured hot and cold.

h. Resistance measurements of all windings on the rated voltage tap and at the tap extremes.

i. The insulation power factor shall be determined for each winding at room temperature and shall not exceed 0.5%.

j. The corona test shall be made during the induced voltage test to demonstrate the absence of damaging corona discharge. The test shall consist of the measurement of the radio influence voltage (RIV) during the full induced voltage test to meet NEMA 107 Methods of Measurement of Radio Influenced Voltage (RIV) of High-Voltage Apparatus. The transformer will be considered to have passed the test if the RIV value observed is less than 500 microvolts, measured at a frequency of 1000 HZ.

k. The Winding Ratios, Polarity, and Phase relation shall be determined.

l. The temperature tests shall be made in accordance with the IEEE Standards and factory witnessed by the District, if so desired by the District.

m. Pressure and vacuum tests of the tank shall be made to demonstrate freedom from oil and air leaks.

n. The District reserves the right to inspect the core & coils and witness all tests at the factory. The Manufacturer shall notify the District at least twenty-one (21) days in advance when the core & coils may be inspected.

15.2.3 BUSHING CURRENT TRANSFORMER TEST

a. Bushing current transformers shall be tested in accordance with applicable sections of IEEE C57.13 Standard Requirements for Instrument Transformers and shall be checked for proper nameplate and polarity markings.

b. To ensure correct installation they shall be given a polarity check and ammeter ratio check after mounting in the transformer. The following performance data shall be furnished:

- Typical excitation curves.
- Typical ratio correction factor curves.
- The resistance of the secondary winding at 75^{o}C, including the approximate resistance of the secondary leads internal to the transformer.
- The thermal and mechanical short-time current ratings.
- Short-Circuit Strength

15.2.4 SHORT CIRCUIT CERTIFIED TEST

a. The transformer shall be designed and constructed to be completely self-protected by its ability to withstand, without mechanical damage, the effects of ten (10) external three-phase bolted short circuits when connected to an infinite bus on either the high or low side for a period of 30 cycles per external fault. There will be sufficient time between faults to permit cooling of the windings. Four (4) of the above external short circuits are to be considered completely offset as defined in IEEE C57.12.00.

b. Conformance to short-circuit mechanical requirements shall be made by submission of certified test data obtained from the testing of prototypes or production units of similar design in accordance with IEEE C57.90a or the latest revision thereof. The data shall include, but not be limited to, number of units tested, voltage rating, MVA rating, year of test, winding conductor material, BIL and whether the units passed or failed.

c. The factory location furnishing the proposed transformer shall prove construction capability by certified test data showing that a transformer with a core and coil identical in design and construction and identical or similar with respect to MVA capacity, kV ratings, BIL, impedance and voltage taps have been tested without failure for short-circuit strength. A description of the test code under which the transformer was tested for short circuit shall be provided by the Manufacturer as a submittal prior to fabrication.

15.2.5 DISSOLVED GAS ANALYSIS (DGA) ACCEPTANCE TEST

The transformer is subject to the following acceptance tests which will be performed at the factory by the manufacturer prior to shipment.

- DGA tests shall be made before and after the dielectric tests and before and after each temperature rise test to provide some assurance that winding insulation integrity was not compromised, or flux heating did not occur.
- To allow for possible variation between the first DGA test and the last DGA test, The District has established acceptable levels of certified gas measurements. For values exceeding the following limits, the District's technical staff will initiate discussion with the manufacturer so that a plan of action can be implemented. Any value other than zero for acetylene will not be accepted.

  Allowable DGA Variation in Test Results (ppm)

Acetylene (C_2H_2)	0
Methane (CH_4)	2
Ethane (C_2H_6)	2
Ethylene (C_2H_4)	2
Hydrogen (H_2)	15
Carbon Monoxide (CO)	25
Carbon Dioxide (CO_2)	200

15.3 FIELD ASSEMBLY AND TESTING

The manufacturer shall be responsible for a complete assembly of the transformer at District's designated substation location and shall provide the following testing after the on-site assembly:

- Industry standard power factor testing
- Transformer Turns Ratio (TTR)
- A complete oil DGA and Dielectric test
- Sweep Frequency Response Analysis (SFRA)
  - Test results to be provided superimposed on factory SFRA test results.

15.4 TEST REPORTS

The Manufacturer shall submit to the District before shipment two (2) certified copies of each test report indicating the transformer built under this specification meets IEEE C57.12.10 Standard Requirements for Liquid-Immersed Power Transformers. If the equipment has failed on any test to meet any requirement of the specifications, shipment shall be deferred until modifications on the equipment have been made to conform to the requirements of this specification.

Spec-16. INFORMATION AND MANUALS

16.1 MANUFACTURER'S DRAWINGS AND INSTRUCTIONS

Drawing approval before construction is required. Within sixty (60) calendar days of notification of Bid award, Manufacturer shall furnish one (1) complete set of drawings for approval.

A. Approval drawings shall include a scaled general outline drawing with accurate dimensions and location of equipment, nameplate, wiring schematics and connection diagrams. The drawings shall also include details of equipment bases and accessories by style number.

B. Drawings returned to the Manufacturer marked "Approved" or "Approved with Corrections Indicated" authorize the Manufacturer to proceed with fabrication of the equipment with the corrections, if any, noted.

C. For drawings marked "Examined and Returned for Correction," the Manufacturer shall make the necessary corrections and submit one (1) print for approval.

D. The Manufacturer shall make any changes necessary to obtain approval or to make the equipment conform to the specifications without additional cost. Approval of drawings shall not be held to relieve the Manufacturer of obligation to meet all requirements of the specifications or of responsibility for correctness of the drawings. In addition, review for approval of the drawings shall not affect the quoted delivery time.

