



AGENDA ITEM EXECUTIVE SUMMARY

Agenda Item:	Consider resolution to award a contract to Pennsylvania Transformer Technology Inc. for the construction and delivery of a new substation power transformer for Western Ave Substation		
Presenter & Title:	Hal Wright, Superintendent of Electrical Services		
Date:	November 13, 2017		
<i>Please Check Appropriate Box:</i>			
<input checked="" type="checkbox"/>	Committee of the Whole Meeting		Special Committee of the Whole Meeting
<input checked="" type="checkbox"/>	City Council Meeting		Special City Council Meeting
<input type="checkbox"/>	Public Hearing		Other -
Associated Strategic Plan Goal/Objective: Vision 5, Goal G to Develop and provide funding for capital investments and projects that consider a variety of local capital needs and those mandated by State/Federal Agencies including: other identified capital projects and equipment for all departments and programs (Capital Projects Plan).			
Estimated Cost: \$501,110.00	Budgeted? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Other Funding? <input type="checkbox"/> Yes <input type="checkbox"/> No	
<i>If "Other Funding," please explain how the item will be funded:</i>			
Executive Summary:			
The Western Ave Substation transformer was identified as needing replacement in the current budget. Abnormal oil samples and preventive maintenance testing show that it is at end-of-life.			
Sealed bids for the construction and delivery of a new 34.5/12kV 20MVA substation Power Transformer were opened on October 23, 2017.			
<u>Manufacturer</u>	<u>Mineral Oil</u>	<u>FR3 Oil</u>	
PTTI	\$427,067.00	\$501,110.00	
ABB	\$643,157.00	\$693,490.00	
Virginia Transformer	\$374,163.00	\$420,163.00	
WEG	\$419,620.00	\$451,620.00	
Virginia Transformer was low bidder. However, due to several factors including payment terms and physical size requirements the bid was rejected. WEG transformer			

was the next lowest bidder. Due to the transformer's physical size this bid was also rejected. Pennsylvania Transformer Technology Inc (PTTI) submitted lowest bid at \$501,110.00 that conformed to the bid requirements including size restrictions.

This project will be completed over two fiscal years due to the length of time it takes to build the transformer. A 10% deposit will be paid for construction and shipping of the transformer, with the 80% due upon delivery and 10% due on final acceptance. Delivery is planned in fall of 2018 to coincide with construction at Western Ave substation.

Attachments: *(please list)*

- Resolution 2017-120
- Recommendation Letter from Stanley Consultants dated November 15, 2017
- Transformer Bid Tabulation
- Western Ave Substation "Rearrange" Construction Estimate Date November 1, 2017
- Conformed Contract for Construction and Delivery of new Power Transformer with Pennsylvania Transformer Technology Inc.

Recommendation / Suggested Action: *(how item should be listed on agenda)*

Award contract to Pennsylvania Transformer Technology Inc. for the construction and delivery of a new substation power transformer for Western Ave Substation in an amount not to exceed \$501,110.00.

RESOLUTION NO. 2017-120

**RESOLUTION AUTHORIZING EXECUTION OF
Contract with Pennsylvania Transformer Technology Inc. for the construction and delivery of
a new substation power transformer for Western Ave. Substation in an amount not to exceed
\$501,110.00.**

BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF GENEVA, KANE COUNTY, ILLINOIS, as follows:

SECTION 1: That the City Administrator is hereby authorized to award, on behalf of the City of Geneva, a contract with Pennsylvania Transformer Technology Inc. for the construction and delivery of a new substation power transformer for Western Ave Substation, in the form attached hereto.

SECTION 2: This Resolution shall become effective from and after its passage as in accordance with law.

PASSED by the City Council of the City of Geneva, Kane County, Illinois, this 4th day of December, 2017

AYES: __ NAYS: __ ABSENT: __ ABSTAINING: __ HOLDING OFFICE: __

Approved by me this 4th day of December, 2017.

City Administrator

ATTEST:

City Clerk

November 15, 2017

Mr. Aaron Holton
 Electric Division Manager
 City of Geneva Public Works
 1800 South Street
 Geneva, IL 60134

**RE: Engineer's Recommendation for Award of Contract
 Bid Proposal No. 17-01 – Western Avenue Substation
 Transformer Procurement**

Dear Aaron:

On October 23, 2017, four bids were opened at the City of Geneva (Geneva). A bid tabulation is enclosed for your review.

Each bidder provided two options. One for standard mineral oil and a second for natural ester oil. As the natural ester oil options were within budget, and have advantages over mineral oil, it is recommended to select a transformer with natural ester oil. These advantages include:

- Natural ester oil is biodegradable which provides great environmental advantages in the case of an oil spill.
- Natural ester oil has a high flash point reducing the probability of ignition from an arcing fault that could cause a substation fire.

Of the four bids that were received, only one bid met the physical size requirement that was requested in the bid. This size requirement was due to the transformer needing to be installed in the place of an existing transformer. A cost estimate was performed to see if additional work could be done in the substation yard to allow for a larger transformer to be used. The estimated cost was \$140,350. A copy of this estimate has been attached. Due to the additional cost that would be required to use a different manufacturer outweighing the saving in the initial cost of the other lower cost transformers, it is recommended that this bid be awarded to Pennsylvania Transformer Inc. (Pennsylvania), based on the following:

<u>Item</u>	<u>Cost</u>
Bid Price	\$501,110.00

A copy of their complete proposal is included in the draft conformed contract for your reference.

Pennsylvania had some clarifications and exceptions. Communications were made with Pennsylvania on these items. An addendum to Pennsylvania's proposal providing the answers to the questions asked is also included in the draft conformed contract. The one item that was not changed is the tap changer manufacturer being Reinhausen. Per our past experience and further discussion with Geneva, the Reinhausen tap changer is deemed acceptable.

Please review and if Geneva agrees with this recommendation, prepare a Notice-to-Proceed letter for Pennsylvania Transformer, Inc., and sign the draft conformed contract. I will then proceed with getting final signatures from Pennsylvania and prepare the conformed contract.

If you have any questions, please contact me at 563.264.6461.

Sincerely,

Stanley Consultants, Inc.



Philip E. Schulz
Project Manager

cc: Mr. Hal Wright

Attachments: Final Transformer Bid Tab
Draft Conformed Contract
Construction Cost Estimate for Yard Rearrange

27824 Transformer Procurement REC ltr 2017-11-15

City of Geneva
Rev 1
Western Avenue Substation Transformer Procurement
12/16/20 MVA, 34.5 kV - 12.47/7.2 kV

Manufacturer	Delta Star		Pensylvania Transformer		SPX (Cahoon Sales)		ABB (T&D Products, Inc.) (WESCO DIST. Inc)		Virgina Transformer		WEG (PwrOne)	
	NAF/NN NO BID	NAF/KN NO BID	ONAN/ONAF/NNAF Y	KNAN/KNAF/KNAF Y	ONAF/ NO BID	KNAF/K NO BID	ONAN/ONAF/NNAF Y	KNAN/KNAF/KNAF Y	ONAN/ONAF/NNAF Y	KNAN/KNAF/KNAF Y	ONAN/ONAF/NNAF Y	KNAN/KNAF/KNAF Y
Bid Document is Signed												
Bid Bond												
Warranty			60/66MO	60/66MO			12/18MO	12/18MO	60MO	60MO	60MO	60MO
Data Sheets			Y	Y			Y	Y			Y	Not completely
Clarifications												
Delivery			30 weeks	30 weeks			30 weeks	30 weeks	23 weeks	23 weeks	22 weeks	22 weeks
Bid Price			\$ 410,317.00	\$ 484,360.00			\$ 620,557.00	\$ 670,890.00	\$ 367,613.00	\$ 413,613.00	\$ 407,970.00	\$ 439,970.00
Owner Travel Allowance			\$ 2,000.00	\$ 2,000.00			\$ 2,000.00	\$ 2,000.00	\$ 2,000.00	\$ 2,000.00	\$ 2,000.00	\$ 2,000.00
Engineer Travel Allowance			\$ 2,000.00	\$ 2,000.00			\$ 2,000.00	\$ 2,000.00	\$ 2,000.00	\$ 2,000.00	\$ 2,000.00	\$ 2,000.00
Owner Per Diem Allowance			\$ 2,375.00	\$ 2,375.00			\$ 950.00	\$ 950.00	\$ 475.00	\$ 475.00	\$ 1,425.00	\$ 1,425.00
Engineer Per Diem Allowance			\$ 10,375.00	\$ 10,375.00			\$ 4,150.00	\$ 4,150.00	\$ 2,075.00	\$ 2,075.00	\$ 6,225.00	\$ 6,225.00
Total Bid Price	\$ -	\$ -	\$ 427,067.00	\$ 501,110.00	\$ -	\$ -	\$ 629,657.00	\$ 679,990.00	\$ 374,163.00	\$ 420,163.00	\$ 419,620.00	\$ 451,620.00
2YR Warranty Adder			Included	Included			\$ 9,000.00	\$ 9,000.00	Included	Included	Included	Included
Total Bid Price (with 2YR Warranty)	\$ -	\$ -	\$ 427,067.00	\$ 501,110.00	\$ -	\$ -	\$ 638,657.00	\$ 688,990.00	\$ 374,163.00	\$ 420,163.00	\$ 419,620.00	\$ 451,620.00
5YR Warranty Adder			Included	Included			\$ 13,500.00	\$ 13,500.00	Included	Included	Included	Included
Total Bid Price (with 5YR Warranty)	\$ -	\$ -	\$ 427,067.00	\$ 501,110.00	\$ -	\$ -	\$ 643,157.00	\$ 693,490.00	\$ 374,163.00	\$ 420,163.00	\$ 419,620.00	\$ 451,620.00
Auxiliary Losses @ Rated MVA			3.20	3.20			4.20	6.30	2.40	3.20	3.20	3.20
No-Load Losses @ Rated Voltage (kW)			12.00	10.50			9.95	9.95	12.32	12.75	9.30	9.50
Load Losses @ Max. MVA Rating (kW)			187.00	213.50			176.28	50.59	161.40	164.64	175.00	177.00
Cost of Auxiliary Losses (\$130.53/kW)	\$ -	\$ -	\$ 417.70	\$ 417.70	\$ -	\$ -	\$ 548.23	\$ 822.34	\$ 313.27	\$ 417.70	\$ 417.70	\$ 417.70
Cost of No-load Losses (\$1740.27/kW)	\$ -	\$ -	\$ 20,883.24	\$ 18,272.84	\$ -	\$ -	\$ 17,315.69	\$ 17,315.69	\$ 21,440.13	\$ 22,188.44	\$ 16,184.51	\$ 16,532.57
Coast of Load losses (\$502.58/kW)	\$ -	\$ -	\$ 93,982.46	\$ 107,300.83	\$ -	\$ -	\$ 88,594.80	\$ 25,425.52	\$ 81,116.41	\$ 82,744.77	\$ 87,951.50	\$ 88,956.66
Total Cost of Losses	\$ -	\$ -	\$ 115,283.40	\$ 125,991.36	\$ -	\$ -	\$ 106,458.71	\$ 43,563.55	\$ 102,869.81	\$ 105,350.91	\$ 104,553.71	\$ 105,906.92
Price + Cost of Losses	\$ -	\$ -	\$ 542,350.40	\$ 627,101.36	\$ -	\$ -	\$ 736,115.71	\$ 723,553.55	\$ 477,032.81	\$ 525,513.91	\$ 524,173.71	\$ 557,526.92
Service Engineer Requirement												
- Cost per day							\$ 3,028.00	\$ 3,028.00			\$ 1,500.00	\$ 1,500.00
- Travel per round trip							\$ 6,056.00	\$ 6,056.00			\$ 2,300.00	\$ 2,300.00
Total Evaluated Cost	\$ -	\$ -	\$ 542,350.40	\$ 627,101.36	\$ -	\$ -	\$ 736,115.71	\$ 723,553.55	\$ 477,032.81	\$ 525,513.91	\$ 524,173.71	\$ 557,526.92
Total Purchase Price of Recommended Supplier				\$ 501,110.00								
Sound Level at 1 ft			see comment	see comment			69.00	69.00	73.00	73.00	69.00	
Sound Level at 6 ft							72.00	72.00	Per IEEE	Per IEEE	72.00	
payment			15% on order 25% with approval dwg 25% after manufacturing and remainder upon shipment	15% on order 25% with approval dwg 25% after manufacturing and remainder upon shipment			10% at order placement 10% at drawing submission 30% at release to manufacture 40% after FAT 10% at shipment	10% at order placement 10% at drawing submission 30% at release to manufacture 40% after FAT 10% at shipment	20% uopn order 30% with approval dwgs and 50% at shipment	20% uopn order 30% with approval dwgs and 50% at shipment	90% at delivery and 10% after final acceptance	90% at delivery and 10% after final acceptance
Comments			- Stated sound level per NEMA - 72dB - Reinhausen RMV-II instead of ABB UZF - Payment has been updated to 10% after drawing approval, 80% at delivery, 10% after acceptance per clarification email	- Stated sound level per NEMA - 72dB - Reinhausen RMV-II instead of ABB UZF - Payment has been updated to 10% after drawing approval, 80% at delivery, 10% after acceptance per clarification email			- Payment terms not as specified - Price does not include offload onto pad - Does not meet diminsions	- Load Losses are assumed to be a typo, however due to the overall transformer cost, was not clarified.	- spare parts are not included in base price - does not meet space requirement - radiator in segment 4	- spare parts are not included in base price - does not meet space requirement - radiator in segment 4	- did not provide price for spare parts - does not meet space requirement	- did not complete data sheet just crossed out the option 1 and added 2, but still showing ONAN. Tap changer is filled with mineral oil

Conceptual Cost Estimate		Date: 11/1/2017	
SUBSTATION/PROJECT: Western Avenue 34.5 kV High Side Rearrange			
DESCRIPTION: Rearrange 34.5kV Portion of Substation to Make More Room for New Transformer			
	Material and Labor		
	Proposed Estimate		
Description	Unit Cost	Qty	Extd Cost
34.5kV Steel Structures	\$10,000	Lot	\$10,000
34.5 kV Bus and Connection	\$7,500	Lot	\$7,500
34.5kV Reassembly	\$5,000	Lot	\$5,000
Foundations	\$10,000	Lot	\$10,000
Site Work/ Grading	\$5,000	Lot	\$5,000
Control Wiring, Raceway, Grounding	\$15,000	Lot	\$15,000
Substation Testing	\$12,000	Lot	\$12,000
Demolition and Disposal	\$5,000	Lot	\$5,000
SUBTOTAL:			\$69,500
UNDEVELOPED DESIGN DETAILS:		10%	\$6,950
CONTINGENCY:		20%	\$13,900
ENGINEERING (Design, Specs, Bid Evaluation):			\$50,000
GRAND TOTAL:			\$140,350

All cost estimates are Stanley Consultants' opinions of probable project, construction, and / or operation and maintenance costs. Cost estimates are made on the basis of our experience and represent our best judgment. We have no control over cost of labor, materials, equipment, contractor's methods, or over competitive bidding or market conditions. Therefore, we do not guarantee that proposals, bids, or actual construction costs will not vary from estimates of project costs, construction, and / or operation and maintenance costs presented.

Conformed Contract

for

Bid Proposal No. 17-01 Western Avenue Substation Transformer Procurement

between

**City of Geneva
Geneva, Illinois**

and

**Pennsylvania Transformer Technology,
Inc.
Canonsburg, Pennsylvania**

November 2017

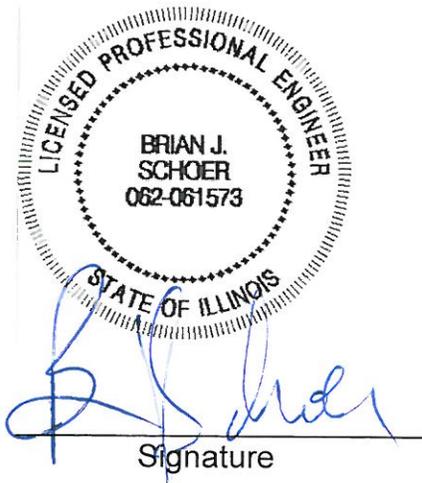


Project Manual

for

Bid Proposal No. 17-01 Western Avenue Substation Transformer Procurement

City of Geneva
Geneva, Illinois



September 29, 2017

License Expiration Date 11/30/2017
Illinois Firm Registration No. 184-001533



A Stanley Group Company
Engineering, Environmental and Construction Services - Worldwide

THIS AGREEMENT is by and between City of Geneva, Illinois (Buyer) and PTTI (Seller).

Buyer and Seller, in consideration of the mutual covenants hereinafter set forth, agree as follows:

Article 1. GOODS AND SPECIAL SERVICES

- 1.1 Seller shall furnish the Goods and Special Services as specified or indicated in the Contract Documents. The Goods and Special Services to be furnished are described in Section 01 11 00.

Article 2. THE PROJECT

- 2.1 The Project for which the Goods and Special Services to be provided under the Contract Documents may be the whole or only a part is generally described as Western Avenue Substation Transformer Procurement Project.

Article 3. ENGINEER

- 3.1 The Contract Documents for the Goods and Special Services have been prepared by Stanley Consultants, Inc. who is hereinafter called Engineer and who is to assume all duties and responsibilities and have the rights and authority assigned to Engineer in the Contract Documents in connection with the furnishing of Goods and Special Services.

Article 4. POINT OF DESTINATION

- 4.1 The place where the Goods are to be delivered is defined in the General Conditions as the Point of Destination and is designated as: Western Avenue Substation Transformer Foundation, 951 Western Avenue, Geneva, Illinois 60134.

Article 5. CONTRACT TIMES

- 5.1 **Time of the Essence.** All time limits for Milestones, if any, for the delivery of Goods and the furnishing of Special Services as stated in the Contract Documents are of the essence of the Contract.
- 5.2 **Days for Submittal of Shop Drawings.** All Shop Drawings and Samples required by the Contract Documents will be submitted to Buyer for Engineer's review within 30 days after the date when the Contract Times commence to run as provided in Paragraph 2.03 of the General Conditions.
- 5.3 **Dates for Delivery of Goods.** The Goods are to be delivered to the Point of Destination and ready for Buyer's receipt of delivery on (or within a period of 15 days prior to or after) October 15, 2018. Coordinate with Owner on exact date at time of shipment.

Article 6. CONTRACT PRICE.

- 6.1 Buyer shall pay Seller for furnishing the Goods and Special Services in accordance with the Contract Documents an amount in current funds as follows:
- 6.1.1 A Lump Sum of: Five Hundred One Thousand One Hundred Ten Dollars (\$501,110.00).

6.1.2 Unit Adjustment Prices. To adjust Lump Sum for changes from quantities required by Contract Documents.

Item	Unit	Unit Adjustment Price
Site services of service engineer	per day	per attached
Transportation, travel time, and out-of-pocket expenses for travel of service engineer to Site	per round trip	per attached

Article 7. PAYMENT PROCEDURES.

7.1 **Submittal and Processing of Payments.** Seller shall submit Applications for Payment in accordance with Article 10 of the General Conditions. Applications for Payment will be processed by Engineer as provided in the General Conditions.

7.2 **Progress Payments; Retainage.**

7.2.1 Buyer shall make progress payments on account of the Contract Price on the basis of Seller's Applications for Payment as follows:

7.2.1.1 Upon receipt of the first Application for Payment submitted in accordance with Paragraph 10.01.A.1 of the General Conditions and accompanied by Engineer's recommendation of payment in accordance with Paragraph 10.02.A of the General Conditions, an amount equal to 10% of the Contract Price, less such amounts as Engineer may determine in accordance with Paragraph 10.02.A.3 of the General Conditions.

7.2.1.2 Upon receipt of the second such Application for Payment accompanied by Engineer's recommendation of payment in accordance with Paragraph 10.01.A.2 of the General Conditions, an amount sufficient to increase total payments to Seller to 90% of the Contract Price, less such amounts as Engineer may determine in accordance with Paragraph 10.02.A.3 of the General Conditions.

7.3 **Final Payment.** Upon receipt of the final Application for Payment accompanied by Engineer's recommendation of payment in accordance with Paragraph 10.06 of the General Conditions, Buyer shall pay the remainder of the Contract Price as recommended by Engineer.

Article 8. INTEREST.

8.1 All moneys not paid when due as provided in Article 10 of the General Conditions shall bear interest at the rate of 4% per annum.

Article 9. SELLER'S REPRESENTATIONS.

9.1 In order to induce Buyer to enter into this Agreement, Seller makes the following representations:

9.1.1 Seller has examined and carefully studied the Contract Documents and the other related data identified in the Bidding Documents.

9.1.2 If specified or if, in Seller's judgment, any local condition may affect cost, progress or the furnishing of the Goods and Special Services, Seller has visited the Point of Destination and become familiar with and is satisfied as to the local conditions that may affect cost, progress or the furnishing of the Goods and Special Services.

9.1.3 Seller is familiar with and is satisfied as to all local federal, state and local Laws and Regulations that may affect cost, progress and the furnishing of the Goods and Special Services.

- 9.1.4 Seller has carefully studied and correlated the information known to Seller, and information and observations obtained from Seller's visits, if any, to the Point of Destination, with the Contract Documents.
- 9.1.5 Seller has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Seller has discovered in the Contract Documents, and the written resolution thereof by Engineer is acceptable to Seller.
- 9.1.6 The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for furnishing Goods and Special Services.

Article 10. CONTRACT DOCUMENTS.

10.1 The Contract Documents consist of the following:

10.1.1 This Agreement (pages 1 to 5, inclusive).

10.1.2 Exhibit A to this Agreement (pages 1 to 43, inclusive).

10.1.3 General Conditions (pages 1 to 12, inclusive).

10.1.4 Specifications as listed in Project Manual table of contents.

10.1.5 Drawings consisting of a cover sheet and sheets as listed in Drawing List and in Standard Drawing List.

10.1.6 The following which may be delivered or issued on or after the Effective Date of the Agreement and are not attached hereto:

10.1.5.1 Notice to Proceed;

10.1.5.2 Written Amendment(s);

10.1.5.3 Work Change Directive(s);

10.1.5.4 Change Order(s).

10.2 The documents listed in paragraph 10.1 are attached to this Agreement (except as expressly noted otherwise above).

10.3 There are no Contract Documents other than those listed above in this Article 10.

10.4 The Contract Documents may only be amended, modified, or supplemented as provided in paragraph 3.04 of the General Conditions.

Article 11. MISCELLANEOUS.

11.1 **Defined Terms.** Terms used in this Agreement will have the meanings indicated in the General Conditions and the Supplementary Conditions.

11.2 **Assignment.** No assignment by a party hereto of any rights under or interests in the Contract Documents will be binding on another party hereto without the written consent of the party sought to be bound. Specifically but without limitation, moneys that may become due and moneys that are due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law). Unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under the Contract Documents.

11.3 **Successors and Assigns.** Buyer and Seller each binds itself, its partners, successors, assigns, and legal representatives to the other party hereto, its partners, successors, assigns, and legal representatives in respect to all covenants, agreements, and obligations contained in the Contract Documents.

11.4 **Severability.** Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon Buyer and Seller, who agree that the Contract Documents shall be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.

11.5 **Waiver.** It is agreed that no waiver or modification of this contract or of any covenant, condition or limitation contained in it shall be valid unless it is in writing and duly executed by the party to be charged with it, and that no evidence of any waiver or modification shall be offered or received in evidence in any proceeding, arbitration, or litigation between the parties arising out of or affecting this contract, or the right or obligations of any party under it, unless such waiver or modification is in writing, duly executed as above. The parties agree that the provisions of this paragraph may not be waived except by a duly executed writing.

11.7 **Entire Agreement.** This Agreement states the entire contract between the parties hereto with respect to the subject matter hereof, and all prior and contemporaneous understandings, representations, and agreements are merged herein or superseded hereby. No alterations, modifications, release, or waiver of this contract or any of the provisions hereof shall be effective unless in writing, executed by the parties.

IN WITNESS WHEREOF, Buyer and Seller have signed this Agreement in duplicate. One counterpart each has been delivered to Buyer and Seller. All portions of the Contract Documents have been signed or identified by Buyer and Seller or on their behalf.

This Agreement will be effective on _____, 20__ (which is the Effective Date of the Agreement).

Buyer: _____
City of Geneva
Geneva, Illinois

Seller: _____
PTTI
Canonsburg, Pennsylvania

By: _____
(CORPORATE SEAL)

By: _____
(CORPORATE SEAL)

Attest _____

Attest _____

Address for giving notices:
22 South First Street
Geneva, Illinois 60134

Address for giving notices
30 Curry Avenue
Canonsburg, Pennsylvania

(If Buyer is a corporation, attach evidence of authority to sign. If Buyer is a public body, attach evidence of authority to sign and resolution or other documents authorizing execution of Agreement.)

Agent for service of process: _____

(If Seller is a corporation, attach evidence of authority to sign.)

Designated Representative:
Name: _____
Title: _____
Address: _____

Designated Representative:
Name: _____
Title: _____
Address: _____

Phone: .

Phone: .

Facsimile: _____

Facsimile: _____

END OF SECTION

**Pennsylvania Transformer Technology, Inc.**

30 Curry Avenue • Canonsburg, Pennsylvania 15317-0440
Phone: (724) 873-2100 • Fax: (724) 873-2113



October 19, 2017

City of Geneva
22 South First Street
Geneva, IL 60134
Attn: City Administrator

RE: RFQ No. 17-01
Power Transformer

We are enclosing our proposal P27151 as invited by the referenced inquiry.

We appreciate this opportunity to quote on your transformer requirements and hope that you will find our proposal to be clear, concise, and competitive. If you have any questions, you may contact us directly at marketing@patransformer.com.

Please Note: In the event of and upon receipt of a purchase order, it is understood that all exception and qualifications contained herein have been read and accepted by the customer.

Sincerely,

A handwritten signature in black ink, appearing to read 'Kirk Karanza', is written over the typed name and title.

Kirk Karanza
Proposal Engineer

Attachments

ATTACHMENT A (continued)

By submission of this bid, I certify that the bid has been arrived at independently and has been submitted without collusion between or among any vendor of materials, supplies, equipment, or services.

PTTI
Name of Corporation, Partnership, or Proprietor

30 Curry Ave.
Address

Canonsburg PA 15317
City State Zip

724-873-2100
Telephone

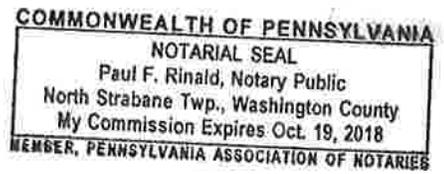
[Signature] Proposal Engineer
Authorized Signature/Title

SUBSCRIBED AND SWORN to before me

this 19th day of October, 2017

Paul F. Rinald
Notary Public

My commission expires: 10/19/18



NOTICE: SUBMIT PROPOSALS ON PROPOSAL FORM ONLY

FORM OF PROPOSAL

Name of Bidder PTTI

Address of Bidder 30 Curry Ave.

Telephone No. of Bidder 724-873-2100

To: City Administrator
City of Geneva
22 South First Street
Geneva, IL 60134

The undersigned bidder, having examined the specifications of the following proposal, hereby proposes to provide the required labor, services, and materials described in this Form of Proposal, the Instruction to Bidders, and Specifications for the sum or sums stated hereinafter: *per attached

I. LUMP SUM BID PRICE - WESTERN AVENUE SUBSTATION TRANSFORMER PROCUREMENT:

Design, fabricate, and deliver FOB transformer pad, and completely assemble one 34.5 kV – 12.47 kV, 12/16/20 MVA power transformer as specified for the sum of: *per attached

Option 1: ONAN/ONAF/ONAF

four hundred ten thousand, three hundred seventeen (Dollars)

Option 2: KNAN/KNAF/KNAF

four hundred eighty-four thousand, three hundred sixty (Dollars)

Factory Witness Testing Allowance

	Round Trips	\$/ Round Trip	Total
Travel Allowance – Owner	1	\$2000	\$2000
Travel Allowance - Engineer	1	\$2000	\$2000

	Days	\$/ Days	Total
Per Diem Allowance – Owner	5	\$475	\$2375
Per Diem Allowance - Engineer	5	\$2075	\$10375

Option 1: Total Cost (Transformer and Witness Testing)

four hundred twenty-seven thousand, sixty-seven (Dollars)

Option 2: Total Cost (Transformer and Witness Testing)

five hundred one thousand, one hundred ten (Dollars)

To be delivered on: shipment 26-30 wks. ARO, 20 .

Prices contained herein are firm through 12-18-17.

Price for extending warranty:

2 years \$N/A
 5 years \$N/A

II. UNIT ADJUSTMENT PRICES: Required Base Bid quantities of the items listed below are set forth in the Specifications. If increases or decreases in these quantities occur, the Contract Price is to be adjusted by Change Order on the basis of the following. Adjustment prices are subject to acceptance by Owner, and rejection of one or more adjustment prices will not invalidate acceptance of this Bid.

Item	Unit	Unit Adjustment Price
Site services of Service Engineer	per day	\$ per attached
Transportation, travel time, and out-of-pocket expenses for travel of Service Engineer to Site	per round trip	\$ per attached

The undersigned bidder states that this proposal is made in conformity with the specifications and agrees that, in the event of any discrepancies between any conditions of this proposal and the specifications prepared by the City of Geneva, the provisions of the latter shall prevail. *per attached

The undersigned bidder certifies that this proposal is made in good faith, without collusion or connection with any other person or persons bidding for these services, labor and materials.

Signed by:

BIDDER: PTTI

BY: Kirk Karanza

TITLE: Proposal Engineer

DATE: 10-19-17

NOTICE: SUBMIT PROPOSALS ON THIS FORM ONLY

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DATA SHEETS 3-PHASE, 2-WINDING TRANSFORMER		Equipment Name: Tag No.: Option 1	
DESCRIPTION	UNITS	SPEC DATA	VENDOR DATA
Manufacturer	-	By Manufacturer	PTTI
Catalog/Serial No.	-	By Manufacturer	N/A
SITE CONDITIONS			
24 Hr. Avg. Ambient Design Temperature	°C	30	30
Maximum Ambient Temperature	°C	40	40
Minimum Ambient Temperature	°C	-30	-30
Site Elevation Above Sea Level	ft	Less than 3,300 ft	Less than 3,300 ft
Seismic Requirements			
Site Class			
S _{DS} – Design Spectral Ground Acceleration at Short Periods (0.2 Seconds)			
I _p – Component Importance Factor			
R _p – Structure Response Modification Factor			
a _p – Component Amplification Factor			
Specific local Building Code and specific sections on seismic requirements used in equipment design	---	By Manufacturer	N/A
Symmetrical short circuit current			
Limited Only by transformer impedance (ANSI standard)	Y/N	Y	Y
Minimum system short circuit current and X ₀ /X ₁	kA/#.#	NONE	NONE
CHARACTERISTICS			
Operating Frequency	Hz	60	60
Design Temperature Rise	°C	55	55
Maximum Temperature Rise	°C	65	65
Cooling Class	-	ONAN/ONAF/ONAF	ONAN/ONAF/ONAF
Capacity at Design Temp Rise	MVA	12/16/20	12/16/20
Capacity at Maximum Temp Rise	MVA	13.4/17.9/22.4	13.4/17.9/22.4
Impedance (Z%/ %Tolerance)	Z%/+-x	7.5%/+-7.5%	7.5%/+-7.5%
HV to LV impedance at nominal voltage on Base Rating	Z%/+-x	7.5%/+-7.5%	7.5%/+-7.5%
HV to Tertiary at nominal voltage on Base Rating	%	NONE	NONE
LV to Tertiary at nominal voltage on Base Rating	%	NONE	NONE
Transformer X/R Ratio	-	By Manufacturer	17.27
Core and Coil Construction Type	-	Circular	Circular
Type of Material Used in Coils	-	Cu	Cu
SYSTEM CONFIGURATION			
Utilized as a Unit Auxiliary Transformer	Y/N	N	N
Utilized as a Generator Step-Up Transformer	Y/N	N	N
Utilized as a Substation Transformer	Y/N	Y	Y
Utilized as a Station Service Transformer	Y/N	N	N
WINDINGS			
High Voltage:			
Nominal Rated Voltage	kV	34.5	34.5
Basic Impulse Level	kV BIL	200	200
Connection	D or Y	D	D
Low Voltage:			
Nominal Rated Voltage	kV	12.47	12.47
Basic Impulse Level	kV BIL	110	110

MEDIUM POWER TRANSFORMERS

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DATA SHEETS 3-PHASE, 2-WINDING TRANSFORMER		Equipment Name: Tag No.: Option 1	
DESCRIPTION	UNITS	SPEC DATA	VENDOR DATA
Connection	D or Y	Y	Y
Displacement Between HV and LV Windings	deg	30° (ANSI std)	30° (ANSI std)
Tertiary:		NONE	NONE
Nominal Rated Voltage	kV	N/A	N/A
Capacity (MVA)	Xx/xx/xx	N/A	N/A
External Connection	Y/N	N/A	N/A
Basic Impulse Level (External connection)	kV	N/A	N/A
Connection	---	N/A	N/A
Neutral:			
Basic Impulse Level	kV BIL	110	110
Connection (Un-Grd, Solid, H-Res, L-Res)	-	Solid	Solid
Neutral Insulation (Uniform, Graded)	-	Graded	Graded
BUSHINGS			
High Voltage:			
Manufacturer	-	By Manufacturer	Pcore
Type	-	Porcelain	Porcelain
Location	-	Cover	Cover
Segment	-	3	3
HV bushing BIL	kV	200	200
Minimum creepage distance	In	35	35
Low Voltage:			
Manufacturer	-	By Manufacturer	Pcore
Type	-	Porcelain	Porcelain
Location	-	Side	Side
Segment	-	1	1
LV bushing BIL	kV	110	110
Minimum creepage distance	In	11	11
Tertiary Voltage:		NONE	NONE
Manufacturer	-	N/A	N/A
Type	-	N/A	N/A
Location	-	N/A	N/A
Segment	-	N/A	N/A
Tertiary bushing BIL	kV	N/A	N/A
Minimum creepage distance	In	N/A	N/A
Manufacturer	-	N/A	N/A
Type	-	N/A	N/A
Location	-	N/A	N/A
Segment	-	N/A	N/A
Neutral bushing BIL	kV	110	110
Minimum creepage distance	In	11	11
CURRENT TRANSFORMERS			
High Voltage (Bushing Current Transformers):			
Quantity on Each Bushing	Qty	2	2
Ratio of Each CT	Pri/Sec	600:5	600:5
Multi-Ratio	Y/N	Y	Y
Accuracy Class	-	C800	C800

