


2020-P00060

**Contract**



**PUERTO RICO ELECTRIC POWER AUTHORITY**

Contract: 00084083  
 Release :  
 Executed: 10/18/2019  
 Printed : 10/18/2019  
 Page : 1

Mail Invoice To:

AUTORIDAD DE ENERGIA ELECTRICA  
 DIVISION DE TESORERIA  
 P.O. BOX 70253  
 SAN JUAN PR 00936-8253

Vendor:

FERNANDO SOSA  
 ROYAL SMIT TRANSFORMERS LLC  
 120 VARNFIELD DR STE E  
 SUMMERVILLE SC 29483

Please Direct Inquiries to:

YADIRA L. LUGO-CORDERO  
 Y-LUGO@AEEPR.COM

Title: PROCUREMENT SUPV  
 Phone: (787) 521-3235

Fax :

Ext:

Work Location:

SUB ESTACION SABANA LLANA  
 AVE. DE DIEGO  
 ESQ. CALLE LAS BRISAS  
 SECTOR SABANA LLANA  
 RIO PIEDRAS, PR 00926

Title: UN (1) TRANSFORMADOR DE POTENCIA 544 MVA, 230/115 KV, SABANA LLAN

Total Value : \$3,144,492.00 USD

\*\* NOT TO EXCEED \*\*


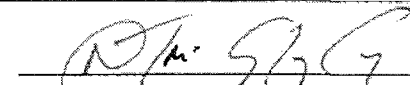
Pricing Method: ESCALATING

Contract Type : SERVICES

Start Date: 10/18/2019

Project :

End Date :

<p>          Vendor Authorized Signature  <u>H. Vazmeulen</u>          Printed Name/Title  <u>11/10/19</u>      <u>+316 82903309</u>          Date Signed      Phone</p> <p>S.S. 981-01-7152</p>	<p>          Authorized Signature  <u>Neftalí González</u> / JEFE DIVISION DE SUMINISTROS          Printed Name/Title  <u>10/18/19</u>      <u>787-521-3268</u>          Date Signed      Phone</p> <p>S.S. 660-43-3747</p>
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*Scope of Work*

ADQUISICIÓN DE UN (1) TRANSFORMADOR DE POTENCIA DE 544 MVA, 230/115 KV,  
 CONSERVACIÓN DE SUBESTACIONES, SABANA LLANA TC





## Contract

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SE ADJUDICA ORDEN DE ACUERDO A NUESTRAS ESPECIFICACIONES, TÉRMINOS Y CONDICIONES SOLICITADOS, NEGOCIADOS Y ACEPTADOS POR LA COMPAÑÍA EN EL RFP 0001932, REQ. NUM.: 179280 Y SEGÚN DISPOSICIONES DE LAS CARTAS CIRCULARES NÚM. 141-17 Y 144-17 DE LA OFICINA DE GERENCIA Y PRESUPUESTO.

### ITINERARIO DE PAGOS

- 10% CON LA APROBACIÓN DE LA ORDEN DE COMPRA
- 10% CON LA AUTORIZACIÓN DE MANUFACTURA
- 25% CON LA EVIDENCIA DE COMPRA DE MATERIALES PARA MANUFACTURA
- 15% CON LA ACEPTACIÓN DEL FACTORY ACCEPTANCE TEST (FAT) Y ANTES DEL EMBARQUE
- 30% CON LA LLEGADA DEL EQUIPO AL PUERTO DE SAN JUAN
- 10% AL RECIBIR Y ACEPTAR EL TRANSFORMADOR EN LA SUBESTACIÓN DE SABANA LLANA

### TÉRMINOS DE PAGO

NETO 30 DÍAS, LUEGO DE APROBADA LA FACTURA POR PARTE DE LA AUTORIDAD, SEGÚN ITINERARIO DE PAGOS NEGOCIADO.

### ALCANCE DE TRABAJO

SE INCLUYE LOS SIGUIENTES DOCUMENTOS:

1. TERMS AND CONDITIONS, RFP 0001932, CONTRACT REQ. 179280, (10 PAGES).
2. SPECIFICATION FOR POWER TRANSFORMERS, CONTRACT REQ. 179280, REV. JULY, 2017 (32 PAGES).
3. PROPOSAL 310002875 REV.3, DATED 07.03.2019 (19 PAGES).

### INSTRUCCIONES GENERALES

1. EL TIEMPO DE ENTREGA ES DE 340 DÍAS CONSECUTIVOS, LUEGO DE RECIBIR EL PRIMER PAGO, SEGÚN ITINERARIO DE PAGOS. APLICARÁ UNA PENALIDAD POR CADA DÍA DE ATRASO DE CINCO MIL DÓLARES (\$5,000.00), HASTA UN MÁXIMO DE DIEZ POR CIENTO (10%) DEL TOTAL DE LA ORDEN DE COMPRA.
2. EL LUGAR DE ENTREGA Y DESCARGA SERÁ EN LA SUBESTACIÓN DE SABANA LLANA (SABANA LLANA TC).
3. EL CONTRATISTA PROVEERÁ UN CERTIFICADO EN ORIGINAL FIRMADO POR UN REPRESENTANTE AUTORIZADO DE UNA COMPAÑÍA EN PUERTO RICO QUE DESCRIBA LA CUBIERTA DE LOS SIGUIENTES SEGUROS:
  - A. FIANZA DE EJECUCIÓN POR EL 100% DEL TOTAL DE LA ORDEN.

### PERSONAS CONTACTO AEE

JOSÉ GEADA, JEFE DIVISIÓN DCEPSE  
ERIC J. PÉREZ, INGENIERO SUPERVISOR DCEPSE

HW



Contract

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YADIRA L. LUGO CORDERO  
SUPERVISORA DE COMPRAS  
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CLÁUSULA DE SERVICIOS INTERAGENCIALES

AMBAS PARTES CONTRATANTES RECONOCEN Y ACCEDEN A QUE LOS SERVICIOS CONTRATADOS PODRÁN SER BRINDADOS A CUALQUIER ENTIDAD DE LA RAMA EJECUTIVA CON LA CUAL LA ENTIDAD CONTRATANTE REALICE UN ACUERDO INTERAGENCIAL O POR DISPOSICIÓN DIRECTA DE LA SECRETARÍA DE LA GOBERNACIÓN. ESTOS SERVICIOS SE REALIZARÁN BAJO LOS MISMOS TÉRMINOS Y CONDICIONES EN CUANTO A HORAS DE TRABAJO Y COMPENSACIÓN CONSIGNADOS EN ESTE CONTRATO. PARA EFECTOS DE ESTA CLÁUSULA, EL TÉRMINO "ENTIDAD DE LA RAMA EJECUTIVA" INCLUYE A TODAS LAS AGENCIAS DEL GOBIERNO DE PUERTO RICO, ASÍ COMO A LAS INSTRUMENTALIDADES Y CORPORACIONES PÚBLICAS Y A LA OFICINA DEL GOBERNADOR.

CLÁUSULA DE TERMINACIÓN

LA SECRETARÍA DE LA GOBERNACIÓN TENDRÁ LA FACULTAD PARA DAR POR TERMINADO EL PRESENTE CONTRATO EN CUALQUIER MOMENTO.

\* \* \* End of Contract \* \* \*

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**PUERTO RICO ELECTRIC POWER AUTHORITY**



Revision: July, 2017

**SPECIFICATION FOR POWER TRANSFORMERS**  
**Contract Requisition: 179280**  
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## SPECIFICATION FOR POWER TRANSFORMERS

### Part I: Standard Information for All Transformers

#### 1. General

- 1.1 Whenever in these specifications, there are required brands and/or models for specific equipments or accessories for the specified transformer, said brands and/or models will be the only ones accepted by PREPA, to maintain uniformity and standardization with existing equipment and spare parts. No substitutes will be allowed. This requirement is in accordance with PREPA's Governing Board Resolution number 3724, dated April 27, 2010.
- 1.2 These specifications describe the minimum requirement for a three phase power transformer of copper windings, with forced-air cooling system, equipped with no-load tap changer and under load-tap changer providing the characteristics and features required for in Part II of this specification.
- 1.3 Unless otherwise noted in these specifications, the transformer shall conform to the latest standards of the Institute of Electrical and Electronic Engineers (IEEE), the National Electric Manufacturers Association (NEMA), and the American National Standards Institute (ANSI), American Safety for Testing Materials (ASTM).

Specifically, the transformer should conform to the following standards:

- ANSI General Requirements for Distribution, Power and Regulating Transformers and Shunt Reactors, C57.12.00.
  - ANSI Terminology for Distribution Power and Regulating Transformers and Reactors other than Current Limiting Reactors, C57.12.80.
  - ANSI Test Code for Distribution, Power and Regulating Transformers and Shunt Reactors, C57.12.90.
- 1.4 The factory requires qualification. For factories that have not been approved by PREPA, the factory and the proposed equipment as per described in this specification requires qualification and shall be evaluated by PREPA's personnel prior to the placement of the Purchase Order.
  - 1.5 The manufacturer shall have a minimum ten years experience manufacturing similar transformers. PREPA reserve the right to declare not responsive the bidder that does not comply with this requirement

## 2. Information Required with the Proposal

PREPA will declare not responsive the bidder that does not comply with the following requirements, as stated in Articles 2.1 to 2.3 below. These requirements shall be included in the bidder's proposal.

### 2.1 Experience and Transformer Data

The Manufacturer shall submit a list of users, in which their equipment are built to the latest standards IEEE, NEMA, ANSI, ASTM, with equivalent operational and design characteristics, that has been acquired and been in service for at least five years. This list shall include the following:

- Name of the user
- Location of the equipment
- Description of the equipment including but not limited to voltage rating, MVA capacity and connection type.
- Time in service
- Name, phone number and email of the contact person at the company.

**\*Special Note:** For those factories that do not comply with at least five years in service, PREPA requires a manufacturer's warranty of five years after the installation of the transformer or 10 years after its delivery, whichever occurs first.

PREPA reserves the right to submit for evaluation and qualification those factories that are not evaluated and whose bidder's proposal complies with the technical specifications and whose economic offer results in PREPA's best interests. Therefore, for prequalification purposes and for those power transformer factories not evaluated prior to the bid opening, PREPA has established the following minimum requirements to be included with their proposal:

1. Years of experience manufacturing transformers (parent company).
2. Production capacity (units quantity, yearly or monthly MVA).
3. Maximum impulse withstand test (KV BIL) capacity at the factory.

**\*Any proposal that does not include and comply with the above mentioned requirements will be declared unresponsive and will be rejected.**

2.2 The bidders shall submit the PREPA Specification Transformer Data Sheet included in Part II and Part III of this specification, and a list of exceptions to the specifications, if any.

2.3 Manufacturer shall submit ISO 9001 related certifications for the factory.

### 3. Design Criteria and Drawings

3.1 Within eight (8) weeks after receipt of Purchase Order, a kick-off meeting will be held between the Manufacturer and the Authority to review the equipment design and specifications. The Manufacturer shall submit a preliminary design, production schedule, and engineering information 7 days prior to this meeting. This meeting will be held at PREPA facilities. Within twelve (12) weeks after receipt of Purchase Order, the Manufacturer is required to send to PREPA design, production schedule and engineering information as required, including the following:

Two (2) sets of drawings marked "For Approval". PREPA agrees to review and return the drawings within three (3) weeks after submittal. PREPA will not authorize the transformer manufacture without these documents. PREPA authorization shall be needed for the transformer manufacture.

#### PO TIME COMPLIANCE STAGES

Item	TASK	Time Starter	Time (in days) After Starter
1	P.O. Approval	-	-
2	Preliminary Design	P.O. Approval	49
3	Kick-off meeting	P.O. Approval	56
4	Transformer Design	Kick-off meeting	28
5	Drawing approval	Transformer Design	21
6	Transformer Manufacture & Delivery	Drawing approval	As per PO, minus days elapsed up to item 5

3.2 Monthly reports shall be submitted to show the progress of the manufacturing process.

3.3 Prior to shipping of the transformer, three (3) copies of the Instruction Manual, final full set drawings "Approved for installation", including the schematic and wiring protection, control diagrams and spare parts list, must be provided by the Manufacturer. In addition, an electronic copy in CD-ROM of the Manual and final drawing in AutoCAD Format Release 2004 shall be supplied.

3.4 If Manufacturer cannot furnish drawings in the time specified, he shall state in his proposal the time schedule he can meet.

3.5 The Manufacturer shall provide all drawings that relate to the specifications, including the following special requirements:

Winding construction, including size and type of conductor

Core construction, installation and assembly

All drawings necessary for the maintenance of the transformers

Load vs. temperature curve at rated voltage and ambient temperature

Value of the winding temperature compensating resistor

Mechanical Protection Devices

### 3.6 Cooling System

The Manufacturer shall provide all the information necessary to assure proper maintenance of the cooling system, including:

All data concerning heat transfer calculations for the cooling system.

Capacity of the pump in G.P.M.

Heat dissipated in the cooling system in B.T.U.

Total oil flow (Q-GPM).

Cross-section areas of each cooling tube

System flow resistance curve.

Head flow curve.

### 3.7 Quality Control

After bid award, the Manufacturer shall submit copies of all the "Quality Control Audit" inspections performed on the manufacturing process of the transformer. This information shall include ISO related certifications. The Manufacturer shall provide office facilities for the Authority's representatives to perform the necessary quality control audit if desired.