E. The Manufacturer shall provide to the District three (3) final sets of certified drawings, wiring diagrams, and instructions for the installation, operation, and maintenance of the equipment a minimum of thirty (30) days prior to shipment. In addition, three (3) sets of complete instruction books shall be furnished to the District before the equipment is shipped. Each instruction book shall include the following:

- Complete set of drawings and wiring diagrams correctly revised.
- Detailed installation instructions.
- Description of all component parts and accessories.
- Complete instructions covering operation and maintenance of all equipment.
- Spare parts list. (To include part numbers or each part.)
- Drawings showing dimensional details and mechanical characteristic of bushings.

F. Each drawing shall be identified by drawing number, the District's contract number, and the Contract item number. The preferred location for this information is in the lower right-hand corner of the drawing. All drawings shall be dated and signed by a representative of the Manufacturer.

G. All drawings shall be neatly arranged, and all drafting and letter characters shall conform to the latest applicable standards.

H. All drawings and transmittal letter shall be in the English language. Dimensions and tolerance shall conform to ASME Y14.5 Dimensioning & Tolerancing. Dimensions shall be complete and in U.S. customary units. If the Manufacturer fabricates in the SI units (metric system), both units shall be shown on the drawings, U.S. unit above the dimension line and SI units below the line. Conversion tolerance shall be within a maximum of 1/32-inch (0.794mm).

I. In addition, the Manufacturer shall provide one complete set of Manufacturer's Final “As Manufactured”, Drawings as detailed above in AutoCAD, Release 2016 or later.

16.2 WIRING AND EQUIPMENT IDENTIFICATION

The Manufacturer shall completely wire each section and plainly mark all wires and terminals. All relays, control switches, auxiliary transformers, terminal boards, etc., shall be suitably marked to conform to markings on wiring diagrams according to ANSI, IEEE, IEC, and/or NEMA standard relay function markings.

Spec-17 EVALUATION OF BIDS

17.1 BID EVALUATION

A. It is recognized that there may be considerable variations in the design and construction of the equipment proposed by the various Manufacturers. The District shall evaluate features which may affect advantages of suitability, the cost of inspection, installation operation, servicing, and adjustment.

B. The District shall evaluate the Manufacturer's experience in producing equipment similar to that herein specified, delivery time, and the experience that users have had with similar equipment produced by Manufacturer. Delivery time will be given significant consideration when evaluating bids.

C. All of the aforementioned factors, in addition to the evaluated losses and Base Bid price, will be given consideration in determining the best Bid. The Manufacturer shall provide the following data, which will be considered in the analysis and evaluation of bids and subsequent bid award:

1. Rating of the transformer.
2. Maximum overall dimensions, including proposed fans and controls.
3. Current and voltage ratings, electrical characteristics, and Manufacturer's catalog number of the bushings and lightning arrestors proposed.

4. Basic impulse levels and dielectric tests of the windings.
5. Exciting current at rated voltage and 110% of rated voltage.
6. Losses at no load and total at rated MVA for each cooling stage.
7. Energy consumed by each stage of cooling equipment.
8. Efficiencies at one-fourth, one-half, three-fourths, and full load.
9. Regulation at rated load, at power factors of 100%, 90% and 80%.
10. Positive and zero sequence resistance, reactance, and impedance of windings at self-cooled rating.
11. Information concerning details of construction.
12. Permissible vacuum, expressed in pounds per square inch, for drying the transformers in their tanks, or filling with oil with radiators attached.
13. Make and specifications of oil.
14. Specify material used in all windings.
15. Intended place of manufacturing. (See Section 21)
16. Net weight of core and coils.
17. Net weight of tank fittings and accessories.
18. Net weight of oil and gallons of oil.
19. Total weight of completely assembled transformer(s) including oil.
20. Clearance height required for untanking the core and coils.
21. Outline drawings or print showing the locations of accessories.
22. Description of Manufacturer's development and testing program used to establish short-circuit to withstand capability of the proposed transformer design. Each Manufacturer shall submit with the proposal a complete listing of all full-size transformers of the manufacture, in OA ratings of 10 through 100 MVA, which have been short-circuit tested. The list shall include all full-sized units tested, whether they were development tests or tests of customer units. Complete ratings shall be given of each unit, and each shall be noted as to whether copper or aluminum windings were used for comparison with winding material offered on this bid.
23. In the case of units tested for or by the ultimate customer, indications shall be given on each unit as to whether the test was successful or unsuccessful and, if tested more than once, each subsequent test shall be so listed and appropriate comments given as to design changes made, if any.
24. Warranty - standard and extended.
25. LTC - describe the load tap changer operation type, operation sequence, maintenance, contact replacement schedule, and life expectancy.

17.2 LOSS EVALUATIONThe evaluation of losses will be based on the present worth of the annual cost which is the sum of three (3) cost components:

- Present worth of investment = bid price ($)
- Present worth of no-load losses = no-load loss (watts) x 5.093 ($/watt)
- Present worth of load losses = load loss (watts) x 2.144 ($/watt)

B. The Manufacturer shall provide a certified test report which is based on actual factory tests made in accordance with IEEE test code for each transformer purchased. No payment shall be made until the test reports are received and analyzed by the District's Engineering Department.

C. The actual losses of each transformer received shall not exceed the evaluated values by more than the following percentages: no-load loss - 0%, load loss - 0%, regulation - 0%. Any transformer found to have load loss, no-load loss, or regulation above the evaluation values shall be assessed a penalty equal to 1.5 times the evaluated cost times the excessive loss.