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DATA SHEETS 3-PHASE, 2-WINDING TRANSFORMER		Equipment Name: Tag No.: Option 1	
DESCRIPTION	UNITS	SPEC DATA	VENDOR DATA
Low Voltage (Bushing Current Transformers)::			
Quantity on Each Bushing	Qty	1	1
Ratio of Each CT	Pri/Sec	1200:5	1200:5
Multi-Ratio	Y/N	Y	Y
Accuracy Class	-	C800	C800
Tertiary Voltage (Bushing Current Transformers)::			
Quantity on Each Bushing	Qty	NONE	NONE
Ratio of Each CT	Pri/Sec	N/A	N/A
Multi-Ratio	Y/N	N/A	N/A
Accuracy Class	-	N/A	N/A
Tertiary (Internal Current Transformers):			
Quantity on Each Winding	Qty	NONE	NONE
Ratio of Each CT	Pri/Sec	N/A	N/A
Multi-Ratio	Y/N	N/A	N/A
Accuracy Class	-	N/A	N/A
Neutral Bushing (Bushing Current Transformers)::			
Quantity on Each Bushing	Qty	1	1
Ratio of Each CT	Pri/Sec	600:5	600:5
Multi-Ratio	Y/N	Y	Y
Accuracy Class	-	C800	C800
CONNECTIONS			
High Voltage (Select one):			
Overhead Cable – Open Air	Y/N	Y	Y
Underground Cable – Open Air	Y/N	N	N
Underground Cable - Enclosed	Y/N	N	N
Nonsegregated Bus Duct	Y/N	N	N
Segregated Bus Duct	Y/N	N	N
Isolated Phase Bus Duct	Y/N	N	N
Gas insulated Bus Duct	Y/N	N	N
Low Voltage Side (Select one):			
Overhead Cable – Open Air	Y/N	N	N
Overhead Cable – Cable Bus	Y/N	Y	Y
Underground Cable – Open Air	Y/N	N	N
Underground Cable – Enclosed	Y/N	N	N
Nonsegregated Bus Duct	Y/N	N	N
Segregated Bus Duct	Y/N	N	N
Isolated Phase Bus Duct	Y/N	N	N
Tertiary (Select one for external connected only):			
Overhead Cable – Open Air	Y/N	N/A	N/A
Underground Cable – Open Air	Y/N	N/A	N/A
Underground Cable – Enclosed	Y/N	N/A	N/A
Nonsegregated Bus Duct	Y/N	N/A	N/A
ARRESTERS			
High Voltage Side	Y/N	Y	Y
Manufacturer	-		
MCOV Rating	kV	22	22

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DATA SHEETS 3-PHASE, 2-WINDING TRANSFORMER		Equipment Name: Tag No.: Option 1	
DESCRIPTION	UNITS	SPEC DATA	VENDOR DATA
Location (Segment)	---	3	3
Discharge monitor	Y/N	N	N
Low Voltage Side	Y/N	N	N
Manufacturer	-	N/A	N/A
MCOV Rating	kV	N/A	N/A
Location (Segment)	---	N/A	N/A
Discharge monitor	Y/N	N/A	N/A
Tertiary (External connection only):	Y/N	NONE	NONE
Manufacturer	-	N/A	N/A
MCOV Rating	kV	N/A	N/A
Location (Segment)	---	N/A	N/A
Discharge monitor	Y/N	N/A	N/A
TAP CHANGER			
De-energized taps:	Y/N	Y	Y
Tap Location	HV/LV	HV	HV
No. of Steps Above Nominal (Std. 2 x +2.5%)	Qty / %	2 x +2.5%	2 x +2.5%
No. of Steps Below Nominal (Std. 2 x -2.5%)	Qty / %	2 x -2.5%	2 x -2.5%
Load Tap Changer:	Y/N	Y	Y
Tap Location	HV/LV	LV	LV
No. of Steps Above Nominal (Std. 16 x +5/8%)	Qty / %	16 / +5/8	16 / +5/8
No. of Steps Below Nominal (Std. 16 x -5/8%)	Qty / %	16 / -5/8	16 / -5/8
Digital Tap Changer Control	Y/N	Y	Y
Automatic, Manual, or Both	-	Both	Both
Transformer Paralleling Equipment	Y/N	N	N
Preservation System (Select One):			
Conservator Tank or Inert Gas Pressure System	-	Inert Gas Pressure	Inert Gas Pressure
Conservator tank location	Segment	N/A	N/A
OIL			
Total Gallons in System	gal	By Manufacturer	4631
Qty shipped Separately	gal	By Manufacturer	N/A
Weight of Oil as Shipped/Quantity of Oil	Lb./Gal.	By Manufacturer	34734
Proposed Method of Oil Shipment	-	By Manufacturer	N/A
COOLING			
Radiator/Cooler Location – Segment (1,2,3,4)	-	1,3	3
Cooling Equipment Fans:			
Quantity of Fan Motors per Stage	Qty	By Manufacturer	4
Horsepower rating of each motor	Hp	By Manufacturer	.25
Rated Voltage and Phases	V, ph	240V, 1 ph	240V, 1 ph
Full Load Current	A	By Manufacturer	38.8
Cooling Equipment Pumps:			
Quantity of Pump Motors per Stage	Qty	N/A	N/A
Horsepower rating of each motor	Hp	N/A	N/A
Rated Voltage and Phases	V, ph	N/A	N/A
Full Load Current	A	N/A	N/A
Guaranteed Power Requirements of Cooling Equipment			
First Stage	kW	By Manufacturer	0

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DATA SHEETS 3-PHASE, 2-WINDING TRANSFORMER		Equipment Name: Tag No.: Option 1	
DESCRIPTION	UNITS	SPEC DATA	VENDOR DATA
Second Stage	kW	By Manufacturer	1.6
Third Stage	kW	By Manufacturer	3.2
Maximum Expected Sound Level at Max. MVA Rating and All Fans Operating at:			
4-feet per NEMA	dBA	By Manufacturer	72
6 feet	dBA	By Manufacturer	-
CONTROL CABINET			
Location – Segment (1,2,3,or4)	-	2	2
Ac Auxiliary Power Voltage supplied to Control Cabinet	VAC	120/240V, 1 ph	120/240V, 1 ph
Qty of Ac Auxiliary Power sources supplied to Control Cabinet	1,2	1	1
Power Required for AC Auxiliary Power Source	kVA	By Manufacturer	9.3
Dc Control Power Voltage supplied to Control Cabinet	VDC	125	125
Dc Rated Continuous Power Required	A	By Manufacturer	-
Dc Rated Peak Power Required	A		
ACCESSORIES			
Nitrogen Pressurization Tanks	Y/N	Y	Y
Special Paint	Y/N	N	N
Ground Resistor	Y/N	N	N
Automatic Transfer Switch for Second Power Supply	Y/N	N	N
Provisions (only) for Gas Analyzer	Y/N	N	N
Wheels	Y/N	N	N
100% spare gaskets	Y/N	N	N
TESTS			
ANSI Routine Tests	Y/N	Y	Y
Winding Insulation	Y/N	Y	Y
Core Insulation	Y/N	Y	Y
Insulation Power Factor	Y/N	Y	Y
Auxiliary Cooling Losses	Y/N	Y	Y
Single Phase Excitation & Rated Voltage	Y/N	Y	Y
No Load Losses & Excitation Current	Y/N	Y	Y
Zero Sequence Impedance	Y/N	N	N
Temperature Rise	Y/N	By Manufacturer	Y
Low Frequency on Auxiliary Devices	Y/N	Y	Y
Lightning Impulse	Y/N	By Manufacturer	Y
Front of Wave Impulse	Y/N	N	N
Switching Impulse	Y/N	N	N
Partial Discharge	Y/N	N	N
Audible Noise	Y/N	Y	Y
Dissolved Gases in Oil Analysis	Y/N	Y	Y
EFFICIENCY			
At 100% of Maximum MVA	%	By Manufacturer	99.47
At 75% of Maximum MVA	%	By Manufacturer	99.54
At 50% of Maximum MVA	%	By Manufacturer	99.58
VOLTAGE REGULATION			
100% of Maximum MVA at:			
Unity Power factor	%	By Manufacturer	0.71

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DATA SHEETS 3-PHASE, 2-WINDING TRANSFORMER		Equipment Name: Tag No.: Option 1	
DESCRIPTION	UNITS	SPEC DATA	VENDOR DATA
80% lagging power factor	%	By Manufacturer	5.0
80% leading power factor	%	By Manufacturer	4.639
Excitation Current at 100% Rated Voltage and Max. MVA	%	By Manufacturer	0.5
GUARANTEED LOSSES			
Auxiliary Losses at full load and Max. MVA rating	kW	By Manufacturer	3.2
No-Load Losses at 100% Rated Voltage	kW	By Manufacturer	12.0
Load Losses at Max. MVA Rating	KW	By Manufacturer	187.0
LOSS EVALUATION			
Auxiliary Losses	\$/kW	130.53	130.53
No-Load Losses	\$/kW	1740.27	1740.27
Load Losses	\$/kW	502.58	502.58
DIMENSIONS (APPROXIMATE)			
Overall Height	in.	By Manufacturer	187
Overall Width	in.	162	162
Overall Depth	in.	162	162
Height over Tank	in.	By Manufacturer	150
Height for Untanking	in.	By Manufacturer	334
Minimum Distance Between Surge Arresters	in.	By Manufacturer	12.3
Recommended Min. Space Between Transformer and Adjacent Structures	in.	By Manufacturer	55-60
WEIGHTS (APPROXIMATE)			
Core and Coil	lbs.	By Manufacturer	38150
Tank and Fittings	lbs.	By Manufacturer	25550
Oil	lbs.	By Manufacturer	34734
Total Transformer With Oil	lbs.	By Manufacturer	100070
Total Shipping Weight	lbs.	By Manufacturer	90070
Weight of Largest Piece for Handling	lbs.	By Manufacturer	90070
DELIVERY			
Method of Shipment (truck, rail, barge, ship)	-	By Manufacturer	truck
Total No. of Weeks from Award of Contract, FOB site	wks	By Manufacturer	shipment 26-30
Submittal of Review Drawings After Award of Contract	wks	By Manufacturer	12-16 wks
Manufacturing Time after Receipt of Approved Drawings	wks	By Manufacturer	approx. 24
SPECIAL REQUIREMENTS			
System configuration See loading conditions in Table 1 below	-		per spec
List parts Requiring Field Assembly	-	By Manufacturer	per attached

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DATA SHEETS 3-PHASE, 2-WINDING TRANSFORMER		Equipment Name: Tag No.: Option 1	
DESCRIPTION	UNITS	SPEC DATA	VENDOR DATA
Describe Extent of Field Welding	-	By Manufacturer	none
List of Required Maintenance Tools Furnished With Equipment	-	By Manufacturer	none
List of Required Spare Parts Furnished With Equipment - High Side Bushing with Gasket – Qty. 1 - Low Side Bushing with Gasket – Qty. 1 - LTC Tank Gaskets – Qty. 1 set		Manufacturer to provide \$/part	- \$3000 -\$2530 -included
List any Special Considerations Maximum fault current available from tertiary in kA from both HV and LV windings:			N/A

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DATA SHEETS 3-PHASE, 2-WINDING TRANSFORMER		Equipment Name: Tag No.: Option 2	
DESCRIPTION	UNITS	SPEC DATA	VENDOR DATA
Manufacturer	-	By Manufacturer	PTTI
Catalog/Serial No.	-	By Manufacturer	N/A
SITE CONDITIONS			
24 Hr. Avg. Ambient Design Temperature	°C	30	30
Maximum Ambient Temperature	°C	40	40
Minimum Ambient Temperature	°C	-30	-30
Site Elevation Above Sea Level	ft	Less than 3,300 ft	Less than 3,300 ft
Seismic Requirements			
Site Class			
S _{DS} – Design Spectral Ground Acceleration at Short Periods (0.2 Seconds)			
I _p – Component Importance Factor			
R _p – Structure Response Modification Factor			
a _p – Component Amplification Factor			
Specific local Building Code and specific sections on seismic requirements used in equipment design	---	By Manufacturer	N/A
Symmetrical short circuit current			
Limited Only by transformer impedance (ANSI standard)	Y/N	Y	Y
Minimum system short circuit current and X ₀ /X ₁	kA/#.#	NONE	NONE
CHARACTERISTICS			
Operating Frequency	Hz	60	60
Design Temperature Rise	°C	55	55
Maximum Temperature Rise	°C	65	65
Cooling Class	-	KNAN/KNAF/KNAF	KNAN/KNAF/KNAF
Capacity at Design Temp Rise	MVA	12/16/20	12/16/20
Capacity at Maximum Temp Rise	MVA	13.4/17.9/22.4	13.4/17.9/22.4
Impedance (Z%/ %Tolerance)	Z%/+-x	7.5%/+-7.5%	7.5%/+-7.5%
HV to LV impedance at nominal voltage on Base Rating	Z%/+-x	7.5%/+-7.5%	7.5%/+-7.5%
HV to Tertiary at nominal voltage on Base Rating	%	NONE	NONE
LV to Tertiary at nominal voltage on Base Rating	%	NONE	NONE
Transformer X/R Ratio	-	By Manufacturer	15.09
Core and Coil Construction Type	-	Circular	Circular
Type of Material Used in Coils	-	Cu	Cu
SYSTEM CONFIGURATION			
Utilized as a Unit Auxiliary Transformer	Y/N	N	N
Utilized as a Generator Step-Up Transformer	Y/N	N	N
Utilized as a Substation Transformer	Y/N	Y	Y
Utilized as a Station Service Transformer	Y/N	N	N
WINDINGS			
High Voltage:			
Nominal Rated Voltage	kV	34.5	34.5
Basic Impulse Level	kV BIL	200	200
Connection	D or Y	D	D
Low Voltage:			
Nominal Rated Voltage	kV	12.47	12.47
Basic Impulse Level	kV BIL	110	110

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DATA SHEETS 3-PHASE, 2-WINDING TRANSFORMER		Equipment Name: Tag No.: Option 2	
DESCRIPTION	UNITS	SPEC DATA	VENDOR DATA
Connection	D or Y	Y	Y
Displacement Between HV and LV Windings	deg	30° (ANSI std)	30° (ANSI std)
Tertiary:		NONE	NONE
Nominal Rated Voltage	kV	N/A	N/A
Capacity (MVA)	Xx/xx/xx	N/A	N/A
External Connection	Y/N	N/A	N/A
Basic Impulse Level (External connection)	kV	N/A	N/A
Connection	---	N/A	N/A
Neutral:			
Basic Impulse Level	kV BIL	110	110
Connection (Un-Grd, Solid, H-Res, L-Res)	-	Solid	Solid
Neutral Insulation (Uniform, Graded)	-	Graded	Graded
BUSHINGS			
High Voltage:			
Manufacturer	-	By Manufacturer	Pcore
Type	-	Porcelain	Porcelain
Location	-	Cover	Cover
Segment	-	3	3
HV bushing BIL	kV	200	200
Minimum creepage distance	In	35	35
Low Voltage:			
Manufacturer	-	By Manufacturer	Pcore
Type	-	Porcelain	Porcelain
Location	-	Side	Side
Segment	-	1	1
LV bushing BIL	kV	110	110
Minimum creepage distance	In	11	11
Tertiary Voltage:			
Manufacturer	-	N/A	N/A
Type	-	N/A	N/A
Location	-	N/A	N/A
Segment	-	N/A	N/A
Tertiary bushing BIL	kV	N/A	N/A
Minimum creepage distance	In	N/A	N/A
Manufacturer	-	N/A	N/A
Type	-	N/A	N/A
Location	-	N/A	N/A
Segment	-	N/A	N/A
Neutral bushing BIL	kV	110	110
Minimum creepage distance	In	11	11
CURRENT TRANSFORMERS			
High Voltage (Bushing Current Transformers):			
Quantity on Each Bushing	Qty	2	2
Ratio of Each CT	Pri/Sec	600:5	600:5
Multi-Ratio	Y/N	Y	Y
Accuracy Class	-	C800	C800

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DATA SHEETS 3-PHASE, 2-WINDING TRANSFORMER		Equipment Name: Tag No.: Option 2	
DESCRIPTION	UNITS	SPEC DATA	VENDOR DATA
Low Voltage (Bushing Current Transformers)::			
Quantity on Each Bushing	Qty	1	1
Ratio of Each CT	Pri/Sec	1200:5	1200:5
Multi-Ratio	Y/N	Y	Y
Accuracy Class	-	C800	C800
Tertiary Voltage (Bushing Current Transformers)::			
Quantity on Each Bushing	Qty	NONE	NONE
Ratio of Each CT	Pri/Sec	N/A	N/A
Multi-Ratio	Y/N	N/A	N/A
Accuracy Class	-	N/A	N/A
Tertiary (Internal Current Transformers):			
Quantity on Each Winding	Qty	NONE	NONE
Ratio of Each CT	Pri/Sec	N/A	N/A
Multi-Ratio	Y/N	N/A	N/A
Accuracy Class	-	N/A	N/A
Neutral Bushing (Bushing Current Transformers)::			
Quantity on Each Bushing	Qty	1	1
Ratio of Each CT	Pri/Sec	600:5	600:5
Multi-Ratio	Y/N	Y	Y
Accuracy Class	-	C800	C800
CONNECTIONS			
High Voltage (Select one):			
Overhead Cable – Open Air	Y/N	Y	Y
Underground Cable – Open Air	Y/N	N	N
Underground Cable - Enclosed	Y/N	N	N
Nonsegregated Bus Duct	Y/N	N	N
Segregated Bus Duct	Y/N	N	N
Isolated Phase Bus Duct	Y/N	N	N
Gas insulated Bus Duct	Y/N	N	N
Low Voltage Side (Select one):			
Overhead Cable – Open Air	Y/N	N	N
Overhead Cable – Cable Bus	Y/N	Y	Y
Underground Cable – Open Air	Y/N	N	N
Underground Cable – Enclosed	Y/N	N	N
Nonsegregated Bus Duct	Y/N	N	N
Segregated Bus Duct	Y/N	N	N
Isolated Phase Bus Duct	Y/N	N	N
Tertiary (Select one for external connected only):			
Overhead Cable – Open Air	Y/N	N/A	N/A
Underground Cable – Open Air	Y/N	N/A	N/A
Underground Cable – Enclosed	Y/N	N/A	N/A
Nonsegregated Bus Duct	Y/N	N/A	N/A
ARRESTERS			
High Voltage Side	Y/N	Y	Y
Manufacturer	-		
MCOV Rating	kV	22	22

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DATA SHEETS 3-PHASE, 2-WINDING TRANSFORMER		Equipment Name: Tag No.: Option 2	
DESCRIPTION	UNITS	SPEC DATA	VENDOR DATA
Location (Segment)	---	3	3
Discharge monitor	Y/N	N	N
Low Voltage Side	Y/N	N	N
Manufacturer	-	N/A	N/A
MCOV Rating	kV	N/A	N/A
Location (Segment)	---	N/A	N/A
Discharge monitor	Y/N	N/A	N/A
Tertiary (External connection only):	Y/N	NONE	NONE
Manufacturer	-	N/A	N/A
MCOV Rating	kV	N/A	N/A
Location (Segment)	---	N/A	N/A
Discharge monitor	Y/N	N/A	N/A
TAP CHANGER			
De-energized taps:	Y/N	Y	Y
Tap Location	HV/LV	HV	HV
No. of Steps Above Nominal (Std. 2 x +2.5%)	Qty / %	2 x +2.5%	2 x +2.5%
No. of Steps Below Nominal (Std. 2 x -2.5%)	Qty / %	2 x -2.5%	2 x -2.5%
Load Tap Changer:	Y/N	Y	Y
Tap Location	HV/LV	LV	LV
No. of Steps Above Nominal (Std. 16 x +5/8%)	Qty / %	16 / +5/8	16 / +5/8
No. of Steps Below Nominal (Std. 16 x -5/8%)	Qty / %	16 / -5/8	16 / -5/8
Digital Tap Changer Control	Y/N	Y	Y
Automatic, Manual, or Both	-	Both	Both
Transformer Paralleling Equipment	Y/N	N	N
Preservation System (Select One):			
Conservator Tank or Inert Gas Pressure System	-	Inert Gas Pressure	Inert Gas Pressure
Conservator tank location	Segment	N/A	N/A
OIL			
Total Gallons in System	gal	By Manufacturer	4897
Qty shipped Separately	gal	By Manufacturer	N/A
Weight of Oil as Shipped/Quantity of Oil	Lb./Gal.	By Manufacturer	36773
Proposed Method of Oil Shipment	-	By Manufacturer	N/A
COOLING			
Radiator/Cooler Location – Segment (1,2,3,4)	-	1.3	1.3
Cooling Equipment Fans:			
Quantity of Fan Motors per Stage	Qty	By Manufacturer	4
Horsepower rating of each motor	Hp	By Manufacturer	.25
Rated Voltage and Phases	V, ph	240V, 1 ph	240V, 1 ph
Full Load Current	A	By Manufacturer	38.8
Cooling Equipment Pumps:			
Quantity of Pump Motors per Stage	Qty	N/A	N/A
Horsepower rating of each motor	Hp	N/A	N/A
Rated Voltage and Phases	V, ph	N/A	N/A
Full Load Current	A	N/A	N/A
Guaranteed Power Requirements of Cooling Equipment			
First Stage	kW	By Manufacturer	0

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DATA SHEETS 3-PHASE, 2-WINDING TRANSFORMER		Equipment Name: Tag No.: Option 2	
DESCRIPTION	UNITS	SPEC DATA	VENDOR DATA
Second Stage	kW	By Manufacturer	1.6
Third Stage	kW	By Manufacturer	3.2
Maximum Expected Sound Level at Max. MVA Rating and All Fans Operating at:			
1-foot per NEMA	dBA	By Manufacturer	72
6 feet	dBA	By Manufacturer	-
CONTROL CABINET			
Location – Segment (1,2,3,or4)	-	2	2
Ac Auxiliary Power Voltage supplied to Control Cabinet	VAC	120/240V, 1 ph	120/240V, 1 ph
Qty of Ac Auxiliary Power sources supplied to Control Cabinet	1,2	1	1
Power Required for AC Auxiliary Power Source	kVA	By Manufacturer	9.3
Dc Control Power Voltage supplied to Control Cabinet	VDC	125	12
Dc Rated Continuous Power Required	A	By Manufacturer	-
Dc Rated Peak Power Required	A		
ACCESSORIES			
Nitrogen Pressurization Tanks	Y/N	Y	Y
Special Paint	Y/N	N	N
Ground Resistor	Y/N	N	N
Automatic Transfer Switch for Second Power Supply	Y/N	N	N
Provisions (only) for Gas Analyzer	Y/N	N	N
Wheels	Y/N	N	N
100% spare gaskets	Y/N	N	N
TESTS			
ANSI Routine Tests	Y/N	Y	Y
Winding Insulation	Y/N	Y	Y
Core Insulation	Y/N	Y	Y
Insulation Power Factor	Y/N	Y	Y
Auxiliary Cooling Losses	Y/N	Y	Y
Single Phase Excitation & Rated Voltage	Y/N	Y	Y
No Load Losses & Excitation Current	Y/N	Y	Y
Zero Sequence Impedance	Y/N	N	N
Temperature Rise	Y/N	By Manufacturer	Y
Low Frequency on Auxiliary Devices	Y/N	Y	Y
Lightning Impulse	Y/N	By Manufacturer	Y
Front of Wave Impulse	Y/N	N	N
Switching Impulse	Y/N	N	N
Partial Discharge	Y/N	N	N
Audible Noise	Y/N	Y	Y
Dissolved Gases in Oil Analysis	Y/N	Y	Y
EFFICIENCY			
At 100% of Maximum MVA	%	By Manufacturer	99.42
At 75% of Maximum MVA	%	By Manufacturer	99.51
At 50% of Maximum MVA	%	By Manufacturer	99.58
VOLTAGE REGULATION			
100% of Maximum MVA at:			
Unity Power factor	%	By Manufacturer	0.77

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MEDIUM POWER TRANSFORMERS
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DATA SHEETS 3-PHASE, 2-WINDING TRANSFORMER		Equipment Name: Tag No.: Option 2	
DESCRIPTION	UNITS	SPEC DATA	VENDOR DATA
80% lagging power factor	%	By Manufacturer	5.05
80% leading power factor	%	By Manufacturer	4.686
Excitation Current at 100% Rated Voltage and Max. MVA	%	By Manufacturer	0.5
GUARANTEED LOSSES			
Auxiliary Losses at full load and Max. MVA rating	kW	By Manufacturer	3.2
No-Load Losses at 100% Rated Voltage	kW	By Manufacturer	10.5
Load Losses at Max. MVA Rating	KW	By Manufacturer	213.5
LOSS EVALUATION			
Auxiliary Losses	\$/kW	130.53	130.5
No-Load Losses	\$/kW	1740.27	1740.27
Load Losses	\$/kW	502.58	502.5
DIMENSIONS (APPROXIMATE)			
Overall Height	in.	By Manufacturer	211
Overall Width	in.	162	16
Overall Depth	in.	162	16
Height over Tank	in.	By Manufacturer	175
Height for Untanking	in.	By Manufacturer	384
Minimum Distance Between Surge Arresters	in.	By Manufacturer	12.3
Recommended Min. Space Between Transformer and Adjacent Structures	in.	By Manufacturer	55-60
WEIGHTS (APPROXIMATE)			
Core and Coil	lbs.	By Manufacturer	37950
Tank and Fittings	lbs.	By Manufacturer	30200
Oil	lbs.	By Manufacturer	36733
Total Transformer With Oil	lbs.	By Manufacturer	106520
Total Shipping Weight	lbs.	By Manufacturer	92260
Weight of Largest Piece for Handling	lbs.	By Manufacturer	92260
DELIVERY			
Method of Shipment (truck, rail, barge, ship)	-	By Manufacturer	truck
Total No. of Weeks from Award of Contract, FOB site	wks	By Manufacturer	shipment 26-30
Submittal of Review Drawings After Award of Contract	wks	By Manufacturer	12-16 wks
Manufacturing Time after Receipt of Approved Drawings	wks	By Manufacturer	approx. 24
SPECIAL REQUIREMENTS			
System configuration See loading conditions in Table 1 below	-		per spec
List parts Requiring Field Assembly	-	By Manufacturer	per attached

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DATA SHEETS 3-PHASE, 2-WINDING TRANSFORMER		Equipment Name: Tag No.: Option 2	
DESCRIPTION	UNITS	SPEC DATA	VENDOR DATA
Describe Extent of Field Welding	-	By Manufacturer	none
List of Required Maintenance Tools Furnished With Equipment	-	By Manufacturer	none
List of Required Spare Parts Furnished With Equipment - High Side Bushing with Gasket – Qty. 1 - Low Side Bushing with Gasket – Qty. 1 - LTC Tank Gaskets – Qty. 1 set	-	Manufacturer to provide \$/part	- \$3000 -\$2530 -included
List any Special Considerations Maximum fault current available from tertiary in kA from both HV and LV windings:	-		N/A

END OF SECTION

- 1) P. E. Schulz
- 2) P. K. Mitchell

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PRICE AND DELIVERY

1. PRICE

ITEM	QTY	MVA	PHASE	HZ	VOLTAGE	PRICE EACH (USD)
1	1	12/16/20//22.4 ONAN/ONAF/ONAF	3	60	34.5Δ-12.47Y kV LTC - Mineral Oil	\$ 427,067
2	1	12/16/20//22.4 ONAN/ONAF/ONAF	3	60	34.5Δ-12.47Y kV LTC - eN1215	\$ 501,110

* Pricing does not include letter of credit or bonds of any kind.

2. FREIGHT AND FOB TERMS

The quoted price is for delivery of the specified equipment F.O.B. Pad via TRUCK with freight prepaid to Geneva, IL. **Unloading, assembly, fluid top-off, and field testing are included. As unloading onto pad is included, PTTI assumes free and complete access to the pad.**

NOTE: Truck shipment to destination is limited to sites that are accessible by the vehicle in which the unit is shipped from the factory. Seller assumes no liabilities for any structures that require relocation or reinforcement in order to reach said destination.

3. SHIPPING DETAILS

Radiators, arresters, arrester brackets, and bushings will be removed for shipment. If oil is included in this contract, the unit will be shipped filled with cooling fluid with make-up fluid being delivered in 55-gallon drums. PTTI will not be responsible for demurrage charges after 2 hours. If the truck is delayed, each additional hour will be charged at \$50.00 per hour or any part thereof.

4. SHIPPING SCHEDULE

The proposed transformer will be scheduled to ship 26-30 weeks or sooner after receipt of a purchase order subject to prior sale. Unit will be manufactured at Raeford, NC factory.

5. BID VALIDITY

This proposal is subject to acceptance within 60 days from the date of this proposal.

6. PRICING & TERMS OF PAYMENT (Qualification to RFQ)

Payment shall be in US Dollars only. Payment will be collected using PTTI's standard invoicing methods. PTTI offers firm pricing with payment terms of 15% of contract price due upon order, 25% of the contract price due upon submittal of approval drawings, 25% of the contract price due upon completion of manufacturing, and the balance due upon shipment, net 30 days. Equipment must be shipped within 12 months from date of order to qualify for firm pricing on this schedule.

**PENNSYLVANIA TRANSFORMER TECHNOLOGY, INC.
STANDARD TERMS AND CONDITIONS OF SALE**

ALL QUOTATIONS, ACKNOWLEDGEMENTS AND/OR INVOICES FOR EQUIPMENT AND SERVICES ARE SUBJECT TO THE EXACT TERMS AND CONDITIONS APPEARING ON THE FACE AND REVERSE SIDE HEREOF AND THE TERMS AND CONDITIONS THAT APPEAR IN SELLER'S CURRENT CATALOG WHICH RELATE TO THAT EQUIPMENT AND SERVICES.

IMPORTANT: NO RETURNS ACCEPTED WITHOUT OUR AUTHORIZATION AND SHIPPING INSTRUCTIONS.

1. IF LOSS AND/OR DAMAGE IS DISCOVERED, DEMAND AN INSPECTION REPORT IMMEDIATELY, REGARDLESS OF YOUR OPINION AS TO THE CAUSE.
2. ARRANGE PROMPTLY TO FILE CLAIM AGAINST THE CARRIER.

General: These Terms and Conditions of Sale shall apply to all sales of equipment and services by Pennsylvania Transformer Technology, Inc., a corporation of the State of Delaware. As used herein, "Seller", "we," "our" shall refer to Pennsylvania Transformer Technology, Inc.

Offer and Acceptance: Seller's quotation or acknowledgement constitutes Seller's offer to sell solely in accordance with the exact terms hereof, and supersedes all previous written and oral quotations, representations and/or agreements. Acceptance can be made by any commercially reasonable means, including Buyer's issuance of an order, acceptance of equipment sold or services provided hereunder, acknowledgement or return of Seller's acknowledgement form, or by electronic transmission. Acceptance hereof by Buyer is expressly limited to the exact terms hereof. If Buyer shall use its own purchase order or other form to order from Seller, such form shall be used for convenience only and shall evidence Buyer's unconditional agreement to these terms and conditions. Any inconsistent or additional terms or conditions contained therein are expressly objected to by Seller. Quotations must be accepted within thirty (30) days from date of quotation. Prices quoted may be withdrawn or changed by Seller at any time prior to receipt of acceptance by Seller. All orders are subject to Government Priorities.

Modifications: No salesman or other party is authorized to bind Seller by any agreement, warranty, statement, promise, or understanding not contained herein, and no modifications of these terms and conditions shall be binding on Seller unless the same are approved in writing by an Executive Officer, Product Marketing Manager, or Service Manager of Seller.

Waiver: The waiver by Seller of any term, provision, or condition hereof shall not constitute a waiver of any other term, provision, or condition hereof, nor shall such waiver be deemed a waiver of a subsequent breach of the same term or condition.

Discrepancies in Take-Offs: Seller's quotation may be based on Seller's interpretation of plans and specifications submitted to Seller by Buyer. In such situations, Buyer shall review Seller's quotation both as to quantities and specifications of material listed. Any discrepancies should be called to Seller's attention immediately, so any change, if necessary, can be made. Seller shall not be liable to Buyer for any damage resulting from any discrepancies which Buyer fails to call to Seller's attention.

Corrections After Acceptance: After acceptance by Buyer, quotations are subject to change by Seller for correction of stenographic or clerical errors. Seller shall immediately notify Buyer of any such corrections, and Buyer may thereafter revoke acceptance within ten (10) days of receipt of notice of such corrections. Failure of Buyer to revoke its acceptance within such period shall constitute acceptance of Seller's changes.

Changes in Specifications: If Buyer desires changes or revisions in specifications upon [which] Seller's quotation is based, such changes or revisions shall be charged to and paid for by Buyer at Seller's applicable rates therefor, and the time for performance on the part of the Seller shall be extended to cover time lost and/or additional work involved and time required for making any such requested changes and/or revisions.

Terms of Payment: Net -- Thirty (30) days from the date of invoice. All accounts are payable in U.S.A. funds at par. Any invoices not paid when due shall be subject to a late charge at the rate of 1-1/2% per month or the highest rate allowable by law, if lower. Should it be necessary for Seller to institute formal proceedings to collect any past due amounts from Buyer, Seller shall be entitled to recover its attorney's fees and other costs associated with the proceedings.

If shipment is delayed by any cause for which Seller is not responsible or which is beyond Seller's reasonable control, the date of completion of the equipment, or any part thereof, shall be regarded as the date of shipment thereof, and an invoice will be issued accordingly. Equipment held for Buyer shall be at Buyer's risk and expense.

Seller's acceptance of orders and shipments and delivering shall be subject to approval of Seller's Credit Department. If, in the sole judgment of Seller, the financial condition of Buyer at time prior to delivery does not justify the continuance of work to be performed by Seller hereunder on the terms of payment agreed upon, Seller may require full or partial payment in advance or cancel any order then outstanding and receive reimbursement for Seller's reasonable and proper cancellation charges. Title to and right to possession of (but not risk of loss to) any material sold hereunder remains in Seller and remains personal property until all payments therefor are made in full by Buyer, and the Buyer agrees to do all acts necessary to protect such right and title. In the event of bankruptcy or insolvency of Buyer, or in the event any proceeding is brought by or against Buyer under any bankruptcy or insolvency laws, Seller shall be entitled to cancel any order then outstanding at any time during the period allowed for filing claims against the estate, and Seller shall receive reimbursement for its reasonable and proper cancellation charges. The rights of Seller under this paragraph are cumulative and in addition to all rights available to the Seller at law or in equity. Any and all destination demurrage charges and detention or unloading are Buyer's responsibility.

Delivery and Risk of Loss: Unless otherwise specifically stated herein, delivery and prices are f.o.b. Seller's shipping point. Buyer shall assume all risk of loss and damage in transit and shall be liable for costs such as demurrage or detention after equipment has left our loading dock or area.

Taxes: Seller's prices do not include sales, use, excise, or other taxes applicable to the equipment or the sale or use thereof. All such taxes, if any, shall be paid by Buyer and may be added to the invoice, or in lieu thereof, Buyer shall provide Seller with a tax exemption certificate acceptable to the taxing authorities.

Shipment/Force Majeure: Shipment dates are computed from the date Seller receives acceptance with complete specifications and/or drawing approvals as required. Shipping dates are approximate. Seller will take all reasonable action or maintain the shipping dates given herein, but Seller shall not be liable for delays in delivery or in performance or failure to manufacture or deliver due to causes beyond Seller's reasonable control including, without limitation, acts of God, acts of Buyer, acts of civil or military authority, priorities, fires, strikes, or other labor disturbances, floods, epidemics, war, riot, delays in transportation or car shortages, energy shortages or inability to obtain necessary labor, materials, components or manufacturing facilities. In the event of such delay, the date of delivery or performance shall be extended for a period equal to the time lost by reason of the delay. Each shipment shall constitute a separate sale, and Buyer's failure to take one or more deliveries shall not constitute cause for cancellation by Buyer. If Buyer is in default of any payments to Seller on this or any other contract, Seller may withhold shipment on this and any other contract.

Inspection, Acceptance: Quotations and acceptances are made on the basis that where Buyer is to inspect, inspection and acceptance of equipment shall be made at Seller's factory prior to shipment.

Limited Warranty: Seller warrants to Buyer only, that the goods delivered hereunder will be free from defects in material or workmanship when used and installed in accordance with the Seller's applicable operating instructions and will be the kind and quality specified in the contract.