### 3.8 Emergency Power Source

Design shall provide automatic transfer device for all auxiliary equipment power sources.



#### 4. Type and Cooling Class

- 4.1 The transformer shall be oil immersed, three phase, and 60 hertz and constructed for outdoor installation in a tropical humid climate.
- 4.2 The transformer shall have a self-cooled rating as per Part II, for a temperature rise of 55°C above 40°C maximum ambient temperature and 30°C being the maximum 24 hours average ambient temperature (as per ANSI/IEEE C57.12.00-2006 Par. 4.1.2.1) with either a one-step (ONAN/ONAF) or a two-step (ONAN/ONAF/ONAF) cooling system. The one-step cooling system shall provide continuous operation at 125 percent of the self-cooled rating without exceeding the rated temperature. The two-step cooling system shall provide continuous operation at 133.3 and 166.6 percent of the self-cooled rating without exceeding the rated temperature.
- 4.3 The transformer shall be provided with insulation permitting an average temperature rise of 65°C without increase in the rate of loss of life. The 65°C rise rating shall be 112 percent of the cooling system steps.

#### 5. Impedance

- 5.1 The transformer impedance shall be as called for in Part II of this specification or requisition documents. For autotransformers the three impedances shall be given (High-Low, High-Tertiary, Low-Tertiary). Information shall be included in the nameplate.

#### 6. Windings and Bushings Insulation

- 6.1 The core shall be built of special steel grain oriented silicon sheets. The core shall be grounded and connected to its fixation structure through removable connections located in the tank cover, in an accessible position so that PREPA technicians can disconnect it to perform insulation test when needed.
- 6.2 All windings shall be provided with the insulation specified in Part II.
- 6.3 For Autotransformers a tertiary winding shall be provided for harmonic suppression. Bushings for these winding shall be provided for test purposes.
- 6.4 All bushings shall be made of porcelain, rated as specified, in accordance with the applicable ANSI Standard C37.010-1999 for medium pollution level. DIN type bushings will not be accepted. **Only ABB or PCORE bushing will be accepted.**
- 6.5 Bushings shall comply with ANSI C57.19.01-1991 and C57.19.01-2000 Performance Characteristics and Dimensions for Outdoor Apparatus Bushings.
- 6.6 All bushings shall be provided with nameplates showing power factor, C1 and C2 test

values.

6.7 All bushings shall be provided with a test tap except, bushing rated down 1kV.

## **7. Bushing Current Transformers (CT's)**

7.1 Transformer's protection CT's are specified in part II. Instrument's CT's characteristics are a manufacturer's design criteria and shall be included.

7.2 Five tap multi ratio current transformers of the type and ratio specified in part II.

7.3 CT's shall be provided on each phase and neutral bushings. A stainless steel nameplate for each current transformer shall be provided in a visible place inside the control cabinet. The nameplate shall include electrical specifications, class and all ratios.

7.4 The secondary leads for all taps of the current transformers shall be terminated on shorting type terminal blocks Marathon Series 1500 in the control compartment of the power transformer.

7.5 CT's leads shall be brought out from tank to an oil tight box. The leads shall be constructed in such a way that oil will not get between conductor and insulation, or that any leak will result at the end of the conductor.

7.6 CT's Neutral leads shall be independently wired to a secondary ground bus.

7.7 All Ct's cable shall be #10 AWG.

## **8. Terminal Data**

8.1 High voltage, low voltage and neutral terminal connectors, all-bronze stud connector for stud to flat NEMA pad, contact pad finished on both sides, rated for the current of the Bushings shall be provided, except as noted on drawings.

## **9. Transformer Tank**

9.1 Tank shipping height (tank height plus the height of any accessory not removed for shipment) shall not exceed 14 feet.

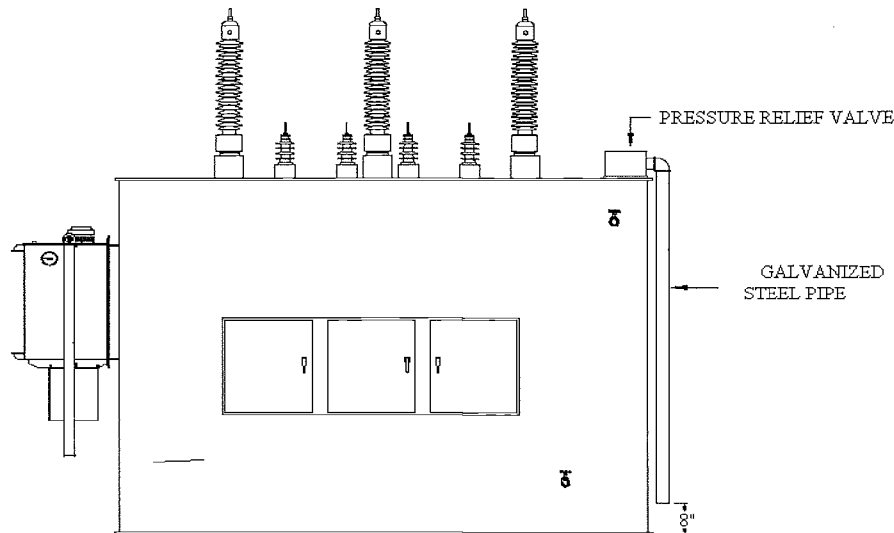
9.2 The transformer tank shall be designed for full vacuum filling in the field.

9.3 The supplier shall specify the type of tank construction (rectangular, bell type, or any other) for evaluation purposes by PREPA.

9.4 The tank shall be completely welded. Tank shall be designed so that welds will not be located within 6 inches of the corners. The tank cover and walls shall be provided with

24" minimum diameter bolted manholes to facilitate inspection of internal clamping system and internal connections. It shall be designed to avoid the accumulation of water at any point on the top.

9.5 A pressure-relief device equal to Qualitrol Series XPRD, with Qualitrol directional shroud and alarm contacts wired to a terminal block in the control compartment, shall be provided in the transformer tank cover. A pressure-relief device equal to Qualitrol Series 208, with Qualitrol directional shroud and alarm contacts wired to a terminal block in the control compartment, shall be provided in the OLTC. The Manufacturer shall furnish oil deflectors to be installed on top of the pressure relief device of the transformer main tank and LTC tank in accordance with the following sketch:



9.6 The tank grounding provisions shall consist of two copper-faced steel pads, or two stainless steel pads without copper facing, each drilled and tapped for grounding terminal connectors.

9.7 All valves, flanges, bolts, nuts, studs, and screws shall have threads conforming to Unified Standards or ANSI Standards, and shall be furnished in accordance with the latest approved practice for the particular duties involved. Only hexagonal nuts shall be used. Pal nuts shall be used where necessary to prevent loosening of nuts by vibration. Drain and fill valves for the main tank (2" diameter) and the OLTC (1" diameter) shall be finished NPT female thread as ANSI standard, flange finished will not be accepted.

9.8 All gaskets shall be made of nitrile synthetic rubber, 80 DURO minimum, with gasket stops.

9.9 The equipment and accessories shall be designed to withstand hurricane forces equal to 30 PSF on cylindrical surfaces and 48 PSF on flat surfaces and shall be suitable for installation in seismic zone 3 locations.

9.10 Recycled steel will not be accepted for the tank or any other component. The manufacturer shall provide certification for steel mill they intend to use in the transformer for the approval of PREPA.

## **10. Oil Preservation**

10.1 The oil preservation method shall consist of either the inert gas-pressure system, or the conservator with bladder or diaphragm (air cell) system. If a conservator is used, the air cell or diaphragm shall be made of nitrile of adequate thickness.

10.2 The inert gas-pressure system shall include the nitrogen gas cylinder (2,000 pounds per square inch at 70°F), regulator, and pressure relief valve, and high-pressure gage, low-pressure gage with alarm contacts, slump, and operating valves.

10.3 Transformer oil shall comply with Doble Transformer Oil Purchase Specification latest version (TOPS) for "Type I or Type II" mineral oil. Transformer shall be shipped with the necessary oil for initial filling. PREPA will notify if the transformer is required to be shipped oil filled or in a separate container.

For transformers shipped filled with oil, any additional oil shall be shipped in tanker trucks or plastic totes (Schutz Ecobulk, IBC tank or similar). PREPA will be responsible to transfer this additional oil to the existing reserve tank and will have 10 calendar days to do the transference. The contractor will be responsible for the disposal of empty containers. The transformer will not be accepted by PREPA until such containers are disposed of properly.

For Transformer shipped empty (oil completely separated), the oil will be shipped in tanker truck or bladders (flexibag). PREPA will be responsible to transfer this oil to the transformer and will have 10 calendar days to do the transference. The contractor will be responsible for the disposal of empty bladders. The transformer will not be accepted by PREPA until such bladders are disposed of properly.

No steel or plastic drums will be accepted. Proposals shall include the specific delivery method for the oil. If this information is not included the bid will be rejected.

## **11. No-Load and Under-Load Tap Changer**

11.1 The load tap changer shall be located on either side, primary or secondary as requested in part II.

11.2 The no-load tap changer shall have a regulating range in percent of rated voltage at

rated KVA (full capacity taps) and in the steps specified in Part II.

11.3 The no-load tap changer handle shall be operable from ground level, shall have provisions for pad locking (½" shackle) in any tap and rated voltage position and shall provide visible indication of tap position without unlocking.

11.4 The load tap changer shall have a regulating range in percent of the rated voltage at rated KVA (full capacity taps), and in the steps specified in Part II. **Only ABB or Maschnefabrik Reinhausen tap changers will be accepted.**

11.5 The tap changing switch mechanism shall be installed in separate oil filled compartment mounted on the transformer tank. A removable bolted cover shall be provided for access to the switch mechanism compartment without opening the main tank or lowering the liquid in the main tank. Covers weighting more than 25 pounds shall be hinged and removable.

11.6 The driving motor for the load-tap changer shall be for operation from the source specified in Part II. The load-tap changer mechanism shall be spring loaded type.

11.7 A weather-proof compartment shall be provided containing the driving motor for the mechanism, removable hand crank for manual tap changing, tap position indicator, limit switches, and operation counter. Provisions shall be made so that the taps can be changed using the hand crank with the transformer under load. Tap Changer shall include normally open contacts to indicate maximum tap position on raise and minimum tap position on lower. The controls shall be accessible to the Operator at ground level. Draining of this compartment shall not be required for access to the drive motor and control circuits.

11.8 A voltage regulating relay shall be provided mounted on a hinged steel panel. Inside the control cabinet, the relay shall be microprocessor based, programmable, adjustable setting from 110 to 130 volts, adjusting bandwidth, reactance compensation reversing switch, line drop compensation and time delay relay equal to Beckwith type 2001C or latest version with Δvar paralleling method option model M-2001C-6 SLBA. It will provide DNP 3.0 communication protocol. Draining of this compartment shall not be required for access to the drive motor and control circuits.

11.9 Test switch for:

- Compensating current
- Voltage regulator

11.10 All transformers shall include:

- Automatic-manual and raise-lower switches to lower or raise the tap changer from transformer control cabinet

- Automatic-manual and raise-lower switches to lower or raise the tap changer from remote control panel in control room
  - Automatic-manual and raise-lower control from SCADA.
- 11.11 All transformers shall include an auxiliary relay for the SCADA voltage regulator alarm.
- 11.12 Synchro transmitter and receiver (receiver to be located at remote control panel in control room) Receiver shall be equal to RTU. Receiver must have visual display indication.
- 11.13 Shall include a remote tap changer position indicator (visual display), with output of  $\pm 1$  mA to connect with PREPA RTU, equal to INCON 1250 or latest version. Display will be located at control panel in the station control room.
- 11.14 The tap changer automatic control equipment shall have Class 1 accuracy as covered by the American Standards for voltage regulators. The purchaser will supply a potential source with 0.3 accuracy class.
- 11.15 LTC compartment shall be capable of withstanding full vacuum in the main tank without damage to itself or components.
- 11.16 The load-tap changer mechanism's main carrying contacts shall be capable of at least 250,000 electrical and mechanical operations before replacement.
- 11.17 The regulating winding shall be electrically independent or placed on a separate winding tube aside from high and low voltage windings. The regulating winding shall be fully distributed.
- 11.18 If auxiliary transformers are used, they shall be constructed to Class 2 transformers standards and using copper conductors.
- 11.19 The following information about the LTC is required:
- a. Manufacturer
  - b. Model number
  - c. Year of manufacturer
  - d. Maximum rated through current at maximum nameplate rating
  - e. Type of transition impedance
  - f. Method of arc interruption
  - g. Type of drive mechanism

- h. Amount of oil in compartment
- i. Mechanical and electrical drawings
- j. Weight information

This information shall be provided in a separate stainless steel nameplate.