17.3 TEST REPORTS

Certified test reports by serial number are required for each delivered transformer and shall precede or accompany transformer invoices. Should the excitation and/or the load losses, determined under the test exceed the Manufacturer's quoted values, the District reserves the right to deduct, as liquidated damages from the purchase price of the transformer, the cost of these excess losses determined by the values above.

The District will not grant credit for losses that may be lower than the guaranteed values.

Spec-18 MANUFACTURER'S DATA

- The Manufacturer shall furnish complete data and information as shown on Section 20 "Exhibit A" for each rating of transformer. The Manufacturer shall submit the data on USB Flash Drive. The preferred method of presentation is utilizing Excel spreadsheet formatting. In all cases a computer hardcopy printout shall accompany the Bid. Any questions regarding the computer application shall be directed to the District's System Engineering Manager.
- The Manufacturer shall submit evidence satisfactory to the purchaser that transformer(s) of design, capacity, and voltage, similar to units specified herein, have been successfully subjected to the tests that have been set forth in these specifications and as prescribed by ANSI.

18.1 REFERENCES

The Manufacturer shall provide an Experience Record of the equipment quoted in the Proposal, compiled on the service history on electric power utility systems in the United States of America.

18.2 GENERAL BIDDING CONDITIONS

The attached general bidding conditions are made a part of this specification.

Spec-19 DELIVERY/SHIPMENT

19.1 SHIPPING PREPARATION

A. All items shall be properly prepared. All heavy parts shall be provided with skids to facilitate handling. All small parts shall be securely boxed and identified as to content.

B. The transformer radiator cooling units shall be securely crated for protection.

C. All exterior electrical receptacles shall be properly covered for protection.

D. All equipment will be suitably covered to protect against road wash, vibration, grime and debris that can damage external surfaces or parts. The Manufacturer will be fully responsible for any and all damage incurred in transit.

E. Three-way impact recorders (in-line, vertical, and transverse) shall be supplied and attached at the Manufacturer’s expense. Any software and USB interface cables required to download and read recorder information will be sent to the District prior to the transformer shipping. Software must be PC based and work with Windows 11 operating system.

F. One (1) recorder shall be mounted inside the nitrogen control compartment or other District approved location. The compartment shall be closed and locked with a District-provided padlock prior to loading for shipment. A second recorder shall be installed external to the transformer. The Manufacturer must provide a contact and mailing address used by the District to send the District provided padlock. The padlock shall be requested at the time the advanced shipping notice is submitted to the District (refer to Section 19.4).

G. The District shall have the right to inspect the recorders’ charts and shall be present for their removal. The removal shall occur only at the District’s technical experts’ expressed consent.

H. Equipment damaged in shipment will be refused on delivery and it will be the Manufacturer's responsibility to arrange for prompt repair or replacement to the standards of new equipment.

I. The Manufacturer will not be relieved of the responsibility of delivering undamaged equipment, even if the damage is internal, or otherwise goes undetected and the nature of the damage remains unknown until the equipment is energized and tested.

19.2 SHIPPING

The Manufacturer shall fill the transformer with inert gas. The gas pressure, gas type, temperature at filling, and the date of filling shall be recorded and forwarded promptly to the District. A pressure gauge shall be mounted to show pressure in the tanks when received by the District.

The oil for the gas-filled transformer shall be shipped F.O.B. in tank truck, at the Manufacturer's expense directly to the substation site. The Manufacturer shall be responsible for filling the transformer with degassed oil on site.

19.3 INSTALLATION AND ACCEPTANCE TESTING:

A. Manufacturer shall coordinate suitable crane services to unload the transformer on site and place it on the provided pad.

B. As stated in Section 13 of this specification, once the transformer has been installed (assembled and filled with oil) at District's designated substation location, the Manufacturer shall perform a complete set of the following list of tests:

- Industry Standard Power Factor Testing
- Transformer Turns Ratio (TTR)
- Winding resistance test
- Sweep Frequency Response Analysis (SFRA)
- DGA and Oil Dielectric Test

C. Test report shall include actual readings; readings corrected to 20^{o}C; a polarization index for each test connection (the ratio of the ten-minute reading to the one-minute reading); the make, model, and serial number of the measuring instrument.

D. For measurements between windings, the tank and windings not being tested shall be "guarded." For measurements between windings and ground, test report shall show the condition of windings not being tested (whether "guarded" or grounded).

E. The Manufacturer shall submit to the District, two (2) certified copies of each test report.

F. If the equipment has failed on any test to meet the requirements of the specification, acceptance of the equipment shall be deferred until modifications on the equipment have been made to conform to the requirements of this specification.

G. SFRA test results shall be superimposed on the factory acceptance SFRA test results for comparison.

19.4 SHIPPING AND INVOICES

- A copy of shipping notice shall be mailed to the District to assure sufficient notice of equipment arrival. Advance notice of intent to ship shall be given a minimum of fifteen (15) days prior to mailing the shipping notice.
- Shipping notices shall furnish complete information of item, or items, contents of item if crated or cased, shipping point, carrier and number of car, and District’s purchase order number.
- Invoices shall give quantity and description of each item covered. If the transformer is shipped by railroad car, the bill of lading shall indicate that the shipping car must be located not more than five (5) cars from the front of the train.