This warranty shall apply only to defects appearing within one (1) year from date of shipment by Seller. If Seller installs the equipment or supplies technical direction of installation by contract, the warranty shall be for a period of one (1) year from date of completion of field erection, but not exceeding eighteen (18) months from date of shipment. The furnishing of warranty services hereunder shall not extend the warranty period on the equipment furnished hereunder.

Seller shall, in complete fulfillment of its liabilities under this warranty and if given prompt notice by Buyer, correct, by repair or replacement at Seller's option, f.o.b. its factory, any defect which shall appear under proper and normal use of its equipment within one (1) year after date of shipment or within one (1) year after the completion of field erection of the equipment if Seller install the equipment or supplies technical direction of installation by contract, but not exceeding eighteen (18) months from date of shipment. Unless otherwise agreed to in contract with Buyer, Seller shall not be liable for costs of equipment removal, costs for transporting repaired equipment or replacement equipment to site and reinstalling equipment.

The liability of Seller under this warranty (except as to title), or for any loss or damage to equipment, whether the claim is based in contract, in tort (including negligence and strict liability), or otherwise, shall not exceed the cost of correcting defects in the equipment as herein provided, and upon the expiration of the warranty period, all of Seller's liability shall terminate. The foregoing shall constitute the exclusive remedy of Buyer and the exclusive liability of Seller except as may be noted below.

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 OF FITNESS FOR A PARTICULAR PURPOSE. FURTHER, SELLER DOES NOT WARRANT ANY EQUIPMENT OF OTHER MANUFACTURERS DESIGNATED BY BUYER.

Supervision of Installation: Unless otherwise provided for by agreement between Seller and Buyer, Seller will neither install nor supervise the installation of the equipment, but the same shall be done by and at the expense of Buyer.

Tests: The conditions of any test of any equipment shall be mutually agreed upon by Seller and Buyer, and Seller shall be notified of, and may be represented at, all tests that may be done.

Protection Against Infringement: In the event any equipment manufactured by Seller is to be made in accordance with drawings, samples, or manufacturing specifications designated by Buyer, Buyer agrees to indemnify and hold Seller harmless from any and all damages, costs and expenses (including attorney's fees) relating to any claim arising from the design, distribution, manufacture or use of the equipment or arising from a claim that such equipment furnished to Buyer by Seller, or the use thereof, infringes any letters patent, foreign or domestic, and Buyer agrees at its own expense to undertake the defense of any suit against Seller brought upon such claim or claims.

In the event any equipment is not to be made in accordance with drawings, samples, or manufacturing specifications designated by Buyer, but rather is the design of Seller, and the equipment has not been modified by Buyer or its customers, Seller agrees to hold Buyer and its customers harmless against any damages awarded by a court of final jurisdiction in any suit or suits for the infringement of any United States letters patent by reason of the sale or use of such equipment furnished by Seller under this agreement, provided that Seller is notified promptly in writing of any claim or suit and is permitted to assume the full direction and control of the defense against such a claim and of any suit brought thereon and is given authority, information and assistance by Buyer (at Seller's expense) for such defense and authority to settle. In case any judgment rendered in such suit shall become final (beyond right of appeal), and where Buyer has complied with the foregoing provisions of this paragraph to Seller's satisfaction, Seller agrees to pay all damages and costs thereby awarded against Buyer. If, subject to the above limitations, Seller agrees to a settlement or compromise preventing, or is otherwise enjoined from, further manufacture, use or sale of the equipment, or any part thereof in a suit in which the equipment, or any part thereof, is finally held to constitute an infringement, Seller shall have the right at its own expense either (a) to procure for the Buyer rights to the patent, or (b) to modify or replace said equipment with non-infringing equipment accomplishing the same purposes as the replaced equipment, or (c) to withdraw such equipment and refund to the Buyer the purchase price thereof, Buyer's remedies for damages resulting from the infringement or claimed infringement of any patent by the equipment are exclusively limited to the provisions of this paragraph.

Exclusivity of Remedy and Limitation of Liability: Seller's liability for any claim of any kind (except "Protection Against Infringement"), whether in contract or in tort (including negligence and strict liability) shall not exceed the purchase price of equipment or services furnished, or the portion thereof which gives rise to the claim. In the event that Buyer claims that Seller has breached any of its obligations with respect to the equipment, Seller may request the return of the equipment and tender to Buyer the purchase price paid therefor by Buyer and [in] such event, Seller shall have no further obligation under the contract with Buyer except to refund such purchase price upon redelivery of the equipment. If Seller so requests the return of the equipment, the equipment shall be redelivered to Seller in accordance with the Seller's instructions at Seller's expense. THE REMEDIES PROVIDED FOR IN THIS SECTION AND THE SECTION ENTITLED "LIMITED WARRANTY" SHALL CONSTITUTE THE SOLE RECOURSE OF BUYER AGAINST SELLER FOR BREACH OF ANY OF SELLER'S OBLIGATIONS UNDER THE CONTRACT WITH BUYER, WHETHER THE CLAIM IS MADE IN TORT OR IN CONTRACT, INCLUDING CLAIMS BASED ON WARRANTY, NEGLIGENCE, STRICT LIABILITY, DECEIT, FRAUD, MISREPRESENTATION, OR OTHERWISE. THIS CLAUSE SHALL SURVIVE FAILURE OF AN EXCLUSIVE REMEDY.

IN NO EVENT SHALL SELLER BE LIABLE FOR SPECIAL, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES (REGARDLESS OF THE FORM OF ACTION, WHETHER IN CONTRACT OR IN TORT (INCLUDING NEGLIGENCE AND STRICT LIABILITY) AND INCLUDING, BUT NOT LIMITED TO, LOSS OF PROFITS, LOSS OF REVENUE, LOSS OF USE OF EQUIPMENT OR ANY ASSOCIATED EQUIPMENT, COST OF CAPITAL, COST OF SUBSTITUTE EQUIPMENT, FACILITIES OR SERVICES, DOWNTIME COSTS, IN AND OUT COSTS, OR CLAIMS OF CUSTOMERS OF BUYER FOR SUCH DAMAGES. ANY ACTION AGAINST SELLER UNDER THIS CONTRACT MUST BE COMMENCED WITHIN ONE (1) YEAR OF ACCRUAL OF THE CAUSE OF ACTION.

Special Containers: In the event Seller furnishes material requiring containers (such as oil barrels, drums, reels, etc.) or tarpaulins or other special covering, an extra charge will be made for such containers or coverings, and Buyer shall pay the amount thereof, but if specifically agreed upon at the time of purchase, Seller will refund such amount if Buyer returns such containers and/or coverings, in good condition, at Buyer's expense, charges prepaid by Buyer, within four months from the original shipment date, to the proper receiving point designated by Seller, and Buyer promptly forwards an invoice or memorandum and necessary shipping documents to Seller.

Assignment: Buyer shall not assign this contract, or any rights therein, without the written consent of Seller.

Other Laws: Any clause required to be included in a contract of this type by any applicable law or administrative regulation having the effect of law shall be deemed to be incorporated herein. Seller represents that with respect to the production of the articles and/or the performance of the services covered hereunder, it has fully complied with Section 12(A) of the Fair Labor Standards Act of 1938, as amended. Acceptance and execution of orders accepted by reason of any law or administrative regulation having the effect of law, or in order to carry out the intent or purpose of any such law or regulation or to acquiesce in a request by a government agency or official thereof, or contingent upon the continuation in effect of such law, regulation or request, may be cancelled by Seller upon the expiration or withdrawal of such law, regulation or request, provided, however, that Seller, at its option, may complete such order.

Cancellation: Buyer's acceptance of Seller's offer may, upon fifteen (15) days notice in writing, be cancelled by Buyer, in whole or in part, but in no event any later than ninety (90) days prior to the date scheduled for shipment of the particular equipment for which cancellation is desired, and only upon the written consent of Seller and upon terms providing for payment to Seller of a cancellation charge satisfactory to it which shall take into proper account the work already done, facilities and material acquired, and/or commitments made by Seller, together with Seller's lost profits. Cancellation policies may also vary by specific product lines or types of equipment. Buyer should refer to those policies, as applicable.

Seller may cancel this contract with Buyer if Buyer's payments are in default hereunder or on any other contract with Seller, if Buyer breaches any other material provision of this contract, or if substantial changes occur in the availability to Seller of raw materials or components.

Returned Material: Material returned for credit or replacement will be accepted by Seller only if a written return authorization and related instructions have previously been obtained by Buyer from Seller's manufacturing location. Only standard products of current design, regularly carried in Seller's stock, and in saleable condition will be accepted for credit.

Penalty or Liquidated Damages/Premiums for Early Shipment: Orders from Buyer which include a penalty or liquidated damage clause will not be honored by Seller unless Seller has specifically accepted the clause in writing. In appropriate cases, Seller may request from Buyer a price premium for shipments made prior to Buyer's requested shipping date.

Governing Law: All matters relating to the interpretation and effect of these Terms and Conditions of Sale and any authorized changes, modifications or amendments thereto shall be governed by the laws of the Commonwealth of Pennsylvania.

Complete Agreement: The complete agreement between Seller and Buyer is contained herein and in the applicable terms and conditions that appear in the Seller's current catalog, and no additional or different terms or conditions stated by Buyer shall be binding upon Seller unless agreed to in writing. No course of dealing or usage of trade shall be relevant to supplement or explain any terms used in this agreement.

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COMMERCIAL INFORMATION

In lieu of acceptance of Purchaser's Terms and Conditions, PTTI will be willing to negotiate an agreeable set of terms and conditions in the event of an order. Below are some of the key terms this proposal is based on.

1. WARRANTY (Qualification to RFQ)

The proposed power transformers are warranted to be free from defects in material and workmanship for a period of time not to exceed **60 months from erection, but not exceeding 66 months from date of shipment**, whichever comes first. In and out will be included for the first year capped at 10% of the transformer price. Customer is responsible for properly storing all materials not required to be returned to factory (including oil) if equipment is returned for a cure.

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

2. INDEMNIFICATION

Pennsylvania Transformer Technology, Inc. shall not be responsible for any special, indirect, incidental, or consequential damages related to this contract or the performance thereof.

3. LIMITATION OF LIABILITY

Seller's liability for any claim of any kind (except "Protection Against Infringement"), whether in contract or in tort (including negligence and strict liability) shall not exceed the purchase price of equipment or services furnished, or the portion thereof which gives rise to the claim.

4. COMMERCIAL QUALIFICATIONS

- Illinois prevailing wages will not apply to direct employees of PTTI.
- See PTTI terms and conditions on pages 1A & 1B of the proposal.

5. SERVICE ENGINEER (Qualification to RFQ)

A service engineer will be provided for 2 days/1 trip. Additional time may be purchased per the rate sheet attached.

6. DRAWING SCHEDULE (Exception to RFQ)

Mechanical drawings will be issued for approval 12-16 weeks after receipt of an order. Controls drawings will be provided four weeks after return of approved mechanical drawings. Approval drawings must be returned within two weeks. Electronic drawings will be provided in AutoCAD 2004 format on CD. PTTI's standard forms will be used for drawing submissions.

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COMMERCIAL INFORMATION

7. TAXES (Exception to RFQ)

Federal Excise Taxes are not applicable to transformers.

This is an INTERSTATE TRANSACTION and, as such, involves no obligation on our part with respect to any Sales, Use or other taxing laws of any State of the United States of America (or of any City or other taxing authority in any such State) in which any purchaser hereunder may be located and/or in which transformers me be located, and this proposal does not include, nor do we assume any such taxes if any.

8. CANCELLATION SCHEDULE (Qualification to RFQ)

NOTE: In no event shall work be suspended or canceled within 60 days of scheduled shipment. Purchaser may not terminate without cause ninety (90) days prior to scheduled shipment.

Before Shipment	% of Transformer Price Due
0-60 Days	100 %
61-90 Days	75 %
91-120 Days	60 %
121-150 Days	50 %
151-180 Days	20 %
181 Days or sooner	10 %

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TECHNICAL INFORMATION

1. POWER TRANSFORMER LOSS MEASUREMENTS

- a. Pennsylvania Transformer Technology, Inc. Employs a modern state-of-the-art transformer loss measuring system manufactured by Multi-Amp Canada, formerly Olman Instruments.
- b. This system is calibrated yearly, on site, by Multi-Amp Canada using techniques described in NBS Technical Note 1204.
- c. Based on this calibration and other quoted transformer parameters, the loss test errors for the unit or units quoted are

- | | |
|-----------------------------|----------|
| (a) Load Loss Test Error | +/-0.36% |
| (b) No Load Loss Test Error | +/-0.30% |

2. LOAD TAP CHANGING SWITCH (Exception to RFQ)

The LTC switch will be Reinhausen RMV-II vacuum type. The transformer we propose to furnish will have the under load tap changing equipment connected in the low voltage for regulation of the low voltage terminals in approximately +/-10% in 32 approximate 5/8% steps, full capacity/reduced capacity, as defined in paragraph 4.5 of ANSI Standard C57.12.10-1997.

3. ARRESTERS

HV arresters will be rated 22 kV MCOV.

4. OIL PRESERVATION SYSTEM

The oil preservation system will be a nitrogen pressure type. PTTI's standard nitrogen system includes a nitrogen bottle and a regulator.

5. OIL

If oil is included in this contract, it will be Type II inhibited.

6. TESTING

This transformer will be tested in accordance with the latest IEEE standards.

7. TECHNICAL COMPLIANCE

The transformer(s) described herein will be designed, constructed, and tested in accordance with the latest applicable ANSI/NEMA Standards in effect at the time of this proposal with qualifications and/or exceptions listed in this proposal.

RFQ No. 17-01
Power Transformer

P27151
Page 5

TECHNICAL INFORMATION

8. TECHNICAL QUALIFICATIONS/EXCEPTIONS

- Item 2 will utilize eN1215 fluid for cooling in lieu of FR3.
- PTTI's tapped LTC winding will be a layer winding that is wound in two parallel halves (top half and bottom half) where the turns are distributed along the length of the coil and the turns are added or removed symmetrically from each half reducing minimum unbalance and thus minimizing the short circuit forces. The copper conductors will be size sufficiently as to prevent them from climbing over adjacent strands. The additional benefit of this winding, which may reduce the need of a series transformer, will eliminate the unnecessary heating that a fully distributed tap winding inherently causes when you operate at a tap other than the rated tap.
- Transformer rejection/modification will not be an option if missed losses are within ANSI tolerances.
- Touch up paint will be provided in non-aerosol cans.
- Seismic testing/analysis is not included in this bid.
- PTTI will provide tentative witness dates 30 days prior to scheduled testing. ALL dates given are subject to PTTI verification one week before. PTTI assumes no responsibility for additional costs incurred due to and/or associated with changes in witness dates.

City of Geneva
Power Transformer

PTTI /P27151
Specs #

ANSI PERFORMANCE DATA

For: City of Geneva

RATING					
Type	POWER	CLASS	H Winding	X Winding	Y Winding
Phase	3		34500 V	12470Y/7200 V	V
Hertz	60	ONAN	12000/13400 KVA	12000/13400 KVA	KVA
Temp Rise	55/65°C	ONAF	16000/17900 KVA	16000/17900 KVA	KVA
Insul. Liquid	OIL	ONAF	20000/22400 KVA	20000/22400 KVA	KVA

ADDITIONAL TAP VOLTAGES	
H Winding:	36225-35362- 34500 - 33637-32775 (FC)
X Winding:	+/-10% in 32-5/8% steps(Appox) by "RMV-II" vacuum type LTC (FC/RC)

INSULATION LEVELS (KV BIL)		
	Winding	Bushing
H Line	200	200
HV Neutral	-----	-----
X Line	110	150
X Neutral	110	150
Y Line	----	----

DIELECTRIC TESTS		
Applied Voltage (To Other windings And ground)	H Winding	70 KV
	X Winding	34 KV
	Y Winding	KV
Induced Voltage	Line To Line	62.1 KV
	Line To Ground	KV

PERFORMANCE DATA: Based on 75°C Reference Temperature and rated 12 MVA, 34.5 – 12.47Y KV						
Losses and Exciting Current				Regulation @ 12 MVA		
Excitation	% Ex. I	No Load @20°C	Load Loss	Total Loss	Power Factor	% Regulation
100%	0.5	12000 W *	52000 W	64000 W *	1.0	0.71
105%	0.8	15000 W			0.9	3.82
110%	1.2	18000 W			0.8	5.00

AUXILIARY LOSSES		
Transformer KVA	Class	Aux Loss (Watts)
16000 KVA	ONAF	1600 W
20000 KVA	ONAF	3200 W *

Sound Level : 69/71/72 dBA *

MECHANICAL DATA			
Dimensions		Assembled	Shipping
Height	(A)	187	161
Width	(B)	162	162
Depth	(C)	162	102
Height Over Cover	(D)	161	
Untanking (Plus Sling)	(E)	334	

PERCENT IMPEDANCE VOLTS					
% IZ	Btwn Wdg	At MVA	KV	Btwn Wdg	At MVA
7.5%*	H-X	12*			
	H-X				
	X-Y				

Weights (Approx.Pounds)	
Core & Coils	38150
Tank & Fittings	25550
Oil (4150) Gal Main	31100
Oil (270) Gal LTC	2025
Shipping Weight With oil	90070
Total Weight	100070

EFFICIENCIES @ 12 MVA				
Load %	Full Load	¾ Load	1/2 Load	¼ Load
100	99.47	99.54	99.58	99.49

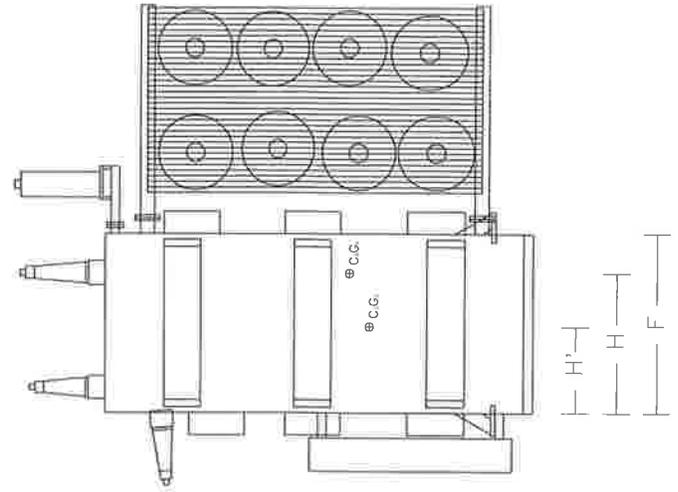
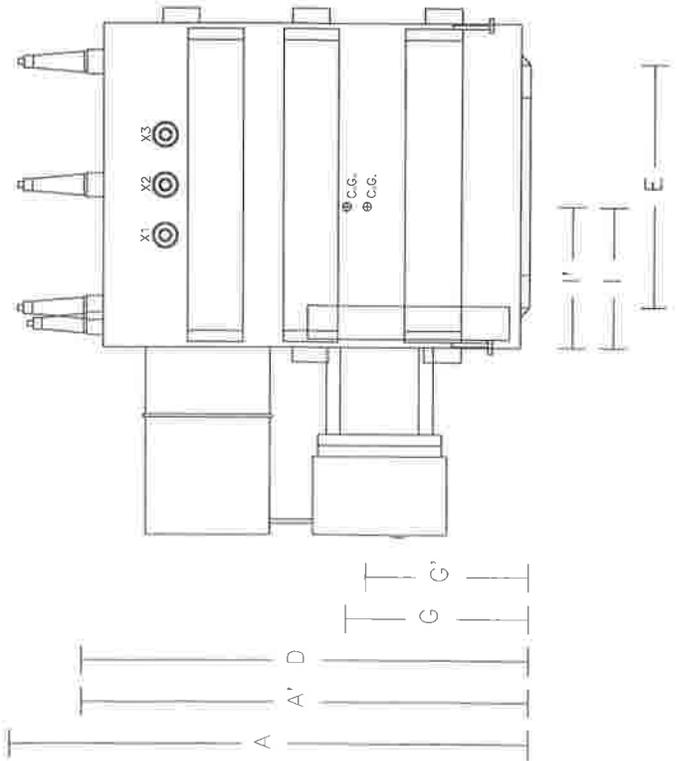
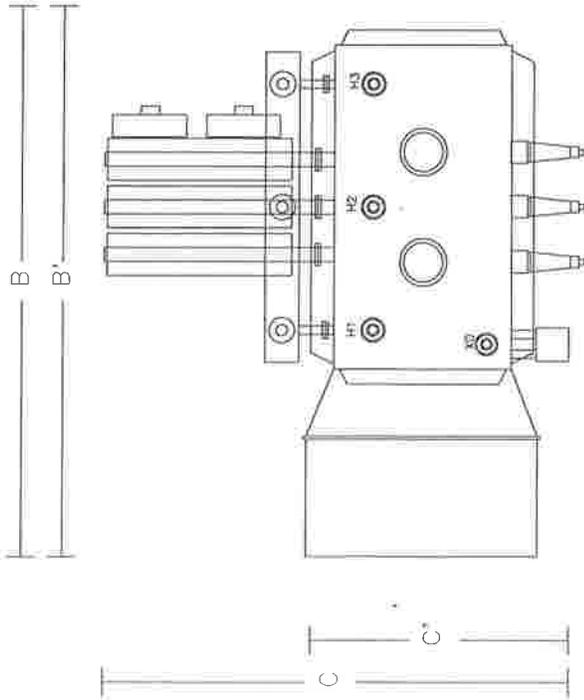
*Guaranteed Parameters

Standard Bill of Material
 (Actual accessories, quantities and placement may vary)

- H.V. Bushing, CAT. # PCORE - BB9293-70
- L.V. Bushing, CAT. # PCORE - BB9293-70
- L.V. Neutral Bushing, CAT. # PCORE - BB9293-70
- H.V. Lightning Arrestors
- Weatherproof compartment for Load Tap Changer switch
- Weatherproof Control Cabinet
- Structural Steel Base
- Jack Pads with provisions for pulling in either direction
- Detachable Plate type Radiators
- Cooling Fans
- Nitrogen Pressure Equipment

Standard Accessories

- Hot Spot Thermometer
- Top Oil Gage
- Pressure Vacuum Gage
- Core Ground Box
- Filler Valve (2")
- Drain Valve (2") with 3/8 Side Sampler
- Ground Pads @ base of unit on Diagonal corners
- 4" Vacuum Flange
- Removable Plate in Control Cabinet
- Nameplate
- Mechanical Pressure Relief Device
- Oil Level Gage
- LTC :- "RMV-II" Type Vacuum LOAD TAP CHANGER (FC/RC)
- Oil Level Gage
- Oil Drain Valve (2") with 3/8 Side Sampler
- Oil Filler Valve (2")
- Mechanical Pressure Relief Device



Dimensions (in inches +/- 6")

- A - (Height) 186
- B - (Width) 162
- C - (Depth) 162
- D - (Stripped Height) 161
- E - (Base Bearing Length) 86
- F - (Base Bearing Depth) 64
- G - (Complete Vertical Center of Gravity) 65
- H - (Complete HV to LV Center of Gravity) 49
- I - (Complete LV to Right Center of Gravity) 50
- A' - (Shipping Height) 161
- B' - (Shipping Width) 162
- C' - (Shipping Depth) 102
- G' - (Shipping Vertical Center of Gravity) 57
- H' - (Shipping HV to LV Center of Gravity) 30
- I' - (Shipping LV to Right Center of Gravity) 50
- Untanking Height 334

Weights (in pounds +/- 10%)

- Core and Coils 36150
- Tank and Fittings 25550
- LTC Mechanism 4475
- Oil (4150) Main Tank and Rads 31100
- Oil (270) LTC Compartment 2025
- Untanking Weight 36150
- Shipping Weight With Oil 90070
- Total Weight 100070



**PENNSYLVANIA TRANSFORMER
TECHNOLOGY, INC.**

City of Geneva
 KVAs: 12000./16000./20000./22400. KVA Power Transformer
 Temperature Rise: 55°C/65°C
 HV - LV - : 34500. - 12470.Y/7200. Volts
Preliminary:
 See final outline for complete Bill of Materials.

SK-P27151

Date: 10/12/17
 Time: 07:53:01
 (v 7.0)

City of Geneva
Power Transformer

PTTI /P27151-1
Specs #

ANSI PERFORMANCE DATA

For: City of Geneva

RATING

Type	POWER	CLASS	H Winding	X Winding	Y Winding
Phase	3		34500 V	12470Y/7200 V	V
Hertz	60	KNAN	12000/13400 KVA	12000/13400 KVA	KVA
Temp Rise	55/65°C	KNAF	16000/17900 KVA	16000/17900 KVA	KVA
Insul. Liquid	OIL	KNAF	20000/22400 KVA	20000/22400 KVA	KVA

ADDITIONAL TAP VOLTAGES

H Winding:	36225-35362- 34500 - 33637-32775 (FC)
X Winding:	+/-10% in 32-5/8% steps(Appox) by "RMV-II" vacuum type LTC (FC/RC)

INSULATION LEVELS (KV BIL)

	Winding	Bushing
H Line	200	200
HV Neutral	-----	-----
X Line	110	150
X Neutral	110	150
Y Line	----	----

DIELECTRIC TESTS

Applied Voltage (To Other windings And ground)	H Winding	70 KV
	X Winding	34 KV
	Y Winding	KV
Induced Voltage	Line To Line	62.1 KV
	Line To Ground	KV

PERFORMANCE DATA: Based on 75°C Reference Temperature and rated 12 MVA, 34.5 – 12.47Y KV

Losses and Exciting Current				Regulation @ 12 MVA		
Excitation	% Ex. I	No Load @20°C	Load Loss	Total Loss	Power Factor	% Regulation
100%	0.5	10500 W *	59500 W	70000 W *	1.0	0.77
105%	0.8	13125 W			0.9	3.88
110%	1.2	15750 W			0.8	5.05

AUXILIARY LOSSES

Transformer KVA	Class	Aux Loss (Watts)
16000 KVA	KNAF	1600 W
20000 KVA	KNAF	3200 W *
Sound Level : 69/71/72 dBA *		

MECHANICAL DATA

Dimensions		Assembled	Shipping
Height	(A)	211	186
Width	(B)	162	162
Depth	(C)	162	99
Height Over Cover	(D)	186	
Untanking (Plus Sling)	(E)	384	
Weights (Approx.Pounds)			
Core & Coils		37950	
Tank & Fittings		30200	
Oil (4415) Gal Main		33100	
Oil (270) Gal LTC		2025	
Shipping Weight With oil		92260	
Total Weight		106520	

PERCENT IMPEDANCE VOLTS

% IZ	Btwn Wdg	At MVA	KV	Btwn Wdg	At MVA
7.5%*	H-X	12*			
	H-X				
	X-Y				

EFFICIENCIES @ 12 MVA

Load %	Full Load	¾ Load	1/2 Load	¼ Load
100	99.42	99.51	99.58	99.53

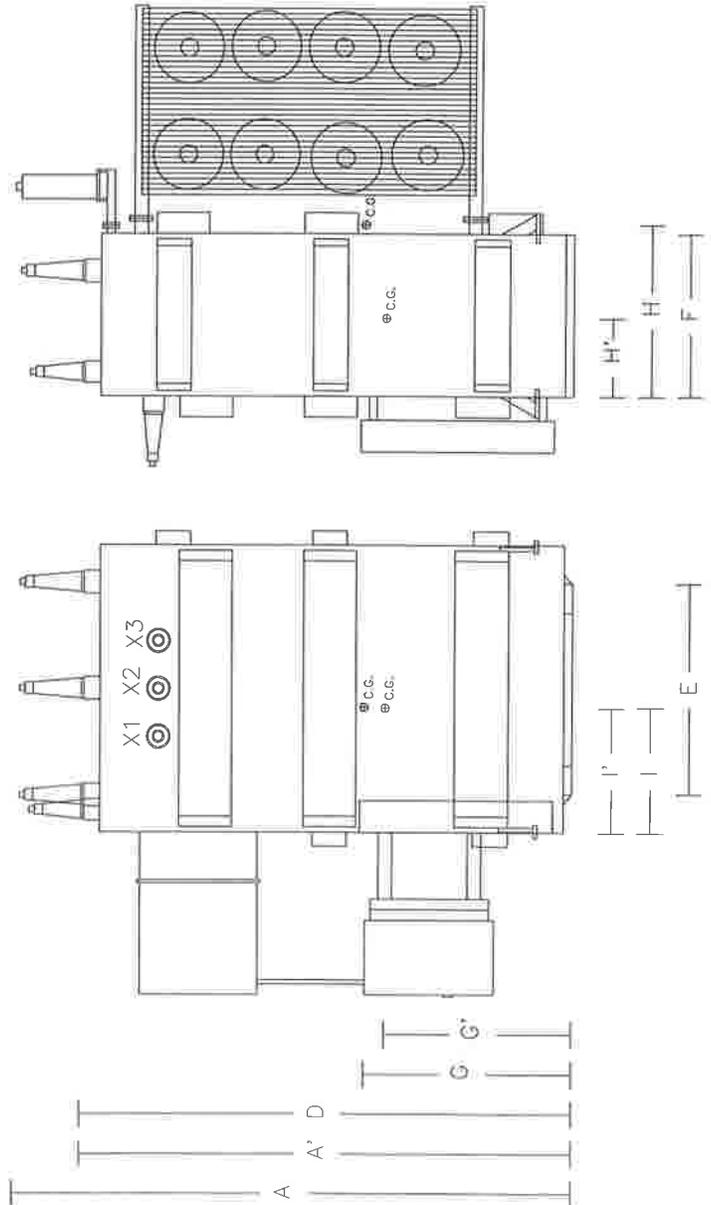
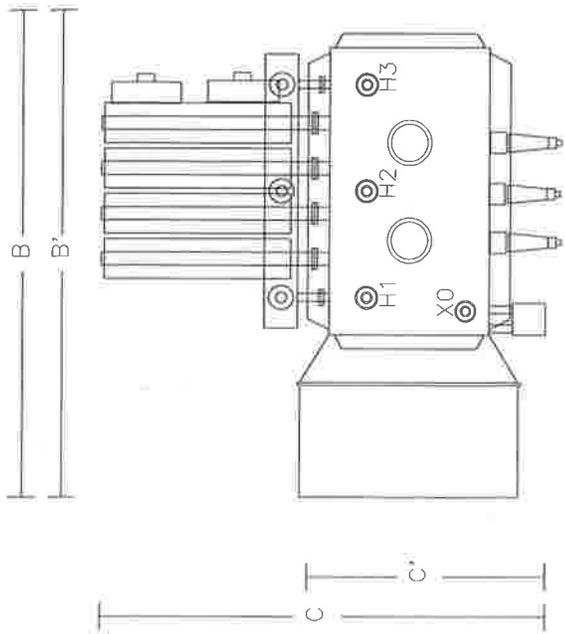
***Guaranteed Parameters**

Standard Bill of Material
(Actual accessories, quantities and placement may vary)

- H.V. Bushing, CAT. # PCORE - B89393-70
- L.V. Bushing, CAT. # PCORE - B89293-70
- L.V. Neutral Bushing, CAT. # PCORE - B89293-70
- H.V. Lightning Arrestors
- Weatherproof compartment for Load Tap Changer switch
- Structural Steel Base
- Jack Pads with provisions for pulling in either direction
- Detachable Plate type Radiators
- Cooling Fans
- Nitrogen Pressure Equipment

Standard Accessories

- Hot Spot Thermometer
- Top Oil Gauge
- Pressure Vacuum Gauge
- Core Ground Box
- Filler Valve (2")
- Drain Valve (2") with 3/8 Side Sampler
- Ground Pads @ base of unit on Diagonal corners
- 4" Vacuum Flange
- Removable Plate in Control Cabinet
- Mechanical Pressure Relief Device
- Oil Level Gage
- LTC-- "RAMV-II" Type Vacuum Load Tap Changer (FC/RC)
- Oil Drain Valve (2") with 3/8 Side Sampler
- Oil Filler Valve (2")
- Mechanical Pressure Relief Device



Dimensions (in inches +/- 6")

A -- (Height)	= 211
B -- (Width)	= 162
C -- (Depth)	= 162
D -- (Stripped Height)	= 186
E -- (Base Bearing Length)	= 79
F -- (Base Bearing Depth)	= 61
G -- (Complete Vertical Center of Gravity)	= 77
H -- (Complete HV to LV Center of Gravity)	= 64
I -- (Complete LV to Right Center of Gravity)	= 47
A' -- (Shipping Height)	= 186
B' -- (Shipping Width)	= 96
C' -- (Shipping Depth)	= 70
H' -- (Shipping HV to LV Center of Gravity)	= 29
I' -- (Shipping LV to Right Center of Gravity)	= 46
Untanking Height	= 384

Weights (in pounds +/- 10%)

Core and Coils	= 37950
Tank and Fittings	= 30200
LTC Mechanism	= 4475
Oil (4415) Main Tank and Rads	= 33100
Oil (270) LTC Compartment	= 2025
Untanking Weight	= 37950
Shipping Weight With Oil	= 92280
Total Weight	= 108520



PENNSYLVANIA TRANSFORMER TECHNOLOGY, INC.

City of Geneva
KVA- 12000./16000./20000./22400. KVA Power Transformer
Temperature Rise: 55°C/85°C
HV - LV - : 34500. - 12470.V/7200. Volts

Preliminary:
See final outline for complete Bill of Materials.

SK-P2715-1

Date: 10/13/17 Time: 06:21:06 (v 7.0)



THIS CERTIFIES THAT

Pennsylvania Transformer Technology
 Pennsylvania Transformer Technology, Inc.

* Nationally certified by the: **EASTERN MINORITY SUPPLIER DEVELOPMENT COUNCIL**

*NAICS Code(s): 33531

* Description of their product/services as defined by the North American Industry Classification System (NAICS)

10/31/2016

Issued Date

PT01362

Certificate Number

Joset Wright-Lacy

Joset B. Wright-Lacy

Valarie J. Cofield

10/31/2017

Expiration Date

Valarie J. Cofield, President/CEO

By using your password (NMSDC issued only), authorized users may log into NMSDC Central to view the entire profile: <http://nmsdc.org>

Certify, Develop, Connect, Advocate.

* MBEs certified by an Affiliate of the National Minority Supplier Development Council, Inc.®



Pennsylvania Transformer Technology, Inc.

30 Curry Avenue • Canonsburg, Pennsylvania 15317-

Phone: (724) 873-2100

Fax: (724)-873-2570

Email: service@patransformer.com



FIELD SERVICE STANDARD

SERVICE PERSONNEL PRICE SCHEDULES
EFFECTIVE JULY 1, 2013
REVISED JUNE 1, 2013

NUMBER: 210-05-004
DATE: JUNE 10, 2013
SUPERSEDES: JULY 31, 2008

The following rates are applicable for Pennsylvania Transformer Technology, Inc. personnel working within the continental United States.

DAILY RATE _____ **\$1400.00**
OVERTIME RATE (per hour) _____ **\$265.00**
WEEKEND/HOLIDAY RATE _____ **\$2,000.00**
WEEKEND/HOLIDAY OVERTIME RATE (per hour) _____ **\$385.00**

The rates above only cover the service engineer's time. They do not include expenses or other charges below

The **Daily Rate** is applicable to time worked or traveled during a normal eight hour workday. A normal workday is Monday through Friday, eight (8) consecutive hours falling between 7:00 AM and 5:00 PM. It may be possible to schedule other work arrangements within the daily rate pricing.

The **Weekend/Holiday Rate** is applicable to all Holidays (Federal Holidays), Saturdays, and Sundays that are actually worked. Saturdays on assignment but not worked will be billed at the "**DAILY RATE**". All Sundays and Holidays worked or on assignment will be billed at the "**WEEKEND/HOLIDAY RATE**"

The **overtime rate** is applicable to all the time that is worked outside the normal workday or exceeds eight (8) hours.