## 12. Cooling Equipment

- 12.1 All motors for fans and other cooling equipment shall be for operation from the source specified in Part II. Fan diameter shall not be larger than 26 inches. **Only Krenz-Vent models will be accepted.**
- 12.2 The transformer shall provide for monitoring the winding temperature in both sides (HV and LV windings). The equipment for automatic control of the cooling system shall consist of a thermal operated control device responsive to winding temperature and which device shall be provided with an independent contact for tripping a circuit breaker. The latter mentioned contact shall be constructed for operation voltage specified in bidding requirements, 5 amperes control circuits, and shall be wired to a suitable terminal block located at the control compartment. A manually operated switch shall also be provided for the cooling equipment.
- 12.3 All motors and other cooling equipment shall be individually protected by circuit breakers.
- 12.4 Fans and cooling equipment shall be started through a magnetic contact or suitable auxiliary device in order to avoid contact burning of winding temperature relay. An electromechanical timer and selector shall be provided to activate the fans periodically. When more than one stage of fans is required, a stage selector to change which set of fans will be first stage shall be provided.
- 12.5 Detachable radiators shall be made of hot-dipped galvanized steel 18GA minimum in accordance with ASTM A-153 or stainless steel in accordance with ASTM 304. Radiators shall be provided with top and bottom radiator valves capable of being locked in the open position. Hand operated shut off valves shall be provided at the inlet and output connections to enable any individual radiator to be drained and removed without lowering the oil level in the tank. Additional flanges for radiators will not be accepted.
- 12.6 The radiators shall be provided with means to avoid internal contamination from the surrounding environment while in storage prior to installation. A pressurized dry gas method shall be employed unless a more efficient method can substitute the gas for this purpose.
- 12.7 Auxiliary relay is required to provide remote indication (SCADA) for cooling fans and

pumps power loss. It cannot be performed using the mechanical contacts of the AC circuit breakers or contactors.

### 13. Noise Level

13.1 The transformer will be so designed that the average noise level will be the latest values given in NEMA Publications, TR1-80, or latest applicable standard.

### 14. Tests

14.1 ANSI Standard tests C57.12.00 shall be performed on each transformer, including Doble power factor test on all bushing transformers.

14.2 The tests to be performed shall include, but will not be limited to the following: ANSI Standard Tests (C57.12.0) or latest edition.

1. Power Factor (to be witnessed)
2. Capacitance Measurements (Winding to Winding and Winding to Ground) (to be witnessed)
3. Ratios and Polarity (to be witnessed, TTR in all Taps)
4. Insulation Resistance (to be witnessed)
5. Core Losses and Exciting Current (to be witnessed)
6. Copper Losses (to be witnessed)
7. Positive Sequence Impedance Tests (High-Low, High-Tertiary, Low-Tertiary) (to be witnessed)
8. Zero Sequence Impedance Test (to be witnessed)
9. Applied Potential Tests (to be witnessed)
10. Induced Potential Tests (to be witnessed)
11. Impulse Tests (to be witnessed)
12. Perform a one hour induced potential test with corona discharge measurements every five minutes all in accordance with Section 10.7 of ANSI/IEEE 12.90-1987 (to be witnessed)
13. Dissolved gas analysis (gas in oil) ANSI/IEEE 57.104
14. Detection of PCB content in oil
15. Noise tests (to be witnessed)
16. Core insulation (to be witnessed)



17. Oil test (breakdown power factor acidity) for both fill oil during testing and residual oil.
18. C.T.'s test installed
19. Temperature Rise (to be witnessed)
20. Control and Protection Wiring tests (to be witnessed)
21. Winding resistance (to be witnessed in all Taps)
22. Sweep frequency Response Analysis

14.3 Manufacturer tests shall be provided for bushings and current transformers. Also ratio and polarity tests shall be performed on the current transformers. As part of the test to be witnessed, C1 and C2 bushings tests shall be performed.

14.4 All the above tests must be performed on the fully assembled transformer at its manufacturing location. Manufacturer shall submit PREPA the tests report on the above items.

#### 14.5 Testing

The Authority reserves the right to witness tests. The Manufacturer shall notify PREPA with 45 calendar day of anticipation the schedule of tests. This notice will include the test protocol and the test schedule. The Authority may waive the witness of tests and in substitution, request certified tests report. Test reports shall be submitted to PREPA for revision and approval. The transformer shall not be released for shipping without this approval. In addition to these specifications, the supplier must meet the requirements called for in Part II.

### 15. Short Circuit Requirements

15.1 The transformers covered by these specifications shall be designed to meet the Short-Circuit Qualification Requirements given in the IEEE Guide for Short-Circuit Testing of Distribution and Power Transformers C57.133 or latest edition.

15.2 PREPA reserves the right to require at the graceful bidder, a copy of the short circuit capability test to the prototype transformer.

### 16. Painting

#### 16.1 General Requirements

1. To propose alternative products to those specified, the bidders shall include in its proposed technical information of the product and the safety data (MSDS) of the materials for evaluation and approval. In addition, the price of the

alternative product and price difference between the specified product and the Deputy will be included.

2. Only the PREPA will determine if the alternate product is equal to or approved equal to the specified.
3. Alternate products comply with the following conditions:
  - a. Equal physical or chemical composition includes additives such as anticorrosive pigments, fiber, etc.
  - b. Equal to or higher content of solids by volume.
  - c. Similar curing capacity of curing equal.
  - d. Equal or greater adhesion capacity under identical ASTM standards test conditions.
  - e. Equal system classification by the standard ISO 12944-2 and NORSOK.
  - f. Equal or greater capacity resistance to abrasion under identical ASTM standards test conditions.
  - g. Equal or greater range of temperature for immersion or dry conditions, depends on the application.
  - h. Equal or greater range of surface temperature during application.
  - i. Equal or greater moisture resistance capacity under identical ASTM standards test conditions.
  - j. Equal or greater impact resistance capacity under identical ASTM standards test conditions.
4. All parts of the coating system shall be from a single source: provide the base coat, intermediate coat, final coat and solvents from the same manufacturer.
5. All work on these specifications will be carried out by experienced staff and in accordance with the recommended practices of the latest editions of:
  - a. *NACE – National Association of Corrosion Engineers*
  - b. *SSPC*
  - c. *EPA*

- d. *OSHA*
- e. *ASTM*
- f. *ISO*
- g. *IEEE*

## 16.2 Paint System

1. System 1: Paint for steel surfaces in severe environment.
  - a. Base Layer (Primer) – Epoxy based of two component organic zinc metal enriched class SSPC-20 Type II, with a minimum of 59% solids by volume. Equal or approved equal Inter-zinc 52 of International, Division of AkzoNobel.
  - b. Intermediate Layer – Epoxy of high consistency, with 82% solids by volume of at least two components, equal to or approved equal to Interseal of International, Division of AkzoNobel.
  - c. Final Layer - Acrylic Polyurethane of high consistency with 56% solids by volume, equal or approved equal to Interthane 870 of International, Division of AkzoNobel.
2. System 2: Paint for steel surfaces exposed to Power Plant harsh environment, but where surface preparation is minimal.
  - a. Base Layer (primer) - Epoxy highly consistent with 82% solids by volume of at least two components, equal to or approved equal to Interseal 670HS of International, Division of AkzoNobel.
  - b. Final Layer - Acrylic Polyurethane of high consistency with 56% solids by volume minimum, equal or approved equal to Interthane 870 of International, Division of AkzoNobel.
3. System 3: System for the inside of the tanks of the transformers.
  - a. Epoxy phenolic two components with high consistency and 76% minimum volume solids, chemical resistant immersion, or approved as equal to 850 of International, Division of AkzoNobel.

### 16.3 Preliminary

1. Examine substrate and conditions under which work will be performed to ensure compliance with the requirements of paint application. Do not start applying the paint until unacceptable conditions are corrected.
2. The products to be used for base coat, intermediate coat, topcoat, spot first and stripe coat shall be of the same manufacturer, this includes the solvent (thinner). The stripe coat is done in accordance to standard SSPC-PA Guide 11.
3. The stripe coat shall be at least 5 mills dry, will apply to all welds, edges and corners. This does not take into account the thickness required to dry the paint.
4. The stripe coat will be applied to the base layer as well be applied to the intermediate layer.
5. Paint is applied according to the manufacturer's requirements and SSPC-PA1.
6. Every job of surface preparation and painting will take place the factory.
7. Before paint application all welding splash, slag remnants, etc shall be removed.
8. Surface preparation obtained will be reviewed using the guidelines and references of SSPC-VIS photo 1 for steel prepared by dry abrasive systems.

### 16.4 Surface Preparation

1. Surface preparation 1 (for steel surfaces exposed to harsh environment) - abrasive dry cleaning, isolating the work area to the degree of "Near White" according to SSPC-SP10. The profile of cleaning shall comply with ISO-8503 and should have an anchor profile of 2.5 mils minimum angular surface. The surface profile shall not exceed 3 mils.
2. Surface Preparation 2 (for galvanized surfaces exposed to harsh environment) - solvent washing in accordance with SSPC-SP1.
3. Surface Preparation 3 – (for tank interior surfaces in immersion) will be prepared to a degree "White Metal" The profile of cleaning shall comply with ISO-8503 and should have an anchor profile of 2.0 mils minimum angular surface up to 3.0 mils.

### 16.5 Application

1. Apply paint according to the requirements of these specifications and in accordance with the manufacturer's recommendations. Using techniques and equipment to the substrate and the type of material to be applied. Spray paint is applied without air ("airless spray"). If

necessary, the Contractor shall take necessary measures for the application of paint is not affected by fugitive dust or fumes in the workplace.

2. Painted surfaces are not dirty, rusty, greasy, wet, and scaly or conditions detrimental to the formation of a durable paint film.
3. Provide finishes compatible with the used Primer.
4. The required film thickness is the same regardless of application method. Shall not apply subsequent coats until the previous coat has cured as specified by the manufacturer's literature.
5. Apply additional coats when the lower staining or other conditions appear in the final layer until a uniform color and texture. Give special attention to ensuring that surfaces, including corners, edges, holes and welds receive the thickness of dry film required.
6. Directions for painting: Apply the first coat to surfaces that have been prepared as soon as possible. If the prepared surface changes color or is oxidized and disappears suddenly readiness specified, you must prepare the surface again.
7. Minimum dry thickness to apply for the specified systems. Be applied at critical points stripe coat before applying the Primer. The thicknesses shown do not include this step.

System 1:

- a. Base: Three (3) mils layer.
- b. Intermediate: Six (6) mils layer.
- c. Final: Three (3) mils layer.

System 2:

- a. Base: Eight (8) mils layer.
- b. Final: Five (5) mils layer

System 3:

- a. Ten (10) mils in two layers of five (5) mils each.

#### 16.6 Colors

- a. Transformer Tank Exterior and attached components- ANSI Gray # 70.
- b. Transformer Tank Interior - White.
- c. Labels – White.

#### 16.7 Quality Control

- 16.7.1 A work mapping, registry of the required test and conditions shall be done to assure that the work is performing following the specifications and paint manufacturer recommendations.
- 16.7.2 The quality control plan shall include but not be limited to the following:
- 16.7.2.1 No visible contaminants presence (Ions/ salts) following the requirements of SSPC Guide 15 method A-2. The test shall be done every 100 ft<sup>2</sup> of surface. The surfaces with the following concentrations shall be classified ad contaminated:
- Chloride > 3 ppm
  - Nitrate >5 ppm
  - Sulfide > 5 ppm
- 16.7.2.2 The test shall be done before the following procedures:
- Surface cleaning SSPC-SP1
  - Surface Preparation required
  - Primer Application
  - Between Coating layers
- 16.7.2.3 Anchor Profile corroboration. After more than 24 hours between the surface preparation and painting application, shall be compulsory and responsibility of the contractor, at his cost, clean it again
- 16.7.2.4 Environmental conditions, such as the ambient temperature, the surface temperature of the substrate, relative humidity and dew point will be verified and documented.
- 16.7.2.5 The reason for mixing of the parts of the painting, mixing time and rest time will be verified and documented.
- 16.7.2.6 The wet paint thickness will be verified and documented.
- 16.7.2.7 Dry paint thicknesses will be verified and documented. This test will take place in accordance to the SSPC – PA2.
- 16.7.2.8 Paint adhesion test shall be done and documented.
- 16.7.2.9 Discontinuity coverage test (Holiday Test) covering 100% of the inner surface of the tank shall be done in compliance with the *NACE* standard and paint manufacturer requirements.

16.7.2.10 All the documentation which includes data and readings taken in relation to the location in the structure or surface shall be submitted to PREPA.

## 17. Other Accessories

The Manufacturer shall furnish all standard accessories, including the following special requirements:

- 17.1 Winding temperature indicator, dial type, with adjustable ungrounded alarm contacts, mounted on transformer. The winding temperature gage, heater coil and calibrating resistor shall be mounted close to tank top and shall allow replacement of these components while the transformer is energized. Additional winding temperature indicator shall be supplied (switchboard type) for install on the control room. Transformer shall be provided also with sensor and transducer. Independent loss of power indication for each circuit provided. **Only Qualitrol or Messko MR gauges will be accepted**, with four auxiliary contacts minimum and sensor signal 4 to 20mA.
- 17.2 Dial type oil thermometer, mounted on transformer. The oil temperature gage shall be mounted close to tank top and shall allow replacement while the transformer is energized. **Only Qualitrol or Messko MR gauges will be accepted**, with three auxiliary contacts minimum and sensor signal 4 to 20mA.
- 17.3 Thermal operated control device responsive to winding temperature, provided with adjustable independent contacts suitable for controlling the cooling system or systems, alarm at 95°C, and tripping a circuit breaker at 110°C. The contacts shall be constructed for operation on 125 VDC control circuit, and shall be wired to a suitable terminal block located at the control compartment, in accordance to IEEE/ANSI 57-12.10. The 95°C contact shall be connected to an auxiliary relay to provide the winding temperature alarm for SCADA.
- 17.4 Liquid level gauges, magnetic type with alarm contacts, on both main and LTC tanks. **Only Qualitrol or Messko MR gauges will be accepted**, with three auxiliary contacts minimum. All cables runs shall be in rigid galvanized steel conduits, according to the latest NEC standard.
- 17.5 Short runs of liquid tight, flexible galvanized steel conduit shall be up to six feet from fans, gages, and pressure monitoring devices to nearby terminal box, rigid galvanized steel fitting or control cabinets.
- 17.6 Sampling valve to obtain oil samples from ground level.
- 17.7 Bonding between the bushing flange and the transformer, or other approved method, to avoid flashover currents traveling through bolts.