19.5 DELIVERY SITE AND DATE

- The transformer shall be shipped F.O.B. to the District's substation site location as found here:

  Mason PUD 3 Belfair Substation
  21341 E State Route 3
  Belfair, WA 98528 USA

- Desired delivery of the transformer shall occur no earlier than June 1, 2025, and no later than July 31, 2025. See Section SC-4 Delivery Schedule.
- The District shall accept delivery once the transformer has been unloaded on the transformer slab, assembled, oil filled, and acceptance tests have been approved and accepted by the District.

Spec-20 “BUY AMERICAN” COMPLIANCE

The transformer must be certified to meet all Build America Buy America Act (BABAA) requirements mandated by Title IX of the Infrastructure Investment and Jobs Act (“IIJA”), Pub. L. 177-58.

The manufacturer shall provide a Manufacturer’s Certification for BABAA requirements with all applicable submittals and prior to shipping. Manufacturer shall comply with BABAA requirements, including coordination with manufacturers, distributors, and suppliers to correct deficiencies in any BABAA documentation. District approval of drawings shall include review of BABAA documentation. Manufacturer shall certify upon delivery that all work and materials have complied with BABAA requirements. For any change orders, Manufacturer shall provide BABAA documentation for any new products or materials required by the change. Installation of materials or products that are not compliant with BABAA requirements shall be considered defective work. Manufacturer should ensure that the District has an approved Manufacturer’s Certification or waiver prior to items being delivered to the project site. By submitting a request for payment, based in whole or in part on furnishing equipment or materials, Manufacturer certifies that such equipment and materials, to Bidder’s knowledge, are compliant with BABAA requirements.

If the Manufacturer/Bidder has an existing federally approved BABAA waiver under which it intends to manufacturer the product, please submit this along with the Bid packet for consideration by the District. BABAA compliance will be a strong determining factor in award of the Bid.

Spec-21 "EXHIBIT A"

MANUFACTURER'S DATA SHEET

Bidder: _____

Manufacturer: _____ *DELIVERY DATE*: _____

Contract # _____

Dry-shipped gas type and pressure: _____

Drawings and Instructions attached: Yes / No

1. Rating: _____

2. Overall Dimensions (Ft.):_____ L._____ W._____ H._____

3. Bushing: LV _____Amps, _____kV BIL, Mfg._____Cat.#_____

HV _____Amps, _____kV BIL, Mfg._____Cat.#_____

4. Lightning Arrestor: LV _____kV, Mfg. _____Cat.#_____

HV _____kV, Mfg. _____Cat.#_____

5. Winding: LV _____kV BIL, Dielectric _____kV

HV _____kV BIL, Dielectric _____kV

6. Exciting Current 100% V. _____A., 110% V. _____A.

7. Losses (KW): No Load: _____ Load (KW) 24 MVA: _____

LOSSES			TAP POSITION (+)					
	MVA	Neutral	1	2	7	8	15	16
Total* Losses (KW)	24							
	32							
	40							
			TAP POSITION (-)					
			-1	-2	-7	-8	-15	-16
Total* Losses (KW)	24							
	32							
	40							

*Total = No Load Losses + Load Losses + Cooling Equipment Losses with no Load Tap Changer set at 2 or B (117,875V)

8. Energy Consumed by each Stage of Cooling Equipment (KW): 32 MVA ____, 40 MVA ____

9. Efficiencies (%): 1/4 _____, 1/2 _____, 3/4 _____,1 _____

10. Regulation: 100% _____, 90% _____, 80% _____

11. Impedance (%): R1 _____, X1 _____, Z1 _____

Ro _____, Xo _____, Zo _____

12. Construction details attached? Yes / No

13. Maximum Vacuum (psi): _____

14. Oil: mfg. _____ Type _____ Non PCB Statement attached? Yes / No

15. Winding Material: _____

16. Place of Manufacture: _____

17. Weight of Core & Coils (lbs): _____

18. Net Weight of Tank Fittings and Accessories: _____

19. Net Weight of Oil & Gallons of Oil: _____

20. Total Weight of Transformer & Oil (lbs): _____

21. Net Weight of Aluminum used (lbs): _____

22. Net Weight of Copper used (lbs.): _____

21. Untanking Clearance (ft.): _____

22. Outline drawing attached?: Yes / No

23. Description of Short-circuit Development and Testing Program attached?: Yes / No

24. Warranty: Basic _____ yr

Extended _____ yr

Copy of Warranty attached? Yes / No

25. LTC Mfg. _____ Type/Model # _____

Control Mfg. _____ Type/Model # _____

Descriptive literature attached?: Yes / No

Maintenance intervals (operations): _____

Maintenance intervals (years): _____

Contact replacement schedule: _____

26. AUDIBLE TRANSFORMER SOUND PRESSURE LEVELS dB(A)

ON (24 MVA) - _____

ON/AF/AF (40 MVA) - _____

No Load, 100% Rated Voltage

No Load, 105% Rated Voltage

No Load, 110% Rated Voltage

PART IV - CONTRACT FORMS

SUBSTATION POWER TRANSFORMER
CONTRACT AGREEMENT (SAMPLE)

STATE OF WASHINGTON

COUNTY OF MASON

THIS AGREEMENT AND CONTRACT, made and entered into at Shelton, Washington, this _____ day of _____, 2023; by and between **PUBLIC UTILITY DISTRICT 3 OF MASON COUNTY, WASHINGTON,** a Public Utility District, hereinafter designated as the **"District"** and

_____
Hereinafter designated as the **"Bidder."**

WITNESSETH:

That whereas the District has heretofore caused to be prepared certain plans and specifications **M1-2023 POWER TRANSFORMER** and other Contract Documents therein described all collectively hereinafter referred to as "Contract Documents," for the sum of:

_____

Dollars ($_____) plus tax, and the Bidder on this _____ day of _____, 2023, filed with the District a Proposal to perform said work and agreed to accept as payment therefore the sums fully stated and set forth in the Proposal for the product, services or work performed.