The **weekend/holiday overtime rate** is applicable to Saturdays, Sundays or Holidays on which the time worked exceeds (8) hours.

Travel Time	Travel Time shall be billed at the " DAILY RATE " for traveling to and from the location or site. Sunday and Holiday travel time will be billed at the " WEEKEND/HOLIDAY RATE ".
Travel Expense	All travel expense will include, airfare, rental car, tolls, lodging, meals and other local living expenses etc. and will be billed at actual cost plus 15%.
Company Vehicle	The cost based on mileage, for company vehicles to travel to and from a job site will be billed at \$.95/mi
Minimum Billing	A minimum billing for one day's service will be charged at the applicable rate for each day or fraction of a day assigned to the job, whether actually worked or not.
Standby Time	Any waiting time when the service engineer is available to work--up to a maximum of eight (8) hours on any one workday or holiday--will be regarded as time actually worked and will be billed at the applicable rate.
Emergency Work	The minimum time off for a service engineer during any 24-hour period will be eight (8) hours.
Emergency Request	A premium may be required when a Service engineer is scheduled with less that the required notice.
Terms of Payment	Standard terms of sale are net 30 days from invoice date. A late payment charge of net 1-½% per month will be applied to any late payments unless otherwise specifically amended by the proposal.



Pennsylvania Transformer Technology, Inc.

30 Curry Avenue • Canonsburg, Pennsylvania 15317-
Phone: (724) 873-2100
Fax (724)-873-2570

Email: service@patransformer.com



FIELD SERVICE STANDARD

Responsibility	Pennsylvania Transformer Technology, Inc. cannot accept responsibility for the quality of workmanship, equipment or materials provided by others.
Insurance Certificates	Insurance certificates for workmen's compensation and liability can be provided by Pennsylvania Transformer Technology, Inc. upon sufficient advance notice. Allow for approximately four weeks from date of request for receipt of the certificates.
Foreign Travel	Request for rates must be made directly to the Service Section for travel outside the continental United States. Note that this includes Alaska and Hawaii.
Non-Transferable	The Service days provided for a C-order under the original contract and are not transferable to other C-orders.
Scheduling	A minimum of two (2) weeks advance notice and a description of the exact services to be rendered shall be provided to the Service Department when scheduling a service engineer.
Design Engineer	The services of a design engineer are available at a cost of \$2,475/day plus travel expenses as described above. This cost will also apply to any time used to prepare and to furnish an Engineering report and/or written recommendations.
<u>Other charges</u>	
Small Expendable Tools	If a job requires a small expendable tools not normally carried by the service engineer, a charge for the tool will be billed at cost.
Material purchased from other Vendors or Subcontractors	If a job requires the purchase of material or services from other vendors or subcontractors, they will be billed at cost plus a 15% handling charge.
Special tools and equipment	A rental charge shall be assessed for specialized tools, equipment and instruments.

PENNSYLVANIA TRANSFORMER TECHNOLOGY, INC. FIVE - YEAR LIMITED TRANSFORMER WARRANTY

Seller warrants to Buyer only, that the goods delivered hereunder will be free from defects in material or workmanship when used and installed in accordance with Seller's applicable operating instructions and will be the kind and quality specified in the contract.

Unless specified otherwise in the Seller's proposal and the contract, this warranty shall apply only to defects appearing within 60 months from date of erection or 66 months from date of shipment, whichever comes first. The furnishing of warranty services hereunder shall not extend the warranty period on the equipment furnished hereunder.

Power transformer warranty shall apply only to those materials and that workmanship provided by the Seller such as the transformer's active parts and tank. Components and accessories, if manufactured by parties other than Seller, are excluded from this warranty and are covered under those accessories' individual manufacturer's warranties, unless defects are a direct result of the Seller's workmanship.

Seller shall, in complete fulfillment of its liabilities under this warranty and if given prompt notice by Buyer, correct, by repair or replacement, any defect which shall appear under proper or normal use of its equipment within the warranty period. In and out will be included for the first year capped at 20% of the transformer price. Customer is responsible for properly storing all materials not required to be returned to factory (including oil) if equipment is returned for a cure. After twelve months, PTTI will provide warranty services FOB Factory.

As condition of this warranty, Buyer shall strictly follow all maintenance and testing schedules in the equipment's operating manuals and maintain a complete and up-to-date log of all work performed on the equipment including oil analyses, tests and work performed, reasons for performing tests or work, dates of tests or work performed, testers or workers names or identifications and test results and conditions during tests. The log shall also record all unusual events encountered by the equipment such as system faults and overvoltages, vandalism, earthquakes, floods, fires, tornadoes or other severe weather or service conditions, with dates of all such events recorded. The Buyer shall promptly notify the Seller of any unusual events or test results which could result in or indicate possible damage to the transformer or its accessories. The Buyer shall strictly follow the Seller's recommendations regarding the need for repairs, de-energization and inspection or further testing, following notice of unusual events and possible damage, if such recommendations are made. In the event of a claim against this warranty, the Buyer shall furnish one (1) copy of the equipment's log to the Seller for review. All work on the equipment, including the accessories and protective relays, performed by the Buyer shall be performed by trained qualified personnel only and all replacement parts for any part, component or accessory shall be obtained directly from the Seller or approved by the Seller, in writing, prior to installation. Failure to follow the instructions in the operating manuals, failure to maintain adequate and complete documentation regarding the maintenance and test history of the equipment, failure to follow the Seller's recommendations following unusual events, work by unqualified personnel or installation of unapproved parts, components or accessories shall void this warranty.

The liability of Seller under this warranty (except as to title), or for any loss or damage to equipment, whether the claim is based on contract, in tort (including negligence and strict liability), or otherwise, shall not exceed the cost of correcting defects in the equipment as herein provided, and upon the expiration of the warranty period, all of the Seller's liability shall terminate. The foregoing shall constitute the exclusive remedy of Buyer and the exclusive liability of Seller except as may be noted below. This warranty does not include any expressed or implied warranty of merchantability or fitness for a particular purpose, nor does the warranty cover any special, indirect or consequential damages, whether in contract or in tort, including, but not limited to loss of revenue, loss of use, costs of substitute equipment facilities or services or claims of customer of Buyer for such damages. Any action against Seller under this contract must be commenced within one (1) year of accrual of the cause of action.

KEYSTONE OF QUALITYSM

Pennsylvania Transformer Technology, Inc.



CORE FORM POWER TRANSFORMERS UP TO 30 MVA, 138kV

Raeford, NC Experience List

TYPES

Auxiliary
Autotransformer
Generator Step-up
Padmount
Specialty
Station Service
Substation
Voltage Regulator

Pennsylvania Transformer Technology, Inc. (PTTI) has manufactured equipment at its Raeford, NC plant since 1988 — formerly Fayetteville Transformer Company 1988 to 1996.

Over 4,000 transformers have been built for more than 500 utility and industrial customers. Various types of transformers and regulators can be built including disk type small and medium power units.

The information provided is a representative sample of the larger disk type transformers manufactured in recent years.



CUSTOMER	BASE MVA	HV	DY	LV	DY	LTC	QTY
Allegheny Power	10	135	d	13	y	No	1
Exelon Corporation	5	34.4	d	4.36	y	Yes	2
Entergy	3.33	13.8	y	13.8	y	Yes	2
Detroit Edison	10	41.5	y	5.04	d	No	1
Allegheny Power	5	23	d	4	y	Yes	1
Entergy	13.4	34.5	y	14.4	y	No	1
Allegheny Power	7.5	46	d	13.09	y	No	1
Allegheny Power	5	46	y	13.09	d	Yes	2
Detroit Edison	10	24	y	5.04	d	No	1
Electrical Design Tech.	7.5	60	y	4.16	d	Yes	1
Detroit Edison	10	24	y	4.8	d	No	1
Detroit Edison	15	41.57	y	13.8	d	Yes	6
Exelon Corporation	2.5	34.4	d	4.36	y	Yes	2
Central Electric	5	69	y	43.8	d	Yes	1
Allegheny Power	7.5	246	y	13.09	d	Yes	2
Detroit Edison	10	24	y	4.8	d	No	1
Carroll Electric	13.4	67	d	13.2	y	No	3
Arkansas Valley Coop.	12	69	d	12.47	y	No	3
ADM	12	12.47	d	4.16	y	No	4
ADM	20	69	d	4.16	y	No	7
Exelon Corporation	7.5	34.4	d	13.2	y	Yes	3
Ouachita Electric Coop.	13.4	67	d	13.2	y	No	1
Southwest Coop.	12	67	d	24.9	y	No	1
Carroll Electric	13.4	67	d	13.2	y	No	1
Columbus Electric Coop.	10	69	d	24.9	y	No	1
Detroit Edison	10	24	y	13.8	d	No	1
Consol Energy	10	67	d	12.47	y	No	3
Ameren	5.6	34.4	d	4.36	y	No	2

MADE IN THE USA



KEYSTONE OF QUALITYSM

Pennsylvania Transformer Technology, Inc.

Raeford, NC Experience List

TYPES

Auxiliary
Autotransformer
Generator Step-up
Padmount
Specialty
Station Service
Substation
Voltage Regulator

CUSTOMER	BASE MVA	HV	DY	LV	DY	LTC	QTY
Consol Energy	10	67	d	12.47	y	No	1
Consol Energy	5	69	d	4.16	y	No	1
Resco	5	69	d	13.09	y	No	1
Ameren	11.2	68.8	d	13.2	y	No	2
Cleco Power	10	34.5	d	13.8	y	Yes	1
Carroll Electric	12	69	y	13.2	y	No	3
Entergy	7.5	34.5	d	13.8	y	Yes	1
Detroit Edison	1.5	41.57	d	24	d	No	1
Detroit Edison	5	41.57	y	24	y	Yes	1
Detroit Edison	1	24	d	2.4		No	3
Ameren	11.2	34.4	d	4.36	y	No	1
Rochester Gas & Electric	11.2	34.4	d	13.09	y	Yes	1
Progress Energy	2.5	23	y	23	y	Yes	1
Detroit Edison	5	41.57	d	4.8	y	Yes	1
Fairfield Electric Coop.	10	69	d	12.4	y	No	2
Progress Energy	5	69	d	24.0	y	No	1
Detroit Edison	5	41.57	d	4.8	y	Yes	1
Newberry Electric Coop.	10	69	d	12.47	y	No	1
Frontier Power	7.5	34.5	d	12.47	y	No	1
Minnkota Power Coop.	10	68.8	d	13.2	y	No	1



Pennsylvania
Transformer
Technology, Inc.

30 Curry Avenue
Canonsburg, PA 15317 USA
724-873-2100
724-873-2593 (Parts & Service)

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Exhibit A - Page 38



November 10, 2017

City of Geneva
22 South First Street
Geneva, IL 60134
Attn: City Administrator

RE: RFQ No. 17-01
Power Transformer
Addendum #1

We are enclosing Addendum #1 to our proposal P27151. Please see attached for questions and answers as well as supporting documentation.

Please Note: All other terms originally proposed remain in effect

Sincerely,

A handwritten signature in black ink, appearing to read 'Kirk Karanza', is written over the typed name and title.

Kirk Karanza
Proposal Engineer

Attachments

Question	Answer
<p>Your proposal stated that instead of FR3 you were using N1215 oil. It is noted that this is another Natural Ester oil produced by Midel, but were wondering if it was possible for the two oils (FR3 and N1215) to be mixed. i.e. if in the future some oil needed to be added, if the client had FR3 oil and it was added would it:</p> <ul style="list-style-type: none"> - affect the transformer operation/insulation/cooling, etc. - affect the transformer warranty. 	<p>PTTI confirms the fluid can be mixed with FR3. Please see attached for miscibility information. Transformer warranty will be unaffected.</p>
<p>Data Sheet for Option 2 Page 29 shows overall width and depth of 16. I assume this is a typo, but want to verify that it will meet the 162 by 162 that was required. Please Confirm.</p>	<p>Confirmed.</p>
<p>Shipping Schedule states transformer to ship 26-30 weeks or sooner after receipt of purchase order, however per Agreement Between Buyer and Seller (Section 00 52 63) Article 5, Part 5.3 delivery is required to be within a period of 15 days before or after October 15, 2018. Please confirm that the transformer will be delivered per requested schedule.</p>	<p>Confirmed. PTTI will schedule production to meet this delivery time frame.</p>
<p>Pricing and Terms of Payment offers payment terms of 15% upon order, 25% upon drawing submittal, 25% due upon completion of manufacturing, and balance at shipment. Per Standard Terms and Conditions Article 10, Part 10.01, payment schedule is to be first payment be submitted after engineer review of all shop drawings, and second application be after receipt of goods. Please confirm that 10% after shop drawing review and second payment after delivery (80%) final payment after acceptance (10%).</p>	<p>Confirmed.</p>
<p>Bidders own Terms and Conditions have been included in bid. Please verify that standard terms and conditions provided in the original request for bid are acceptable, and the bidders terms can be removed.</p>	<p>Confirmed.</p>
<p>Bid shows Reinhausen LTC verify that Bidder can provide ABB UZF per spec.</p>	<p>For this rating, current is very high and we would need to introduce series transformer causing the design become much more complicated. This is not an option we are interested in offering at this time.</p>
<p>I wanted to verify that you have reviewed and verified the ability to stay to the 162" x 162" dimension as this is being installed in an existing location where space is limited.</p>	<p>Reviewed and verified.</p>
<p>I wanted to verify the minimum space between transformer and adjacent structures. In the data sheet it was stated that 55-60 inches was recommended. We are looking at having a wall on the side of segment 4 that would be approx. 36 inches away from the transformer. Please verify that this is acceptable.</p>	<p>Verified. 36" is fine.</p>



Technical Department Report

Confidential

Title: TD3910 Miscibility of Midel 7131, Midel eN 1204 and Midel eN 1215 with FR3

Summary:

The miscibility of 90%, 50% and 10% mixtures of Midel 7131, Midel eN 1204, Midel eN 1215 with FR3 was evaluated at -24°C, 5°C, room temperature and 50°C. The mixtures were inspected over 7 days and any changes in the mixtures noted. After 7 days had past, mixtures that were not at ambient were left to return to ambient to determine whether any separation had occurred.

Separation of the ester mixtures was not observed under any of the conditions studied. Where partial or full solidification did occur at low temperature due to the pour points of the natural esters, no separation was observed, either at low temperature or once the samples had returned to room temperature.

The results of this investigation indicate that the Midel products are miscible with FR3 under the conditions studied.

Circulation:

Investigation by	Author(s)	Approved	Date
F. Edwards	F. Edwards		23/11/2016

Report No. TD3910

Objective

To determine the miscibility of Midel 7131, Midel eN1204, and Midel 1215 with FR3.

Method

90%, 50% and 10% mixtures of Midel 7131, Midel eN 1204, Midel eN 1215 with FR3 were made up. The mixtures were subjected to a range of temperatures conditions: -24°C; 5°C; 20°C and 50°C. Daily examination (exc. weekends) of the mixtures was carried out over a seven day period to determine whether any separation between the two components had occurred. Any changes in the appearance of the mixtures were noted. Mixtures which had been held at temperatures other than room temperature were re-examined after returning to room temperature.

Results and discussion

No differences in the mixtures were observed at 50°C, room temperature and 5°C for the duration of the experiment indicating miscibility of Midel 7131, Midel eN 1204 and Midel eN 1215 with FR3 at these temperatures.

After one day at -24°C, Midel 7131 mixtures containing 50% and 90% FR3 turned hazy, as did the Midel eN1204 and Midel eN1215 mixtures with FR3. Mixtures containing a high content of FR3 (90%) and all of the Midel eN1215 and FR3 mixtures lost the ability to pour after two days. This observation was expected as the pour point of the soybean oil-based esters is higher than the temperature at which the experiment was performed. No other observations were noted until day seven where the 50% Midel eN1204 and 50% FR3 mixture also lost the ability to pour and crystals developed in the 90% Midel eN1204 and 10% FR3 mixture. These changes can also be attributed to the pour point properties of the fluid and are not considered of any concern. After allowing the samples to return to room temperature, there was no evidence of solid or separation, indicating miscibility of all the Midel esters with FR3. As changes were noted in the appearance of the mixtures held at -24°C, images of the mixtures after seven days and once the mixtures returned to room temperature are shown in the appendix of this report.

Conclusion

No separation of the mixtures was observed under any of the conditions studied indicating miscibility of the Midel products with FR3.

Appendix

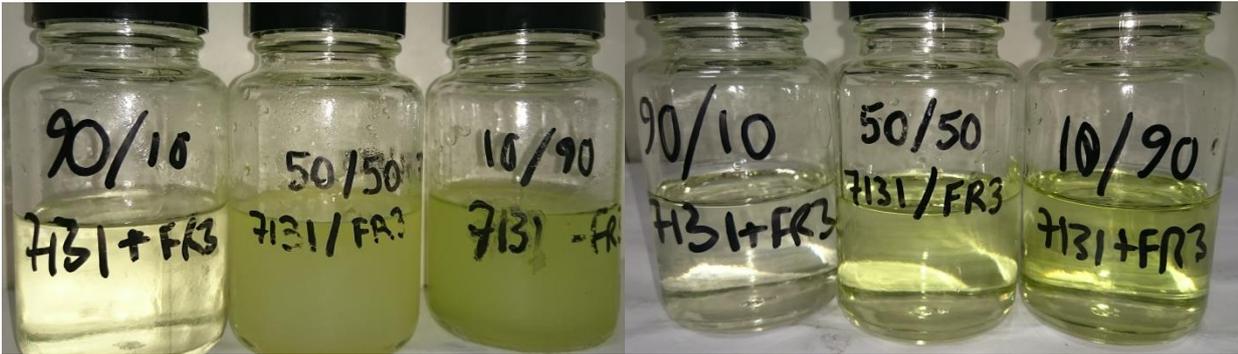


Figure 1: Images of Midel 7131 and FR3 mixtures after being held at $\sim 24^{\circ}\text{C}$ for 7 days. Both photographs contain, from left to right, 90%, 50% and 10% Midel 7131. The photograph on the left shows the mixtures immediately following removal from the freezer. The photograph on the right shows the same mixtures after being allowed to return to room temperature.



Figure 2: Images of Midel eN 1204 and FR3 mixtures after being held at $\sim 24^{\circ}\text{C}$ for 7 days. Both photographs contain, from left to right, 90%, 50% and 10% Midel eN 1204. The photograph on the left shows the mixtures immediately following removal from the freezer. The photograph on the right shows the same mixtures after being allowed to return to room temperature.



Figure 3: Images of Midel eN 1215 and FR3 mixtures after being held at $\sim 24^{\circ}\text{C}$ for 7 days. Both photographs contain, from left to right, 90%, 50% and 10% Midel eN 1215. The photograph on the left shows the mixtures immediately following removal from the freezer. The photograph on the right shows the same mixtures after being allowed to return to room temperature.

DATA SHEETS 3-PHASE, 2-WINDING TRANSFORMER		Equipment Name: Tag No.: Option 2	
DESCRIPTION	UNITS	SPEC DATA	VENDOR DATA
80% lagging power factor	%	By Manufacturer	5.05
80% leading power factor	%	By Manufacturer	4.686
Excitation Current at 100% Rated Voltage and Max. MVA	%	By Manufacturer	0.5
GUARANTEED LOSSES			
Auxiliary Losses at full load and Max. MVA rating	kW	By Manufacturer	3.2
No-Load Losses at 100% Rated Voltage	kW	By Manufacturer	10.5
Load Losses at Max. MVA Rating	KW	By Manufacturer	213.5
LOSS EVALUATION			
Auxiliary Losses	\$/kW	130.53	130.5
No-Load Losses	\$/kW	1740.27	1740.27
Load Losses	\$/kW	502.58	502.5
DIMENSIONS (APPROXIMATE)			
Overall Height	in.	By Manufacturer	211
Overall Width	in.	162	162
Overall Depth	in.	162	162
Height over Tank	in.	By Manufacturer	175
Height for Untanking	in.	By Manufacturer	384
Minimum Distance Between Surge Arresters	in.	By Manufacturer	12.3
Recommended Min. Space Between Transformer and Adjacent Structures	in.	By Manufacturer	55-60
WEIGHTS (APPROXIMATE)			
Core and Coil	lbs.	By Manufacturer	37950
Tank and Fittings	lbs.	By Manufacturer	30200
Oil	lbs.	By Manufacturer	36733
Total Transformer With Oil	lbs.	By Manufacturer	106520
Total Shipping Weight	lbs.	By Manufacturer	92260
Weight of Largest Piece for Handling	lbs.	By Manufacturer	92260
DELIVERY			
Method of Shipment (truck, rail, barge, ship)	-	By Manufacturer	truck
Total No. of Weeks from Award of Contract, FOB site	wks	By Manufacturer	shipment 26-30
Submittal of Review Drawings After Award of Contract	wks	By Manufacturer	12-16 wks
Manufacturing Time after Receipt of Approved Drawings	wks	By Manufacturer	approx. 24
SPECIAL REQUIREMENTS			
System configuration See loading conditions in Table 1 below	-		per spec
List parts Requiring Field Assembly	-	By Manufacturer	per attached

STANDARD GENERAL CONDITIONS FOR PROCUREMENT CONTRACTS

ARTICLE 1- DEFINITIONS AND TERMINOLOGY

1.01 Defined Terms

A. Whenever used in the Bidding Requirements or Contract Documents and printed with initial capital letters, the terms listed below will have the meanings indicated which are applicable to the singular or plural thereof. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.

1. Addenda-Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.

2. Agreement-The written instrument signed by both Buyer and Seller covering the Goods and Special Services and which lists the Contract Documents in existence on the Effective Date of the Agreement.

3. Application for Payment-The form acceptable to Buyer which is used by Seller in requesting progress and final payments and which is accompanied by such supporting documentation as is required by the Contract Documents.

4. Bid- The offer or proposal of a Seller submitted on the prescribed form setting forth the prices for the Goods and Special Services to be provided.

5. Bidder-The individual or entity that submits a Bid directly to Buyer.

6. Bidding Documents-The Bidding Requirements and the proposed Contract Documents (including all Addenda).

7. Bidding Requirements-The advertisement or invitation to bid, Instructions to Bidders, Bid security of acceptable form, if any, and Bid Form with any supplements.

8. Buyer- individual or entity purchasing the Goods and Special Services. The term "Buyer" is used to be consistent with the Uniform Commercial Code (UCC).

9. Change Order-A document which is signed by Seller and Buyer and authorizes an addition, deletion, or revision to the Contract Documents or an adjustment in the Contract Price or the Contract Times, issued on or after the Effective Date of the Agreement. Change Orders may be the result of mutual agreement by Buyer and Seller, or of resolution of a Claim.

10. Claim-A demand or assertion by Buyer or Seller seeking an adjustment of Contract Price or Contract Times, or both, or other relief with respect to the terms of the Contract. A demand for money or services by a third party is not a Claim.

11. Contract-The entire and integrated written agreement between Buyer and Seller concerning the Goods and Special Services. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.

12. Contract Documents-Those items so designated in the Agreement. Shop Drawings and other Seller submittals are not Contract Documents, even if accepted, reviewed, or approved by Engineer or Buyer.

13. Contract Price-The moneys payable by Buyer to Seller for furnishing the Goods and Special Services in accordance with the Contract Documents as stated in the Agreement.

14. Contract Times-The times stated in the Agreement by which the Goods must be delivered and Special Services must be furnished.

15. Drawings-That part of the Contract Documents prepared or approved by Engineer which graphically shows the scope, extent, and character of the Goods and Special Services to be furnished by Seller. Shop Drawings and other Seller submittals are not Drawings as so defined.

16. Effective Date of the Agreement-The date indicated in the Agreement on which it becomes effective, but if no such date is indicated, it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver.

17. Engineer-The individual or entity designated as such in the Agreement.

18. Field Order-A written order issued by Engineer which requires minor changes in the Goods or Special Services but which does not involve a change in the Contract Price or Contract Times.

19. General Requirements-Sections of Division 01 of the Specifications. The General Requirements pertain to all sections of the Specifications.

20. Goods-The tangible and movable personal property that is described in the Contract Documents, regardless of whether the property is to be later attached to realty.

21. Goods and Special Services-The full scope of materials, equipment, other items, and services to be furnished by Seller, including Goods, as defined herein, and Special Services, if any, as defined herein. This term refers to both the Goods and the Special Services, or to either the Goods or the Special Services, and to any portion of the Goods or the Special Services, as the context requires.

22. Laws and Regulations; Laws or Regulations-Any and all applicable laws, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.

23. Milestone-A principal event specified in the Contract Documents relating to an intermediate completion date or time prior to the Contract Times.

24. Notice of Award-The written notice by Buyer to the Successful Bidder stating that upon timely compliance by the Successful Bidder with the conditions precedent listed therein, Buyer will sign and deliver the Agreement.

25. Notice to Proceed-A written notice given by Buyer to Seller fixing the date on which the Contract Times commence to run and on which Seller shall start to perform under the Contract.

26. Point of Destination-The specific address of the location where delivery of the Goods shall be made, as stated in the Agreement.

27. Project-The total undertaking of which the Goods and Special Services may be the whole, or only a part.

28. Project Manual-The documentary information prepared for bidding and furnishing the Goods and Special Services. A listing of the contents of the Project Manual is contained in its table of contents.

29. Samples-Physical examples of materials, equipment, or workmanship that are representative of some portion of the Goods and Special Services and which establish the standards by which such portion of the Goods and Special Services will be judged.

30. Seller-The individual or entity furnishing the Goods and Special Services.

31. Shop Drawings-All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for Seller and submitted by Seller to illustrate some portion of the Goods and Special Services.

32. Special Services-Services associated with the Goods to be furnished by Seller as required by the Contract Documents.

33. Specifications-That part of the Contract Documents consisting of written requirements for materials, equipment, systems, standards and workmanship as applied to the furnishing of the Goods and Special Services, and certain administrative requirements and procedural matters applicable thereto.

34. Successful Bidder-The Bidder submitting a responsive Bid, to whom Buyer makes an award.

35. Supplementary Conditions-That part of the Contract Documents which amends or supplements these General Conditions.

36. Work Change Directive-A written statement to Seller issued on or after the Effective Date of the Agreement and signed by Buyer ordering an addition, deletion, or other revision in the Contract Documents with respect to the Goods and Special Services. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the change ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times.

1.02 Terminology

A. The words and terms discussed in Paragraphs 1.02.B and 1.02.C are not defined, but have the indicated meanings when used in the Bidding Requirements or Contract Documents.

B. Intent of Certain Terms or Adjectives:

1. The Contract Documents include the terms "as allowed," "as approved," "as ordered," "as directed" or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives "reasonable," "suitable," "acceptable," "proper," "satisfactory," or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Goods and Special Services. It is intended that such exercise of professional judgment,

action, or determination will be commercially reasonable and will be solely to evaluate, in general, the Goods and Special Services for compliance with the requirements of and information in the Contract Documents and conformance with the design concept of the completed Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective shall not be effective to assign to Engineer any duty or authority to supervise or direct the furnishing of Goods or Special Services or any duty or authority to undertake responsibility contrary to any other provision of the Contract Documents.

2. The word "non-conforming" when modifying the words "Goods and Special Services," "Goods," or "Special Services," refers to Goods and Special Services that fail to conform to the Contract Documents.

3. The word "receipt" when referring to the Goods, shall mean the physical taking and possession by the Buyer under the conditions specified in Paragraph 8.01.B.3.

4. The word "day" means a calendar day of 24 hours measured from midnight to the next midnight.

5. The word "furnish," when used in connection with the Goods and Special Services shall mean to supply and deliver said Goods to the Point of Destination (or some other specified location) and to perform said Special Services fully, all in accordance with the Contract Documents.

C. Unless stated otherwise in the Contract Documents, words or phrases that have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

ARTICLE 2 - PRELIMINARY MATTERS

2.01 Delivery of Bonds

A. When Seller delivers the executed counterparts of the Agreement to Buyer, Seller also shall deliver such bonds as Seller may be required to furnish.

2.02 Evidence of Insurance

A. When Seller delivers the executed counterparts of the Agreement to Buyer, Seller shall deliver to Buyer, with copies to each additional insured identified by name in Paragraph 4.2.C.1, certificates of insurance (and other evidence of insurance which either of them or any additional insured may reasonably request) which Seller is required to purchase and maintain in accordance with Article 4.

2.03 Commencement of Contract Times; Notice to Proceed

A. The Contract Times will commence to run on the thirtieth day after the Effective Date of the Agreement or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Agreement. In no event will the Contract Times commence to run later than the sixtieth day after the day of Bid opening or the thirtieth day after the Effective Date of the Agreement, whichever date is earlier.

2.04 Designated Representatives

A. Buyer and Seller shall each designate its representative at the time the Agreement is signed. Each representative shall have full authority to act on behalf of and make binding decisions in any matter arising out of or relating to the Contract.

2.05 Progress Schedule

A. Within 15 days after the Contract Times start to run, Seller shall submit to Buyer and Engineer an acceptable progress schedule of activities, including at a minimum, Shop Drawing and Sample submittals, tests, and deliveries as required by the Contract Documents. No progress payment will be made to Seller until an acceptable schedule is submitted to Buyer and Engineer.

B. The progress schedule will be acceptable to Buyer and Engineer if it provides an orderly progression of the submittals, tests, and deliveries to completion within the specified Milestones and the

Contract Times. Such acceptance will not impose on Buyer or Engineer responsibility for the progress schedule, for sequencing, scheduling, or progress of the work nor interfere with or relieve Seller from Seller's full responsibility therefor. Such acceptance shall not be deemed to acknowledge the reasonableness and attainability of the schedule.

2.07 Preliminary Conference

A. Within 20 days after the Contract Times start to run, a conference attended by Seller, Buyer, Engineer and others as appropriate will be held to establish a working understanding among the parties as to the Goods and Special Services and to discuss the schedule referred to in Paragraph 2.06.A, procedures for handling Shop Drawings and other submittals, processing Applications for Payment, and maintaining required records.

2.08 Safety

A. Buyer and Seller shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss. When Seller's personnel, or the personnel of any subcontractor to Seller, are present at the Point of Destination or any work area or site controlled by Buyer, the Seller shall be responsible for the compliance by such personnel with any applicable requirements of Buyer's safety programs that are made known to Seller.

ARTICLE 3- CONTRACT DOCUMENTS: INTENT AND AMENDING

3.01 Intent

A. The Contract Documents are complementary; what is called for by one is as binding as if called for by all.

B. Any labor, documentation, services, materials, or equipment that may reasonably be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce or furnish the indicated Goods and Special Services will be provided, whether or not specifically called for, at no additional cost to Buyer.

C. Clarifications and interpretations of, or notifications of minor variations and deviations in, the Contract Documents, will be issued by Engineer as provided in Article 9.

3.02 Standards, Specifications, Codes, Laws and Regulations

A. Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to Laws and Regulations, whether such reference be specific or by implication, shall mean the standard, specification, manual, code, or Laws and Regulations in effect at the time of opening of Bids (or on the Effective Date of the Agreement if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.

B. No provision of any such standard, specification, manual or code, or any instruction of a supplier shall be effective to change the duties or responsibilities of Buyer or Engineer, or any of their subcontractors, consultants, agents, or employees from those set forth in the Contract Documents, nor shall any such provision or instruction be effective to assign to Buyer or Engineer, or any of their consultants, agents, or employees any duty or authority to supervise or direct the performance of Seller's obligations or any duty or authority to undertake responsibility inconsistent with the provisions of the Contract Documents.

3.03 Reporting and Resolving Discrepancies

A. Reporting Discrepancies:

1. Seller's Review of Contract Documents Before the Performance of the Contract: Before performance of the Contract, Seller shall carefully study and compare the Contract Documents and check and verify pertinent figures therein and all applicable field measurements. Seller shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy which Seller discovers or has actual knowledge of and shall obtain a written interpretation or clarification from Engineer before proceeding with the furnishing of any Goods and Special Services affected thereby.

2. Seller's Review of Contract Documents During the Performance of the Contract: If, during the performance of the Contract, Seller discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents or between the Contract Documents and any provision of any Law or Regulation applicable to the performance of the Contract, any standard, specification, manual or code, or of any instruction of any Supplier, Seller shall promptly report it to Engineer in writing. Seller shall not proceed with the furnishing of the Goods and Special Services affected thereby until an amendment to or clarification of the Contract Documents has been issued.

3. Seller shall not be liable to Buyer or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Seller had actual knowledge thereof.

B. Resolving Discrepancies: Except as may be otherwise specifically stated in the Contract Documents, the provisions of the Contract Documents shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between the provisions of the Contract Documents and:

1. the provisions of any standard, specification, manual, code, or instruction (whether or not specifically incorporated by reference in the Contract Documents); or

2. the provisions of any Laws or Regulations applicable to the furnishing of the Goods and Special Services (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.04 Amending and Clarifying Contract Documents

A. The Contract Documents may be amended to provide for additions, deletions, and revisions to the Goods and Special Services or to modify contractual terms and conditions by a Change Order.

B. Buyer may issue a Work Change Directive providing for additions, deletions, or revisions to the Goods and Special Services, in which case (1) the Contract Price shall be equitably adjusted to account for any reasonable and necessary credits to Buyer for any such deletion, or for costs (including reasonable overhead and profit) incurred by Seller to accommodate such an addition or revision and (2) the Contract Times shall be equitably adjusted to account for any impact on progress and completion of performance. Such adjustments subsequently shall be duly set forth in a Change Order.

C. The requirements of the Contract Documents may be supplemented and minor variations and deviations in the Goods and Special Services may be authorized, by one or more of the following ways:

1. Field Order;
2. Engineer's written interpretation or clarification.

ARTICLE 4- BONDS AND INSURANCE

4.01 Bonds

A. Seller shall furnish to Buyer payment bond, each in an amount at least equal to the Contract Price, as security for the faithful performance and payment of all of Seller's obligations under the Contract Documents. This bond shall remain in effect until 1) one year after the date when final payment becomes due or 2) completion of the correction period specified in Paragraph 8.03, whichever is later, except as provided otherwise by Laws or Regulations or by the Contract Documents. Seller shall also furnish such other bonds as are required by the Contract Documents.

B. Bond shall be in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in the current list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. Bond signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual's authority to bind the surety. The evidence of authority shall show that it is effective on the date the agent or attorney-in-fact signed each bond.

C. If the surety on any bond furnished by Seller is declared bankrupt or becomes insolvent or its right to do business is terminated

in any state where any part of the Project is located or it ceases to meet the requirements of Paragraph 4.01.B, Seller shall promptly notify Buyer and Engineer and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the requirements of Paragraphs 4.01.B and 4.02.

4.02 Insurance

A. *Property Insurance:* Seller shall assume all risk of loss or damage to the Goods prior to acceptance of delivery by Buyer at the point of delivery; and shall purchase and maintain insurance on the Goods during the process of fabrication and while in transit to insure against the perils of fire and extended coverage including "all risk" insurance for physical loss and damage including theft, vandalism and malicious mischief, collapse, water damage and such other perils as may be provided herein and as Seller deems appropriate.