- 17.8 Lifting, moving, and jacking facilities.
- 17.9 Pressure relay shall operate on rate of pressure changes. This relay shall not be affected by gradual pressure changes occurring during normal transformer operation. In addition, it shall not be sensitive to mechanical shock or electrical disturbances, which cause no internal damage to the transformer. The relay contacts shall be constructed for operation in control circuit, and shall be wired to a suitable terminal block located at the control panel.
- 17.10 A ground bus for the individual connection of the neutral secondary wires from the CT's shall be supplied on a convenient and accessible location at the bottom of the control cabinet with provision to be connected to the substation-grounding mat.
- 17.11 The stainless steel ASTM 304 gauge 14 control cabinet shall be equipped with a weather proof, separately fused, 15 A, 125 V, 2 poles, 3 wires, polarized, grounded UL Listed, US Standard, duplex GFCI outlet, connected to the 115 VAC power supply. The outlet shall be mounted on a convenient location on the control cabinet housing, and shall be accessible from the outside without opening the cabinet. A lighting fixture suitable for the connection of an incandescent lamp of not less than 60W, connected to the 115 VAC power supply, shall be provided inside the control cabinet.
- 17.12 Additional alarms contacts as required (oil, temperature, voltage regulator, Buchholz, etc).
- 17.13 Transformers with diaphragm conservator oil preservation system shall be provided with a combustible Buchholz relay. The relay shall have alarm contacts suitably wired to a terminal block at the control panel.
- 17.14 Furnish one externally accessible test bushing to perform the core insulation test at the top of the range.
- 17.15 PREPA will not accept the use of Programmable Logic Controllers (PLC) for control any of the mechanical gages, alarms and trips.
- 17.16 Nameplate
- 17.17 A gas detector relay is required for transformers equipped with diverter switch.
- 17.18 A weld-on metal plate shall be installed at the top of the transformer in a suitable location for installing a fall protection system, equal to DBI Sala model 8517266.
- 17.19 A continuous gas monitoring system for the transformer, able to detect at least Hydrogen, Carbon Monoxide, Methane, Acetylene, Ethylene, and Moisture, equal to Morgan Schaffer Calisto 5 or Kelman Transfix, as described in the table Part II item 11 shall be provided. Shall include external display, DNP 3 communication, USB and



Ethernet ports, remote alarm capability, software and instruction manuals. The software to the Calisto 5 shall be Calisto Manager last version, and the software to the Kelman Transfix shall be Perception Fleet including monitoring, diagnostic and mathematical modeling tool. System shall not require calibration, have a three year warranty, and have an expected operating life of at least 15 years. For the continuous gas monitoring system, two valve 1" diameter, finished NPT female thread as ANSI standard, shall be installed in the main tank located according to equipment specifications.

## 18. Spare Parts

18.1 Prior to shipping of the transformer, a spare parts list must be provided by the Manufacturer.

## 19. Impact Register

19.1 The transformer shall be provided with two impact recorder MESSKO MLog IM50/IM100 during transit from factory to the delivery place. Manufacturer shall be responsible to install new batteries at the shipping moment.

19.2 The nitrogen or dry air filled or conservator transformer tank with core and coil assembly shall be provided with a suitable self-contained, three-directional shock and vibration recorder during transit from factory to the delivery place in Puerto Rico.

19.3 PREPA in the presence of the supplier will remove the impact recorder from the transformer and will interpret the records. The Impact recorder will come with all necessary accessories (cable, software, ext), to PREPA obtain all the information directly from the recorder. After interpret the impact recorder, PREPA will return the equipment. If the Impact Recorder record, show unusual movements, PREPA will notify the supplier and request that the manufacturer make an inspection and reporting of damage inside the transformer. In addition, PREPA will request to repeat all the tests as specification. All cost, regarding the inspection and testing shall be covered by the supplier.

## 20. Surge Arresters

20.1 High and low voltage surge arresters shall be supplied by the transformer manufacturer. The arresters will be installed near the bushings. Specification for the arresters is included with the bid documents. **Only ABB arresters will be accepted.**

20.2 This specification covers the minimum requirements for the design, manufacturing and testing of metal oxide, outdoor, station class lightning arresters. The lightning arrester shall meet or exceed the requirements and comply with the tests established in the latest applicable ANSI and NEMA Standards.

20.3 The equipment described in this specification requires qualification. PREPA

reserves the right to require a sample for evaluation purposes.

- 20.4 The housing shall be constructed of polymeric material (silicon rubber) with glass reinforced epoxy collar. It shall maintain a clean and moisture free atmosphere for its internal components.
- 20.5 The Manufacturer shall stamp the arrester nameplate with the factory-measured dielectric-loss (watts loss) for each unit supplied. The plate shall be made of aluminum or suitable for coastal environment.
- 20.6 The lightning arresters will have the minimum units per stack. The manufacturer shall specify number of units per stack, mounting dimensions, size, weight and electrical characteristics.
- 20.7 Each arrester shall be provided with terminals for connecting line and ground conductors.
- 20.8 Arresters shall be designed for application of 60 Hz and average daily temperature of 40°C.
- 20.9 The arrester shall be designed to withstand forces developed by indicated wind velocities of 150 mph (30 lb/ft<sup>2</sup>).
- 20.10 The following technical characteristics shall be satisfied.

<b>System Line to Line Voltage (kV)</b>	<b>Duty Cycle Voltage Rating (kV)</b>	<b>Maximum Continuous Operating Voltage (MCOV) (kV)</b>	<b>Maximum Discharge Voltage for an 8/20 μs Current Wave at 10 kA (kV)</b>
<b>4.16</b>	3	2.55	9-11.3
<b>7.2 and 8.32</b>	6	5.10	15-19
<b>13.2</b>	10	8.40	25-30
<b>38</b>	36	29	86.4-107
<b>115 (Grd. Y)</b>	90	70	215-256
<b>115 (Delta)</b>	108	88	260-308
<b>230</b>	170	140	413-450

The successful bidder shall submit the data for the maximum discharge voltage values for 1.5 kA to 40 kA.

## **21. Evaluation of Losses during Bid**

21.1 Bidders shall include a table listing guaranteed no-load core loss at 100% rated voltage, load (copper) losses at self-cooled rating, and auxiliary losses at maximum 65°C rating for the transformer specified. These will be evaluated as follows:

No-Load Core Losses: \$4,000/kW

Load (Copper) Losses: \$3,000/kW

Auxiliary Losses: \$1,000/kW

Bidders that not include guaranteed no load core loss, load (copper) losses, and auxiliary losses for this evaluation will be considered non responsive.

21.2 Evaluated losses for each transformer will be calculated by multiplying the appropriate dollars/kW values listed in the above table by the bidder's guaranteed losses as stated in the appropriate spaces with the products added to the bid price for evaluation.

21.3 Should the actual losses of the transformer, as determined under test, be higher than those on the bidder's guaranteed load losses characteristics table, the Vendor shall be penalized for each excess kilowatt or fraction thereof so determined, as follows:

No-Load Core Losses: \$20,000/kW

Load (Copper) Losses: \$15,000/kW

Auxiliary Losses: \$7,000/kW

## **22. Bid Evaluation Criteria**

22.1 Bid Evaluation Criteria are the points amount of a bid after bid points adjustments are made pursuant to objective measurable criteria, set forth in the invitation for bids, which affect the economy and effectiveness in the operation or use of the product, such as reliability, maintainability, useful life, residual value, and time of delivery, performance, or completion. The price of the eligible products and services must be the most heavily weighted factor. This means that it must have the highest number of "Points Available." Bidder's Proposals will be rated on how well they meet each factor. Point values for all

factors are totaled for each vendor.

## 22.2 Grading Criteria:

- Pricing considering guaranteed losses and delivery time (40 point)  
The bidder with the lowest price receives the maximum score. The bidder with the next lowest price receives points by dividing the lowest price by the next lowest price and multiplying that percentage by the available points.
- Manufacturer Prior Experience (20 point).  
The manufacturer with the greatest number of experience receives the maximum score and will be the base to calculate the other manufacturers points. The other manufacturers receive points by dividing his number of experience by the base number and multiplying that percentage by available points.
  - Similar projects execution in compliance with this technical specification (10 point).
  - Equipment in service in compliance with this technical specification (10 points)
- Manufacturer Prior Experience in PREPA (20 point).  
These points will be assigned with the PREPA previous experience.
  - Similar projects execution (5 points)
  - Quality of equipment received (5 points)
  - Equipment in service (5 points)
  - Compliance history (5points)
- Technical Merit (Pass/Fail) Pass = 1 to 20 points, Fail = 0 and will be rejected. Pass is considered proposal with full compliance and with minor deviation with the technical specification, term and condition. Fail is considered no compliance or major deviation with the technical specification, term and condition. It will be considered a major deviation when there is a deviation to the request that affects the quality, quantity, price, delivery, warranty and functionality. Otherwise, will be consider minor deviation. In this case, bidder with the full compliance receives the maximum score and will be the base to calculate the other bidder with minor deviation.

**Part II: Specific Requirements for Three Phase Power Transformer**

Table of Bidding Requirements for Three Phase Power Transformers

Item	Description	Requirement of PREPA	Proposal of the Bidder	Comments
1.0	Transformer Type (Two-Winding, Autotransformer or Three-Winding)	Autotransformer		
2.0	Transformer Connection (Wye-Wye, Delta-Wye, Wye-Delta, Etc.)	Autotransformer		
3.0	Voltage Ratio (Primary to Secondary Voltages; Tertiary Voltage only for Three-Winding Transformers)	230/115 KV		
4.0	Rated Capacity (MVA)	293/389/486 MVA @ 55° (328/436/544MVA(@ 65°)		
5.0	Self-Cooled Rating (KVA) of:			
5.1	Primary Winding	293000 KVA (@ 55°) 328000 KVA (@ 65°)		
5.2	Secondary Winding	293000 KVA (@ 55°) 328000 KVA (@ 65°)		
5.3	Tertiary Winding (if applicable)	N/A		
6.0	Basic Impulse Insulation Level (kV) of:			
6.1	Primary Winding	1050 kV		
6.2	Secondary Winding	550 kV		
6.3	Tertiary Winding (if applicable)	250 kV		

PREPA-TECHNICAL SPECIFICATION  
POWER TRANSFORMER  
CONTRACT REQUISITION: 179280

Item	Description	Requirement of PREPA	Proposal of the Bidder	Comments
6.4	Primary Bushings	1050 kV		
6.5	Secondary Bushings	550 kV		
6.6	Tertiary Bushings (if applicable)	250 kV		
7.0	Transformer Impedance at Self-Cooled Rating (%) (Tolerance of $\pm 10\%$ according to IEEE)	6-8 %		
8.0	Accuracy, Ratio and Number of Sets (by Bushing) of Multi-ratio Bushing Current Transformers for: CXXX / XXX : XMR / X			
8.1	High Voltage Bushings	C800/2000:5MR/2		
8.2	Low Voltage Bushings	C800/3000:5MR/2		
8.3	Neutral Bushings	C800/1200:5MR/1		
8.4	Tertiary Winding	C800/3000:5MR/3		
9.0	Location of the No-Load Tap Changer Mechanism (High Voltage or Low Voltage Winding)	N/A		
9.1	Range in Percent of Rated Voltage, Number and Description of Full Capacity Taps in the No-Load Tap Changer Mechanism	N/A		
10.0	Location of the Under Load Tap Changer Mechanism (High Voltage or Low Voltage Winding)	Low Voltage Winding		
10.1	Range in Percent of Rated Voltage, Number and Description of Full Capacity Taps in the Under Load Tap Changer Mechanism	+20%, -10% of the rated voltage in 25 steps		
10.2	Under Load Tap Changer Driving Motor Nominal Voltage (AC volts) 120 or 240 VAC, 480 V 3 Phase	480 VAC, three phase		

PREPA-TECHNICAL SPECIFICATION  
 POWER TRANSFORMER  
 CONTRACT REQUISITION: 179280

Item	Description	Requirement of PREPA	Proposal of the Bidder	Comments
11.0	Gas Monitoring System:	N/A (provide only 2 valve to the Calisto 5 installation)		
12.0	Cooling Equipment Motors Nominal Voltage (AC volts)	480 VAC, three phase		
13.0	Delivery Place, DDP	Warehouse #5 Palo Seco Cataños. <b>unloaded</b>		
13.1	Oil Delivery	Tanker Truck		
14.0	Standard Warranty	36 months after installing or 60 months after receiving.		

**PART III: TRANSFORMER DATA SHEET**

1.1 BIDDER NAME: \_\_\_\_\_

In addition to other data and descriptive material furnished with Bidder's Proposal, the Bidder must fill all spaces of the following Bid Data Section. The specifically listed data is in no way intended to limit the data submitted, and the Bidder is invited to submit all material that he believes necessarily to provide a complete description of his offering.