WHEREAS the said Contract Documents fully and accurately described the terms and conditions upon which the Bidder proposes to furnish said products, services and perform said work, together with the manner and time of furnishing same:

IT IS THEREFORE AGREED, that the Bidder agrees to provide products, services or work required in the Contract Documents for the sum stated above and that the Contract Documents filed with the District, as aforesaid, do in all particulars become part of the Agreements and Contract by and between the parties hereto in all matters and things therein set forth and described: and further, that the District and the Bidder hereby accept and agree to the terms and conditions of said Contract Documents filed as completely as if said terms and conditions and plans were herein set out in full.

IN FAITH WHEREOF, witness the hands and seals of both parties hereto on the day and year in the Agreement first above written.

BIDDER:	**PUBLIC UTILITY DISTRICT NO. 3 OF MASON COUNTY**
_____	
BY: _____	**BY:** _____
TITLE: _____	**TITLE:** _____
DATE: _____	**DATE:** _____

PART IV - CONTRACT FORMS

SUBSTATION POWER TRANSFORMER
PERFORMANCE BOND (SAMPLE)

KNOW ALL MEN BY THESE PRESENTS: That whereas **PUBLIC UTILITY DISTRICT 3 OF MASON COUNTY**, hereinafter designated as the "District" has entered into an agreement dated _____

with

_____
_ hereinafter designated as the "Bidder," providing for **M1-2023 SUBSTATION POWER TRANSFORMER** which agreement is on file at the District office and by this reference is made a part hereof.

WHEREAS said Bidder is required under the terms of said agreement and under the provisions of Section 39.08.010 et seq. of the Revised Code of Washington to furnish a bond for the faithful performance of said agreement;

NOW, THEREFORE, we, the undersigned Bidder, as principal, and _____ _____ a corporation organized and existing under and by virtue of the laws of the state of _____ and duly authorized to do a surety business in the state of Washington, as surety, are held and firmly bound unto the state of Washington and said Public Utility District 3 of Mason County in the sum of

_____

Dollars ($_____) for the payment of which we do jointly and severally bind ourselves, our heirs, executors, administrators, successors and assigns by these presents.

THE CONDITIONS OF THIS OBLIGATION are such that if the said principal, his/her heirs, representatives or successors, shall well and truly keep and observe all of the covenants, conditions, and agreements in said Contract, and pay all laborers, mechanics, subcontractors and material men with provisions and supplies for carrying on such work, and shall indemnify and save harmless the District, its officers and agents, from any pecuniary loss resulting from the breach of any said terms, covenants, or conditions to be performed by the Bidder.

AND FURTHER, that the Bidder will correct or replace any defective work or materials discovered by the said District within a period of one year from the date of acceptance of such work by said District, then this obligation shall become null and void; otherwise it shall be and remain in full force and effect.

No change, extension of time, alteration, or addition to the work to be performed under the agreement shall in any way affect Bidder or Surety's obligation on this bond, and surety does hereby waive notice of any change, extension of time, alterations or additions thereunder.

This bond is furnished in pursuance of the requirements of the agreement above mentioned and in addition thereto it is furnished to meet the requirements of Section 39.08.010 et seq. of Revised Code of Washington, and, in addition to other obligations herein contained, is made, executed and delivered by the Bidder and surety to the District for filing with the District Auditor for the use and benefit of said District together with all laborers, mechanics, subcontractors, material men and all persons who supply such person or persons, subcontractors with provisions and supplies for the carrying on of the work covered by the agreement to the extent required by said Revised Code of Washington, and, in addition, to the extent the District or its property may be held liable under any of said sections of the Revised Code of Washington.

IN WITNESS WHEREOF, the said Bidder and the said surety have caused this bond to be signed and sealed by their duly authorized officers this _____ day of _____, 201_____.

SURETY:

_____

BY: _____

_____
TITLE

BIDDER:

_____

BY: _____

_____
TITLE

SURETY'S AGENT:

_____

_____

_____
Address

PART V

GENERAL CONDITIONS

GC-1 DISTRICT

1.1 Whenever the term "District" appears in this contract, or in any related document, it shall mean the Public Utility District No. 3 of Mason County, Shelton, Washington, or its duly authorized representative.

1.2 All claims of the Bidder and all questions relating to the interpretation of the Contract, including all questions as to the acceptable fulfillment of the Contract on the part of the Bidder and all questions as to compensation, shall be submitted in writing to the District for determination.

1.3 All determinations and instructions of the District will be final. Pending such determination, the Bidder shall proceed with the work.

GC-2 INTENT OF DOCUMENTS

2.1 It is intended that the obligations of the District and the Bidder are fully set forth and described in the Contract Documents. All parts of other documents are intended to be correlative and complementary, and any work required by one and not mentioned in another, shall be executed to the same extent and purpose as though required by all. The misplacement, addition or omission of a word or character shall not change the intent of any document from that set forth by the Contract Documents as a whole. Should a question of doubt rise in respect to the intent and meaning of any part of the Contract Documents, the matter shall be submitted to the District for decision.

2.2 The Bidder shall be solely responsible for any costs or expenses arising from a failure to request such instructions or interpretations.

2.3 If the Bidder, in the course of the work finds any discrepancy between the various parts of the Contract Documents or finds any errors or omissions in the Contract Documents, the District shall be informed in writing. Any work done after such discovery, until authorized, will be done at the Bidder’s risk.