B. *Liability Insurance* Seller shall purchase and maintain such liability and other insurance as is appropriate for the furnishing of Goods and Special Services and as will provide protection from claims set forth below which may arise out of or result from Seller's furnishing of the Goods or Special Services and Seller's other obligations under the Contract Documents, whether the furnishing of Goods or Special Service, or other obligations are to be performed by Seller, any subcontractor or supplier, or by anyone directly or indirectly employed by any of them to furnish the Goods or Special Services, or by anyone for whose acts any of them may be liable:

1. claims under workers' compensation, disability benefits, and other similar employee benefit acts;
2. claims for damages because of bodily injury, occupational sickness or disease, or death of Seller's employees;
3. claims for damages because of bodily injury, sickness or disease, or death of any person other than Seller's employees;
4. claims for damages insured by reasonably available personal injury liability coverage which are sustained: (i) by any person as a result of an offense directly or indirectly related to the employment of such person by Seller, or (ii) by any other person for any other reason;
5. claims for damages, other than to the Goods, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom; and
6. claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance or use of any motor vehicle.

C. The policies of insurance so required by this Paragraph 4.02 to be purchased and maintained shall:

1. with respect to insurance required by Paragraphs 4.02.B.3 through 4.02.B.6 inclusive, include as additional insureds (subject to any customary exclusion in respect of professional liability) City of Geneva, Illinois, Stanley Consultants, Inc., their consultants, shall be listed as additional insureds, and include coverage for the respective officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of all such additional insureds, and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby;
2. include at least the specific coverages and be written for not less than the limits of liability provided below or required by Laws or Regulations, whichever is greater;
3. include completed operations insurance;
4. include contractual liability insurance covering Seller's indemnity obligations under Paragraphs 5.09 and 12.02.
5. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed or renewal refused until at least 30 days prior written notice has been given to Buyer and Seller and to each other additional insured identified in these General Conditions to whom a certificate of insurance has been issued (and the certificates of insurance furnished by Seller pursuant to Paragraph 4.02.E will so provide);
6. remain in effect at least until final payment and at all times thereafter when Seller may be correcting, removing, or replacing nonconforming Goods in accordance with Paragraph 8.03; and
7. with respect to completed operations insurance, and any insurance coverage written on a claims-made basis, remain in effect for at least two years after final payment (and Seller shall furnish Buyer and each other additional insured identified herein, to whom a certificate of insurance has been issued, evidence

satisfactory to Buyer and any such additional insured of continuation of such insurance at final payment and one year thereafter); and

8. with respect to any delegation of professional design services to Seller pursuant to Paragraph 5.10, include professional liability coverage by endorsement or otherwise.

D. The limits of liability for the insurance required by Paragraph 4.02.B shall provide coverage for not less than the following amounts or greater where required by Laws and Regulations:

1. Workers' Compensation, and related coverages under Paragraphs 4.02.B.1 and B.2:

- | | |
|---|-------------|
| a. State: | Statutory |
| b. Applicable Federal (e.g., Longshoreman's): | Statutory |
| c. Employer's Liability: | \$1,000,000 |

2. Seller's General Liability under Paragraphs 4.02.B.3 through B.6 which shall include completed operations and product liability coverages and eliminate the exclusion with respect to property under the care, custody and control of Seller:

- | | |
|--|-------------|
| a. General Aggregate | \$3,000,000 |
| b. Products – Completed Operations Aggregate | \$3,000,000 |
| c. Personal and Advertising Injury | \$3,000,000 |
| d. Each Occurrence (Bodily Injury and Property Damage) | \$3,000,000 |
| e. Property Damage liability insurance will provide Explosion, Collapse, and Underground coverages where applicable. | |
| f. Excess or Umbrella Liability: | |
| 1) General Aggregate | \$3,000,000 |
| 2) Each Occurrence | \$3,000,000 |

3. Automobile Liability under Paragraph 4.02.B.6:

- | | |
|-----------------------------|-------------|
| a. Bodily Injury: | |
| 1) Each person | \$2,000,000 |
| 2) Each Accident | \$2,000,000 |
| b. Property Damage: | |
| 1) Each Accident | \$2,000,000 |
| c. Combined Single Limit of | \$2,000,000 |

E. Seller shall deliver to Buyer, with copies to each additional insured identified in Paragraph 4.02.C.1, certificates of insurance (and other evidence of insurance requested by Buyer or any other additional insured) which Seller is required to purchase and maintain.

F. Failure of Buyer to demand certificates of insurance or other evidence of Seller's full compliance with these insurance requirements or failure of Buyer to identify a deficiency in compliance from the evidence provided shall not be construed as a waiver of Seller's obligation to maintain such insurance.

G. If Buyer has any objection to the coverage afforded by or other provisions of the insurance required to be purchased and maintained on the basis of non-conformance with the Contract Documents, Buyer shall notify Seller in writing within 10 days after receipt of the certificates or other evidence required by Paragraph 4.02.J. Seller shall provide such additional information in respect to insurance as Buyer shall reasonably request.

H. Upon assignment of this Contract, Seller shall comply with the written request of assignee to provide certificates of insurance to assignee.

I. Buyer does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Seller.

J. The insurance and insurance limits required herein shall not be deemed as a limitation on Seller's liability under the indemnities granted to Buyer in the Contract Documents.

4.03 Licensed Sureties and Insurers

A. All bonds and insurance required by the Contract Documents to be purchased and maintained by Buyer or Seller shall be obtained from surety or insurance companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds or insurance policies for the limits and coverages so required. Such surety and insurance companies shall also meet such additional requirements and qualifications as may be provided.

ARTICLE 5 - SELLER'S RESPONSIBILITIES

5.01 Supervision and Superintendence

A. Seller shall supervise, inspect, and direct the furnishing of the Goods and Special Services competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform its obligations in accordance with the Contract Documents. Seller shall be solely responsible for the means, methods, techniques, sequences, and procedures necessary to perform its obligations in accordance with the Contract Documents. Seller shall not be responsible for the negligence of Buyer or Engineer in the design or specification of a specific means, method, technique, sequence, or procedure that is shown or indicated in and expressly required by the Contract Documents.

5.02 Labor, Materials and Equipment

A. Seller shall provide competent, qualified and trained personnel in all aspects of its performance of the Contract.

B. All Goods, and all equipment and material incorporated into the Goods, shall be as specified, and unless specified otherwise in the Contract Documents, shall be:

1. new, and of good quality;
2. protected, assembled, connected, cleaned, and conditioned in accordance with the original manufacturer's instructions; and
3. shop assembled to the greatest extent practicable.

5.03 Laws and Regulations

A. Seller shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of its obligations in accordance with the Contract Documents. Except where otherwise expressly required by such Laws and Regulations, neither Buyer nor Engineer shall be responsible for monitoring Seller's compliance with any Laws or Regulations.

B. If Seller furnishes Goods and Special Services knowing or having reason to know that such furnishing is contrary to Laws or Regulations, Seller shall bear all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such performance. It shall not be Seller's responsibility to make certain that the Specifications and Drawings are in accordance with Laws and Regulations, but this provision shall not relieve Seller of Seller's obligations under Paragraph 3.03.

C. Changes in Laws or Regulations not known at the time of opening of Bids (or, on the Effective Date of the Agreement if there were no Bids) having an effect on the cost or time of performance shall be the subject of an adjustment in Contract Price or Contract Times. If Buyer and Seller are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 9.06.

5.04 Or Equals

A. Whenever the Goods, or an item of material or equipment to be incorporated into the Goods, are specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular supplier or manufacturer, the specification or description is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or-equal" item is permitted, other items of material or equipment or material or equipment of other suppliers or manufacturers may be submitted to Buyer for Engineer's review.

1. If in Engineer's sole discretion, such an item of material or equipment proposed by Seller is functionally equal to that named and sufficiently similar so that no change in related work will be required, it may be considered by Engineer as an "or-equal" item.

2. For the purposes of this paragraph, a proposed item of material or equipment may be considered functionally equal to an item so named only if:

a. in the exercise of reasonable judgment, Engineer determines that: 1) it is at least equal in quality, durability, appearance, strength, and design characteristics; 2) it will reliably perform at least equally well the function imposed by the design concept of the completed Project as a functioning whole; 3) it has an acceptable record of performance and availability of responsive service; and

b. Seller certifies that if approved: 1) there will be no increase in any cost, including capital, installation or operating costs, to Buyer; and 2) the proposed item will conform substantially to the detailed requirements of the item named in the Contract Documents.

B. **Engineer's Evaluation:** Engineer will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to Paragraph 5.04.A. Engineer will be the sole judge of whether to accept or reject such a proposal or submittal. No "or-equal" will be ordered, manufactured or utilized until Engineer's review is complete, which will be evidenced by an approved Shop Drawing. Engineer will advise Buyer and Seller in writing of any negative determination. Notwithstanding Engineer's approval of an "or-equal" item, Seller shall remain obligated to comply with the requirements of the Contract Documents.

C. **Special Guarantee:** Buyer may require Seller to furnish at Seller's expense a special performance guarantee or other surety with respect to any such proposed "or-equal."

D. **Data:** Seller shall provide all data in support of any such proposed "or-equal" at Seller's expense.

5.05 Taxes

A. Seller shall be responsible for all taxes and duties arising out of the sale of the Goods and the furnishing of Special Services. All taxes are included in the Contract Price.

1. Buyer will furnish the required certificates of tax exemption to Seller with respect to materials and equipment to be incorporated into the Project facilities.

2. Buyer's exemption does not apply to construction tools, machinery, equipment, or other property purchased by or leased by Seller, or to supplies or materials not incorporated into the Project facilities.

3. The Contract Price does not include the cost of sales or compensating use taxes to the extent such are exempted by this paragraph.

5.06 Shop Drawings and Samples

A. Seller shall submit Shop Drawings and Samples to Buyer for Engineer's review in accordance with the schedule required in Paragraph 2.06.A. All submittals will be identified as required and furnished in the number of copies specified in the Contract Documents. The data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Seller proposes to provide.

B. Where a Shop Drawing or Sample is required by the Contract Documents, any related work performed prior to Engineer's review of the pertinent submittal will be at the sole expense and responsibility of Seller.

C. Submittal Procedures:

1. Before submitting each Shop Drawing or Sample, Seller shall have determined and verified:

a. all field measurements (if required), quantities, dimensions, specified performance criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto; and

b. that all materials are suitable with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the furnishing of Goods and Special Services.

c. Seller shall also have reviewed and coordinated each Shop Drawing or Sample with the Contract Documents.

2. Each submittal shall bear a stamp or include a written certification from Seller that Seller has reviewed the subject submittal and confirmed that it is in compliance with the requirements of the Contract Documents. Both Buyer and Engineer shall be entitled to rely on such certification from Seller.

3. With each submittal, Seller shall give Buyer and Engineer specific written notice of any variations that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be both in a written communication separate from the submittal and by specific notation on each Shop Drawing or Sample.

D. Engineer's Review:

1. Engineer will provide timely review of Shop Drawings and Samples.

2. Engineer's review will be only to determine if the Goods and Special Services covered by the submittals will, after installation or incorporation in the Project, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole.

3. Engineer's review shall not relieve Seller from responsibility for any variation from the requirements of the Contract Documents; nor will any review by Engineer relieve Seller from responsibility for errors or omissions in the Shop Drawings or from responsibility for having complied with the provisions of paragraph 5.06.C.1.

E. Seller shall furnish required submittals with sufficient information and accuracy in order to obtain required approval of an item with no more than three submittals. Engineer will record Engineer's time for reviewing subsequent submittals of Shop Drawings, samples, or other items requiring approval and Seller shall reimburse Buyer for Engineer's charges for such time.

F. In the event that Seller requests a change of a previously approved item, Seller shall reimburse Buyer for Engineer's charges for its review time unless the need for such change is beyond the control of Seller.

G. **Resubmittal Procedures:** Seller shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Seller shall direct specific attention in writing to any revisions other than the corrections called for by Engineer on previous submittals.

5.07 Continuing Performance

A. Seller shall adhere to the progress schedule established in accordance with Paragraph 2.06.A., and the Goods shall be delivered and the Special Services furnished within the Contract Times specified in the Agreement.

B. Seller shall carry on furnishing of the Goods and Special Services and adhere to the progress schedule during all disputes or disagreements with Buyer. No furnishing of Goods and Special Services shall be delayed or postponed pending resolution of any disputes or disagreements, except as permitted by Paragraphs 11.03 or 11.04, or as Buyer and Seller may otherwise agree in writing.

5.08 Seller's Warranties and Guarantees

A. Seller warrants and guarantees to Buyer that the title to the Goods conveyed shall be proper, its transfer rightful, and free from any security interest, lien, or other encumbrance. Seller shall defend, indemnify, and hold Buyer harmless against any liens, claims, or demands contesting or affecting title of the Goods conveyed.

B. Seller warrants and guarantees to Buyer that all Goods and Special Services will conform with the Contract Documents, and with the standards established by any Samples approved by Engineer. Engineer shall be entitled to rely on Seller's warranty and guarantee. If the Contract Documents do not otherwise specify the characteristics or the quality of the Goods, the Goods shall comply with the requirements of Paragraph 5.02.B.

C. Seller's warranty and guarantee hereunder excludes defects or damage caused by:

1. abuse, improper modification, improper maintenance, or improper operation by persons other than Seller; or

2. corrosion or chemical attack, unless corrosive or chemically-damaging conditions were disclosed by Buyer in the Contract Documents and the Contract Documents required the Goods to withstand such conditions;

3. use in a manner contrary to Seller's written instructions for installation, operation, and maintenance; or
4. normal wear and tear under normal usage.

D. Seller's obligation to furnish the Goods and Special Services in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Goods and Special Services that are non-conforming, or a release of Seller's obligation to furnish the Goods and Special Services in accordance with the Contract Documents:

1. observations by Buyer or Engineer;
2. recommendation by Engineer or payment by Buyer of any progress or final payment;
3. use of the Goods by Buyer;
4. any acceptance by Buyer (subject to the provisions of Paragraph 8.02.D.1) or any failure to do so;
5. the issuance of a notice of acceptance by Buyer pursuant to the provisions of Article 8;
6. any inspection, test or approval by others; or
7. any correction of non-conforming Goods and Special Services by Buyer.

E. Buyer shall promptly notify Seller of any breach of Seller's warranties or guarantees.

- F. Seller makes no implied warranties under this Contract.

5.09 Indemnification

A. To the fullest extent permitted by Laws and Regulations, Seller shall indemnify and hold harmless Buyer and Engineer, and the officers, directors, members, partners, employees, agents, consultants, contractors, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of Seller's obligations under the Contract Documents, provided that any such claim, cost, loss, or damages attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Goods themselves), including the loss of use resulting therefrom, but only to the extent cause by any negligent act or omission of Seller, or any individual or entity directly or indirectly employed by Seller or anyone for whose acts Seller may be liable.

B. In any and all claims against Buyer or Engineer or any of their respective assignees, consultants, agents, officers, directors, members, partners, employees, agents, consultants, contractors, or subcontractors, by any employee (or the survivor or personal representative of such employee) of Seller, any subcontractor, any supplier, or any individual or entity directly or indirectly employed by any of them to furnish any of the Goods and Special Services, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 5.09.A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for seller or any such subcontractor, supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.

C. The indemnification obligations of Seller under Paragraph 5.09.A shall not extend to the liability of Engineer and Engineer's officers, directors, partners, employees, agents, and consultants arising out of:

1. the preparation or approval of, or the failure to prepare or approve, maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or
2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

5.10 Delegation of Professional Design Services

A. Seller will not be required to provide professional design services unless such services are specifically required by the Contract Documents or unless such services are required to carry out Seller's responsibilities for furnishing the Goods and Special Services. Seller shall not be required to provide professional services in violation of applicable law.

B. If professional design services or certifications by a design professional related to the Goods and Special Services are specifically required of Seller by the Contract Documents, Buyer and Engineer will specify all performance and design criteria that such services must satisfy. Seller shall cause such services or certifications to be provided by a properly licensed professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Goods and Special Services designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to Engineer.

C. Buyer and Engineer shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications or approvals performed by such design professionals, provided Buyer and Engineer have specified to Seller all performance and design criteria that such services must satisfy.

D. Pursuant to this Paragraph 5.10, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 5.06.D.2.

E. Seller shall not be responsible for the adequacy of the performance or design criteria required by the Contract Documents.

ARTICLE 6 - SHIPPING AND DELIVERY

6.01 Shipping

A. Seller shall select the carrier and bear all costs of packaging, transportation, insurance, special handling and any other costs associated with shipment and delivery.

6.02 Delivery

A. Seller shall deliver the Goods F.O.B. the Point of Destination in accordance with the Contract Times set forth in the Agreement, or other date agreed to by Buyer and Seller.

B. Seller shall provide written notice to Buyer at least 10 days before shipment of the manner of shipment and the anticipated delivery date. The notice shall also include any instructions concerning special equipment or services required at the Point of Destination to unload and care for the Goods. Seller shall also require the carrier to give Buyer at least 24 hours notice by telephone prior to the anticipated time of delivery.

C. Buyer will be responsible and bear all costs for unloading the Goods from carrier.

D. Buyer will assure that adequate facilities are available to receive delivery of the Goods during the Contract Times for delivery set forth in the Agreement, or another date agreed by Buyer and Seller.

E. No partial deliveries shall be allowed, unless permitted or required by the Contract Documents or agreed to in writing by Buyer.

6.03 Risk of Loss

A. Risk of loss and insurable interests transfer from Seller to Buyer upon Buyer's receipt of the Goods.

B. Notwithstanding the provisions of Paragraph 6.03.A, if Buyer rejects the Goods as non-conforming, the risk of loss on such Goods shall remain with Seller until Seller corrects the non-conformity or Buyer accepts the Goods. If rejected Goods remain at the Point of Destination pending modification and acceptance, then Seller shall be responsible for arranging adequate protection and maintenance of the Goods at Seller's expense.

6.04 Progress Schedule

A. Seller shall adhere to the progress schedule established in accordance with Paragraph 2.06 as it may be adjusted from time to time as provided below.

1. Seller shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.06) proposed adjustments in the progress schedule that will not result in changing the Contract Times. Such adjustments will comply with any provisions of the General Requirements applicable thereto.

2. Proposed adjustments in the progress schedule that will change the Contract Times shall be submitted in accordance with the requirements of Article 7. Adjustments in Contract Times may only be made by a Change Order.

ARTICLE 7 - CHANGES: SCHEDULE AND DELAY

7.01 Changes in the Goods and Special Services

A. Buyer may at any time, without notice to any surety, make an addition, deletion, or other revision to the Contract Documents with respect to the Goods and Services, within the general scope of the Contract, by a Change Order or Work Change Directive. Upon receipt of any such document, Seller shall promptly proceed with performance pursuant to the revised Contract Documents (except as otherwise specifically provided).

B. If Seller concludes that a Work Change Directive issued by Buyer affects the Contract Price or Contract Times, then Seller shall notify Buyer within 15 days after Seller has received the Work Change Directive, and submit written supporting data to Buyer within 45 days after such receipt. If Seller fails to notify Buyer within 15 days, Seller waives any Claim for such adjustment. If Buyer and Seller are unable to agree on entitlement to, or on the amount or extent, if any, of an adjustment in the Contract Price or Contract Times, or both, that should be allowed as a result of a Work Change Directive, a Claim may be made therefor as provided in Paragraph 9.06.

C. Seller shall not suspend performance while Buyer and Seller are in the process of making such changes and any related adjustments to Contract Price or Contract Times.

7.02 Changing Contract Price or Contract Times

A. The Contract Price or Contract Times may only be changed by a Change Order.

B. Any Claim for an adjustment in the Contract Price or Contract Times shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 9.06.

C. If Seller is prevented from delivering the Goods or performing the Special Services within the Contract Times for any unforeseen reason beyond its control and not attributable to its actions or inactions, then Seller shall be entitled to an adjustment of the Contract Times to the extent attributable to such reason. Such reasons include but are not limited to acts or neglect by Buyer, inspection delays, fires, floods, epidemics, abnormal weather conditions, acts of God, and other like matters. If such an event occurs and delays Seller's performance, Seller shall notify Buyer in writing within 15 days of knowing or having reason to know of the beginning of the event causing the delay, stating the reason therefor.

D. Seller shall not be entitled to an adjustment in Contract Price or Contract Times for delays within the control of Seller. Delays attributable to and within the control of Seller's subcontractors or suppliers shall be deemed to be delays within the control of Seller.

E. If Seller is prevented from delivering the Goods or furnishing the Special Services within the Contract Times due to the actions or inactions of Buyer, Seller shall be entitled to any reasonable and necessary additional costs arising out of such delay to the extent directly attributable to Buyer.

F. Neither Buyer nor Seller shall be entitled to any damages arising from delays which are beyond the control of both Buyer and Seller, including but not limited to fires, floods, epidemics, abnormal weather conditions, acts of God, and other like matters.

ARTICLE 8- BUYER'S RIGHTS

8.01 Inspections and Testing

A. General:

1. The Contract Documents specify required inspections and tests. Buyer shall have the right to perform, or cause to be performed, reasonable inspections and require reasonable tests of the Goods at Seller's facility, and at the Point of Destination. Seller shall allow Buyer a reasonable time to perform such inspections or tests.

2. Seller shall reimburse Buyer for all expenses, except for travel, lodging, and subsistence expenses of Buyer's and Engineer's representatives, for inspections and tests specified in the Contract Documents. If as the result of any such specified testing the Goods are determined to be non-conforming, then Seller shall also bear the travel, lodging, and subsistence expenses of Buyer's and Engineer's representatives, and all expenses of re-inspection or retesting.

3. Buyer shall bear all expenses of inspections and tests that are not specified in the Contract Documents (other than any re-inspection or retesting resulting from a determination of non-conformity, as set forth in Paragraph 8.01.A.2 immediately above); provided, however, that if as the result of any such non-specified inspections or testing the Goods are determined to be non-conforming, then Seller shall bear all expenses of such inspections and testing, and of any necessary re-inspection and retesting.

4. Seller shall provide Buyer timely written notice of the readiness of the Goods for all inspections, tests, or approvals which the Contract Documents specify are to be observed by Buyer prior to shipment.

5. Buyer will give Seller timely notice of all specified tests, inspections, and approvals of the Goods which are to be conducted at the Point of Destination.

6. If, on the basis of any inspections or testing, the Goods appear to be conforming, Buyer will give Seller prompt notice thereof. If on the basis of said inspections or testing, the Goods appear to be non-conforming, Buyer will give Seller prompt notice thereof and will advise Seller of the remedy Buyer elects under the provisions of Paragraph 8.02.

7. Neither payments made by Buyer to Seller prior to any tests or inspections, nor any tests or inspections shall constitute acceptance of non-conforming Goods, or prejudice Buyer's rights under the Contract.

B. Inspection on Delivery:

1. Buyer or Engineer will visually inspect the Goods upon delivery solely for purposes of identifying the Goods and general verification of quantities and observation of apparent condition in order to provide a basis for a progress payment. Such visual inspection will not be construed as final or as receipt of any Goods and Special Services that, as a result of subsequent inspections and tests, are determined to be non-conforming.

2. Within ten days of such visual inspection, Buyer shall provide Seller with written notice of Buyer's determination regarding conformity of the Goods. In the event Buyer does not provide such notice, it will be presumed that the Goods appear to be conforming and that Buyer has acknowledged their receipt upon delivery.

3. If, on the basis of the visual inspection specified in Paragraph 8.01.B.1, the Goods appear to be conforming, Buyer's notice thereof to Seller will acknowledge receipt of the Goods.

C. Final Inspection:

1. After all of the Goods have been incorporated into the Project, tested in accordance with such testing requirements as are specified, and are functioning as indicated, Buyer or Engineer will make a final inspection.

2. If, on the basis of the final inspection, the Goods are conforming, Buyer's notice thereof will constitute Buyer's acceptance of the Goods.

3. If, on the basis of the final inspection, the Goods are non-conforming, Buyer will identify the non-conformity in writing.

8.02 Non-Conforming Goods and Special Services

A. If, on the basis of inspections and testing prior to delivery, the Goods and Special Services are found to be non-conforming, or if at any time after Buyer has acknowledged receipt of delivery and before

the expiration of the correction period described in Paragraph 8.03, Buyer determines that the Goods and Special Services are non-conforming, then Seller shall promptly, without cost to Buyer and in response to written instructions from Buyer, either correct such non-conforming Goods and Special Services, or, if Goods are rejected by Buyer, remove and replace the non-conforming Goods with conforming Goods, including all work required for reinstallation.

B. Buyer's Rejection of Non-Conforming Goods:

1. If Buyer elects to reject the Goods in whole or in part, Buyer's notice to Seller will describe in sufficient detail the non-conforming aspect of the Goods. If Goods have been delivered to Buyer, Seller shall promptly, and within the Contract Times, remove and replace the rejected Goods.

2. Seller shall bear all costs, losses and damages attributable to the removal and replacement of the non-conforming Goods as provided in Paragraph 8.02.E.

3. Upon rejection of the Goods, Buyer retains a security interest in the Goods to the extent of any payments made and expenses incurred in their testing and inspection.

C. Remedying Non-Conforming Goods and Special Services:

1. If Buyer elects to permit the Seller to modify the Goods to correct the non-conformance, then Seller shall promptly provide a schedule for such modifications and shall make the Goods conforming within a reasonable time.

2. If Buyer notifies Seller in writing that any of the Special Services are non-conforming, Seller shall promptly provide conforming services acceptable to Buyer. If Seller fails to do so, Buyer may delete the Special Services and reduce the Contract Price a commensurate amount.

D. Buyer's Acceptance of Non-Conforming Goods: Instead of requiring correction or removal and replacement of non-conforming Goods discovered either before or after final payment, Buyer may accept the non-conforming Goods. Seller shall bear all reasonable costs, losses, and damages attributable to Buyer's evaluation of and determination to accept such non-conforming Goods as provided in Paragraph 8.02.E.

E. Seller shall pay all claims, costs, losses, and damages, including but not limited to all fees and charges for re-inspection, retesting and for any engineers, architects, attorneys and other professionals, and all court or arbitration or other dispute resolution costs arising out of or relating to the non-conforming Goods and Special Services. Seller's obligations shall include the costs of the correction or removal and replacement of the non-conforming Goods and the replacement of property of Buyer and others destroyed by the correction or removal and replacement of the non-conforming Goods, and obtaining conforming Special Services from others.

F. Buyer's Rejection of Conforming Goods: If Buyer asserts that Goods and Special Services are non-conforming and such Goods and Special Services are determined to be conforming, or if Buyer rejects as non-conforming Goods and Special Services that are later determined to be conforming, then Seller shall be entitled to reimbursement from Buyer of costs incurred by Seller in inspecting, testing, correcting, removing, or replacing the conforming Goods and Special Services, including but not limited to fees and charges of engineers, architects, attorneys and other professionals, and all court or arbitration or other dispute resolution costs associated with the incorrect assertion of non-conformance or rejection of conforming Goods and Special Services.

8.03 Correction Period

A. Seller's responsibility for correcting all non-conformities in the Goods and Special Services will extend for a period of one year after the earlier of the date on which Buyer has placed the Goods in continuous service or the date of final payment, or for such longer period of time as may be prescribed by Laws or Regulations or by the terms of any specific provisions of the Contract Documents.

ARTICLE 9- ROLE OF ENGINEER

9.01 Duties and Responsibilities

A. The duties and responsibilities and the limitations of authority of Engineer are set forth in the Contract Documents.

9.02 Clarifications and Interpretations

A. Engineer will issue with reasonable promptness such written clarifications or interpretations of the Contract Documents as Engineer may determine necessary, which shall be consistent with or reasonably inferable from the overall intent of the Contract Documents. Such written clarifications and interpretations will be binding on Buyer and Seller. If either Buyer or Seller believes that a written clarification or interpretation justifies an adjustment in the Contract Price or Contract Times, either may make a Claim therefor.

9.03 Authorized Variations

A. Engineer may authorize minor deviations or variations in the Contract Documents by: 1) written approval of specific variations set forth in Shop Drawings when Seller has duly noted such variations as required in Paragraph 5.06.C.4, or 2) a Field Order.

9.04 Rejecting Non-Conforming Goods and Special Services

A. Engineer will have the authority to disapprove or reject Goods and Special Services that Engineer believes to be non-conforming. Engineer will also have authority to require special inspection or testing of the Goods or Special Services as provided in Paragraph 8.01 whether or not the Goods are fabricated or installed, or the Special Services are completed.

9.05 Decisions on Requirements of Contract Documents

A. Engineer will be the initial interpreter of the Contract Documents and judge of the acceptability of the Goods and Special Services. Claims, disputes and other matters relating to the acceptability of the Goods and Special Services or the interpretation of the requirements of the Contract Documents pertaining to Seller's performance will be referred initially to Engineer in writing with a request for a formal decision in accordance with this paragraph.

B. When functioning as interpreter and judge under this Paragraph 9.05, Engineer will not show partiality to Buyer or Seller and will not be liable in connection with any interpretation or decision rendered in good faith in such capacity. The rendering of a decision by Engineer pursuant to this Paragraph 9.05 with respect to any such Claim, dispute, or other matter (except any which have been waived by the making or acceptance of final payment as provided in Paragraph 10.07) will be a condition precedent to any exercise by Buyer or Seller of such rights or remedies as either may otherwise have under the Contract Documents or by Laws or Regulations in respect of any such Claim, dispute, or other matter.

9.06 Claims and Disputes

A. Notice: Written notice of each Claim relating to the acceptability of the Goods and Special Services or the interpretation of the requirements of the Contract Documents pertaining to either party's performance shall be delivered by the claimant to Engineer and the other party to the Agreement within 15 days after the occurrence of the event giving rise thereto, and written supporting data shall be submitted to Engineer and the other party within 45 days after such occurrence unless Engineer allows an additional period of time to ascertain more accurate data.

B. Engineer's Decision: Engineer will review each such Claim and render a decision in writing within 30 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any.

C. If Engineer does not render a formal written decision on a Claim within the time stated in Paragraph 9.06.B., Engineer shall be deemed to have issued a decision denying the Claim in its entirety 31 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any.

D. Engineer's written decision on such Claim or a decision denying the Claim in its entirety that is deemed to have been issued pursuant to Paragraph 9.06.C, will be final and binding upon Buyer and Seller 30 days after it is issued unless within 30 days of issuance Buyer or Seller appeals Engineer's decision by initiating the mediation of such

Claim in accordance with the dispute resolution procedures set forth in Article 13.

E. If Article 13 has been amended to delete the mediation requirement, then Buyer or Seller may appeal Engineer's decision within 30 days of issuance by following the alternative dispute resolution process set forth in Article 13, as amended; or if no such alternative dispute resolution process has been set forth, Buyer or Seller may appeal Engineer's decision by 1) delivering to the other party within 30 days of the date of such decision a written notice of intent to submit the Claim to a court of competent jurisdiction, and 2) within 60 days after the date of such decision instituting a formal proceeding in a court of competent jurisdiction.

F. No Claim for an adjustment in Contract Price or Contract Times will be valid if not submitted in accordance with this Paragraph 9.06.

G. The parties agree to endeavor to avoid or resolve Claims through direct, good faith discussions and negotiations whenever practicable. Such discussions and negotiations should at the outset address whether the parties mutually agree to suspend the time periods established in this Paragraph 9.06; if so, a written record of such mutual agreement should be made and jointly executed.

ARTICLE 10- PAYMENT

10.01 Applications for Progress Payments

A. Seller shall submit to Buyer for Engineer's review Applications for Payment filled out and signed by Seller and accompanied by such supporting documentation as is required by the Contract Documents and also as Buyer or Engineer may reasonably require. The timing and amounts of progress payments shall be as stipulated in the Agreement.

1. The first application for Payment will be submitted after review by Engineer of all Shop Drawings and of all Samples required by the Contract Documents.

2. The second Application for Payment will be submitted after receipt of the Goods has been acknowledged in accordance with Paragraph 8.01.B and will be accompanied by a bill of sale, invoice, or other documentation reasonably satisfactory to Buyer warranting that Buyer has rightfully received good title to the Goods from Seller and that, upon payment, the Goods will be free and clear of all liens. Such documentation will include releases and waivers from all parties with viable lien rights. In the case of multiple deliveries of Goods, additional Applications for Payment accompanied by the required documentation will be submitted as Buyer acknowledges receipt of additional items of the Goods.

10.02 Review of Applications for Progress Payments

A. Engineer will, within ten days after receipt of each Application for Payment, either indicate in writing a recommendation of payment and present the Application to Buyer, or return the Application to Seller indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Seller may make the necessary corrections and resubmit the Application.

1. Engineer's recommendation of payment requested in the first Application for Payment will constitute a representation by Engineer, based on Engineer's review of the Application for Payment and the accompanying data that the Shop Drawings and Samples have been reviewed and approved as required by the Contract Documents and Seller is entitled to payment of the amount recommended.

2. Engineer's recommendation of payment requested in the Application for Payment submitted upon Buyer's acknowledgment of receipt of the Goods will constitute a representation by Engineer, based on Engineer's review of the Application for Payment and the accompanying data Seller is entitled to payment of the amount recommended. Such recommendation will not constitute a representation that Engineer has made a final inspection of the Goods, that the Goods are free from non-conformities, acceptable or in conformance with the Contract Documents, that Engineer has made any investigation as to Buyer's title to the Goods, that exhaustive or continuous inspections have been made to check the quality or the quantity of the Goods beyond the responsibilities specifically assigned to Engineer in the Contract Documents or that there may not be other

matters or issues between the parties that might entitle Seller to additional payments by Buyer or Buyer to withhold payment to Seller.

3. Engineer may refuse to recommend that all or any part of a progress payment be made, or Engineer may nullify all or any part of any payment previously recommended if, in Engineer's opinion, such recommendation would be incorrect or if on the basis of subsequently discovered evidence or subsequent inspections or tests Engineer considers such refusal or nullification necessary to protect Buyer from loss because the Contract Price has been reduced, Goods are found to be non-conforming, or Seller has failed to furnish acceptable Special Services.

10.03 Amount and Timing of Progress Payments

A. Subject to Paragraph 10.02.A., the amounts of the progress payments will be as provided in the Agreement. Buyer shall within 45 days after receipt of each Application for Payment with Engineer's recommendation pay Seller the amount recommended; but, in the case of the Application for Payment upon Buyer's acknowledgment of receipt of the Goods, said 45-day period may be extended for so long as is necessary (but in no event more than 60 days) for Buyer to examine the bill of sale and other documentation submitted therewith. Buyer shall notify Seller promptly of any deficiency in the documentation and shall not unreasonably withhold payment.

10.04 Suspension of or Reduction in Payment

A. Buyer may suspend or reduce the amount of progress payments, even though recommended for payment by Engineer, under the following circumstances:

1. Buyer has reasonable grounds to conclude that Seller will not furnish the Goods or the Special Services in accordance with the Contract Documents, and

2. Buyer has requested in writing assurances from Seller that the Goods and Special Services will be delivered or furnished in accordance with the Contract Documents, and Seller has failed to provide adequate assurances within ten days of Buyer's written request.

B. If Buyer refuses to make payment of the full amount recommended by Engineer, Buyer will provide Seller and Engineer immediate written notice stating the reason for such action and promptly pay Seller any amount remaining after deduction of the amount withheld. Buyer shall promptly pay Seller the amount withheld when Seller corrects the reason for such action to Buyer's satisfaction.

10.05 Final Application for Payment

A. After Seller has corrected all non-conformities to the reasonable satisfaction of Buyer and Engineer, furnished all Special Services, and delivered all documents required by the Contract Documents, Engineer will issue to Buyer and Seller a notice of acceptance. Seller may then make application for final payment following the procedure for progress payments. The final Application for Payment will be accompanied by all documentation called for in the Contract Documents, a list of all unsettled Claims, and such other data and information as Buyer or Engineer may reasonably require.