1.2 RECEIVING AND INSTALLATION DATA

A. Weights, lbs.

1. Transformer

a. Installed: \_\_\_\_\_

2. Oil, installed: \_\_\_\_\_

3. Core and coil assembly, net: \_\_\_\_\_

4. Tank and fittings, net: \_\_\_\_\_

5. Heaviest shipping assembly, as shipped: \_\_\_\_\_

6. Total Shipping weight (transformer, accessories, and oil): \_\_\_\_\_

7. Total shipping height (tank height plus the height of any accessory not removed for shipment): \_\_\_\_\_

B. Oil, gallons: \_\_\_\_\_

C. Largest shipping section, l, w, h, inches: \_\_\_\_\_ / \_\_\_\_\_ / \_\_\_\_\_

D. Transformers installed dimensions, inches

1. Overall height: \_\_\_\_\_

2. Overall length: \_\_\_\_\_

3. Overall width: \_\_\_\_\_

4. Minimum un-tanking height, base to crane hooks:





B. Impedance, percent: (H- X)

1. Quote: \_\_\_\_\_
2. Base KVA: \_\_\_\_\_

C. Regulation at 100% load, 55°C rise rating percent

- |                             | H - X | H - Y |
|-----------------------------|-------|-------|
| 1. 100 percent power factor | _____ | _____ |
| 2. 80 percent power factor  | _____ | _____ |

D. Exciting current, percent

1. 100 percent voltage: \_\_\_\_\_
2. 110 percent voltage: \_\_\_\_\_

E. Efficiency at ONAN rating and 75°C winding temperatures, percent

1. Full Load: \_\_\_\_\_
2.  $\frac{3}{4}$  Load: \_\_\_\_\_
3.  $\frac{1}{2}$  Load: \_\_\_\_\_
4.  $\frac{1}{4}$  Load: \_\_\_\_\_

F. Guaranteed maximum losses at 75°C winding temperatures, kW

1. No-load losses at 1.0 p.u. voltage: \_\_\_\_\_
2. Total losses at ONAN rating at 1.0 p.u. voltage: \_\_\_\_\_
3. Load losses ( $I^2R$  + stray) at ONAN rating: \_\_\_\_\_
4. Cooling equipment demand at top ONAF rating: \_\_\_\_\_

Corona level considered being damaging, RIV, micro volts: \_\_\_\_\_

G. Basic Impulse Insulation Level (BIL)

1. HV Winding: \_\_\_\_\_

2. LV Winding: \_\_\_\_\_

3. Neutral: \_\_\_\_\_

1.4 For the OLTC and NLTC

A. The no-load tap changer will be placed at (Select between HV or LV winding): N/A

B. The OLTC will be placed at: LV

1. OLTC Manufacturer: \_\_\_\_\_

2. Model: \_\_\_\_\_

3. Rated current: \_\_\_\_\_

4. Type of transition impedance: \_\_\_\_\_

5. Mean of interruption (oil or vacuum): \_\_\_\_\_

6. Number of operations at rated current before replacement of contact or vacuum chambers: \_\_\_\_\_

1.5 Noise level at ONAN/ONAF/ONAF: \_\_\_\_\_ / \_\_\_\_\_ / \_\_\_\_\_

... End of specification...

# PUERTO RICO ELECTRIC POWER AUTHORITY



Puerto Rico Electric Power Authority

Terms and Conditions

RFP 0001932

Contract Requisition: 179280

## **Article 1:** Definitions

Whenever the words defined in this article or pronouns used instead are mentioned in this Order, they shall have the meanings here given:

- 1.1) The word "PREPA" shall mean the Puerto Rico Electrical Power Authority and all its corresponding Divisions.
- 1.2) The word "Engineer" shall mean the Head of the Substations Maintenance Department of PREPA, acting directly or through his properly authorized representatives.
- 1.3) The word "Contracting Officer" shall mean the Head of the Materials Management Division, acting directly or through his properly authorized representatives.
- 1.4) The words "Order" or "Service Order" shall mean, collectively, all the covenants, terms, and stipulations in these articles of agreement and in all supplementary documents hereto attached which constitute essential parts of the Order and are hereby made part thereof, to wit:
  - a. Purchase Order
  - b. Instructions to Bidders
  - c. Invitation to Bid and Advertisement for Bids
  - d. Bidder's Bid Including Bid Data and Schedules
  - e. Terms and Conditions
  - f. Technical Specifications
  - g. Bid, Performance, and Payment Bonds
  - h. Sworn Statement
- 1.5) The word "Contractor" designates the company that will perform all works as defined in the Order and the Special Conditions and Specifications contained in it.

## **Article 2:** Quality Requirements

- 2.1) Contractor Audits: Prior to placing an Order of any sort with a specific contractor, the Contractor's facilities, quality control system, and general operation shall be audited for capability to adequately perform transformer components inspection, maintenance and manufacturing processes by a representative(s) from PREPA's purchasing, quality control and engineering organizations. Approval shall be granted

for a period specified by PREPA, but may be removed for inadequate performance at any time.

- 2.2) Manufacturer shall furnish evidence about their capacity and experience in manufacturing power transformers of similar capacity of not less than ten (10) years.
- 2.3) Technical Review and First Article Inspection: For each specific manufacturing process, Contractor can be required to submit a description of the process to the Engineer for review and shall obtain written approval by the Contracting Officer or the Engineer for any change to the process.

**Article 3: Consideration**

- 3.1) The Service Order is the sum of all prices by line items, and the price quoted in the Proposal shall constitute full compensation for all inspection, engineering, cost of all insurance, profit, Contractor's overhead, and all other work satisfactorily in accordance with this Order. Notwithstanding the foregoing, should the custom duties or tariffs imposed by the United States be increased or decreased prior to the date of importation of the equipment or any of the materials required for the fabrication thereof, payments to the Contractor will be increased or decreased accordingly.
- 3.2) In accordance with the terms and conditions contained herein, PREPA agrees to pay and the Contractor accepts, as full payment for the complete performance of this Service Order, plus any additional amount to be paid due to extra work ordered and accepted by the Contracting Officer and the Engineer, according to Changes and/or Extra Work Article, below.
- 3.3) Contractor shall submit its invoice for work already done for the PREPA approval, together with the technical supporting documents of required tests. All invoices submitted by the Contractor shall be subject to PREPA's reasonable approval before being paid, and its payment shall be done within thirty (30) days after the date of its approval by PREPA. All invoices submitted by the Contractor shall include the following Certification in order to proceed with its payment. This is an essential requirement and those invoices without this certification will not be processed for payment:

Under penalty of absolute nullity, I hereby certify that no employee, official or directive of PREPA is a party or has any interest in the profits or benefits to be obtained under this Service Order, or if any employee, official or directive of PREPA has any interest in the profits or benefits to be obtained under this Service Order, or if any employee, official or directive of PREPA has any interest in the profits or benefits under this Service Order or a waiver has been previously obtained. I, also certify that the only consideration to (furnish the goods) or (provide the services) under this Service Order is the payment agreed with PREPA's authorized representative. The total amount of this invoice is fair and correct. The (works) were completed, (the products) were delivered or (the services) were provided and no payment has been received for said concept.

Contractor's Signature

**Article 4:** Commencement and Completion of Work

- 4.1) Delivery time preferred by the Authority is within 300 calendar days or less, after the supplier receives the Purchase Order. Nevertheless, the Authority will consider quotations with delivery offers up to a maximum of 360 calendar days after receipt of Purchase Order. This time includes the pickup and delivery of all equipment at PREPA's facilities. Quotations with delivery time within the preferred delivery date will be considered on an equal basis. Quotations exceeding the maximum delivery as stated above will be rejected. Quotations with delivery time between the preferred delivery time and the maximum allowed delivery time will be evaluated using the following formula and will be compared on that basis for bid award:

$$EQ = QP \left[ 1 + \frac{K(DO-DP)}{DP} \right]$$

Where EQ = Evaluated quotation

QP = Quoted Price

DP = Delivery time preferred by the Authority (calendar days)

DO = Deliver time offered by bidder (calendar days) If DO is greater than DP'

K = Variable percentage factor = 70% for this bid

Unless otherwise noted, delivery times shorter than the preferred will be accepted but no credit will be given in the evaluation of the bid.

Failure to comply with the delivery date offered by the successful bidder shall make him liable in the quantity specified under the "penalty clause" section.

**Article 5:** Exceptions

- 5.1) Any exceptions to the requirements of this specification or its references shall be explicitly stated in the proposal. Exceptions taken shall include reasons for such exceptions and describe in detail the alternatives.
- 5.2) Bidders shall state all cases where alternates are offered.

**Article 6:** Documentation and Certification

- 6.1) Certificate of Compliance: A document certifying that all aspects of this Order and specification have been met shall be signed by the responsible Contractor representative and shall be presented to the Engineer along with the final report.
- 6.2) A report of the entire manufacturing process shall be submitted. Failure to comply with report will result in payment hold. Report shall include the following;
- a. Operating and maintenance Manuals
  - b. Drawing

- c. All the accepting tests (electrical and mechanical), evaluation and certification.
- d. Recommendations

**Article 7:** Suspension of Work

- 7.1) The Contracting Officer or the Engineer may, at any time, suspend the whole or any portion of the work under this Order, but this right to suspend the work shall not be construed as denying Contractor actual reasonable and necessary expenses due to delays, caused by such suspension. It's being understood that expenses will not be allowed for such suspension when ordered by the Contracting Officer or the Engineer on account of a Force Majeure Event, as defined in Force Majeure Article, herein.
- 7.2) The cause of such suspension shall be put in writing by the Contracting Officer or the Engineer within five (5) working days after the suspension or as soon as practicable. Contractor's obligations shall be extended for a period of time reasonably necessary to overcome the effects of any suspension.
- 7.3) If the suspension extends for more than 120 days, contractor shall have the right to terminate the contract.

**Article 8:** Specifications and Drawings

- 8.1) PREPA reserves the right to review and approve all drawings, specifications, methods and data, which Contractor develops hereunder. Such review or approval shall no way relieve Contractor from its responsibilities, obligations, or liabilities under this Order.

**Article 9:** Changes and/or Extra Work

- 9.1) Any variation from the original scope contained in this proposal, will be consider an extra work. A separate quote for this extra work will be issued for PREPA's reasonable approval. No extra work will be performed before a written approval from PREPA.

**Article 10:** Time Extensions

- 10.1) Contractor may apply for time extensions for construction changes, unforeseeable causes, changed conditions, etc., as indicated throughout the Specifications if such time extension affects the schedule of proposed progress.

**Article 11:** Inspection

- 11.1) A representative of PREPA shall have reasonable free access to all place of parts manufacture assembly and equipment testing, for inspection purposes to determine conformance with the specifications and with accepted practices in manufacture by providing reasonable prior written notice to the Contractor. The contractor shall provide office space and normal office facilities for PREPA representative during his inspection visit. Contractor shall advise PREPA at least 45 days before final acceptance testing in order to make the necessary travel arrangements.

- 11.2) If however, upon inspection by the Engineer it is found that any work, in whole or in part, does not materially comply with the requirements and specifications of this contract, the Engineer shall give Contractor the necessary instructions as to replacement of material and performance of work necessary to final completion and acceptance and Contractor immediately shall comply with and execute such instructions.

**Article 12: Force Majeure**

- 12.1) Contractor shall not be liable nor in breach or default of its obligations under the Contract to the extent performance of such obligations is delayed or prevented, directly or indirectly, due to causes beyond its reasonable control, including, but not limited to, acts of God, fire, terrorism, war (declared or undeclared), epidemics, insurrection, acts (or omissions) of PREPA or PREPA's suppliers or agents, any act (or omission) by any governmental authority, strikes or labor disputes. The delivery or performance date shall be extended for a period equal to the time lost by reason of delay, plus such additional time as may be reasonably necessary to overcome the effect of the delay. If Contractor is delayed by any acts (or omissions) of PREPA, or by the prerequisite work of PREPA's other contractors or suppliers, Contractor shall be entitled to an equitable price and performance adjustment.
- 12.2) The parties hereto shall be excused from performing hereunder and shall not be liable in damages or otherwise, if and only to the extent that they shall be unable to perform or are prevented from performing by a Force Majeure event. For purposes of this Service Order, Force Majeure means any cause without the fault or negligence, and beyond the reasonable control of, the party claiming the occurrence of a Force Majeure event. Force Majeure may include, but not be limited to the following: Acts of God, industrial disturbances, acts of the public enemy, war, blockages, boycotts, riots, insurrections, epidemics, earthquakes, storms, floods, civil disturbances, lockouts, fires, explosions, interruptions of services due to the acts or failure to act of any governmental authority, provided that these events, or any other claimed as a Force Majeure event, and/or its effects, are beyond the reasonable control and without the fault or negligence of the party claiming the Force Majeure, and that such party, within ten (10) days after the occurrence of the alleged Force Majeure, gives the other party written notice describing the particulars of the occurrence and its estimated duration. The burden of proof as to whether a Force Majeure has occurred shall be on the party claiming the Force Majeure.

**Article 13: Penalty Clause for Delays**

- 13.1) If the Contractor fails to comply with the delivery (s) established in the Order, the contractor shall pay to the Authority a penalty of Five Thousand and no/100 (\$5,000.00) dollars for each calendar day of delay in making delivery up to a maximum of 10% of the Order price, and the contractor and his sureties shall be liable for the amount thereof; PROVIDED, that the contractor shall not be liable to such amount when the delay in delivery is due to unforeseeable causes beyond the control, and without the fault or negligence of the contractor.