GC-3 ENTIRE AGREEMENT/SEVERABILITY

3.1 No representations have been made to induce either party to enter into this Agreement except for the representations explicitly stated herein. This Agreement (including any addenda or exhibits attached hereto) supersedes all prior or contemporaneous written or oral agreements or expressions of intent or understanding and is the entire agreement between the parties with respect to its subject matter. If any provision of this Agreement is held by a court of competent jurisdictions to be invalid, void, or unenforceable, the remaining provisions will nevertheless continue in full force without being impaired or invalidated in any way. The invalid, void, or unenforceable provisions shall be adjusted rather than voided, if possible, in order to achieve the intent of the parties to this Agreement to the extent possible, unless such modification would materially alter the original intent of this Agreement. All terms, conditions or provisions which may appear on any purchase or sales order or invoice issued pursuant to this

Agreement, to the extent inconsistent with the terms and conditions of this Agreement, shall be of no force or effect, notwithstanding the fact that such order or invoice may have been executed subsequent to the date of this Agreement, and, in any event, preprinted terms of any such order or invoice shall have no force or effect.

GC-4 LAWS AND ENFORCEMENT

4.1 All operations of the Bidder having to do with the design, manufacture, inspection, production, processing, tests, packaging, shipping, and invoicing of the equipment and materials covered by the Contract shall be conducted in compliance with applicable laws, regulations, statutes, ordinances and codes of the United States Government and of the state of Washington and any subdivision or agency thereof having jurisdiction.

4.2 In performing any of the work hereunder, the Bidder shall be solely responsible for compliance with all said applicable laws, regulations, statutes, ordinances, and codes, and shall indemnify the District from any claim, damage or judgment arising from any non-compliance, alleged or proven.

4.3 If either party brings an action to enforce this Contract Document or to recover damages for the breach of same, the prevailing party shall be entitled to recover its reasonable attorney’s fees. Venue of/for any such action shall be in Mason County Superior Court.

GC-5 TAXES AND ASSESSMENTS

5.1 Material and equipment furnished hereunder, being for the exclusive use of a political subdivision of the state of Washington, is exempt from any Federal Manufacturer's excise tax by virtue of Section 4221 of the Internal Revenue Code.

5.2 The contract prices shall include all taxes levied on the Bidder, including Washington business and occupation tax, in connection with this work, but shall not include Washington State sales or use tax levied against the District. Such sales or use tax levied against the District in connection with this work and paid by the Bidder will be computed on taxable items and reimbursed to the Bidder in accordance with rules relating to the Revenue Act of the state of Washington as amended, issued by the Excise Tax Division of the Tax Commission of the state of Washington.

GC-6 PATENT INDEMNITY

6.1 The Bidder hereby agrees to indemnify and save harmless the District, against any and all judgments, costs, damages and expenses which may be awarded against the District in any suit, action or proceeding brought against the District for infringement or alleged infringement of any patent, arising out of the use by the District of the machinery, equipment or materials furnished by the Bidder hereunder in the ordinary course of its use for the purpose hereunder intended or out of the processes or acts so employed by the Bidder.

GC-7 STANDARD SPECIFICATIONS

7.1 References are made in the specifications to standard specifications, codes, practices, and requirements of such organizations as American Society for Testing and Materials (ASTM), American National Standards Institute, Inc. (ANSI), National Electrical Manufacturers Association (NEMA), Institute of Electrical and Electronic Engineers (IEEE), and others.

7.2 Wherever such references are made, it is to be understood that the issue of each respective specification, code, practice, or requirement in effect on the day the Invitation for Bids is dated, is to be followed unless otherwise noted.

GC-8 NO WAIVER

8.1 None of the provisions of the Contract Document shall be considered waived by the District except when such waiver is given in writing. No such waiver shall be or be construed to be a waiver of any past or future default, breach, or modification of any of the terms, provisions, conditions, or covenants of the Contract Document except as expressly stipulated in such waiver.

GC-9 PASSING OF TITLE

9.1 Title to the equipment to be furnished under the Contract Document shall pass to the District when delivered by public carrier to locations as specified in this Document and accepted by a representative of the District by issue of a delivery receipt.

9.2 The issue of a delivery receipt shall not impair the District's rights in any regard provided herein.

PART VI

SPECIAL CONDITIONS

SC-1 SCOPE

1.1 The work to be performed under this contract consists of the following:

Furnishing all labor, materials and equipment as required to design, manufacture, and furnish electrical apparatus and appurtenances as described in Specifications, Part III.

SC-2 INDUSTRY STANDARDS

2.1 The apparatus and appurtenances to be furnished under this specification shall be designed, manufactured, and tested to conform with the applicable ANSI Standards, including appendixes, as amended by this specification.

SC-3 BIDDERS'S DRAWINGS

3.1 All drawings, prints, lists, etc., furnished by the Bidder in compliance with the requirements of the following paragraphs shall be supplied without extra cost, and the cost shall be included in the price of the equipment furnished under the contract. All submitted drawings, when approved, shall form a part of the Contract Document to the same extent as though incorporated herein. All correspondence shall be addressed to: **Mason County Public Utility District 3, P.O. Box 2148, Shelton, Washington 98584, Attention: Jennifer Renecker, Purchasing Manager.**

SC-4 DELIVERY SCHEDULE

4.1 Timely delivery is critical for the execution of this project. Adherence to the delivery schedule window is mandatory and deviation from the agreed upon delivery schedule may result in penalties.

Desired Delivery: As detailed in Part III Specifications, desired delivery of the transformer shall occur no earlier than June 1, 2025, and no later than July 31, 2025.