10.06 Final Payment

A. If, on the basis of final inspection and the review of the final Application for Payment and accompanying documentation, Engineer is reasonably satisfied that Seller has furnished the Goods and Special Services in accordance with the Contract Documents, and that Seller's has fulfilled all other obligations under the Contract Documents, then Engineer will, within ten days after receipt of the final Application for Payment, recommend in writing final payment subject to the provisions of Paragraph 10.07 and present the Application to Buyer. Otherwise, Engineer will return the Application to Seller, indicating the reasons for refusing to recommend final payment, in which case Seller shall make the necessary corrections and resubmit the Application for payment. If the Application and accompanying documentation are appropriate as to form and substance, Buyer shall, within 45 days after receipt thereof, pay Seller the amount recommended by Engineer, less any sum Buyer is entitled to set off against Engineer's recommendation, including but not limited to liquidated damages to which Buyer is entitled.

10.07 Waiver of Claims

- A. The making and acceptance of final payment will constitute:
1. a waiver of all Claims by Buyer against Seller, except Claims arising from unsettled liens from non-conformities in the Goods or Special Services appearing after final payment, from Seller's failure to comply with the Contract Documents or the terms of any special guarantees specified therein, or from Seller's continuing obligations under the Contract Documents; and
 2. a waiver of all Claims by Seller against Buyer (other than those previously made in accordance with the requirements herein and listed by Seller as unsettled as required in Paragraph 10.05.A, and not resolved in writing).

ARTICLE 11 - CANCELLATION, SUSPENSION, AND TERMINATION

11.01 Cancellation

A. Buyer has the right to cancel the Contract, without cause, at any time prior to delivery of the Goods by written notice. Cancellation pursuant to the terms of this paragraph shall not constitute a breach of contract by Buyer. Upon cancellation:

1. Buyer shall pay Seller for the direct costs incurred in producing any Goods that Seller has specially manufactured for the Project, plus a fair and reasonable amount for overhead and profit.
2. For Goods that are not specially manufactured for the Project, Seller shall be entitled to a restocking charge of 10 percent of the unpaid Contract Price of such Goods.

11.02 Suspension of Performance by Buyer

A. Buyer has the right to suspend performance of the Contract for up to a maximum of ninety days, without cause, by written notice. Upon suspension under this paragraph, Seller shall be entitled to an increase in the Contract Times and Contract Price caused by the suspension, provided that performance would not have been suspended or delayed for causes attributable to Seller.

11.03 Suspension of Performance by Seller

A. Subject to the provisions of Paragraph 5.07.B, Seller may suspend the furnishing of the Goods and Special Services only under the following circumstance:

1. Seller has reasonable grounds to conclude that Buyer will not perform its future payment obligations under the Contract; and,
2. Seller has requested in writing assurances from Buyer that future payments will be made in accordance with the Contract, and Buyer has failed to provide such assurances within ten days of Seller's written request.

11.04 Breach and Termination

A. Buyer's Breach:

1. Buyer shall be deemed in breach of the Contract if it fails to comply with any material provision of the Contract Documents, including but not limited to:
 - a. wrongful rejection or revocation of Buyer's acceptance of the Goods,
 - b. failure to make payments in accordance with the Contract Documents, or
 - c. wrongful repudiation of the Contract.
2. Seller shall have the right to terminate the Contract for cause by declaring a breach should Buyer fail to comply with any material provisions of the Contract. Upon termination, Seller shall be entitled to all remedies provided by Laws and Regulations.

a. In the event Seller believes Buyer is in breach of its obligations under the Contract, Seller shall provide Buyer with reasonably prompt written notice setting forth in sufficient detail the reasons for declaring that it believes a breach has occurred. Buyer shall have seven days from receipt of the written notice declaring the breach (or such longer period of time as Seller may grant in writing) within which to cure or to proceed diligently to cure such alleged breach.

B. Seller's Breach:

1. Seller shall be deemed in breach of the Contract if it fails to comply with any material provision of the Contract Documents, including, but not limited to:

- a. failure to deliver the Goods or perform the Special Services in accordance with the Contract Documents,
- b. wrongful repudiation of the Contract, or
- c. delivery or furnishing of non-conforming Goods and Special Services.

2. Buyer may terminate Seller's right to perform the Contract for cause by declaring a breach should Seller fail to comply with any material provision of the Contract Documents. Upon termination, Buyer shall be entitled to all remedies provided by Laws and Regulations.

a. In the event Buyer believes Seller is in breach of its obligations under the Contract, and except as provided in Paragraph 11.04.B.2.b, Buyer shall provide Seller with reasonably prompt written notice setting forth in sufficient detail the reasons for declaring that it believes a breach has occurred. Seller shall have seven days from receipt of the written notice declaring the breach (or such longer period of time as Buyer may grant in writing) within which to cure or to proceed diligently to cure such alleged breach.

b. If and to the extent that Seller has provided a performance bond under the provisions of Paragraph 4.01, the notice and cure procedures of that bond, if any, shall supersede the notice and cure procedures of Paragraph 11.04.B.2.a.

ARTICLE 12 - LICENSES AND FEES

12.01 Intellectual Property and License Fees

A. Unless specifically stated elsewhere in the Contract Documents, Seller is not transferring any intellectual property rights, patent rights, or licenses for the Goods delivered. However, in the event the Seller is manufacturing to Buyer's design, Buyer retains all intellectual property rights in such design.

B. Seller shall pay all license fees and royalties and assume all costs incident to the use or the furnishing of the Goods, unless specified otherwise by the Contract Documents.

12.02 Seller's Infringement

A. Subject to Paragraph 12.01.A, Seller shall indemnify and hold harmless Buyer, Engineer and their officers, directors, members, partners, employees, agents, consultants, contractors, and subcontractors from and against all claims, costs, losses, damages, and judgments (including but not limited to all reasonable fees and charges of engineers, architects, attorneys and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement or alleged infringement of any United States or foreign patent or copyright by any of the Goods as delivered hereunder.

B. In the event of suit or threat of suit for intellectual property infringement, Buyer will promptly notify Seller of receiving notice thereof.

C. Seller shall promptly defend the claim or suit, including negotiating a settlement. Seller shall have control over such claim or suit, provided that Seller agrees to bear all expenses and to satisfy any adverse judgment thereof.

1. If Seller fails to defend such suit or claim after written notice by Buyer, Seller will be bound in any subsequent suit or claim against Seller by Buyer by any factual determination in the prior suit or claim.

2. If Buyer fails to provide Seller the opportunity to defend such suit or claim after written notice by Seller, Buyer shall be barred from any remedy against Seller for such suit or claim.

D. If a determination is made that Seller has infringed upon intellectual property rights of another, Seller may obtain the necessary licenses for Buyer's benefit, or replace the Goods and provide related design and construction as necessary to avoid the infringement at Seller's own expense.

12.03 Buyer's Infringement

A. Buyer shall indemnify and hold harmless Seller, and its officers, directors, partners, employees, agents, consultants, contractors, and subcontractors from and against all claims, costs, losses, damages, and judgments (including but not limited to all reasonable fees and charges of engineers, architects, attorneys and other professionals and all court or arbitration or other dispute

resolution costs) arising out of or relating to any infringement or alleged infringement of any United States or foreign patent or copyright caused by Seller's compliance with Buyer's design of the Goods or Buyer's use of the Goods in combination with other materials or equipment in any process (unless intent of such use was known to Seller and Seller had reason to know such infringement would result).

B. In the event of suit or threat of suit for intellectual property infringement, Seller must after receiving notice thereof promptly notify Buyer.

C. Upon written notice from Seller, Buyer shall be given the opportunity to defend the claim or suit, including negotiating a settlement. Buyer shall have control over such claim or suit, provided that Buyer agrees to bear all expenses and to satisfy any adverse judgment thereof.

1. If Buyer fails to defend such suit or claim after written notice by Seller, Buyer will be bound in any subsequent suit or claim against Buyer by Seller by any factual determination in the prior suit or claim.

2. If Seller fails to provide Buyer the opportunity to defend such suit or claim after written notice by Buyer, Seller shall be barred from any remedy against Buyer for such suit or claim.

12.04 Reuse of Documents

A. Neither Seller nor any other person furnishing any of the Goods and Special Services under a direct or indirect contract with Seller shall: (1) acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or its consultants, including electronic media versions; or (2) reuse any of such Drawings, Specifications, other documents, or copies thereof on any other project without written consent of Buyer and Engineer and specific written verification or adaptation by Engineer. This prohibition will survive termination or completion of the Contract. Nothing herein shall preclude Seller from retaining copies of the Contract Documents for record purposes.

12.05 Electronic Data

A. Unless otherwise stated, copies of data furnished by Buyer or Engineer to Seller, or by Seller to Buyer or Engineer that may be relied upon are limited to the printed copies (also known as hard copies). Files in electronic media format of text, data, graphics, or other types are furnished only for the convenience of the receiving party. Any conclusion or information obtained or derived from such electronic files will be at the user's sole risk. If there is a discrepancy between the electronic files and the hard copies, the hard copies govern.

B. Because data stored in electronic media format can deteriorate or be modified inadvertently or otherwise without authorization of the data's creator, the party receiving electronic files agrees that it will perform acceptance tests or procedures within 60 days, after which the receiving party shall be deemed to have accepted the data thus transferred. The transferring party will correct any errors detected within the 60-day acceptance period.

C. When transferring documents in electronic media format, the transferring party makes no representations as to long term compatibility, usability, or readability of documents resulting from the use of software application packages, operating systems, or computer hardware differing from those used by the data's creator.

ARTICLE 13 - DISPUTE RESOLUTION

13.01 Dispute Resolution Method

A. Either Buyer or Seller may initiate the mediation of any Claim decided in writing by Engineer under Paragraph 9.06.B or 9.06.C before such decision becomes final and binding. The mediation will be governed by the Construction Industry Mediation Rules of the American Arbitration Association in effect as of the Effective Date of the Agreement. The request for mediation shall be submitted in writing to the American Arbitration Association and the other party to the Contract. Timely submission of the request shall stay the Engineer's decision from becoming final and binding. The venue for any mediation proceeding shall be in an agreed upon location in Kane County, IL.

B. Buyer and Seller shall participate in the mediation process in good faith. The process shall be concluded within 60 days of filing of the request. The date of termination of the mediation shall be determined by application of the mediation rules referenced above.

C. If the mediation process does not result in resolution of the Claim, then Engineer's written decision under Paragraph 9.06.B or a denial pursuant to Paragraph 9.06.C shall become final and binding 30 days after termination of the mediation unless, within that time period, Buyer or Seller:

1. elects in writing to invoke any dispute resolution process provided for in Article 13, or

2. agrees with the other party to submit the Claim to another dispute resolution process, or

3. if no dispute resolution process has been provided for in Article 13, delivers to the other party written notice of the intent to submit the Claim to a court of competent jurisdiction, and within 60 days of the termination of the mediation institutes such formal proceeding.

13.02 Arbitration

A. All Claims or counterclaims, disputes, or other matters in question between Buyer and Seller arising out of or relating to the Contract Documents or the breach thereof (except for Claims which have been waived by the making or acceptance of final payment as provided by Paragraph 10.07) not resolved under the provisions of Paragraph 13.01 will be decided by binding arbitration in accordance with the rules of American Arbitration Association, subject to the conditions and limitations of this Paragraph. This agreement to arbitrate and any other agreement or consent to arbitrate entered into will be specifically enforceable under the prevailing law of any court having jurisdiction. Arbitration shall take place in or near Kane County, Illinois.

B. No demand for arbitration of any Claim or counterclaim, dispute, or other matter that is required to be referred to Engineer initially for decision in accordance with Paragraph 9.06 will be made until the earlier of: (i) the date on which Engineer has rendered a written decision, or (ii) the 31st day after the parties have presented their final evidence to Engineer if a written decision has not been rendered by Engineer before that date. Subject to the provisions of Paragraph 13.02.A, no demand for arbitration of any such Claim or counterclaim, dispute, or other matter will be made later than 30 days after the date on which Engineer has rendered a written decision in respect thereof in accordance with Paragraph 9.06; and the failure to demand arbitration within said 30 day period will result in Engineer's decision being final and binding upon Buyer and Seller. If Engineer renders a decision after arbitration proceedings have been initiated, such decision may be entered as evidence but will not supersede the arbitration proceedings, except where the decision is acceptable to the parties concerned.

C. Notice of the demand for arbitration will be filed in writing with the other party to the Contract and with the selected arbitrator or arbitration provider, and a copy will be sent to Engineer for information. The demand for arbitration will be made within the 30 day period specified in Paragraph 13.02.B, and in all other cases within a reasonable time after the Claim or counterclaim, dispute, or other matter in question has arisen, and in no event shall any such demand be made after the date when institution of legal or equitable proceedings based on such Claim or other dispute or matter in question would be barred by the applicable statute of limitations.

D. No arbitration arising out of or relating to the Contract Documents shall include by consolidation, joinder, or in any other manner any other individual or entity (including Engineer, and Engineer's consultants and the officers, directors, partners, agents, employees or consultants of any of them) who is not a party to this Contract unless:

1. the inclusion of such other individual or entity is necessary if complete relief is to be afforded among those who are already parties to the arbitration; and

2. such other individual or entity is substantially involved in a question of law or fact which is common to those who are already parties to the arbitration and which will arise in such proceedings.

E. The award rendered by the arbitrator shall be in writing and include: (i) a concise breakdown of the award; (ii) a written explanation

of the award specifically citing the Contract Document provisions deemed applicable and relied on in making the award.

F. The award will be consistent with the agreement of the parties and final. Judgment may be entered upon it in any court having jurisdiction thereof, and it will not be subject to modification or appeal.

ARTICLE 14- MISCELLANEOUS

14.01 Giving Notice

A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if: 1) delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended, or 2) if delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

14.02 Controlling Law

A. This Contract is to be governed by the law of the state in which the Point of Destination is located.

B. In the case of any conflict between the express terms of this Contract and the Uniform Commercial Code, as adopted in the state whose law governs, it is the intent of the parties that the express terms of this Contract shall apply.

14.03 Computation of Time

A. When any period of time is referred to in the Contract Documents by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a

Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day shall be omitted from the computation.

14.04 Cumulative Remedies

A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract Documents, and the provisions of this paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

14.05 Survival of Obligations

A. All representations, indemnifications, warranties and guarantees made in, required by, or given in accordance with the Contract Documents, as well as all continuing obligations indicated in the Contract Documents, will survive final payment, completion, and acceptance of the Goods and Special Services and termination or completion of the Agreement.

14.06 Entire Agreement

A. Buyer and Seller agree that this Agreement is the complete and final agreement between them, and supersedes all prior negotiations, representations, or agreements, either written or oral. This Agreement may not be altered, modified, or amended except in writing signed by an authorized representative of both parties

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Goods and Special Services covered by Contract Documents.
- B. Agreement.
- C. Goods and Special Services by others.

1.02 GOODS AND SPECIAL SERVICES COVERED BY CONTRACT DOCUMENTS

- A. Goods and Special Services of this Agreement comprises design, fabrication, and delivery F.O.B transformer pad and completely assemble one 34.5kV-12.47kV, 12/16/20MVA power transformer located in Geneva, Illinois for the City of Geneva.

1.03 AGREEMENT

- A. Provides Goods and Special Services under single lump sum Agreement.

1.04 WORK BY OTHERS

- A. Work on Project which will be executed after delivery of Goods and furnishing Special Services of this Agreement, and which is excluded from this Agreement, as follows:
 - 1. Connection of transformer to high-voltage and low-voltage cables and bus work.
 - 2. Connection to power and control cables.
 - 3. Concrete pad foundation.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

PART 1 GENERAL

1.01 SUBMITTAL PROCEDURES

- A. Deliver submittals to person listed below when required by Specification Sections:
 - 1. Engineer: Mr. Philip Schulz, P. E.
Email: schulzphil@stanleygroup.com
Stanley Consultants, Inc.
Stanley Building
225 Iowa Avenue
Muscatine, Iowa 52761-3764
- B. Submittals shall be in English language.
- C. Weights, measures, and units shall be English units with SI metric values following in parenthesis.
- D. Symbols and drawings shall conform to ANSI Y32.2/IEEE 315/CSA Z99.

1.02 SELLER RESPONSIBILITIES

- A. Review submittals prior to submission.
- B. Determine and verify:
 - 1. Field measurements.
 - 2. Field construction criteria.
 - 3. Catalog numbers and similar data.
 - 4. Conformance to Specifications.
- C. Coordinate each submittal with other submittals and with requirements of Goods and Special Services and of Contract Documents.
- D. Notify Engineer in writing, at time of submission, of any deviations in submittals from requirements of Contract Documents. Any such deviations permitted by Engineer will require modifications of Contract Documents.
- E. Provide space on Shop Drawings for Seller and Engineer stamps.
- F. When Shop Drawings are revised for resubmission, identify all changes made since previous submission.
- G. Submittals containing language imposing duties on others (such as verification of dimensions or supply of related information) inconsistent with contract language shall be null and void.
- H. Submittals shall not be used as media for inquiries for information or for verification of information that must be supplied by others to Seller. Inquiries or verification of information shall be made by separate Seller submittal using Request for Information (RFI) process.
- I. Begin no fabrication of Goods requiring submittal review until return of submittals by Engineer with stamp, as either "Reviewed", "Reviewed as Noted", or "Reviewed as Noted-Resubmit."
- J. Distribute copies of reviewed submittals that carry reviewer stamp as either "Reviewed" or "Reviewed as Noted" as appropriate. Instruct parties to promptly report any inability to comply with requirements.
- K. Submittals not requested will not be recognized or processed.

1.03 ENGINEER DUTIES

- A. Review required submittals with reasonable promptness and in accord with schedule, only for general conformance to design concept of Project and compliance with information given in Contract Documents. Review shall not extend to means, methods, sequences, techniques, or procedures of construction or to safety precautions or program incident thereto. Review of a separate item as such will not indicate approval of assembly in which item functions.
- B. Affix stamp and initials or signature, and indicate requirements for resubmittal, or review of submittal. Engineer's action on submittals is classified as follows:
 - 1. Reviewed: Submittal has been reviewed and appears to be in conformance to design concept of Project and Contract Documents. Seller may proceed with fabrication of work in submittal.
 - 2. Reviewed As Noted: Submittal has been reviewed and appears to be in conformance to design concept of Project and Contract Documents, except as noted by reviewer. Seller may proceed with fabrication of work in submittal with modifications and corrections as indicated by reviewer.
 - 3. Reviewed As Noted-Resubmit: Submittal has been reviewed and appears to be in conformance to design concept of Project and Contract Documents, except as noted by reviewer. Seller may proceed with fabrication of work in submittal with modifications and corrections as indicated by reviewer. Seller shall make any corrections indicated by reviewer and resubmit for review.
 - 4. Resubmit: Submittal has been reviewed and appears not to be in conformance to design concept of Project or with Contract Documents. Seller shall not proceed with fabrication of work in submittal, but instead shall make any corrections required by reviewer and resubmit for review.
 - 5. Returned without Review: Submittal is being returned without having been reviewed because: 1) not required by Contract Documents; 2) grossly incomplete; 3) indicates no attempt at conformance to Contract Documents; 4) cannot be reproduced; 5) lacks Seller's completed approval stamp; or 6) lacks design professional's seal when required by law or Contract Documents. If submittal is required by Contract Documents, Seller shall not proceed with Work as detailed in submittal, but instead shall correct defects and resubmit for review.
 - 6. For Information Only: Submittal has not been reviewed but is being retained for informational purposes only.
 - 7. Void: Submittal is voided because it is no longer required or has been superseded by another submittal.
- C. Return 1 copy of submittals to Seller. Seller shall make additional copies as required.
- D. Review of submittals shall not relieve Seller from responsibility for any variation from Contract Documents unless Seller has, in writing, called Engineer's attention to such variation at time of submission, and Engineer has given written concurrence pursuant to Contract Documents to specific variation, nor shall any concurrence by Engineer or other reviewer relieve Seller from responsibility for errors or omissions in submittals.

1.04 SHOP DRAWINGS SUBMITTALS

- A. Submit for review for limited purpose of checking for conformance to information given and design concept expressed in Contract Documents. Produce copies and distribute in accordance with article "Submittal Procedures" and for record documents purposes as described in Section 01 70 00.
- B. Designate in construction schedule, or in separate coordinated submittal schedule, dates for submission and dates that reviewed submittals will be needed.
- C. Make submittals promptly in accordance with approved schedule, and in such sequence as to cause no delay in Work or in work of other Sellers.
- D. Present in clear and thorough manner, complete with respect to dimensions, design criteria, materials of construction, and like information to enable review of information as required.
- E. Details shall be identified by reference to sheet and detail, schedule or room numbers shown on Drawings.

- F. Indicate special utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- G. Equipment which is identified on Contract Documents with tag number or name shall be identified on Shop Drawing with same tag.
- H. Schedule submittals to expedite Project. Coordinate submission of related items.
- I. For each submittal for review, allow 15 days excluding delivery time to and from Seller.
- J. Identify variations from Contract Documents and product or system limitations which may be detrimental to successful performance of completed Work.
- K. Shop Drawings shall be submitted in electronic format.
 - 1. Submit electronic copy on CD, E-mail files.
 - 2. Text documents shall be submitted in .pdf format.
 - 3. Drawings shall be submitted in .pdf or .tif format.
 - 4. Electronic submittal shall be suitable for reproduction in black and white.
- L. Number required:
 - 1. If Shop Drawings are not submitted in electronic format, submit 3 copies of each Shop Drawing.
 - 2. Copies of Shop Drawings submitted shall be black line on white background.
 - 3. Reviewer will reproduce additional copies of Shop Drawings as required for internal distribution.
 - 4. Shop Drawings shall be suitable for reproduction in black and white. Shop Drawings submitted which are not suitable for reproduction will not be reviewed.
 - 5. If Seller will not grant permission to reviewer to reproduce Shop Drawings, submit **3** copies of each Shop Drawing.
 - 6. Samples: Submit number stated in each Specification section.
 - 7. Drawings larger than 8-1/2" x 11" shall be rolled.
- M. Submittals shall contain:
 - 1. Date of submission and dates of any previous submissions.
 - 2. Project title and number.
 - 3. Contract identification.
 - 4. Names of:
 - a. Seller.
 - b. Supplier.
 - c. Manufacturer.
 - 5. Identification of product, with Specification section number and article number.
 - 6. Field dimensions, clearly identified as such.
 - 7. Relation to adjacent or critical features of Work or materials.
 - 8. Applicable standards, such as ASTM or Federal Specification numbers.
 - 9. Identification of deviations from Contract Documents.
 - 10. Identification of revisions on resubmittals.
 - 11. An 8" x 3" blank space for Seller and reviewer stamps.
 - 12. Indication of Seller's approval, initialed or signed, with wording substantially as follows:

"Seller represents to Buyer and Engineer that Seller has either determined and verified all quantities, dimensions, field construction criteria, materials, catalog numbers, and similar data, or assumes full responsibility for doing so and has reviewed or coordinated each submittal with requirements of Work and Contract Documents."
 - 13. If Contract Documents include performance specifications stating required results which can be verified as meeting stipulated criteria, so that further design by Seller prior to fabrication is necessary, Submittal depicting such design must be prepared under seal of professional engineer registered licensed in appropriate state and Submittal shall be signed and sealed in accordance with applicable regulations and with following certification statement:

"I hereby certify that this engineering document was prepared by me or under my direct personal supervision, that I am a duly registered licensed professional engineer under laws of state of Illinois and I accept responsibility for adequacy of this document to meet criteria stipulated in Contract Documents."

N. Product Data:

1. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
2. Indicate product utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

O. Design data:

1. Submit for Engineer's knowledge as contract administrator or for Buyer.
2. Submit for information for limited purpose of assessing conformance with information given and design concept expressed in Contract Documents.

P. Data sheets:

1. Data sheets may require information not known until Seller's engineering is complete. Furnish estimated values based on good engineering judgment. Estimated values shall be identified by placement of "(est.)" next to value.
2. Data Sheets shall be updated and resubmitted by Seller once final values are known.
3. Do not leave items blank or labeled "To Be Determined" or "Later."
4. Do not submit manufacturer Product Data instead of completed data sheets.

Q. Test reports:

1. Submit for Engineer's knowledge as contract administrator or for Buyer.
2. Submit test reports for information for limited purpose of assessing conformance with information given and design concept expressed in Contract Documents.

R. Certificates:

1. When specified in individual specification sections, submit certification by manufacturer, installation/application subcontractor.
2. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
3. Certificates may be recent or previous test results on material or product, but must be acceptable to reviewer.

S. Manufacturer's instructions:

1. When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, adjusting, and finishing, to Engineer for delivery to Buyer in quantities specified for Product Data.
2. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

T. Manufacturer's field reports:

1. Submit report in duplicate within 30 days of observation for information.
2. Submit for information for limited purpose of assessing conformance with information given and design concept expressed in Contract Documents.

U. Erection drawings:

1. Submit for information for limited purpose of assessing conformance with information given and design concept expressed in Contract Documents.
2. Data indicating inappropriate or unacceptable Work may be subject to action by Engineer or Buyer.

V. Samples:

1. Samples for selection as specified in product sections:
 - a. Submit for aesthetic, color, or finish selection.

- b. Submit samples of finishes from full range of manufacturers' standard colors, textures, and patterns for selection.
 2. Submit to illustrate functional and aesthetic characteristics of product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
 3. Include identification on each sample, with full Project information.
 4. Submit number specified in individual Specification Sections; 1 of which will be retained by Engineer.
 5. Reviewed Samples which may be used in Work are indicated in individual Specification Sections.
 6. Samples will not be used for testing purposes unless specifically stated in specification section.
 7. Field Samples and mock-ups:
 - a. Erect at Project Site, at location acceptable to Engineer.
 - b. Size or area: That specified in respective Specification Section.
 - c. Fabricate each Sample and mock-up complete and finished.
 - d. Remove mock-ups upon acceptance of Work or when acceptable to Engineer.
- W. Operations and maintenance manuals:
 1. Designate in construction schedule, or in separate coordinated schedule, dates for submission and dates that reviewed operations and maintenance manuals will be needed.
 2. Operations and maintenance manuals shall be presented in clear and thorough manner, complete with respect to dimensions, design criteria, materials of construction, and like information to enable reviewer to review information as required. Details shall be identified by reference to sheet and detail, schedule or room numbers shown on Drawings.

1.05 RESUBMISSION REQUIREMENTS

- A. Make any corrections or changes in submittals required by Engineer and resubmit until stamped as either "Reviewed," "Reviewed as Noted," or "For Information Only."
- B. Text and depictions changed on Submittal shall be back-circled (clouded).
- C. Engineer will assume that portions of Submittal not back-circled have not been changed by Seller from previous submission.
- D. Indicate revision number and date in document revision block.

1.06 DISTRIBUTION

- A. Distribute reproductions of Shop Drawings which carry Engineer stamp as either "Reviewed" or "Reviewed as Noted" to:
 1. Record Documents file.
 2. Supplier or fabricator.
- B. Distribute Samples which carry Engineer stamp as either "Reviewed" or "Reviewed as Noted" as directed by Engineer.

1.07 SUBMITTAL TRANSMITTAL FORM PROCEDURES

- A. Submittals shall be accompanied by completed copies of Submittal Transmittal form, bound herein. An electronic version of transmittal form is available and may be obtained from Engineer. Reproduce additional copies required.
- B. Submit **1** copy of transmittal form for initial submittals and resubmittals. Sequentially number transmittal form. Revise submittals with original number and sequential alphabetic suffix.
- C. Prior to submittal, complete information under heading "Seller's Transmittal."
- D. Engineer will complete information under "Reviewer's Action."
- E. Do not include submittals for more than one section of Specifications on Submittal Transmittal form.

- F. Identify project title, location, and number and contract title and number.
- G. Identify preparer name and, submittal number, including preparer's submittal revision number.
- H. A brief description under "Title" should clearly identify specific application of equipment or material covered by Submittal, utilizing where possible same title used in Drawings and Specifications.
- I. Identify Specification Section number.
- J. Apply Seller's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction work, and coordination of information is in accordance with requirements of Contract Documents.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

PART 1 GENERAL

1.01 SERVICE ENGINEER RESPONSIBILITIES

- A. Contractor shall provide qualified Service Engineer(s), as necessary to:
 - 1. Supervise assembly of equipment.
 - 2. Inspect equipment after it is installed to assure that all details of installation are correct and that equipment is prepared for operation in accordance with manufacturer's instructions and recommendations.
 - 3. Check connections to equipment and adjust, or supervise adjustment of, control and indicating devices after equipment has been installed and connected.
 - 4. Fully instruct Owner's operating personnel in operation and maintenance of equipment.
 - 5. Provide Engineer with duplicate copies of final alignment and clearance measurements on all rotating or reciprocating equipment. Measurements shall clearly identify each piece of equipment.
 - 6. Supervise preliminary operation of equipment and necessary adjustments.
- B. Presence of Service Engineer will in no way relieve Contractor of any responsibility assumed under Agreement.
- C. Work and abilities of Service Engineer shall be subject to review of Engineer. If Engineer determines that any Service Engineer is not properly qualified, Contractor shall replace Service Engineer upon written notification by Engineer.
- D. Contractor shall provide continuity in assignment of Service Engineer to Work. In event substitution of Service Engineer is made which is not at request of Engineer, substitute's time for "familiarization" shall be at Contractor's expense.
- E. Service Engineer shall make trips only with approval of Engineer, shall report in person daily to Resident Project Representative while at site, and shall submit written record of time spent at site and report on results of trip to site to Resident Project Representative weekly. Per diem unit adjustment price is based on 8 hours at site each day and includes out-of-pocket expenses at site. Only that time spent by Service Engineer at site with Engineer's approval shall be credited against total service day as estimated in Agreement. Hours worked in excess of normal 8 hours in any day will be paid for at one-eighth of per diem rate per hour.
- F. If any of Service Engineer's time spent at site or if any of his trips to site are required to make corrections to equipment supplied under Agreement resulting from defective design, material or workmanship used in manufacture of equipment, such time and trips will be at Contractor's expense and will not be counted against number of working days or trips specified, nor will unit adjustment prices apply.
- G. Contractor will provide, from manufacturer of equipment, Service Engineer who will perform functions specified for equipment provided Contract Documents.
 - 1. Contractor shall pay for cost of time and trips to site of Service Engineer provided by Contractor if additional time or trips are required because of defective workmanship, materials, or equipment furnished under this Agreement.
 - 2. Engineer will be sole determining agent as to reasonableness of Service Engineer's claim for added compensation.
- H. Service Engineer shall make trips only with approval of Engineer, shall report in person daily to Resident Project Representative while at site, and shall submit written record of time spent at site and report on results of trip to site to Resident Project Representative weekly. Per diem unit adjustment price is based on 8 hours each day. Hours worked in excess of normal 8 hours in any day will be paid for at one-eighth of per diem rate per hour.
- I. If any of Service Engineer's time spent at site or if any of his trips to site are required to make corrections to equipment supplied under Agreement resulting from defective design, material, or workmanship used in manufacture of equipment, such time and trips will be at Contractor's expense

and will not be counted against number of working days or trips specified, nor will unit *adjustment* prices apply.

1.02 SUPERINTENDENT RESPONSIBILITIES

- A. Contractor shall provide qualified person to act as superintendent for unloading and placement of transformer on existing concrete pad and take responsibility for the following:
1. Maintaining site safety during unloading and placement.
 2. Instruct and advise crew during unloading and placement taking care not to damage existing construction.
 3. Inspect completed job for compliance with requirements of specification.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

PART 1 GENERAL

1.01 PRODUCTS

- A. Provide products of qualified manufacturers suitable for intended use. Provide products of each type by a single manufacturer unless specified otherwise.
- B. Do not use materials and equipment removed from existing premises, except as specifically permitted by the Contract Documents.
- C. Provide interchangeable components of the same manufacturer for components being replaced.

1.02 PRODUCT DELIVERY REQUIREMENTS

- A. Transport and handle products in accordance with manufacturer's instructions.
- B. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.
- C. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

1.03 RECEIVING, UNLOADING AND STORING

- A. Unload equipment as soon as possible after arrival. Contractor shall pay freight railcar and truck demurrage, detention, and any other costs which may be billed to Owner due to failure to unload railcars or trucks within time required by freight companies.
- B. Use of bare wire rope slings for unloading and handling equipment and materials is prohibited without Owner approval.
- C. Equipment and materials shall be stored and maintained in accordance with manufacturer's recommendations and these specifications.
- D. Provide physical protection for equipment placed in storage.
 - 1. Stored equipment shall be supported above ground and shall be covered with canvas or other heavy-duty sheeting. Cover shall be securely fastened and shall be replaced if torn or otherwise damaged during storage period.
 - 2. Following items shall be stored in weatherproof, heated (minimum 50°F) building complete with bins for storage of small pieces of equipment. Storage inside of existing plant will not be available.
 - a. Electronic instruments and cabinets.
 - b. Electrical equipment with general purpose enclosures.
 - c. Insulation materials.
 - d. Rotating equipment.
 - e. Miscellaneous electronic equipment, gaskets, and small machined parts.
 - f. Instruments and controls.
 - g. Protection panels.
- E. Inspect stored equipment weekly and document activities performed. Renew protective coatings as necessary to preserve fitness of equipment.
- F. Contractor shall provide materials, equipment, and labor required for such storage and maintenance. Contractor shall be accountable for any deterioration of materials or equipment occasioned by improper storage or maintenance, and shall recondition, repair, or replace any such materials or equipment without additional cost to Owner.

- G. Electrical equipment or equipment with any electrical components stored outdoors shall be supported at least 12" above ground.

1.04 GENERAL STORAGE

- A. Store products immediately on delivery in accordance with manufacturer's instructions, with seals and labels intact. Protect until installed.
- B. Arrange storage in manner to provide access for maintenance of stored items and for inspection.

1.05 ENCLOSED STORAGE

- A. Store products subject to damage by elements in substantial weathertight enclosures.
- B. Maintain temperature and humidity within ranges required by manufacturer's instructions.
- C. Provide humidity control and ventilation for sensitive products, as required by manufacturer's instructions.
- D. Store unpacked and loose products on shelves, in bins, or in neat groups of like items.

1.06 EXTERIOR STORAGE

- A. Provide substantial platforms, blocking, or skids, to support fabricated products above ground; slope to provide drainage. Protect products from soiling and staining.
- B. For products subject to discoloration or deterioration from exposure to elements, cover with impervious sheet material. Provide ventilation to avoid condensation.
- C. Store loose granular materials on clean, solid surfaces such as pavement, or on rigid sheet materials, to prevent mixing with foreign matter.
- D. Provide surface drainage to prevent flow or ponding of rainwater.
- E. Prevent mixing of refuse or chemically injurious materials or liquids.

1.07 MAINTENANCE OF STORAGE

- A. Periodically inspect stored products on scheduled basis. Maintain log of inspections, make available to Engineer on request.
- B. Verify storage facilities comply with manufacturer's product storage requirements.
- C. Verify manufacturer required environmental conditions are maintained continually.
- D. Verify surfaces of products exposed to elements are not adversely affected and if weathering of finishes is acceptable under requirements of Contract Documents.

1.08 MAINTENANCE OF EQUIPMENT STORAGE

- A. For mechanical and electrical equipment in long-term storage, manufacturer's service instructions shall accompany each item, with notice of enclosed instructions shown on exterior of package.
- B. Service equipment on regularly scheduled basis, maintaining log of services; submit as record document.