In case of delay, the Head of the Materials Management Division shall ascertain the facts and extent of the delay and extend the time for delivery when in his reasonable judgment, the findings of facts justify such an extension.

- 13.2) The Authority shall have the right to the payment or to the withholding of the amount of the penalty for delay in delivery. Contractor agrees that said penalty shall not be subject to reduction, moderation, or modification, since this penalty is a pecuniary punishment for the delay, and not a liquidation of damages.
- 13.3) Bidders should clearly state in his proposal the acceptance of this clause; however, bidder's silence on this regard shall be understood to mean full acceptance of the clause and all its terms. Rejection or non-acceptance of this clause will be cause for rejection of bidder's proposal.
- 13.4) The contractor must send to the Authority a written acknowledgement of the Order or request. In case the contractor fails to send the acknowledgment, this clause will be applied, starting two weeks from the date of the Authority's written request or Order.
- 13.5) United States Post Office postmark dates on mail, or any other means of acknowledgment approved by the Authority, will be used in the determination of the periods of time stated in this clause.

**Article 14:** Termination

- 14.1) PREPA may terminate the Contract (or any portion thereof) for cause if contractor: (i) becomes insolvent, (ii) substantially breaches a material obligation, which does not otherwise have a specified contractual remedy, and fails to cure the breach within thirty (30) days of notice from PREPA if it is not reasonably possible to cure the breach in said period, PREPA may provide extension of this period upon contractor's written request; or fails to commence to cure the breach and diligently proceed with the cure if it is not possible to cure within thirty (30) days of such notice. If PREPA terminates the Contract, PREPA shall pay to the Contractor all portions of the work completed.

**Article 15:** Indemnities

- 15.1) Contractor shall be responsible for any and all damages caused to the equipment from the time that said equipment leaves Contractor's facilities until such time as said equipment returns to PREPA's facilities. Contractor agrees to indemnify PREPA for all costs and expenses of any nature (including attorney's fees) incurred by PREPA and which originate or arise relating to claims by third parties for personal damages, including death, or for property damage, to the extent that such damages or injury have been caused directly by act or omission of Contractor in the performance or nonperformance of its obligations under this Order.

**Article 16:** Permits and Licenses

- 16.1) Contractor shall obtain, maintain and submit evidence of all the licenses, permits and authorizations required to perform all services and tasks under this Order, and shall send all notices, pay all fees, and related costs and will comply and will have its

subcontractors and agents comply with all laws, ordinances, rules, and regulations applicable to the work, in accordance with the drawings and specifications.

**Article 17:** Claims for Labor and Materials

- 17.1) Contractor shall, at his own expense, assume the defense of and save harmless PREPA from claims for labor and materials and not suffer any mechanics or other liens to remain outstanding against any of the property used in connection with the work; and shall, on reasonable prior written request, furnish satisfactory evidence that all persons who have done work or furnished materials have been fully paid. If Contractor fails to comply with his obligations in this respect, PREPA may take such liens or claims and may withhold from any monies due to Contractor such amounts as may be necessary to satisfy and discharge any lawful claims and any cost and expense incidental thereto.

**Article 18:** Laws to be observed

- 18.1) Contractor shall observe and comply with any and all applicable Federal, Commonwealth and Municipal Laws, by-laws, ordinances, and regulations in any manner affecting the work, the equipment or the materials used in the proposed rehabilitation and/or installation or construction, and those employed on the work or the conduct of the work, and with all such orders and decrees as exist at present or may be enacted prior to the completion of the work by bodies or courts having any jurisdiction or authority over the work.
- 18.2) Contractor shall save harmless and indemnify PREPA and its representative officers, agents, and servants against any claim, excluding omissions, for liability arising from or based on the violation of any such law, by-law, ordinance, regulation, order or decree, whether by himself or his employees.

**Article 19:** Liabilities

- 19.1) Civil Responsibility

The Parties agree that their responsibilities for damages under this Service Order will be governed by the Puerto Rico Civil Code and its case law, as dictated by the Supreme Court of Puerto Rico. Notwithstanding, the total liability of the Contractor for all claims regardless of whether a claim is based in contract, warranty, indemnity, tort/extracontractual liability (including negligence), strict liability or otherwise, shall not exceed the Service Order price of the equipment and the transport giving rise to the claim. Contractor's liability shall terminate upon the expiration of the applicable warranty period, provided that PREPA may enforce a claim that accrued prior to that date by commencing an action, as applicable under Article 20, Disputes, before the expiration of the applicable statute of limitations or repose, but not later than one (1) year after the expiration of such warranty period.

The Contractor shall not be responsible for loss of profits or revenues, indirect or consequential damages that may occur in relation to the work performed under this Contract.

**Article 20:** Disputes

- 20.1) Except as otherwise specifically provided in this Service Order, all disputes concerning questions of fact arising under this Service Order shall be reasonably decided by the Engineer, subject to written appeal by the Contractor within thirty (30) days to the Contracting Officer. As soon as practicable thereafter, the Contracting Officer shall inform each party hereto of his decision regarding the dispute, which decision shall be final and conclusive upon the parties hereto, unless such decision is challenged. If such challenge is made, either party may pursue its remedy at law or equity. In the meantime, the Contractor shall diligently proceed with the work as directed.

**Article 21:** Workmanship

- 21.1) All work shall be performed and completed in a thorough workmanlike manner and shall follow the generally accepted industry standards in the manufacture of materials and apparatus of the types covered by these specifications. In addition, skilled personnel in their various trades shall perform all work.
- 21.2) Contractor shall specify all locations and facilities to be used and names of all contractors to be used, if any. PREPA reserves the right to decline the use of subcontractor for quality purposes.

**Article 22:** Warranty

- 22.1) The warranty will be as Item 14 of the Table of Bidding Requirements in the Specification for Power Transformer. If, during the warranty period, the units or its components are proved to be defective, the vendor shall replace or repair such unit at no cost to the buyer, including all transportation costs (both ways). Vendor shall be responsible to comply with this warranty clause. Notwithstanding the foregoing, the Contractor shall only be liable for in and out charges, being decommissioning, installation, if contractor has clear and stable access to site
- 22.2) The Contractor warrants to PREPA that the products shall be shipped free from defects in material, workmanship and title and, the services shall be performed in a competent, diligent manner in accordance with any mutually agreed specifications. If Products or Services do not materially comply with the above warranties, PREPA shall promptly notify contractor in writing within the warranty period. Contractor shall thereupon, at its option, repair or replace the defective Products or re-perform the defective Services. If in contractor's reasonable judgment the Product cannot be repaired or replaced or the Services cannot be re-performed, contractor shall refund or credit monies paid by PREPA for that portion of Products or Services that do not materially comply with the above warranties.

- 22.3) The warranty period will begin the date on which PREPA receives the transformer on-site and will continue for a period as indicated in the technical specification. No warranty claim shall extend the applicable warranty period.
- 22.4 Notwithstanding anything to the contrary herein, as a precondition to any obligation of Contractor to perform warranty work, Buyer shall provide (a) all oil test results from the Work and (b) a log book of maintenance performed on the Work, service conditions of the Work (including load flow over time) and abnormalities (such as abnormal voltages, short circuits etc) that have occurred in the network to which the Work is connected, and (c) free and clear access to the Work. Notwithstanding anything to the contrary herein, the warranty of Contractor shall exclude any repair, replacement or damages due to (a) Buyer's failure to follow Contractor's instructions or industry standards regarding the operation of the Work; (b) modification or repairs to the Work by persons other than Contractor or Contractor's subcontractors, or third parties agreed to by Contractor; (c) failure of Buyer to test oil in accordance with ANSI and IEEE standards or to promptly report to Contractor test results indicating exceeded values; (d) damage from a voltage surge or failure of Buyer to protect the Work from voltage surges; (e) failure of Buyer to perform routine maintenance required by any manual provided by Contractor or industry standards; (f) defects in equipment, circuits, or the network that is not part of the Work; (g) movement of the Work without advance written notice to Contractor; (h) Acts of God or vandalism; and (i) Buyer's use of the Work in a manner inconsistent with Buyer's original specifications.

The foregoing warranty is exclusive and in lieu of all other warranties, whether written, oral, express or implied, or statutory (except as to title). Contractor expressly disclaims and excludes any implied warranty of merchantability or fitness for a particular purpose. This warranty provides buyer's exclusive remedy against the contractor.

**Article 23: IP Indemnity**

- 23.1) The Contractor agrees to indemnify and hold harmless PREPA from any rightful suit and/or claim of any third party that any Parts manufactured by Contractor and furnished hereunder infringes any patent of the United States. If PREPA notifies Contractor promptly of the receipt of any claim, does not take any position adverse to Contractor regarding such claim and gives Contractor information, assistance and exclusive authority to settle and defend the claim, Contractor shall, at its own expense and option, either (i) settle or defend the claim or any suit or proceeding and pay all damages and costs awarded in it against PREPA, or (ii) procure for Contractor royalty-free, irrevocable, non-transferable the right to continue using the Part, or (iii) modify the Part so that it become non-infringing, or (iv) replace the Part with non-infringing Parts; or (v) if mutually acceptable to the Parties, remove the infringing Part and refund and/or reduce the price allocable to such part. The foregoing states the entire liability of Contractor for patent infringement of any Parts. This shall not apply to any Part which is altered, modified or manufactured exclusively to PREPA's design. With respect to any Part furnished under the CONTRACT which is not manufactured by Contractor, only the patent indemnity of the manufacturer, if any, shall apply. This IP indemnity shall be the sole and exclusive remedy for any claim based on patent, trademark, or copyright infringement for product or services.

**Article 24:** Shipping

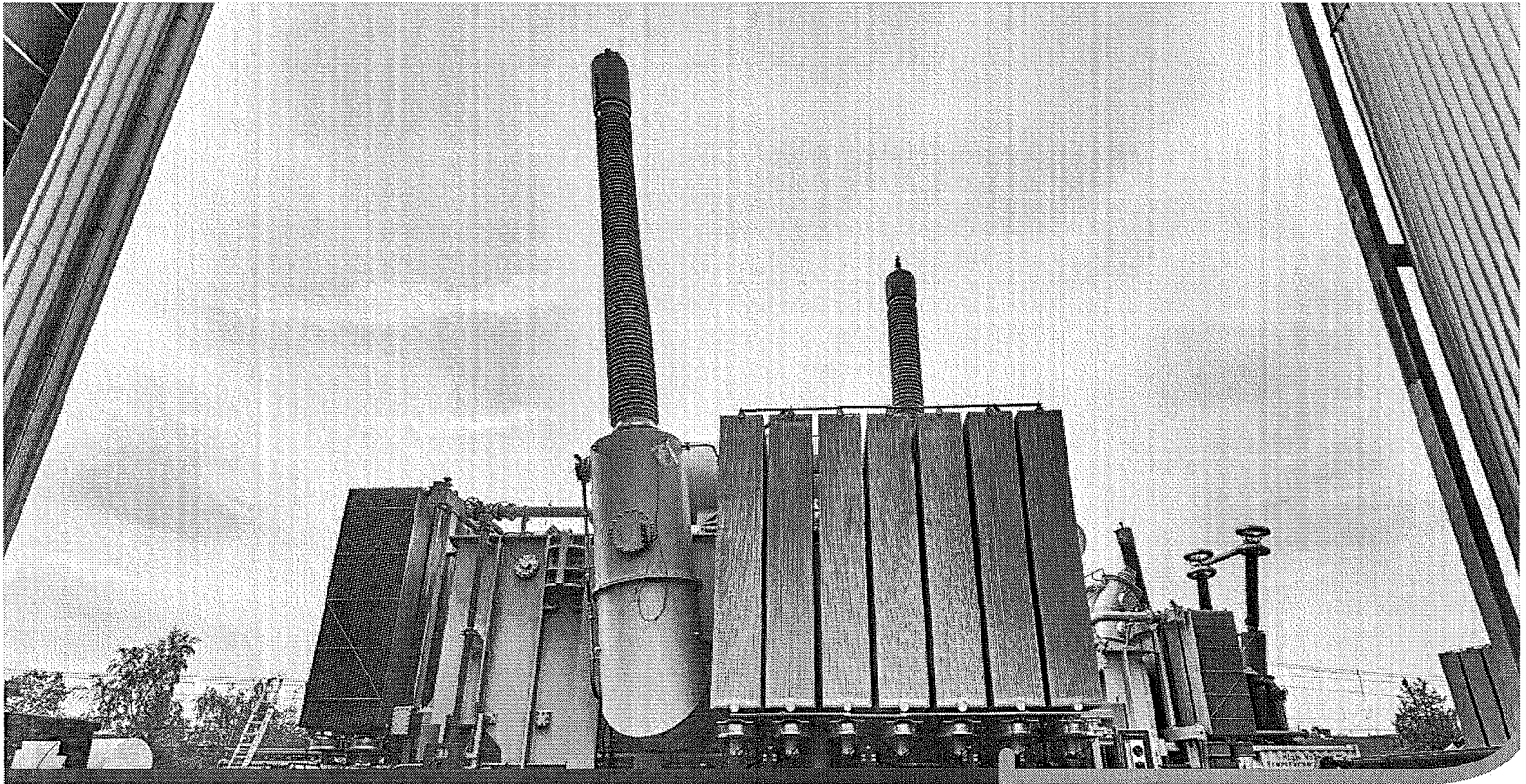
- 24.1) The transformer shall be shipped nitrogen or dry air filled with a temporary pressure gauge for inspection in transit and during storage prior to installation. Transformer tank and its auxiliary equipment such as gauges, etc., shall be adequately protected against damage during transportation.
- 24.2) All radiators, bushings, cooling fans, pumps and other accessories susceptible to damage during shipment shall be removed from the transformer and shipped separately.
- 24.3) A suitable crate shall be erected around load tap changer to protect it from damage during shipment.
- 24.4) PREPA shall provide a clear and stable access road within its facilities, for the delivery and unloading of the transformer on the foundation. See Annex A for the facilities of the substation.