1. However, the District acknowledges that lead times for unique electrical equipment industry-wide are pushed out further than ever before. If the desired delivery date above is not attainable, the District will consider dates into future years. This will be a significant factor in the Bid Evaluation and award. At this location, delivery must occur during June or July of the delivery year.

2. Bidder Commitment: The Bidder is expected to adhere to the delivery date provided in their bid schedule proposal; any deviation from this date must be pre-approved by the District in advance.

3. Penalties for Late Delivery: Late deliveries will incur a penalty of $100.00 per day, deducted from the agreed bid price, commencing from the first day after the specified delivery deadline.

4.2 Equipment will be packaged in such a manner as to facilitate the following:

1. Full inspection of equipment with minimal removal of packing, lagging, suitable for easy repackaging. Device packed in such a manner as to allow reloading and transport to job site by District.
2. If transported in enclosed trailer, easy removal of equipment by Hyster H50H, 5000 lb. forklift, and standard height loading dock.
3. If transported on an open deck flatbed, the device must be suitably crated and reinforced for removal with a crane. **Device will be suitably covered to protect against road wash, grime and debris that can damage external surfaces or parts.**

SC-5 PAYMENT

5.1 Payment for apparatus will be made in one lump sum within thirty (30) days after the date of delivery of the apparatus and all associated appurtenances in satisfactory condition, accepted by the District and upon presentation of the invoice by the Contractor.

SC-6 GUARANTEES

6.1 In addition to any other remedy provided by law, if within twenty-four (24) months after satisfactory normal continuous operation of any item of equipment delivered hereunder is begun, any item of equipment is found to be defective, whether in design, workmanship, or material,

the Bidder shall, at the Bidder's own expense, furnish and install the necessary replacement part or parts and shall at the Bidder's expense make tests, if required, to demonstrate the meeting of the guarantee.

6.2 In addition to meeting the general guarantee set forth above, the equipment must meet any and all of the applicable specific guarantees set forth elsewhere in the Contract Document. The District may reject any item of equipment which fails to do so or direct the Bidder to make necessary alterations to correct the deficiency. All costs and expenses incident to furnishing, delivering, and installing replacement parts or by altering existing parts, together with expenses incurred by retesting by reason of failure of the equipment to meet the guarantees and other requirements of the specifications, shall be borne by the Bidder.

6.3 Nothing herein shall be deemed to be a waiver by the District of other remedies it may have under the law, which are expressly reserved.

SC-7 BID EXTENSION

7.1 The District may wish to purchase quantities in addition to quantities stated in Part VI, Bid Proposal, delivered to alternate locations within Mason County, WA. Extended quantities will not have the restrictive foundation requirement found in SPEC-9, which is uniquely necessary for this specific substation location. Additionally, extended quantities would not be subject to the Delivery Schedule in SC 4.1.

7.2 The District acknowledges this action would be subject to a mutual agreement between the District and the Bidder.

PART VII
BID FORMS

BIDDER DOCUMENTS

DATA TO BE SUBMITTED WITH BID

Each Bidder shall submit the following with Bidder response:

Spec-21 Exhibit “A” Manufacturer Data Sheet
Bidder Acknowledgement
Bid Bond
Bidding Schedule
Bid Proposal
Certification of Compliance with Wage Payment Statutes / Suspension & Debarment

one (1) copy of descriptive information relating to the equipment Bidder proposes to furnish.
USB flash drive as outlined in Part III Specifications, Section 18 Manufacturer’s Data.
Electronic submission through Bonfire portal is acceptable.

The drawings and data submitted must be in sufficient technical provisions of the specification. Failure of such information to indicate compliance of the Bid with the specification, or failure to submit all the required data, may result in rejection of the Bid.

PART VII
BID FORMS

BID DOCUMENT ACKNOWLEDGEMENT

In compliance with the Call for Bids dated **October 05, 2023,** undersigned hereby proposes to design and furnish apparatus and appurtenances as included in the Bidding Documents, all delivered F.O.B. public carrier to the District's **Belfair substation site, 21341 E State Route 3, Belfair,** Washington, in conformity with the Bid Document and addenda, if any, on file at the office of the District, Public Utility District 3 of Mason County, Shelton, Washington, at the prices stated opposite the respective items listed on the Bidding Documents attached hereto.

It is understood that this Bid constitutes a firm offer which cannot be withdrawn for thirty (30) calendar days after the date set for Bid opening.

The undersigned certifies that Bidder has examined and is familiar with Bid Document No. **M1-2023**, that Bidder has checked all the figures shown in the Bidding Schedule and other attachments hereto and understands that the District will not be responsible for any errors or omissions on the Bidder's part in making up the Bid.

If awarded the Contract, the undersigned hereby agrees to execute a Contract and furnish the necessary bonds within ten (10) calendar days after receipt of notice of the award.

The undersigned further agrees that if awarded the Contract, Bidder will deliver the material and equipment within the time limits fixed in the Contract Documents.

Attached hereto and made a part hereof by this reference are the Bidding Schedule and Drawings and Data to be submitted with Bid. There is enclosed herewith a Bid Bond, or a certified or Cashier's Check payable to the District in an amount of not less than five percent (5%) of the amount of the Total Bid which shall be and remain the property of the said District in event of failure of the successful Bidder to execute the necessary Contract and furnish the required bonds. It is understood that the failure of the successful Bidder to enter into the required Contract and give the required bonds within ten (10) calendar days after the form of agreement and bonds have been supplied to, will cause substantial injury to the District which injury is not easily reduced to monetary terms, and it is therefore agreed that this sum is proper to be considered as liquidated damages for such injury.