1.09 PRODUCTS LIST

- A. Within 30 days after effective date of Agreement, submit complete list of major products which are proposed for installation electronically to Engineer.
- B. Tabulate products by Specification section number and title.
- C. For products specified only by reference standards, list for each such product:
 - 1. Name and address of manufacturer.
 - 2. Trade name.
 - 3. Model or catalog designation.
 - 4. Manufacturer's data:
 - a. Reference standards.
 - b. Performance test data.

1.10 PRODUCT OPTIONS

- A. For products specified only by reference standard, select product meeting that standard, by any manufacturer.
- B. For products specified by naming several products or manufacturers, select any one of products and manufacturers named which complies with Specifications.
- C. For products specified by naming one or more products or manufacturers and stating "or equal," submit request as for substitutions for any product or manufacturer which is not specifically named.
- D. For products specified by naming only one product and manufacturer, there is no option and no substitution will be allowed.
- E. Whenever Specifications call for item by manufacturer's name and type and additional features of item are specifically required by Specifications, additional features specified shall be provided whether or not they are normally included in standard manufacturer's item listed.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

PART 1 GENERAL

1.01 CLOSEOUT PROCEDURES

- A. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Engineer's review.
- B. Provide submittals to Engineer that are required by governing or other authorities.
- C. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due.

1.02 FINAL CLEANING

- A. Execute final cleaning prior to final project assessment.

1.03 PROJECT RECORD DOCUMENTS

- A. Maintain on site one set of the following record documents; record actual revisions to the Work:
 - 1. Drawings.
 - 2. Specifications.
 - 3. Addenda.
 - 4. Change Orders and other modifications to the Contract.
 - 5. Reviewed Shop Drawings, Product Data, and Samples.
 - 6. Manufacturer's instruction for assembly, installation, and adjusting.
- B. Ensure entries are complete and accurate, enabling future reference by Owner.
- C. Submit documents to Engineer with claim for final Application for Payment

1.04 SPARE PARTS AND MAINTENANCE PRODUCTS

- A. Provide spare parts, maintenance, and extra products in quantities specified in individual specification sections.
- B. Deliver to Project site and place in location as directed; obtain receipt prior to final payment.

1.05 PRODUCT WARRANTIES AND PRODUCT BONDS

- A. Obtain warranties and bonds executed in duplicate by responsible subcontractors, suppliers, and manufacturers, within ten days after completion of the applicable item of work.
- B. Execute and assemble transferable warranty documents and bonds from subcontractors, suppliers, and manufacturers.
- C. Verify that documents are in proper form, contain full information, and are notarized.
- D. Co-execute submittals when required.
- E. Provide Table of Contents and assemble in 3-D side ring binder with durable plastic cover.
- F. Submit prior to final Application for Payment.
- G. Time of Submittals:
 - 1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within 10 days after acceptance.

2. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.
3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty or bond period.

1.06 MAINTENANCE SERVICE

- A. Furnish service and maintenance of components indicated in specification sections during the warranty period.
- B. Examine system components at a frequency consistent with reliable operation. Clean, adjust, and lubricate as required.
- C. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original component.
- D. Maintenance service shall not be assigned or transferred to any agent or Subcontractor without prior written consent of the Owner.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

PART 1 GENERAL

1.01 OPERATING AND MAINTENANCE DATA REQUIREMENTS

- A. Operating and maintenance data shall be in English language.
- B. Compile product data and related information appropriate for Owner's maintenance and operation of products furnished under Agreement.
- C. Prepare operating and maintenance data as specified in this section and as referenced in other pertinent sections of Specifications.
- D. Instruct Owner's personnel in maintenance of products and in operation of equipment and systems.

1.02 QUALITY ASSURANCE

- A. Preparation of data shall be done by personnel:
 - 1. Trained and experienced in maintenance and operation of described products.
 - 2. Familiar with requirements of this section.
 - 3. Skilled as technical writers to extent required to communicate essential data.
 - 4. Skilled as draftsmen competent to prepare required drawings.

1.03 FORM OF SUBMITTALS

- A. Prepare data in form of an instructional manual for use by Owner's personnel.
- B. Format:
 - 1. Sheet size: 8-1/2" x 11" minimum.
 - 2. Paper: 20 lb minimum, white, for typed pages.
 - 3. Text: Manufacturer's printed data, or neatly typewritten.
 - 4. Drawings:
 - a. Provide reinforced punched binder tab, bind in with text.
 - b. Larger size drawings shall be folded to 8-1/2" x 11", and inserted into pockets.
 - 5. Provide fly-leaf for each separate product, or each piece of operating equipment.
 - a. Provide typed description of product, and major component parts of equipment.
 - b. Provide indexed tabs.
 - 6. Cover: Identify each volume with typed or printed title "OPERATING AND MAINTENANCE INSTRUCTIONS." List:
 - a. Title of Project.
 - b. Identity of separate structure as applicable.
 - c. Identity of general subject matter covered in manual.
 - 7. Binders:
 - a. Commercial quality 3-ring binders with durable and cleanable plastic covers.
 - b. Maximum ring size: 3".
 - c. When multiple binders are used, correlate data into related consistent groupings.

1.04 CONTENT OF MANUAL

- A. Neatly typewritten table of contents for each volume, arranged in systematic order.
 - 1. Contractor, name of responsible principal, address, and telephone number.
 - 2. List of each product required to be included, indexed to content of volume.
 - 3. List, with each product, name, address, and telephone number of:
 - a. Subcontractor or installer.
 - b. Maintenance contractor, as appropriate.
 - c. Identify area of responsibility of each.
 - d. Local source of supply for parts and replacement and list of recommended spare parts.

4. Identify each product by product name and other identifying symbols as set forth in Contract Documents, including nameplate information and shop order numbers for each item of equipment furnished.
- B. Product data:
1. Include only those sheets which are pertinent to specific product.
 2. Annotate each sheet to:
 - a. Clearly identify specific product or part installed.
 - b. Clearly identify data applicable to installation.
 - c. Delete references to inapplicable information.
- C. Drawings:
1. Supplement product data with Drawings as necessary to clearly illustrate:
 - a. Relations of component parts of equipment and systems.
 - b. Control and flow diagrams.
 2. Coordinate Drawings with information in Project record documents to assure correct illustration of completed installation.
 3. Do not use Project record documents as maintenance Drawings.
- D. Written text, as required to supplement product data for particular installation.
1. Organize in consistent format under separate headings for different procedures.
 2. Provide logical sequence of instructions for each procedure.
- E. Copy of each warranty, Bond, and service contract issued.
1. Provide information sheet for Owner's personnel, giving:
 - a. Proper procedures in event of failure.
 - b. Instances which might affect validity of warranties or Bonds.

1.05 MANUAL FOR EQUIPMENT AND SYSTEMS

- A. Submit 3 copies of complete manual in final form
- B. Contents, for each unit of equipment and system, as appropriate:
1. Description of unit and component parts:
 - a. Function, normal operating characteristics, and limiting conditions.
 - b. Performance curves, engineering data, and tests.
 - c. Complete nomenclature and commercial number of replaceable parts.
 2. Operating procedures:
 - a. Startup, break-in, routine, and normal operating instructions.
 - b. Regulation, control, stopping, shutdown, and emergency instructions.
 - c. Summer and winter operating instructions.
 - d. Special operating instructions.
 3. Maintenance procedures:
 - a. Routine operations.
 - b. Guide to "trouble-shooting."
 - c. Disassembly, repair, and reassembly.
 - d. Alignment, adjusting, and checking.
 4. Servicing and lubrication schedule: List of lubricants required.
 5. Manufacturer's printed operating and maintenance instructions.
 6. Description of sequence of operation by control manufacturer.
 7. Original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
 - a. Predicted life of parts subject to wear.
 - b. Items recommended to be stocked as spare parts.
 8. As-installed control diagrams by controls manufacturer.
 9. List of original manufacturer's spare parts, manufacturer's current prices, and recommended quantities to be maintained in storage.
 10. Other data as required under pertinent sections of Specifications.

- C. Content, for each electrical and electronic system, as appropriate.
 - 1. Description of system and component parts:
 - a. Function, normal operating characteristics, and limiting conditions.
 - b. Performance curves, engineering data, and tests.
 - c. Complete nomenclature and commercial number of replacement parts.
 - 2. Circuit directories of panelboards:
 - a. Electrical service.
 - b. Controls.
 - c. Communications.
 - 3. As-installed color-coded wiring diagrams.
 - 4. Operating procedures:
 - a. Routine and normal operating instructions.
 - b. Sequences required.
 - c. Special operating instructions.
 - 5. Maintenance procedures:
 - a. Routine operations.
 - b. Guide to "trouble-shooting."
 - c. Disassembly, repair, and assembly.
 - d. Adjustment and checking.
 - 6. Manufacturer's printed operating and maintenance instructions.
 - 7. List of original manufacturer's spare parts, manufacturer's current prices, and recommended quantities to be maintained in storage.
 - 8. Other data as required under pertinent sections of Specifications.
- D. Prepare and include additional data when need for such data becomes apparent during instruction of Owner's personnel.
- E. Additional requirements for operating and maintenance data: Respective sections of Specifications.

1.06 SUBMITTAL SCHEDULE

- A. Preliminary draft:
 - 1. Provide 2 copies with shipped with equipment.
 - 2. Submit 2 copies to Owner.
 - 3. Submit 2 copies to Engineer of proposed formats and outlines of contents prior to start of Work. Engineer will review draft and return 1 copy with comments.
- B. Submit 1 copy of completed data in final form 15 days prior to final inspection or acceptance. Copy will be returned after final inspection or acceptance, with comments.
- C. Submit specified copies of approved data in final form 10 days after final inspection or acceptance.

PART 2 PRODUCTS

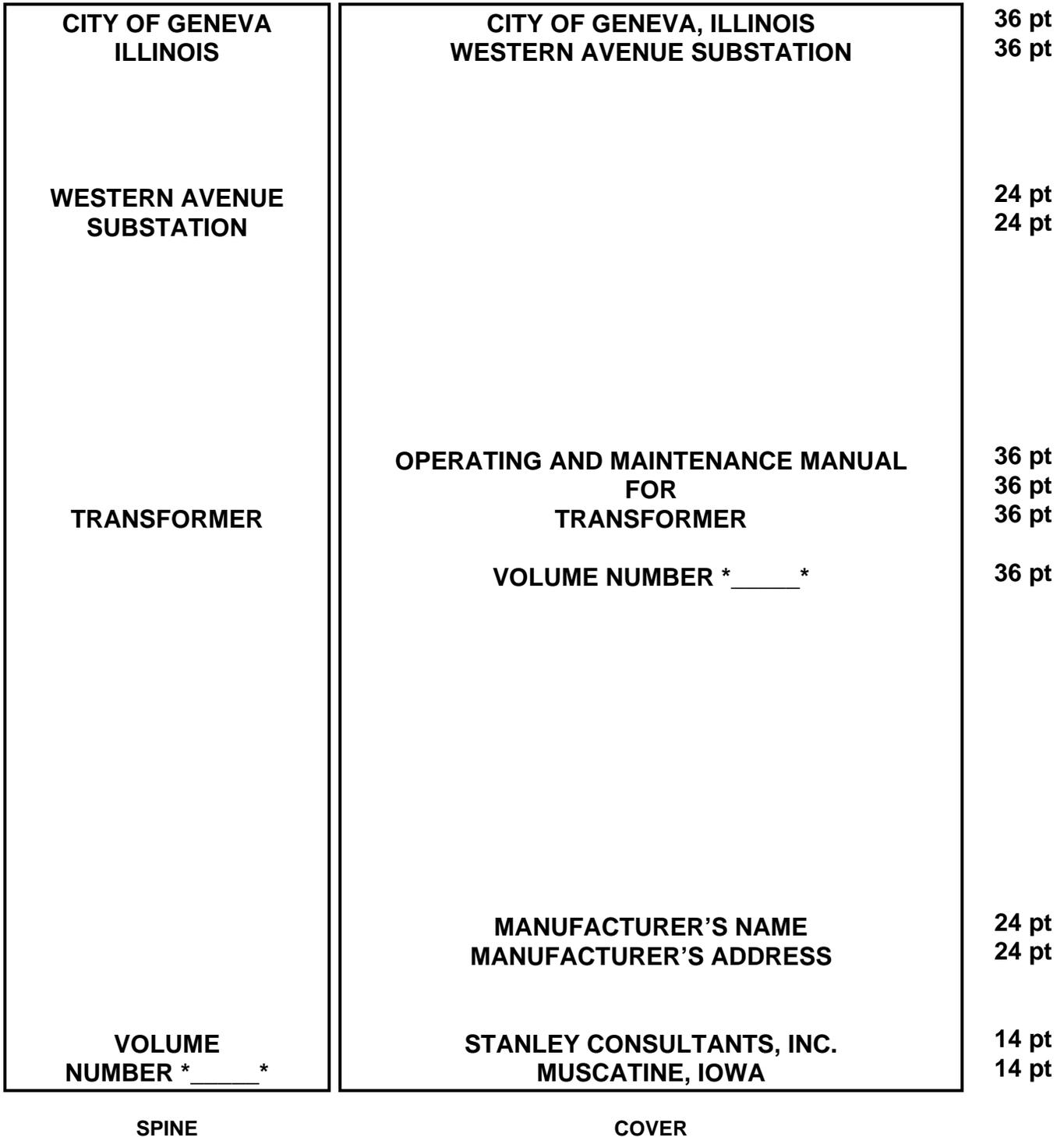
NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

OPERATING AND MAINTENANCE MANUAL COVER DIAGRAM



1. Imprinting shall be in Arial font.
 2. Spine printing shall be 12-point.
 3. Cover printing shall be in point sizes indicated.
- * If more than one volume is necessary, imprint cover with volume numbers.

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. General electrical requirements for equipment and services including, but not limited to:
 - 1. Factory wiring.
 - 2. Low voltage cabinets and electrical enclosures.
 - 3. Equipment safety grounding.
 - 4. Low voltage fuses and fuse blocks.
 - 5. Control relays and switches.
 - 6. Pushbuttons.
 - 7. Indicating lights.
 - 8. Alarm and trip contacts.
 - 9. Packaging, identification, and tagging.
 - 10. Nameplates.
 - 11. Grounding and bonding.

1.02 INFORMATIONALSUBMITTALS

- A. Submit with Bid: Description of manufacturer's standard factory test procedure for logic systems.
- B. Product Data:
 - 1. List of proposed material identifying manufacturer, type and model number for equipment to be provided for complete job.
 - 2. Manufacturer's catalog sheets marked to indicate specific type, model or catalog number of equipment to be provided.
 - 3. Equipment drawings, elementary diagrams, schematics, wiring, performance curves, instruction manuals, and all other documentation necessary for complete description of material being supplied and as required to support installation, commissioning and maintenance of equipment. Manufacturer's standard connection diagram or schematic showing more than one scheme of connection will not be accepted.
 - 4. Manufacturer's technical descriptions, product data sheets, and applicable manuals for use in protective device system coordination including:
 - a. Fuse manufacturer, type, ratings, and protection curves.
 - b. Circuit breaker manufacturer, type, trip setting ranges, and protection curves.
 - c. Relay trip device ranges, curves, and setting manuals.
 - d. Transformer damage curves.
 - e. CT ratios and saturation curves.
 - f. VT ratings.
 - 5. List of recommended spare parts required for equipment start-up, commissioning and operation.
 - 6. List of special maintenance tools required for installation and operation of equipment.
 - 7. If necessary, provide additional data to clearly demonstrate that proposed alternate equipment meets or exceeds equipment as specified.
 - 8. When requested by Engineer, submit system information, including but not limited to, utility feeders, existing relays, circuit breakers, fuses, and transformers.

1.03 CLOSEOUT SUBMITTALS

- A. Operation and maintenance manuals. Provide at minimum:
 - 1. Itemized equipment list.
 - 2. General description and technical data.
 - 3. Receiving, storage, installation, and testing instructions.
 - 4. Operating and maintenance procedures.
 - 5. Complete set of final drawings requiring no further action.
 - 6. Complete documentation of inspections and tests performed, including logs, curves, and certificates. Documentation shall note any replacement of equipment or components that failed during testing.
 - 7. Spare parts list.

8. Lubrication recommendations.
9. Warranty information.

1.04 MAINTENANCE MATERIALS

- A. Extra materials: Provide touchup paint in same type and color to repair at least 25% of finish-painted equipment surface. Paint shall be sufficient to perform touch-up painting in accordance with shop-applied material instructions for repair painting.
- B. Each piece of equipment shall be furnished with special tools as required for installation, maintenance, and dismantling of equipment.
 1. Furnish in quantities as necessary to complete work on schedule.
 2. Tools shall be new and shall become property of Owner.
 3. Tools and intended use shall be identified in assembly instructions. Tools shall only be used for their intended purpose.

1.05 QUALITY ASSURANCE

- A. Manufacturer qualifications:
 1. Manufacturer of equipment specified shall be recognized in industry for normally supplying this type of equipment.
 2. Manufacturer shall be ISO certified.
 3. When requested by Engineer, provide list of similar equipment installations that have employed identical equipment from manufacturer.
- B. Installer qualifications:
 1. Installer shall be skilled in trade and shall have thorough knowledge of products and equipment specified.
 2. Cutting, drilling, trenching, or channeling necessary to properly install equipment shall be performed by competent skilled crafts people in safe, professional manner.
- C. Regulatory requirements: Perform electrical construction in accordance with NEC, local and state codes as applicable to job site.
- D. Materials and equipment furnished for permanent installation shall be new, unused, and undamaged.
- E. Asbestos not allowed.
- F. Parts shall be manufactured to American industry standard sizes and gages to facilitate maintenance and interchangeability. Metric sized components not allowed unless specifically requested and approved.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Pack, ship, handle, and store in accordance with manufacturer's requirements.
- B. Ship equipment completely factory assembled unless physical size, arrangement, configuration, or shipping and handling limitations make this impracticable. Shipping splits and required field assembly shall be identified with equipment submittals.
- C. Costs associated with sections, accessories, or appurtenances requiring field assembly shall be Contractor's responsibility.
- D. Separately packaged parts and accessories shall be consolidated and shipped together with equipment. Mark each container clearly to identify contents and as belonging with main equipment.
 1. Provide individual weatherproof itemized packing slips attached to outside of each container for contents included. Provide duplicate inside each container.
 2. Attach master packing list, covering accessory items for equipment, to main piece of equipment.

- 3. Mark each container with project identification number for equipment and container number followed by total number of containers.
- E. Equipment shall be suitably protected during shipment, handling, and storage. Damage incurred during shipment shall be repaired at no cost to Owner.
- F. Protect coated surfaces against impact, abrasion, and discoloration.
- G. Electrical equipment and insulation systems shall be protected against ingress of moisture. Use space heaters if necessary to protect against moisture.
- H. Exposed threads shall be greased and protected.
- I. Pipe, tube, and conduit connections shall be closed with rough usage plugs. Seal and tape open ends of piping, tubing, and conduit.
- J. Equipment openings shall have covers, and taped to seal equipment.
- K. Store materials in clean, dry place. Protect from weather, dirt, water, construction debris, and physical damage in accordance with manufacturer's instructions.

1.07 SCHEDULING

- A. Coordinate with Owner early and late shipping and delivery schedules for items requiring storage and handling at Site.

1.08 WARRANTY

- A. Electrical equipment and components shall be provided with the same duration of warranty, as the overall equipment warranty.

PART 2 PRODUCTS

2.01 DESIGN CRITERIA

- A. Service conditions: Provide equipment and material suitable for intended service and installation at location indicated.
- B. Low-voltage auxiliary and control power.
 - 1. Electrical power for ac control and instrumentation equipment:
 - a. Provide devices necessary for proper operation and protection of equipment during electrical power supply and ambient temperature fluctuations specified.
 - b. Design for continuous operation at any voltage from 85% to 110% of nominal voltage. Dropout voltage shall be 60% of nominal for relays and 75% for contactors and starters.
 - 2. Electrical power for dc devices:
 - a. Design for continuous operation on ungrounded station battery system, capable of maintaining operation at any voltage from 80% to 112% of nominal voltage.
 - b. Electrical devices served shall not impose ground connection on supply.
- C. Auxiliary power: Design auxiliary equipment for low voltage service, with electrical power designed to operate from one of nominal electrical power sources as follows and as indicated on Drawings:

Volts	Phase	Frequency
120/240	1	60
125	1	dc

2.02 FACTORY WIRING

- A. Select cable for electrical and environmental conditions of installation, and suitable for unusual service conditions where encountered.
 - 1. Proper temperature application cable shall be used throughout, but shall be not less than 90°C rated.
 - 2. Conductors routed over hinges shall use extra-flexible stranding.
 - 3. Cable insulation shall be rated for maximum service voltage used, but not less than 600 volts.
 - 4. Splices not allowed.

- B. Panel, control cabinet, switchboard, motor control center, and switchgear wiring shall use flame retardant cross-linked polyethylene (XLP) or flame retardant ethylene-propylene rubber (EPR) insulation that meet or exceed requirements of UL 44 for Types SIS, and XHHW.
 - 1. Minimum size: No. 12 AWG.
 - 2. Request tinned copper if used in certain corrosive type environments.
 - 3. Conductors: Annealed bare copper with fine stranding passing IEEE 1202 and UL VW-1 flame test.

- C. Instrumentation, thermocouple, and thermocouple extension wire shall use twisted shielded pairs/triads having flame retardant cross-linked polyethylene (XLPE) insulation, and chlorinated polyethylene (CPE) jacket.
 - 1. Minimum size: No. 16 AWG (1.0 mm²).
 - 2. Conductor type:
 - a. Instrument: Annealed copper Class B stranding.
 - b. Thermocouple: Solid alloy, ANSI MC 96.1.
 - 3. Provide each pair/triad with shield.
 - 4. Shielding shall consist of aluminum-polyester tape and flexible strand tin-coated No.18 AWG (0.75 mm²) copper drain wire.
 - 5. Drain wire for each instrument cable shall be insulated with spaghetti sleeve. One end of shield wire shall be terminated on grounded terminal.
 - 6. Cables shall pass IEEE 1202 and ICEA 70,000 Btu/hr vertical tray flame test, and each conductor shall pass UL VW-1 flame test.

- D. Terminations:
 - 1. Conductor terminal connectors shall be insulated, ring tongue, compression type connectors properly sized for conductor and terminal.
 - a. Connectors shall be constructed of copper and shall be tin-plated.
 - b. Interior surface of connector wire barrel shall be serrated; exterior surface of connector wire barrel shall be furnished with crimp guides.
 - 2. Uninsulated terminal connectors shall be used for conductors terminated on devices equipped with individual fitted covers, such as, but not limited to, control switches and lockout relays.
 - 3. Connections requiring disconnect plug and receptacle type devices shall be provided with factory-terminated conductors on each plug and receptacle.
 - a. Plugs and receptacles shall be factory wired into junction boxes containing terminal blocks for external connections.
 - b. Conductors on disconnect portion of plug-receptacle assemblies shall be in common jacket.
 - 4. Prior to shipment of equipment, remove temporary wiring installed in factory for equipment testing.
 - 5. Current transformers shall terminate on shorting type terminal blocks. Ship with shorting jumpers installed.

- E. Identification and labeling:
 - 1. Provide conductor identification sleeve on each end of each internal conductor. Mark each sleeve with opposite end destination identification with nonsmudging, permanent black ink. Sleeves shall be UV-resistant self-adhesive type or PVC, not less than 1/2" long.
 - 2. Permanently label each terminal block, terminal, conductor, relay, breaker, fuse block, and other auxiliary devices to coincide with identification indicated on manufacturer's drawings.

2.03 ELECTRICAL ENCLOSURES

- A. Size junction boxes, pull boxes, and enclosures in accordance with requirements of NEC.
- B. Junction boxes and pull boxes 4" (100 mm) trade size or smaller in any dimension shall be galvanized malleable iron, or cast ferrous metal NEMA rated for installed location. Do not use concentric knockouts.
- C. Junction boxes, pull boxes, and electrical enclosures larger than 4" (100 mm) trade size in any dimension shall be as follows, unless required otherwise.
 - 1. NEMA rating for electrical enclosures installed in nonhazardous locations:
 - a. Indoor:
 - 1) Dry environmentally controlled area: NEMA 12.
 - 2) Noncorrosive wet or hose-down area: NEMA 4.
 - 3) Corrosive wet or hose-down area: NEMA 4X
 - b. Outdoor:
 - 1) Corrosive area: NEMA 4X.
 - 2) Noncorrosive area hose-down or spray area: NEMA 4.
 - 3) Noncorrosive area nonhose-down area NEMA 3R.
 - 2. Construct noncast-metal electrical enclosures from reinforced steel plate capable of supporting devices mounted on or within enclosure without deflection. Steel plate thickness shall conform to UL requirements.
 - 3. Enclosures shall be of adequate strength to support mounted components during shipment and installation.
 - 4. Conduit entrances: Field drilled.
 - 5. Electrical enclosures located in outdoor, wet, or hose down areas shall be provided with space heaters. Provide space heaters completely wired within enclosure. Provide following:
 - a. Space heater.
 - b. Adjustable thermostat with set point temperature indicator.
 - c. One miniature circuit breaker protective device.
 - d. Space heaters, thermostat, and protection shall not interfere with cable into or out of enclosure, or with maintenance or replacement of devices within enclosure.
 - e. Use of space heaters shall not change or discolor any painted surface.
 - f. Space heater capacity shall maintain enclosure internal temperature above dew point under specified service conditions.
 - g. Space heaters: Rate for 240 volts ac minimum, and size for operation on applied voltage of 120 volts ac.
- D. Outdoor electrical enclosures with ventilating openings:
 - 1. Louver on outdoor electrical equipment and protect in accordance with NEMA type.
 - 2. Equip openings on outdoor electrical equipment with fine mesh filters and stainless steel bug screens.

2.04 EQUIPMENT SAFETY GROUNDING

- A. Install exposed raceway electrically continuous. Conduit and tray shall not be considered to be only ground conductor.
- B. Furnish equipment that is part of integral shipping unit or assembly with bare copper ground conductor extending to central ground connection lug. Lug shall be suitable for field connection to local ground. Electrical equipment shall be considered any device that is energized.
- C. Single-point ground connections required for proper operation of electronic equipment shall be insulated from equipment safety ground. Such connections shall be extended, using insulated cable, to single insulated termination point suitable for field connection to appropriate ground system.
- D. Conduits containing power circuits shall have ground conductor installed inside conduit. Ground conductor shall be bonded to equipment or tray or duct ground at both ends.

- E. Provide ground bushing on each conduit containing power circuit. Connect ground bushings together inside enclosure and to enclosure ground lug or ground bus.
 - 1. Use No. 8 AWG conductor for ground bushings trade size 1-1/2" (38 mm) and smaller.
 - 2. Ground bushings larger than 1-1/2" (38 mm) shall be sized in accordance with requirements of NEC, but in no case shall bushings be smaller than No. 8 AWG.
- F. Ground conductor: Uninsulated, Class B standard, round soft drawn uncoated copper as defined in ICEA S-19-81, unless specified otherwise.
- G. Hardware: Clamps, bolts, washers, nuts, and other hardware used with grounding conductor shall be copper, copper alloy, high copper alloy, or silicon bronze.

2.05 PIN AND SOCKET CONNECTORS

- A. Unless shown on Drawings, not allowed.

2.06 FUSES AND FUSE BLOCKS

- A. Modular-type, Class H screw terminal fuse blocks with Bakelite frame and reinforced retaining clips. Blocks shall be similar in construction and by same manufacturer.
- B. Slow blow fuses: Bussmann Type MDL or Gould Shawmut Type GDL with ampere ratings of 1/4, 1/2, 1, or 2.
- C. Fast acting fuses: Bussmann Type NON or Gould Shawmut Type OT with ampere ratings of 1, 3, 6, 10, 15, 20, or 30.
- D. Extremely fast acting fuses: Bussmann Type KAB with ampere ratings of 1, 3, 6, 10, 15, 20, or 30.

2.07 CONTROL RELAYS

- A. General service, industrial grade auxiliary relays rated 600-volt.
- B. Contacts: Reversible from N.O. to N.C. in field.
- C. Timing relays for critical service: Agastat Series 7000.

2.08 CONTROL SWITCHES

- A. Multistage, rotary-type rated 120 volts ac or 125 volts dc, 3 amperes, as required.
- B. Handles: Black, fixed, modern, pistol grip type. Provide engraved black plastic escutcheon plates with targets.
- C. Provide with colored LED lamps and nameplates as required.

2.09 PUSHBUTTONS

- A. Standard pushbuttons: Heavy, industrial-type rated 120 volts ac or 125 volts dc, 3 amperes, as required.
- B. Provide with colored LED lamps and nameplates as required.

2.10 INDICATING LIGHTS

- A. Status indicating lights: High-intensity, cluster, LED-type for panel mounting.

- B. Coordinate indicating light colors with indicated conditions as follows. Indicating lights shall be energized when condition exists and shall be de-energized when condition does not exist:
 - 1. Red: Equipment energized: such as motor running, valve open, or breaker closed.
 - 2. Green: Equipment de-energized: such as motor stopped, valve closed, or breaker open.
 - 3. Amber: Equipment abnormality: such as motor trip, breaker trip, or relay trip.
 - 4. White: Monitoring of control power or trip coil: such as lockout relay trip coil monitor or breaker trip coil monitor. Light is on during normal circuit operation and off during loss of power or loss of coil.
 - 5. Blue: Loss of control power.

2.11 ALARM AND TRIP CONTACTS

- A. Alarm contacts for remote annunciation: Suitable for operation at 120 volts ac and 125 volts dc. Contacts shall be rated at least 0.5-ampere make and break, minimum.
- B. Alarm contacts: Normally closed contacts that open to alarm condition.
- C. Trip contacts for remote trip: Suitable for operation at 125 volts dc and rated 5 amperes make or break, minimum.

2.12 WIRING DEVICES

- A. Standard convenience outlets: Premium, heavy-duty, specification-grade, duplex, 3-wire, grounding, 20-ampere, 125-volt for 120-volt circuits, and rated 250-volts for 240 or 208-volt circuits.
- B. Ground fault circuit interrupter (GFI) receptacles: Duplex, 20-ampere, and 125 volts, feed-through type.
- C. Isolated ground (IG) outlets: Duplex, 3-wire, with isolated grounding terminal, 20-ampere, and 125 volts. Outlets shall be orange in color, unless specified otherwise.

2.13 IDENTIFICATION AND TAGGING

- A. Provide power, control, and instrumentation cables with permanent type identification markers with typed cable numbers and from/to information at each point of termination. Cable numbers and from/to information will be provided for circuits not associated with low-voltage panelboards.
 - 1. Position cable markers to be readily visible for inspection.
 - 2. Cable numbers shall match those as shown on Drawings.
 - 3. Provide wire tags at each termination point for each conductor. Tags shall be permanent, wrap around, heat-shrinkable type with typewritten information.

2.14 EQUIPMENT NAMEPLATES

- A. Laminated white-over-black plastic such that face is white with black letters, with 1/8" (3 mm) engraved letters securely fastened with minimum of 2 self-tapping, stainless steel screws.
- B. Nameplates shall meet requirements of NFPA 70E

2.15 HARDWARE

- A. Provide hardware including, but not limited to, anchor bolts, nuts, washers, expansion anchors, wire nuts needed for installation.
- B. Hardware smaller than 3/4" (19 mm) shall match NEMA standard size bolt holes on electrical equipment.

PART 3 EXECUTION

NOT USED

END OF SECTION

- 1) P. E. Schulz
- 2) P. K. Mitchell

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Design, manufacture, test, deliver, assemble, and install Class I medium power transformers and accessories for oil-immersed, self-cooled, forced-air cooled, and forced-oil cooled, with self-cooled ratings as follows:
 - 1. High voltage windings above 110 kV BIL to below 450 kV BIL.
 - 2. Transformers base rated 50,000 kVA and lower.

1.02 EVALUATION AND PENALTIES

- A. Bid evaluation:
 - 1. Bids will be evaluated considering base and/or alternate bids plus additions as described herein.
 - 2. Loss evaluation:
 - a. Cost of equipment losses will be considered in Bid evaluations,
 - b. Guaranteed equipment kW losses will be evaluated at rates listed on Data Sheets.
 - c. Evaluation basis:
 - 1) No-load losses at 100% voltage.
 - 2) Load losses at maximum MVA rating.
 - d. Evaluation:
 - 1) Guaranteed equipment losses listed on Data Sheets included with Bid will be multiplied by rates listed on Data Sheets.
 - 2) Above determined values will be added to quoted equipment price.
 - 3. Transformers manufactured outside continental United States can be assessed a cost for Owner's expenses. Expenses will be added to evaluated bid price:
 - a. Additional cost of Owner and Engineer to witness test each individual unit.
 - b. At Owner's option, cost of an independent professional to expedite and monitor quality control.
- B. Penalties:
 - 1. Penalties will be assessed if actual no-load or load losses from certified shop test reports exceed guaranteed values by more than tolerances allowed by IEEE C57 standards.
 - 2. Penalty evaluation: Penalty will be computed by multiplying load and no-load kW losses stated on certified shop test reports that exceed guaranteed values provided on Data Sheets by more than tolerances allowed by IEEE C57.12.00 by \$/kW shown on Data Sheets.
 - 3. Total dollar value of above computed penalty will be assessed to Vendor.
 - 4. Losses less than those guaranteed will not be credited.

1.03 WITNESS TESTING ALLOWANCE

- A. Costs included in cash allowances: Include costs for Owner and Engineer to attend witness testing for testing as specified on Data Sheet.
 - 1. Travel allowance:
 - a. Travel shall be per round trip required for witness testing.
 - 1) Owner: \$2,000 per round trip.
 - 2) Engineer: \$2,000 per round trip.
 - 3) Above cost for continental United States only. Additional charges will be assigned for international flights.
 - 2. Daily per diem allowance: Expenses other than travel shall be covered by per diem allowance at the following rates:
 - a. Owner: \$475 per day.
 - b. Engineer: \$2,075 per day.
 - 3. Two per diem days shall be added for each round trip to cover expenses for travel days.
 - 4. Proposal shall provide quantities for allowances, if additional trips are needed they will be paid at the same rate at manufacturer's expense.
- B. Total trip cost will be deducted from final payment of transformer.

1.04 WORK BY OTHERS

- A. Foundations.
- B. External electrical connections of main and auxiliary conductors.