**Article 25:** Subcontractors

- 25.1) The Contractor shall not assign nor subcontract its rights and obligations under this Contract, except in the event PREPA gives written authorization for such actions. Provided that no subcontract shall be considered for PREPA's approval, except when the following requirements are met: (1) the Contractor delivers PREPA a copy of the subcontract, not less than thirty (30) days prior to the effective date of the proposed subcontract; (2) the subcontract includes, as a condition for its legal validity and enforceability, a provision whereby PREPA has the right to substitute, subrogate or assume Contractors' rights under the subcontract, in the event that PREPA declares the Contractor in breach or default of any of the Contract terms and conditions; and (3) the subcontract includes, as a condition for its validity and enforceability, a provision establishing for the subcontractor the obligation to comply with all Contractors' obligations under the Contract (mirror image clause), except for such obligations, terms and conditions which exclusively related with works or services not included under the subcontract. Contractor will be fully responsible for the Work despite subcontracting any part of the Work as described above.

# PREPA

DATE: July 03, 2019  
CUSTOMER REFERENCE: RFP 1932  
SMIT REFERENCE: 310002875\_Rev3



## AUTHORIZED SALES REPRESENTATIVE

Company: EPMSPR  
Contact: Fernando Sosa  
Email: [fsosa@epmspr.com](mailto:fsosa@epmspr.com)

## USA AGENT FOR ROYAL SMIT TRANSFORMERS B.V.

SMIT Transformer Sales, Inc.      120 Varnfield Drive Suite E  
Mr. Sanjay Y. Patel                      Summerville, SC 29483  
Email: [lpeer@smitusa.com](mailto:lpeer@smitusa.com)                      Phone: (843) 871-3434

**Puerto Rico Electric Power Authority**

**Attn: Mr. Yadira L. Lugo-Cordero**

**Date** : July 3, 2019  
**Your reference** : RFP 1932  
**Our reference** : 310002875\_Rev3

Dear Mr. Lugo-Cordero,

Thank you for your interest in our company and products and we hereby submit our proposal 310002875 for the design, production, testing and transport, of transformers as per your inquiry.

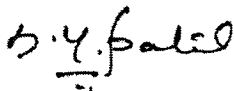
Royal Smit factory for transformers was founded in 1913 and we have been supplying Large Power Transformers ever since, worldwide, with a huge installed base in North America. Our company is known for its quality, personal approach and unique design features.

Our sales representative, Fernando Sosa, will be in contact with you to review our proposal. Should you need any further information or clarifications or if there is information missing from this proposal, please feel free to contact us directly or through our sales representative.

We highly appreciate this opportunity to quote on your transformer requirements and would very much like to have the opportunity to meet with you in person to discuss technical and commercial options.

Sincerely,

**Royal Smit Transformers B.V.**



Sanjay Y. Patel  
Technical Director, Smit Transformer Sales, Inc.  
E-mail: [L.Peer@smitusa.com](mailto:L.Peer@smitusa.com)



Harrie Vermeulen  
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+31 6 22903309

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## SECTION 2: SCOPE OF SUPPLY

### 2.1. Equipment

The offer includes the supply and delivery of items as follows:

Item	Qty	MVA	Ph	Hz	Voltage Rating	Drawing Ref.
20	1	328/436/544	3	60	230/115 kV	1871660

Details of offered designs are provided by completed enclosed technical datasheets and technical support documentation, APPENDIX E.

Place of manufacturing: Royal Smit Transformers BV, Nijmegen, The Netherlands.

### 2.2. Addendums/Clarifications Received

None

### 2.3. Other Items

- Shipping and delivery: DDP Pad (Sabana Llana) Puerto Rico (INCOTERMS 2010).
- Transformer oil: included.
- Spare parts, optional price.
- 10 days Field Service supervisor for delivery and placing on pad is included.
- Factory testing: included, as per APPENDIX B and required specifications.
- Oil pumps will be Kelvion
- A performance bond for 100% of the unit price, until delivery on site. Issued by an American bank

## 2.4. Services

- Route survey
- The offer includes one specification review meeting and the possibility of one design review meeting at SMIT.
- A dedicated project manager will be assigned to this project. This single point of contact our project manager will support the customer (and/or his representatives) during every aspect of the design, manufacturing and delivery of the equipment. Regular progress reports and local representation assure you have complete and accurate project planning and execution. We welcome the chance to introduce you to this project's manager.
- Coordination meeting: one coordination meeting to discuss health and safety requirements, transportation, delivery, erection, installation, oil-filling and testing procedures.
- Final inspection of transformer upon delivery to site.

## 2.5. Documentation

The following documentation is included with the supply and delivery of the transformer(s):

- Operation and Maintenance Manual
- Outline drawing
- Secondary wiring drawings
- Other documentation can be delivered on request.

## 2.6. Storage

This offer is based on delivery of the transformer(s) and other items that are part of the contract immediately after factory testing. No allowances have been made for storage at our facilities or elsewhere after the completion of the factory testing. Separate prices for storage are available upon request.

## 2.7. Technical Compliance

The transformer(s) described herein will be designed, constructed and tested in accordance with applicable ANSI/NEMA Standards in effect at the time of this proposal and Inquiry No. RFP 1932 dated November 5, 2018 with specifications, and with qualifications and/or exceptions listed in this proposal.

## 2.8. Technical Clarifications and Exceptions

No technical exceptions are taken.

## SECTION 3: DELIVERY AND INSTALLATION

### 3.1. Delivery Schedule

The Delivery time of the quoted transformer(s) is as follows:

Item 20: 340 Calendar days after receipt of the down payment, Ex Works The Netherlands.  
We expect a shipping time of approx. 8 weeks.

- Submittal of design package for design review: 8 weeks after receipt of down payment (tbd)
- Final drawings : 6 weeks after design approval (tbd)

### 3.2. Terms of Delivery

*Equipment, parts and transformer oil*

- **Inland transport+ DDP delivery (on the pad) is subject to the following conditions:**
  - All 3<sup>rd</sup> Party cost (route survey, permitting, addition equipment, bridge jumping etc) are excluded and will be paid for by customer at cost + 3% handling fee
  - Availability of suitable dual-lane trailer on the island

### 3.3. Clear and Stable Access

In case delivery to the site and/or placement on the foundation is part of the scope of supply, this offer is based on the assumption that the customer will supply a clear and stable access road from the public highway to and next to the foundation for the transformer delivery.

Prices quoted for shipment are based on the situation as it exists at the bid issue date and are subject to adjustment if any conditions exist at the moment of delivery that complicate the movement of the transformer(s) and which could not be foreseen at the moment the proposal was submitted and that result in extra costs for the Purchaser.

### 3.4. Impact Recorders

The transformer(s) proposed herein will be shipped with Impact Recorder(s) attached to the transformer. The Impact Recorder is the property of Royal Smit Transformers BV and must be returned to the address shown below within 30 calendar days of purchaser's receipt of the equipment. Failure to return the Impact Recorder(s) will result in Royal Smit Transformers BV issuing an Invoice in the amount of \$3,325 to the purchaser of the transformer for each Impact Recorder not returned.

**Return Shipping Address:**

Royal Smit Transformers BV  
c/o Smit Transformer Sales, Inc.  
120 Varnfield Drive Suite E  
Summerville, SC 29483

**3.5. Supervision**

The price includes the service of a qualified Supervisor of Royal Smit Transformers BV for supervision of delivery and placing on pad for a period of up to 10 consecutive days. Required service of the Supervisor beyond this period will be charged according to the rates as provided by the “Field Services” clause. The presence of the Royal Smit Transformers BV Supervisor during erection of the transformer is required to validate the warranty.

These 10 days comprise of:

- 1 day for travel to the location of the transformer
- 1 day for travel back to country of residence.
- 8 consecutive days of 8 consecutive working hours.

Notes:

- If more than 10 consecutive days of supervision by a SMIT employee are required, this must be agreed in advance, to allow for work planning.
- For the extra days a SMIT technician is required, the applicable daily rate will be charged.
- If the customer wishes an alternative planning of the 8 days of 8 hours this can be arranged in co-operation with the supervisor. A maximum of 12 hours a day applies.
- For hours worked over and above the 8 days x 8 hours = 64 hours the applicable hourly rate will be charged. These days/hours will be charged automatically, unless otherwise agreed.
- Hourly rates are to be used for variation work for which no unit prices have been agreed on and which is to be carried out as per account rendered. The hourly rates for machinery include the driver and all other costs relating to the use of the machinery.
- The hourly rates for personnel shall, in addition to the wage, cover all the Contractor’s costs and the Contractor’s profit.

Please refer to APPENDIX C HOURLY RATES.

### **3.6. Installation and Assembly**

Erection, installation, oil filling, field-testing and commissioning services for the transformer(s) by a Smit-approved subcontracted crew is not included in our offer.

**SECTION 4: PRICING AND CONDITIONS**

**4.1. Pricing**

**4.1.1. Transformer**

Item 10	Qty	MVA	Voltage Rating	Per unit
Transformer	1	328/436/544	230/115 kV	\$2,605,108*
		*Based on 14ft shipping height design		
		Discount (1%)		- \$26,051
Transportation		Puerto Rico Harbor		\$ 257,500
		DDP on pad, Sabana transmission Center		218,600***
Performance Bond		100% 12 months, 1 unit		89,335**
<b>GRAND TOTAL PER UNIT:</b>				<b>\$ 3,144,492</b>

\*Pricing based on an order of a quantity of 1 unit.

\*\*We will issue a performance bond for 100% of the unit price, valid until delivery, issued by American bank.

\*\*\* As per par.3.2. conditions, indication only, excluding 3rd party cost

Optional			
	1 piece Calisto 5 Dissolved Gas Analyzer	\$	47,329

**4.1.2. Spare Parts**

Item 10	Description	Model/Catalog	Price Each
1	HV Bushing	230Z2000LB	\$ 10,420
2	Netural Bushing	046W2000UD	\$ 2,750
3	LV Bushing	115W3500XV	\$ 5,940
4	HV Arrester	PEXLIM Q258-XH300	\$ 6,460
5	LV Arrester	PEXLIM R108-YH145	\$ 2,470
6	Radiator	3000*25	\$ 2,340
7	Fan Assembly	Krenz F16	\$ 780
8	Gasket set	Groove	\$ 4,930
9	Buchholz relay	Messko Bucholz relay MBR80	\$ 1,980

Quoted spare parts pricing is contingent on ordering together with the delivery of the transformer, and will be packed and shipped together with the transformer accessories.

## **4.2. Conditions**

### **4.2.1. Bid Validity**

This proposal is valid for 30 days after issue date.

### **4.2.2. Currency**

All prices and invoice amounts are in U.S. Dollars.

### **4.2.3. Rate of Exchange**

Quoted ex-works pricing is firm. Rate of exchange at time of quotation = rate 0.87

### **4.2.4. Invoicing**

Standard terms of sale are Net 30 days from date of invoice.

Any contract changes (adders/deducts) made after the submittal of the invoice for the first progress payment will be settled with the final progress payment term.

In the event the delivery date is delayed at Buyer's request, Buyer shall be responsible, at Seller's option, to make payment for the product in accordance with the payment schedule irrespective of whether a construction milestone has been met, or to make payment to Seller for any cost incurred by Seller as a result of the late delivery request.

### **4.2.5. Payment Terms**

#### **PREPSHIPMENT**

- 10% upon receipt of PO
- 10% upon approved drawings and release for manufacturing
- 25% upon evidence material ordered and received at factory
- 15% upon FAT Test accepted



#### POST SHIPMENT

- 30% upon arrival at San Juan Port
- 10% upon completion/ placement on pad

#### 4.2.6. Duties and Taxes

Import duties (as per DDP delivery term) are included. Clause 3.1. of the Terms and Conditions is applicable. Federal, State and Local sales, use and other applicable taxes have not been included in the prices. Applicable state sales, use, or gross receipts taxes shall be billed unless Purchaser provides a state tax exemption certificate or direct pay permit for state of delivery at time of award.

#### 4.2.7. Contract

In the event of an award, the contract (Purchase Order) shall be between **Royal Smit Transformers BV** and the buyer. All Purchase Orders are to be issued to **Royal Smit Transformers BV** and submitted c/o 120 Varnfield Drive Suite E, Summerville, SC 29483.

#### 4.2.8. Cancellation Schedule

In case the order is cancelled by customer without cause, Article 14.1 of the Terms and Conditions will apply "If PREPA terminated the contract, PREPA shall pay to the contractor all portions of the work completed". This includes engineering work, route surveys, permitting, materials purchased, reservations etc.

#### 4.2.9. Warranty Conditions

Article 22 of the Terms and Conditions apply.

Royal Smit Transformers B.V. offers a standard 5 year warranty on the active part and 18 months on all other components of the offered transformers with one year In/Out.

Please refer to APPENDIX A for detail Warranty Conditions.

#### 4.2.10. Terms and Conditions

Puerto Rico Electric Power Authority Terms and conditions contract requisition 179280 apply.