This Bid also acknowledges receipt, understanding, and full consideration of the following addenda issued prior to date for receipt of bids. Addenda Nos. _____ (if no addenda have been received, so state.)

Date _____

Bidder _____

Signature_____

By _____

Title _____

Address _____

_____

Note: If Bidder is a corporation, indicate State of Incorporation under signature; if a partnership, give full names of all partners.

PART VII
BID FORMS

BID BOND

_____, as Principal, and _____ _____, as Surety, obligate ourselves to **PUBLIC UTILITY DISTRICT NO. 3 OF MASON COUNTY** (the District), in the sum _____ _____Dollars (which is a sum not less than five percent (5%) of the amount of the Total for Bid Comparison). Principal and Surety hereby bind ourselves, our heirs, executors, administrators, and successors, jointly and severally, to pay this sum.

The condition of the obligation of this bond is that:

Principal has submitted its written bid, dated _____ in response to the District's advertisement for bid for _____ _____.

If Principal withdraws its bid in a manner not authorized in the Bid Document; or if the Principal does not, within ten (10) calendar days after the notice of award for any reason whatsoever, except the fault of the District, enter into the Contract Agreement with the District in accordance with the bid and give Performance and Payment Bond with good and sufficient surety for the faithful performance and proper fulfillment of the contract, and supply the certificate of insurance (if applicable) and proof of proper submittal to the Washington State Department of Labor & Industries of its Statement of Intent to Pay Prevailing Wages (if applicable) as required by the Contract, then the above obligations shall be and remain in full force and effect; and we shall immediately pay to the District as liquidated damages the above stated sum; otherwise they shall be void.

The person signing this bond on behalf of Principal and the person signing on behalf of Surety each have full authority from our governing bodies to bind Principal and Surety by that signature. Principal and Surety have each signed this instrument and each stamped it with our seals this _____ day of _____, 20___.

(SEAL)

(Principal)

_____
_____
_____
(Business Address)

In Presence of

_____
_____
_____
(Address)

(SEAL)

(Surety)

_____
_____
_____
(Business Address)

In Presence of

_____
_____
_____
(Address)

PART VII
BID FORMS

BIDDING SCHEDULE

The District requires all deliveries for Bid **M1-2023** to be immediately delivered to the Belfair Substation, 21341 E State Route 3, Belfair, WA 98528 USA. Desired Delivery of the transformer shall occur no earlier than June 1, 2025, and no later than July 31, 2025. See Section SC-4 regarding Delivery Schedule.

Production Time (weeks)_____

Shipping Time (weeks) _____

Delivery Date to Site (Must be in June or July of the given year) _____

Manufacturer's Name _____

BIDDER _____

BY _____

TITLE _____

PART VII
BID FORMS

BID PROPOSAL

Power transformer and all equipment shall be of new manufacture only.

BIDDER'S NAME: _____

MFG NAME: _____

		QUANTITY	PRICE
ITEM 1:	Three-phase transformer rated 24/32/40/45 MVA (OA/FA/FA/FA 65ºC) 60 cycles with high-voltage taps on the primary side and an on-load tap changer (OLTC) on the secondary side.	1ea.	$_____
ITEM 2:	Spare high-voltage transformer bushing	1ea.	$_____
ITEM 3:	Spare low-voltage transformer bushing	1ea.	$_____
ITEM 4:	Complete set of spare parts for transformer load tap change equipment	1ea.	$_____
ITEM 5:	Extended Warranty (5 Years) Above 2-year Guarantee (SC-6)	1 ea.	$_____
ITEM 6:	Charge per week for District requested delay of delivery		$_____
ITEM 7:	Latest date in which the transformer contract could be cancelled without the District incurring any costs.		_____

Note:

- Bidder shall quote on all Items 1, 2, 3, 4, 5 and 6. Of these items, the District will award Item 1(Base Bid) and may include or omit any one or more of Items 2 through 6.
- Bidder shall submit with the Bid Proposal a list of recommended spare parts for transformer load tap changer equipment as quoted for Item 4.
- ***ONLY FIRM PRICES WILL BE ACCEPTED*.**

Date _____ **Bidder** _____

_____

By _____

Title _____

Address _____

_____

Note: If Bidder is a corporation or limited liability company, indicate State of Incorporation or formation under signature; if a partnership, give full names of all partners.

Certification of Compliance with Wage Payment Statutes / Suspension & Debarment

The bidder hereby certifies that, within the three-year period immediately preceding the bid solicitation date (October 5, 2023), the bidder is not a "willful" violator, as defined in RCW 49.48.082, of any provision of chapters 49.46, 49.48, or 49.52 RCW, as determined by a final and binding citation and notice of assessment issued by the Department of Labor and Industries or through a civil judgment entered by a court of limited or general jurisdiction.

Bidder/Vendor represents and warrants that neither it nor its principals or affiliates presently are debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in any governmental contract by any governmental department or agency within the United States.

I certify under penalty of perjury under the laws of the State of Washington that the foregoing is true and correct.

_____
Bidder's Business Name

_____
Signature of Authorized Official*

_____
Printed Name

_____
Title

_____ _____ _____
Date City or other Location State or Country

Check One:

☐ Sole Proprietorship ☐Partnership ☐ Joint Venture
☐ Corporation ☐Limited Liability Company

State of Incorporation, or if not a corporation, State where business entity was formed:

_____

If a co-partnership, give firm name under which business is transacted:

_____

** If a corporation, proposal must be executed in the corporate name by the president or vice-president (or any other corporate officer accompanied by evidence of authority to sign). If a co-partnership, proposal must be executed by a partner.*