## APPENDIX A: WARRANTY CONDITIONS

### 1. Warranty Period

#### **5 YEARS, ACTIVE PART**

[Five (5) year warranty period option is standard for a SGB-SMIT Group transformer, and Purchaser has elected not to use a SGB-SMIT Group selected and approved subcontractor for complete assembly and field testing services].

Upon payment of order in full, SGB-SMIT Group warrants that core & coil assembly (active part) to be free from defects in workmanship and material for the earlier of 60 months from delivery date to the contractual delivery point, or 66 months after a successful acceptance test at SGB-SMIT Group in Nijmegen, The Netherlands.

SGB-SMIT Group also warrants for a period of 18 months all selected and mounted accessories of a SGB-SMIT Group transformer, commencing upon the date of the successful acceptance test at SGB-SMIT Group. The accessories must be delivered by a SGB-SMIT Group selected and approved supplier.

### 2. Notification

2.1 The manufacturer shall be provided written notice and a complete description of any manufacturing defect within fourteen (14) days after discovery of a manufacturing defect by the purchaser. Time is of the essence and any notice to the manufacturer exceeding such time period shall result in the exclusion of the noticed defect from this warranty. To the extent allowed by applicable law, all lawsuits to enforce this warranty shall be instituted within one (1) year of the written notification of the defect, or such lawsuits shall be time-barred by this warranty.

2.2 The purchaser shall provide the manufacturer a reasonable time from the date of notification to investigate and repair defects.

2.3 In the event the purchaser has notified the manufacturer regarding a defect and no defect can be determined for which the manufacturer is responsible, the manufacturer is entitled to compensation from the purchaser for any expenses incurred by the manufacturer.

2.4 Prior to repairing a defect, the manufacturer reserves the right to study the periphery and the historic loading and excitation data of the transformer at its place of use, and to complete an inspection of the gas in oil analysis and load tables.

### 3. Warranty Conditions

The following are conditions precedent to any obligation of the manufacturer under this warranty:

3.1 Purchaser (or its contractors) shall not have made or performed any modifications, repairs, dismantling and/or other material work on the transformer without prior written consent of the manufacturer.

3.2 Purchaser shall follow all requirements for maintenance in the Operation & Maintenance Manual for the specific transformer. Purchaser shall keep a logbook of all maintenance performed on the transformer and of the history of service conditions (including load flow over time) and of abnormalities (such as abnormal voltages, short circuits etc.) that have occurred in the network to which the transformer is connected.

3.3 Purchaser shall have taken samples of the oil in the transformer in accordance with ANSI C576.104 or IEC 60567, and submitted such samples to chemical tests for PCB and gas in oil analysis. These samples must be analysed by the manufacturer or an independent chemical laboratory approved by the manufacturer. The purchaser must notify the manufacturer within fourteen (14) days of receipt of test results indicating allowed values are exceeded.

3.4 The primary and secondary of the transformer must be protected from voltage surges by appropriate devices. It is the purchaser's responsibility that the occurring values do not exceed the values of the transformer's design. Trip and alarm contacts must be connected at all times.

3.5 A manufacturer's service representative must have been present during field assembly, vacuum filling (if required) and inspection of the installation prior to transformer energization.

3.6 The transformer must not have been erected and/or moved without manufacturer supervision.

#### 4. Warranty Exclusions

4.1 The manufacturer shall not be liable for any incidental or consequential damage or expenses of any kind, including without limitation loss of profits or use.

4.2 The manufacturer shall not be liable for parts that were prescribed by the purchaser, that have not been released according to the quality system ISO 9001 used by the manufacturer, or that have not been approved in writing by the manufacturer.

4.3 The manufacturer shall not be liable for defects that occur in or are completely or partly caused by parts/materials delivered by purchaser or parts ordered from a third party that are not under warranty of such third party at the time the notice of defect is provided.

4.4 The manufacturer shall not be liable for defects that occurred or are caused by untimely maintenance or non-observance of control and maintenance directions in the Operation & Maintenance Manual or by use other than the intended normal use of the product.

4.5 Defects caused by vandalism, improper installation by the purchaser or third party, improper maintenance or improper use are excluded from this warranty.

4.6 The manufacturer shall not be liable for defects that are caused by a faulty repair by the purchaser or its contractor.

4.7 The warranty does not apply to defects caused in whole or in part by normal wear and tear and damages caused by faulty or careless use, improper working equipment, incomplete site work, unfit site preparation and/ or chemical, electro technical or electrical influences that were not foreseen in the contract of purchase.

4.8 The warranty does not apply to defects caused in whole or in part by voltage surges.

#### 5. Work on Site and Repair

5.1 In the event that repairs are executed on site, the Buyer shall be responsible for providing working access to the product (including removal, disassembly, replacement or reinstallation) and shall provide manufacturer with all facilities and utilities required and usually employed for the repair of the product.

5.2 In the event the manufacturer replaces parts/products in compliance with its warranty obligations, the replaced parts/products shall be property of the manufacturer.

5.3 Repairs will be carried out at site, unless the manufacturer deems it is necessary in its discretion to send back the defective part or transformer to a repair facility for repair or replacement.

#### 6. Addition of Diagnostic and Monitoring Equipment

6.1 The manufacturer reserves the right to add, to build in or supply, (without having a purchase order

for such an addition, and at no cost to the purchaser) diagnostic and monitoring equipment, which it considers necessary to evaluate the product. The manufacturer will notify the purchaser should such additions be deemed necessary.

#### 7. In/Out Warranty/Limitation of Warranties

7.1 The direct cost of removing the product from service, transportation to and from the place of repair and reinstallation of the product at site, up to a maximum of 10% of the purchase price, is included in this warranty for 12 months from shipment to the contractual delivery point.

Direct costs exclude expenses for removing firewalls, installing temporary equipment, incremental costs of supplying service, loss of profits or revenues or any other indirect losses. In no event shall the manufacturer be liable under this In/Out Warranty for any costs or expenses exceeding in the aggregate 10% of the purchase price of the product.

7.2 Where the defect has not been successfully remedied, the purchaser is entitled to a reduction of the contract price of the transformer in proportion to the reduced value of the transformer.

7.3 The manufacturer's sole liability and the purchaser's exclusive remedy for a defect in workmanship and material is repair or replacement of the product, at the manufacturer's option.

THE FOREGOING WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES, WHETHER WRITTEN, ORAL, EXPRESS OR IMPLIED, OR STATUTORY (EXCEPT AS TO TITLE). SELLER EXPRESSLY DISCLAIMS AND EXCLUDES ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. THIS WARRANTY PROVIDES

PURCHASER'S EXCLUSIVE REMEDY AGAINST THE MANUFACTURER.

## APPENDIX B: SMIT FACTORY TESTING

SMIT tests transformers in conformance with ANSI C57 standards and Purchaser specifications.

High-Voltage and High-Power Testfield.

Chemical Laboratory

Acceptance tests are the final phase of transformer production in the factory, as well as a main part of the Quality Assurance System. Tests are performed according to National and International Standards (IEC and ANSI) and can be distinguished as dielectric tests, power measurement tests and other tests including sound measurements and tests of the secondary equipment. The following lists specific information about Smit test facilities:

### Preliminary Measurements

- 2500 kVA, 3 kV in-factory test generator operating at 50 Hz.
- Voltage Ratio bridges.
- Resistance Measurement Bridges. (Thomson)
- Haefely RSO impulse generator with a Smit impulse chop simulator.
- Generator for damped oscillating voltages up to 325 kHz for research on resonant voltages.
- Physical and chemical laboratory with a wide range of facilities for measurements of properties of materials used in transformers.

### Oil Tests

- Facilities for testing and measuring properties of oil according to IEC, such as breakdown voltages, water content, dielectric dissipation factor at 90°C, interfacial tension and neutralization value.
- Dissolved gasses in oil.
- Furan compounds in oil.
- PCB in oil.

### Impulse Tests

- HighVolt 180 kJ impulse generator consisting 12 stages 200 kV each.
- Maximum Voltage 2400 kV.
- HighVolt voltage divider of 2400 kV.
- Haefely Impulse Voltage Divider of 2400 kV.
- Several smaller Impulse Voltage Dividers up to 600 kV.
- Haefely Chopping Bridge of 2400 kV.
- Haefely/Smit Overshoot Compensation Unit for the HighVolt Impulse Generator.
- Smit Integrated Digital Acquisition System (SIDAS) for registration of transient voltages during impulse test. This system includes diagnostic software.

#### Applied Voltage Tests

- 300 kV, 1A Smit Voltage Test Transformer operating at 50 Hz.
- 500 kV, 200A Smit Voltage Test Transformer operating at 50 or 60 Hz.
- Schering Bridge for Loss Factor and Capacitance measurements.
- Automatic Capacitance Bridge for Loss Factor and Capacitance measurements.
- Doble Test Set for Field measurements.

#### Partial Discharge Measurements

- Biddle PD-meter for measurements in PC and  $\mu\text{V}$  including wide and narrow band.
- Screened measurement circuit with background noise less than 10 pico coulombs.

#### Power Measurement Test

Frequency	50 Hz	60 Hz
<b>Generators</b>	2x21=42 MVA	2x21=42 MVA
<b>Capacitors</b>	118 MVA	142 MVA
<b>Max. Reactive Power</b>	160 MVA	184 MVA
<b>Max. Voltage</b>	73 kV three-phase 500 kV single-phase	73 kV three-phase 500 kV single-phase
<b>Power</b>	2300 kW	2300 kW
<b>Current</b>	10000 A	10000 A

Two identical three-phase power loss measurement systems, including zero-flux current transformers, gas-capacitor voltage dividers and Wattmeters. The current ranges up to 4000 A and voltage up to 100 kV. For the calculation of the average voltage and the harmonics in the no-load current an 8 channel differential input digitizer is used. The whole system is computer controlled. The computer software takes also care of the necessary calculations during the measurement process. This system has an overall uncertainty of less than 30 ppm. (e.g. error < 0.3 % at power factor 0.01).

#### Heatrun Test

- 30 channel Hybrid Recorder of YEW, for temperature measurements.
- Direct Hotspot measurements with LUXTRON glass fiber sensors. Up to 4 sensors simultaneously.

#### Noise and Vibration Measurements

- Bruel and Kjaer 4 channel Pulse measurement system for real-time measurements of Sound Pressure and Sound Intensity.

#### Miscellaneous

- Facilities for all needed additional measurements.
- Calibration of Instruments. The philosophy of our test lab is to calibrate most of the used instruments ourselves with our well-equipped calibration lab. Only the most accurate systems (for instance power loss measurement system) are calibrated externally. (In this example by NRC – Canada).
- Ultrasonic sensors for location of faults during Impulse Tests.
- Frequency Response Analysis (FRA) measurement for the measurement of the absolute frequency spectrum of the Transformers Transfer Function.

#### **Warehouse and Repair Facilities, USA**

SGB-SMIT owned repair facility: OTC Services, Louisville, Ohio

- Field Services
- Spare parts
- Storage
- Repairs

## APPENDIX C: HOURLY RATES

### Labor & Rental rates

#### Field Service labor rates

Additional services of a supervising erection engineer beyond the days included in this proposal are available at an additional cost. The service engineer time must be ordered within sixty (60) days of ordering the transformers and must be utilized within the quoted warranty period.

The following rates are applicable for Royal Smit Transformers BV technicians working within the United States and are valid for the year **2019**.

Daily rate ...	US \$ 1360
Hourly rate...	US \$ 170

The daily rate is applicable to all days, including travel days and days at the job site, whether worked, or on standby. The regular workday is considered to be 8 hours plus time for regular breaks, if applicable.

Overtime rate at regular workdays...	US \$ 192 Per hour or any part thereof
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Holiday rate ...	US \$ 1675 Per 8 hour day or any part thereof
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The Holiday rate is applicable to all Holidays, Saturdays, and Sundays that are worked.

Overtime rate for holidays, Saturdays and Sundays ...	US \$ 210 Per hour or any part thereof
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The overtime rates are applicable to all time worked beyond 8 hours on regular days and holidays.

Travel time ...	Travel time will be invoiced against a daily rate. Travel time is the time that the supervisor needs to travel from the port of origin to the job site.
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Travel expenses ...	Travel expenses will be based on travel from port of origin to the job site and the local travel cost will be invoiced against actual cost plus 10% surcharge for handling and administration cost.
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Living expenses ...	Living expenses will be invoiced against actual cost plus 10% surcharge for handling and administration cost.
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**Terms of payment.** Standard terms are net 30 days from the date of the invoice. Late payment charges of 1-1/2% per month will be applied to any late payments unless otherwise specifically amended by the proposal.

**Scheduling ...** A two (2) weeks advance notice will be appreciated for planning purposes. Moreover a description of the exact services to be rendered shall be provided to Royal Smit Transformers BV when scheduling a service engineer.

**Equipment rental rates for oil treatment and dry-out process**

- |    |  |                                      |
|----|--|--------------------------------------|
| 1. | Rent of vacuum pump  | \$ 210<br>Per running hour           |
| 2. | Rent of oil purifier   | \$ 280<br>Per running hour           |
| 3. | Use of equipment trailer<br>Such as vacuum- and oil hoses,<br>gaskets, bolts, nuts etc.  | \$ 2900<br>Per transformer treatment |
| 4. | Transport of the equipment trailer from point of origin (CO) to site round trip will be invoiced against actual cost plus 10% surcharge for handling to allow and administration cost. |                                      |