1.05 INFORMATIONAL SUBMITTALS

- A. Submit with Bid:
 - 1. Equipment proposed shall be furnished to have sufficient mechanical strength to withstand without failure all through-fault currents. Demonstrate equipment will meet this requirement by one of following methods:
 - a. Certified test data showing that equipment with core and coil identical in design and construction and identical or similar with respect to kVA capacity, kV ratings, BIL, impedance and voltage taps has been tested without failure for short-circuit strength.
 - b. History of successful experience with equipment of identical or similar ratings, design, and construction.
 - 1) List units in service with core and coils that are essentially identical in design, construction, and manufacture to equipment covered by this Specification.
 - 2) Provide information on date of installation, location, and failures if any.
 - c. Where equipment has not been built or cumulative service record is less than 20 equipment years, submit list of equipment in service that represent closest approximation to equipment covered by this Specification. Information submitted shall be:
 - 1) Representative of total experience of manufacturer, with design of equipment it proposes to furnish.
 - 2) Include dates of installation or shipping.
 - 3) Ratings of equipment.
 - 4) Failures and causes of failure, if any, that have been experienced.
 - 2. Copy of warranties.
 - 3. Guaranteed loss data as required in Data Sheets.
 - 4. Guaranteed sound analysis as required in Data Sheets.
 - 5. Location of manufacture of each transformer.
 - 6. Drawings with proposed overall estimated dimensions, weight, enclosure construction, and general layout of equipment and accessories.
 - 7. List of equipment shipped loose requiring field installation.
 - 8. Special equipment, tools and accessories required for installation or maintenance.
 - 9. Data describing specifically and in detail location of service facilities and engineers and spare parts inventories and extent of inventory in United States for equipment furnished.
 - 10. Completed preliminary Data Sheets.
 - 11. Testing schedule.
- B. Quality assurance data:
 - 1. Document submittal index.
 - 2. Test reports of all shop tests conducted in accordance with IEEE C57.12.00 prior to shipment.
 - 3. Certified shop test reports for each power transformer prior to shipment.
 - 4. Dew point of gas in transformer just prior to shipment.
 - 5. Insulating oil test reports just prior to and immediately following transformer testing.
 - 6. Current transformer excitation and ratio correction factor curves.
 - 7. Maximum allowable impact readings that can occur during shipping in X, Y, and Z directions.
 - 8. Engineering, part procurement, manufacturing, testing and shipping schedule.
 - 9. Notice of any cancellation, delay, material change, or schedule impact upon knowledge of information.
 - 10. Status reports provided monthly.
 - 11. Storage, handling, and erection requirements.
 - 12. Notification of inspection and test schedule.

1.06 ACTION SUBMITTALS

- A. Product Data:
 - 1. Fan and pump motor data sheets.
 - 2. Complete instruction manual and parts list for each transformer.

- B. Shop Drawings:
 - 1. Certified Data Sheets.
 - 2. Drawings detailing overall dimensions, weight, lifting points, enclosure construction, and layout of transformer and accessories.
 - 3. Outline, general arrangement, assembly, installation, and foundation arrangement drawings.
Drawings shall provide following information:
 - a. Dimensions from centerline of tank in plan and elevation views to centerline of high-voltage and low-voltage bushings, assembled transformer center of gravity, extreme edge of jacking pads, extreme edge of base in contact with foundation, distance to outside edge of radiators.
 - b. Elevation above foundation of center of gravity, maximum oil level, minimum oil level, top of tank, top of radiators, base and tops of surge arrestors and bushings, jacking pads, and high and low voltage live parts.
 - c. Shipping and installed weight of transformer and weight of oil required. Quantity of oil in gallons and liters.
 - d. Location of control cabinets and conduit entrances dimensioned from equipment centerlines and bottom of base.
 - e. Certified flange details and bolt pattern for isolated phase or nonsegregated phase bus duct if requested on Data Sheets.
 - 4. Drawings of transformer nameplate with complete data.
 - 5. Drawings of transformer nameplate, schematic and wiring diagrams showing tap arrangements, wiring of accessories, and connection and interconnection wiring diagrams.

1.07 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data. Provide at a minimum:
 - 1. General description and technical data.
 - 2. Receiving, storage, installation, and testing instructions.
 - 3. Operating and maintenance procedures.
 - 4. Complete set of approved drawings and documents submitted for review.
 - 5. Certified copies of final transformer and communications test reports.
 - 6. Certified copies of field installation tests.
 - 7. Final transformer nameplate drawings including transformer test impedances.
 - 8. Current transformer excitation and ratio correction factor curves.

1.08 MAINTENANCE MATERIALS

- A. Extra materials: Provide 2-quarts of touch-up paint for each transformer, in pressurized aerosol cans.

1.09 QUALITY ASSURANCE

- A. Regulatory requirements:
 - 1. Design, fabricate, and test equipment in accordance with applicable standards of ANSI, NEMA, and IEEE and in accordance with applicable requirements of OSHA, specifically:
 - a. IEEE C57.12.00 – General Requirements for Distribution, Power, and Regulating Transformers.
 - b. IEEE C57.12.10 – Requirements for Transformers 230 kV and Below, 833/958 through 8333/10417 kVA, Single phase, and 750/862 through 60,000/80,000/100,000 kVA Three Phase With and Without Load Tap Changers.
 - c. IEEE C57.12.80 – Standard Terminology for Power and Distribution Transformers.
 - d. IEEE C57.12.90 – Test code for Distribution, Power, and Regulating Transformers and Guide for Short Circuit Testing Distribution and Power Transformers.
 - e. IEEE C57.98 – Guide for Transformer Impulse Tests.

- f. IEEE C57.116 –Guide for Transformers Directly Connected to Generators.
- g. IEEE C57.131 – IEEE Standard Requirements for Load Tap Changers
- h. NEMA TR 1 – Transformers, Regulators, and Reactors.

B. Perform routine production and required tests on equipment prior to shipment, in accordance with IEEE C57.12.00 and as noted on Data Sheets.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Ship transformer assembly as complete as transportation limitations permit to job site. Shipping to nearest rail unloading facility not acceptable.
- B. If nitrogen tanks are furnished, tanks shall become property of Owner.
- C. Insulating oil shipped separately shall be in nonreturnable drums or by tanker truck. Coordinate oil shipment and storage with site personnel.
- D. Instruments and gages shall be covered and protected from damage, either physical or climate.
- E. Provide with each transformer a 3-way temporary impact recorder to measure magnitude and direction of longitudinal (Y), lateral (X) and vertical (Z) impacts that occur during shipment. Stipulate in shipping order to carrier that only Owner may remove an impact recorder.
- F. Upon delivery, notify Owner for removal of impact recorders.
 - 1. If a recorder indicates impacts equal to or greater than those listed by Agreement in any of three directions specified, Contractor will be notified.
 - 2. Upon notification Contractor shall inspect and test transformer.
- G. Determine if dew point of gas in tank is acceptable just prior to shipment, record data, and submit for review.

1.11 SERVICE CONDITIONS

- A. Transformer shall be capable of operating at rated kVA under usual operating conditions as defined in IEEE C57.12.00 including ambient temperatures, cooling medium temperatures, frequency, voltage, altitude, and load current.

1.12 WARRANTY

- A. Transformer shall be provided with manufacturer's standard, 1-year warranty from date of delivery.
- B. Submit separate prices for extending transformer warranty to 2 and 5 years, respectively.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. ABB Power Transformers.
- B. Delta Star, Inc.
- C. Pennsylvania Transformers Technologies, Inc.
- D. SPX/Waukesha Electric.
- E. Virginia Transformer Corp.
- F. WEG.

2.02 SYSTEM DESCRIPTION

- A. Transformer shall be capable of withstanding without injury mechanical and thermal stresses resulting from short circuit currents as outlined in IEEE C57.12.00.
- B. When indicated on Data Sheets for direct connection to generator (indicated as unit auxiliary transformer or as generator step-up transformer), transformer shall be capable of withstanding, without injury, mechanical and thermal stresses caused by through faults on external terminals of any winding, up to 125% of its rated voltage in accordance with IEEE C57.116.
 - 1. Thermal and time duration shall be as stated in IEEE C57.12.00.
 - 2. Transformer shall be capable of operating 10% above rated secondary voltage at no-load, and 5% at full load.
- C. Provide appropriate hole spacing and hole quantities at termination location on bushings as required for connections to both high-voltage and low-voltage bushings, as indicated on Data Sheets
- D. Provide auxiliary equipment and services as indicated on Data Sheets.

2.03 DESIGN REQUIREMENTS

- A. Design equipment enclosure in accordance with seismic requirements as listed in most recent local building code and Data Sheets.
- B. Audible sound levels shall not exceed values as indicated on Data Sheets when measured in factory in accordance with NEMA TR 1 test code.
- C. If Load Tap Changer is specified, transformer shall be capable of delivering rated kilovolt amperes at rated low voltage position and on all positions above rated low voltage.

2.04 COOLING CLASS

- A. Cooling class designation shall be as indicated on Data Sheets and shall be consistent with IEEE C57.12.00.
 - 1. First letter designates internal cooling medium in contact with windings.
 - a. O – Mineral oil or synthetic liquid with fire point $\leq 300^{\circ}\text{C}$.
 - b. K – Insulating liquid with fire point $> 300^{\circ}\text{C}$.
 - c. L – Insulating liquid with no measurable fire point.
 - 2. Second letter designates circulation method for internal cooling medium.
 - a. N – Natural convection flow.
 - b. F – Forced circulation through cooling equipment (i.e., coolant pumps), natural convection around windings.
 - c. D – Forced circulation through cooling equipment, directed into at least main windings.
 - 3. Third letter designates external cooling medium.
 - a. A – Air.
 - b. W – Water.
 - 4. Fourth letter designates circulation method for external cooling medium.
 - a. N – Natural convection.
 - b. F – Forced circulation (i.e., fans for air cooling, pumps for water cooling).

2.05 MECHANICAL CONSTRUCTION

- A. Fabricate tanks, bases, radiators, covers, junction boxes, and other attached compartments from materials of sufficient strength to withstand normal service stresses without distortion or damage.
- B. Base shall be suitable for rolling or skidding in a direction parallel with either centerline.
- C. Design tanks and enclosures:
 - 1. Suitable for vacuum filling and vacuum drying in field.
 - 2. Maximum tank pressure shall comply with IEEE C57.12.00.

- D. Transformer tank top shall be domed to prevent water accumulation, and have a skid-resistant surface.
- E. Main tank cover, joints in transformer tanks, non-removable flanges, and bases shall be made gastight and oiltight by welding.
- F. Recessed gaskets shall be used for flange connections on manhole, bushings, and other bolted connections.
- G. Equip transformer with provisions for jacking in accordance with IEEE C57.12.10. Provide lifting hooks on tank, and lifting eyes on cover.
- H. Unless alternate method is used to prevent corrosion of exterior of bottom of transformer tank, transformer tank design shall be such that ventilation is provided between concrete supporting slab and bottom of transformer tank.
- I. Only supporting steel beneath bottom of transformer tank may touch concrete slab. Design of steel supporting transformer tank bottom shall be such that bottom is accessible for inspection after installation.
- J. Provide recommendation for attachment of transformer to foundation with design drawings. Method of attachment will take into account seismic requirements of job site as indicated on Data Sheets.
- K. Gages and indicators mounted more than 5' (1.5 m) above bottom of base supports shall be sized and angled such that they are easily read from ground line elevation.
- L. Wiring:
 - 1. Wiring, thermocouple wiring, and connections shall be separately supported and protected to prevent damage during shipment or after final installation.
 - 2. Wiring shall be neatly bundled, terminated and marked in accordance with connection diagrams.

2.06 GROUNDING

- A. Two copper-faced steel grounding pads, each not less than 2" x 3-1/2" (50 mm x 88 mm) with 2 holes vertically spaced on 1-3/4" (44 mm) centers drilled and tapped for 1/2" (13 mm), 13 UNC thread. Minimum threaded depth of holes: 1/2" (13 mm).
- B. Protect threads by use of noncorrosive material.
- C. Weld ground pads on tank wall at diagonally opposite sides of transformer, located at, or near base.
- D. Provide ground conductors from equipment mounted on transformer that require grounding, to ground pads. Use No. 4/0 AWG, minimum
- E. Provide separate ground strap or conductor from neutral bushing to ground pad for transformers with solidly grounded neutrals. Ground strap to be sized for maximum ground fault with maximum duration as indicated on Data Sheet. For transformers with impedance grounded neutral, neutral ground strap shall be insulated from transformer and metallic parts for line-to-line voltages.

2.07 CORE AND COILS

- A. Brace to withstand short-circuit forces without damage or displacement of coil or core in accordance with IEEE C57.12.00.
 - 1. 3-phase transformers rated less than or equal to 5.0 MVA: Limited only by transformer impedance – Category II.
 - 2. 3-phase transformers rated greater than 5.0 MVA: Limited by transformer and system impedance in accordance with Category III and IV.

- B. Core and coils shall withstand forces normally expected from shipping, moving and handling without use of special internal shipping braces.
- C. Provide suitable cooling liquid passages to limit hot spot temperature rise above average winding temperature rise at rated load.
- D. Complete core and coil assembly shall be readily removable from tank for repairs.
- E. Insulate coils from core and each other with sufficient insulation to withstand standard impulse and low frequency test for transformers of specified voltage class.
- F. Core ground connection shall be accessible at manhole without removing oil from transformer tank or climbing into tank.
- G. Transformer cores: Circular in cross section for transformers 10 MVA and larger.
- H. Windings: Circular in cross-section and made up of copper conductor.
- I. Tertiary windings (if specified on Data Sheets):
 - 1. kVA rating as required to meet short circuit withstand, but not less than 35% of transformer rating.
 - 2. Loading conditions: Transformer shall be suitable for operation for loading conditions specified on Data Sheets.
 - 3. Impedance: Limit fault magnitude to conditions specified on data sheets with in-feed from both high- and low-voltage terminals simultaneously.
- J. When dual voltage high voltage windings are specified the high voltage winding reconnection shall be made via a manual operated reconnection switch accessible from outside the transformer tank with position indicator and provisions for padlocking on transformer case minimum 48" (1.2 m) above bottom of baseplate support.

2.08 TOP OIL TEMPERATURE INDICATOR

- A. Provide dial-type, liquid temperature indicator relay for visible indication of top oil temperature.
- B. Indicator:
 - 1. Gage: Not less than 6" (150 mm) in diameter; clearly readable from ground elevation.
 - 2. Temperature controller:
 - a. Microprocessor temperature monitor and controller.
 - b. 3 temperature monitoring probes.
 - c. Outputs for SCADA monitoring.
 - d. RS232 with DNP3.0.
 - e. Software:
 - 1) Complete set of software to operate, communicate, and analyze data.
 - 2) Corporate license to software for Owner's and Engineer's use.
 - f. Communications wired to auxiliary control cabinet.
 - g. Manufacturer: Advance Power Technologies TTC 1000, or equal.
- C. Equip indicator with separate alarm contact and trip contact and manually resettable maximum temperature indicating hand.
- D. Mount so sensing element can be removed without loss of oil and not interfere with tanking and untanking transformer core and coils.

2.09 COOLING EQUIPMENT AND CONTROLS

- A. Furnish integrally mounted equipment to provide required cooling capacity to maintain specified transformer rating.
 - 1. Radiators: Furnish radiator valves when detachable radiators are required by design of unit.

2. Position to not obstruct access to manholes, hand holes, or other inspection/maintenance locations.
 3. Design to inhibit collection or retention of water or debris.
- B. Temperature control shall be provided by electronic winding temperature indicator arranged, and designed to automatically operate transformer cooling equipment in steps proportionate to transformer load and temperature.
- C. Winding temperature indication:
1. At a minimum, electronic hot spot winding temperature indicator shall have alarm contacts and 4 levels of operation.
 2. Contacts shall be provided for customer remote indication for high temperature and high-high temperature.
 3. Provide current transformer required for winding temperature indicators.
 4. Hot spot thermal relay shall be provided with test switch so test can be circulated through relay with transformer in service and current transformer shorted out.
- D. Arrange cooling equipment controls so no single fault in control circuitry will cause loss of more than one half of cooling system capability.
- E. Arrange transformer cooling equipment controls so single remote contact will shut down all fans, regardless of mode of operation selected (manual or auto).
- F. Arrange ODAF cooling controls as follows:
1. "Auto-Manual" selector switch and local "On-Off" switches for each fan bank and each pump bank.
 2. When in "Auto" state, cooling shall be initiated from integral winding hot spot detection.
 3. Provide 2 external control override when control switch is in "Auto." One external connection shall start cooling system regardless of hot spot temperature; second shall stop cooling systems regardless of hot spot detection.
- G. Provide cooling fan and pump motor contactor status for remote monitoring of cooling system.

2.10 AUXILIARY POWER AND CONTROL CABINET

- A. Enclose control equipment in weatherproof cabinet with NEMA rating as indicated on Data Sheet. Permanently attach to transformer.
- B. Location:
1. Locate cabinet at height above bottom of base support such that it is suitable for operation and inspection by person standing at level of bottom of base support.
 2. Top of cabinet height shall be no more than 6'-7" (2 m) measured from bottom of base support elevation.
- C. Extend auxiliary power and control circuits that require an external connection to a common weatherproof control cabinet wired to terminal blocks.
- D. Wiring:
1. Provide wiring, raceway, and terminal blocks in accordance with Section 26 05 00.
 2. Equip terminal blocks with washer head binding screws, covers, and white terminal identification marking strips General Electric Type EB-25, Marathon Type 1600, or equal. Screw shall accept standard holding type screw drivers only.
 3. Minimum No.12 AWG for control and minimum No.10 for current transformer wiring. Provide ring-tongue terminals on each end of control wiring.
 4. Use either molded-case or DIN-rail mounted miniature circuit breakers to protect individual branch circuits integral to control cabinet for external circuits entering cabinet.
- E. Auxiliary power source:
1. Others will provide single or dual source of ac power and single source of dc power to control cabinet for fans, space heaters, auxiliaries, and control as indicated on Data Sheet.

2. If second source of power for fans is specified on Data Sheets, use transfer switch to automatically switch between sources. Transfer switch shall be break-before-make and integral to control cabinet.
 3. If transformer equipment is furnished that operates on voltages other than that provided, equipment required to transform voltage of auxiliary power shall be furnished with transformer and shall be integral to control cabinet. Locate transformer to prevent damage or field personnel usage as step.
- F. Provide control cabinet with space heaters capable of maintaining cabinet internal temperature above dew point.
1. Heaters shall be spaced away, and be thermally insulated from devices and painted surfaces.
 2. Controlled by adjustable thermostat, factory set to close on falling temperature at 80°F (On) and open on rising temperature at 95°F (Off).
- G. Interior lighting:
1. Furnish interior cabinet LED light fixture that illuminates automatically when door is opened.
 2. Overcurrent protection device within cabinet shall protect fixture.
 3. Confirm cabinet lamps are readily available within Owner's service area.
- H. Furnish duplex 120-volt, 20-ampere, general use GFI receptacle within each enclosure to provide power for maintenance personnel. Overcurrent protection device within cabinet shall protect receptacle.
- I. Paint inside of cabinet white.
- J. Fan and/or pump motor starters, control power transformers, and protective devices as required for a complete and operational transformer shall be furnished as part of control cabinet.
- K. Provide undervoltage relays to actuate alarm on loss of any external auxiliary power source with contacts wired to terminal blocks for external use.
- L. Communications:
1. Provide central communications panel for communication connection to transformer mounted and/or provided equipment.
 2. Panel shall be clearly labeled including communications ports of any type.
 3. Communications shall be fully tested through panel as part of testing procedure and detailed reports provided.
- M. Provide operating and maintenance manual holding slot integral to control cabinet.
- N. Provide red shipping jumpers on current transformer terminals. Use of shorting-type terminal blocks only not acceptable.
- O. Locate transformer nameplate on door of transformer control cabinet.

2.11 CURRENT TRANSFORMER CIRCUITS

- A. Extend current transformer leads into transformer control cabinet. Terminate current transformer leads on shorting-type General Electric EB-27 terminal blocks mounted in transformer control cabinet.
- B. Ratios of multi-ratio current transformers shall be wired to transformer control cabinet.
- C. Short CT circuits at full ratio for shipment.

2.12 INSULATING OIL

- A. Ship transformer filled whenever possible.

- B. Furnish sufficient quantity of insulating oil for complete vacuum filling to manufacturer's recommended level.
- C. Design transformer with sufficient bracing and strength to permit full vacuum filling with insulating liquid.
- D. Insulating oil shall meet requirements as defined by ANSI/ASTM D3487 or ANSE/ASTM D6871 and following:
 - 1. Chemically stable.
 - 2. Free from acidity or other corrosive ingredients.
 - 3. Possess high dielectric strength.
 - 4. Contain less than 15 ppm water when tested in accordance with procedures of ASTM D1533 (Karl Fischer method).
 - 5. Test at least 30 kV upon receipt at final destination when tested in accordance with procedures of ASTM D877.
 - 6. If dielectric test strength of any oil received in field, whether shipped separately or in transformer, tests less than 30 kV, provide labor, supervision, material, and equipment required to replace oil in its entirety until test meets these specifications.
- E. Insulating oil sampling and test procedures at factory shall conform to requirements of ASTM D117 and ASTM D923 for insulating oil.
- F. Insulating oil shall be inhibited with 0.3% by weight of DBPC (2, 6-Ditertiary-Butyl Para-Cresol). Transformer nameplate shall state that oil is inhibited.
- G. Certify and warrant that equipment furnished insulating oil without PCBs. Replace equipment at no cost should testing indicate that equipment does not meet this condition. Affix sign to transformer near drain valves which states that mineral oil used in equipment. Wording: "CONTAINS NO PCBs."

2.13 INSULATING LIQUID PRESERVATION SYSTEM

- A. Provide transformer with manufacturer's standard oil conservation system unless noted otherwise on Data Sheets. Indicate type of proposed oil conservation system on Data Sheets.
- B. Conservator oil preservation system:
 - 1. If indicated on Data Sheets or if proposed by manufacturer, furnish conservator liquid preservation system as specified on Data Sheets as defined in accordance with IEEE C57.12.80.
 - 2. Type: Automatically maintained system that seals liquid from atmosphere. Provide required tank, piping, liquid level gage, upper filter press connection, and sampler.
 - 3. Design conservator system to withstand full vacuum. Provision shall be made for filling of main tank and conservator while under vacuum.
 - 4. System shall maintain constant atmospheric pressure on oil. Provide sufficient capacity in conservator tank to prevent low level alarms for complete operating temperature range of transformer for ambient conditions listed on Data Sheets.
 - 5. Volume of oil shall be adjusted such that no oil shall be released until after top oil temperature exceeds 120°C.
 - 6. Conservator system shall include, but not be limited to:
 - a. Conservator shut off valve.
 - b. Main tank shut off valve.
 - c. Drain valve.
 - d. Dehydrating breather with oil seal used with air cell breather.
 - e. Pressure/vacuum bleeder with gage. Set to operate at lowest level consistent with reliable operation mounted on conservator air space.
 - f. Dual pressure/vacuum switch to operate prior to bleeder operation mounted on conservator air space.
 - g. Vent valves with easy open/close feature.
 - h. Liquid level gage with high and low-level alarm contacts.
 - i. Buchholz relay 2-float version of flow-through type installed between tank and conservator system. Selected and installed in accordance with Buchholz requirements. Relay contacts

shall be supplied with Form "C" contacts for each of functions and shall be wired to control cabinet.

- j. Interconnecting piping: Metallic.
- C. Inert gas system:
- 1. Where specified on Data Sheets, provide automatically maintained system to provide dry nitrogen gas atmosphere above oil. System shall include electronic monitoring system with alarm contacts arranged for remote indication of low, low/low, and high gas pressure.
 - 2. Provide valves to permit purging gas space and testing tank seal by admitting dry nitrogen under pressure.
 - 3. Nitrogen gas:
 - a. Bottled in 200 cu ft cylinders with connection No. 580 of ANSI/CGA-V-1.
 - b. Gas shall be in accordance with ASTM D1933, Type III.
 - c. Filling pressure: 2,200 ft-lb/sq in at 21.1°C.
 - d. Provide gas for initial charge on transformer and one full extra bottle for future use.
 - 4. Nitrogen control equipment, including adequate space for nitrogen bottles, shall be protected by easily accessible, weatherproof enclosure mounted on transformer tank.

2.14 CURRENT TRANSFORMERS (CT)

- A. Provide bushing type CTs with fully distributed windings for relaying or metering service in quantities, ratios, and ratings as indicated on Data Sheets or on one-line diagrams.
- B. Extend current transformer leads into transformer control cabinet and terminate on shorting-type terminal blocks.

2.15 BUSHINGS

- A. Suitable for service conditions specified herein.
- B. Bushing insulation class: Not less than that of winding to which connected.
- C. Bushing electrical characteristics and tests: IEEE C57.12.00 and IEEE C57.19.00.
- D. Bushing dimensions: IEEE C57.19.01 and NEMA TR1.
- E. Bushing color: Manufacturer's standard.
- F. Terminals: As indicated on Data Sheets.
- G. 110 kV BIL and above: Oil-filled, IEEE C57.19.00 and IEEE C57.19.01.
- H. Above 110 kV BIL: Provide with facilities for power factor testing.
- I. Minimum clearances: NEMA TR 1-1980, Table TR 1-0.06.

2.16 SURGE ARRESTERS

- A. When indicated on Data Sheets, provide metal-oxide station class arresters with voltage ratings as specified on Data Sheets. General Electric "Tranquell," Ohio Brass "DynaVar," or ABB "ExlimQ."
- B. Mount near bushings such that they do not interfere with connections with minimum clearances specified in NEMA TR 1 for bushings are achieved with clearances approaching NEMA SG6 where practicable.
- C. Provide with full-capacity, copper connections, maximum 750 kcmil conductor size, between arrester and transformer bushing terminals to allow connection to arresters.

- D. Provide with ground connections.
- E. Connections between bushings and arresters shall contain provisions for expansion and contraction.

2.17 TAP CHANGER

- A. Provide tap voltages as indicated on Data Sheets. Each tap position shall be fully rated and shall not limit kVA rating of transformer.
- B. De-energized tap changer (NLTC):
 - 1. Provide operator for de-energized tap changer with extension to allow manual operation of tap changer at base elevation.
 - 2. Mount manual operating mechanism with tap position indicator and provisions for padlocking on transformer case minimum 48" (1.2 m) above bottom of baseplate support.
 - 3. Locate mechanism inside tank above core and coils if possible. If this location is impractical, mechanism shall be accessible through ports.
 - 4. Each tap position shall be fully rated.
- C. Load tap changer (LTC) when specified on Data Sheets:
 - 1. Operating mechanism with motor drive, local position indicator, operation counter, and raise/lower switches for manual operation.
 - 2. Equipment for LTC shall be mounted in a weatherproof compartment adjacent to tap changer compartment.
 - 3. Meet requirements of IEEE C57.131
 - 4. High-speed resistance or vacuum reactance.
 - 5. Design for minimum of 500,000 operations before contact or vacuum bottle replacement.
 - 6. Preventative transformer or series transformer required shall be power class, copper wound, and of a round core/coil design.
 - 7. Mount tap changer in separate oil-filled compartment, capable of withstanding full vacuum in main tank without bypass piping.
 - 8. LTCs intended for automatic operation shall have at a minimum:
 - a. Top filling plug.
 - b. Drain valve with sampling device.
 - c. Cover mounted pressure relief device.
 - d. Pressure control switch with alarm contacts.
 - e. Liquid level gage with alarm contacts.
 - f. Local position indicator.
 - g. Operations counter.
 - h. Space for mounting equipment for circulating current method for parallel operation.
 - i. Selsyn-type transmitter for position indication.
 - j. Raise and lower switches for manual control.
 - k. Current transformer for input to LDC shall be provided separate of other required transformer CTs.
 - l. Controller:
 - 1) Digital control package Beckwith M2001C with line-drop compensator (LDC) with resistance and reactance adjustments and one current transformer.
 - 2) If specified on Data Sheet:
 - a) Include external communications device
 - b) Transformer paralleling communications and devices.
 - m. Auto-manual selector switch.
 - n. Testing terminals.
 - o. Static voltage regulating relay.
 - p. Control and time delay relays.
 - q. Reactance reversing switch.
 - r. Control compartment mounted to transformer with terminal blocks, space heaters, interior lighting, and convenience receptacle.
 - s. Continuous oil filtering system.
 - 9. LTCs intended for remote operation shall have at a minimum:
 - a. Remote-Local selector switch.

- b. Remote tap position indicator for mounting on remote control cabinet.
- 10. Design drive mechanism such that LTC can be manually operated, while transformer is operating under load, safely with no risk to transformer or operator.
- 11. If mechanism stalls in "Off-Tap" position, whether in automatic or manual operation, LTC shall be capable of maintaining full load indefinitely and an alarm contact shall be provided for remote monitoring.
- 12. Manufacturer: ABB UZF.

2.18 ACCESSORIES

- A. Provide standard accessories in accordance with IEEE C57.12.10.
- B. Provide following devices with at least one set of single-pole, double-throw (SPDT) alarm contacts for each:
 - 1. Magnetic liquid level indicator.
 - 2. Pressure relief device piped such that releases occur away from bushings, control cabinets etc. Include dry Form C contact for remote indication. Wire to control cabinet.
 - 3. Top oil temperature indicator.
 - 4. Loss of control power.
 - 5. Loss of auxiliary ac power alarm devices.
- C. Alarm contacts: Indicator contacts, switches, and relays used as alarm contacts shall be ungrounded and suitable for interrupting 0.02 ampere dc inductive, 0.2 ampere dc noninductive, or 2.5 amperes ac noninductive load at 250 volts maximum.
- D. Liquid drain and sampling devices.
- E. Upper and lower filter press connections.
- F. Lifting, moving and jacking facilities.
- G. Tilt transformer gages for ease of reading from ground. Mount within 5' (1.5 m) elevation of transformer base.
- H. Provide Buchholz fault pressure relay system, sensitive to rate of pressure increase including single-pole, single-throw (SPST) primary element controlling auxiliary seal-in relay and reset switch arranged and connected to provide manually resettable lockout function on operation of primary element.
 - 1. Design auxiliary relay for satisfactory operation on specified dc system. Provide electrically separate contacts for use with remote equipment. Mount inside main control cabinet.
 - 2. Wire rate of pressure rise relay equipment to terminal points in main control cabinet. Provide complete provisions for testing.
 - 3. Fault pressure relay: "Quailitrol."

2.19 IDENTIFICATION AND TAGGING

- A. Provide permanent nameplates to identify protective relays, meters, instruments, selector switches, indicating lights, terminal blocks, and other devices within various compartments.
- B. Nameplates shall have black lettering on white background. Fasten in place using Type 316 stainless steel, self-tapping screws. Nameplates shall be heat- and UV-resistant.
- C. Terminal blocks shall be clearly marked for wiring using permanent printed markers. Each internal interconnecting wire shall be identified at both ends with sleeve type wire markers with from/to information.
- D. Tag equipment with item number as shown on Data Sheets.

2.20 PAINTS AND FINISHES

- A. Type: Polyurethane or epoxy, durable.
- B. Tank paint: Manufacturer's standard ANSI gray.
- C. Radiators: Manufacturer's standard ANSI gray or bare galvanized steel.

2.21 SOURCE QUALITY CONTROL

- A. Transformer no-load and load-loss test results shall be certified by a licensed professional Engineer.
- B. Perform routine production and required tests on equipment prior to shipment, in accordance with IEEE C57.12.00 and as noted on Data Sheets.
- C. Perform routine accuracy tests on each metering accuracy current transformer in accordance with IEEE C57.13.
- D. Witness testing. Notification in writing shall be provided not less than 30 days prior to scheduled starting date of factory test. Provide notification of performance date for each test not less than 10 days prior to date of test to allow witness testing if so desired.
- E. Unusual events or damage occurring during fabrication of transformer and of tests, which do not meet specified standard values shall be reported. Inspection of such damages or test failures may be witnessed. Corrective measures to overcome such damage or failure shall be subject to acceptance by Engineer.
- F. Temperature test: Not required on individual units if tests exist for thermal duplicate unit of previous manufacture. Copy of test on file shall be furnished.
- G. Special tests:
 - 1. Impulse tests:
 - a. Perform in accordance with IEEE Standard C57.12.90 using neutral current method of fault detection.
 - b. Oscillographic records of test shall be included in test reports.
 - 2. Partial discharge test:
 - a. Test for partial discharge in accordance with partial discharge procedures specified in "Partial Discharge Measurement" and IEEE C57.113.
 - b. Test voltage shall be determined in accordance with ANSI/IEEE C57.12.00.
 - c. Acceptable measured partial discharge above background:
 - 1) RIV level:
 - a) Lower than 100 microvolts with increase in RIV not exceeding 30 microvolts during 1-hour test.
 - b) Shall not exceed 250 microvolts at any time during test.
 - 2) Apparent charge measurement level below 500 picocoulombs.
 - d. Perform partial discharge test after other dielectric tests are completed.
 - e. Test report:
 - 1) Provide test results in both microvolts and picocoulombs
 - 2) Curve of data obtained in test shall be included in test reports.
 - 3. Megger tests: Perform in accordance with following procedure. Resistance measurements shall be corrected to 20°C.
 - a. Perform with transformer filled with oil and with appropriate bushings interconnected to measure resistance from high to ground, low to ground, and from high to low. Perform using applied potential of 2,500 volts.
 - b. Perform between core and ground using applied potential of 500 volts.
 - 4. Gas-in-oil: Before testing begins and after tests specified are completed, dissolved gas-in-oil analysis shall be made of main tank oil.

5. Audible sound level: Not to exceed values given in NEMA TR 1 when measured in factory in accordance with NEMA TR 1 test code.
6. Communications test: Perform communications testing on devices with external communications capability and provide test report to document satisfactory operations. Tests shall include, but not be limited to:
 - a. Original device manufacturer installation and operational tests.
 - b. Signal levels and communications panel.
 - c. Demonstration of equipment operation during Owner witness tests.
 - d. Submit test report to document satisfactory operations.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's recommended procedures in presence of manufacturer's service representative.
- B. Move transformer to permanent location. Use cribbing and planking as required avoiding damage to underground piping or ducts in vicinity of foundation.
- C. Do not start assembly of transformer (except unloading and moving) until manufacturer's service representative is on job site.
- D. Assemble, fill with oil, test, and refill oil if necessary as specified; connect and test. Provide vacuum pumping equipment required for filling transformer.
- E. Install accessories as directed by service representative.
- F. Install insulating oil under vacuum and through a filter. Provide vacuum pumping.
- G. Provide and maintain power to heaters in transformer control cabinets.
- H. Provide documented field tests in accordance with manufacturer's recommendations.
- I. Cooperate with Owner test team for checkout and commissioning of communications.

3.02 PLACEMENT OF INSULATING OIL

- A. Receive and place oil in oil-filled equipment.
- B. Placement:
 1. Place oil in equipment through filter in complete accordance with manufacturer's recommendations and these specifications. Vacuum filling is required for power transformers.
 2. Oil removed to facilitate moving or assembly of equipment shall be replaced in same manner as oil in new equipment.
 3. Use metal hose or oilproof synthetic hose for oil placement.
 4. When work is performed inside equipment tank, use extreme care to prevent dropping tools or other loose objects within tanks.
 5. Open work on equipment shall be done in clear, still weather or under shelter.
- C. Testing:
 1. Test oil before and after placement or replacement of oil.
 2. IEEE C57.106 and ASTM D877 or ASTM D1816, and ASTM D923 under observation of manufacturer's service representative.
 3. Provide necessary testing facilities.
- D. Filtering:
 1. When directed by Engineer or Owner, filter oil by recirculating through filter as required, to bring to insulation level recommended by manufacturer.

2. Filtering of oil during original placement or replacement shall be considered part of equipment installation.
3. Refiltering of oil, which has become contaminated due to Contractor's failure to conform to manufacturer's recommendations and these specifications for placement of oil, or due to failure to properly protect oil from contamination when exposed to outside air, shall be provided by Contractor at no additional cost to Owner.
4. Provide necessary filtering equipment.

E. Vacuum filling:

1. Fill in accordance with manufacturer's recommendations. General procedure is as specified below.
2. Following items shall be as recommended by manufacturer:
 - a. Maximum exposure time of core and coils to atmosphere.
 - b. Minimum vacuum pressure before and during oil filling operations.
 - c. Length of time vacuum is to be maintained before oil filling.
 - d. Temperature of core and coils prior to oil filling.
 - e. Temperature of oil when filling.
 - f. Moisture and air content of oil.
 - g. Vacuum pressure to be maintained after completion of oil placement.
 - h. Length of time vacuum is to be maintained after completion of oil placement, prior to being released with nitrogen.
 - i. Time duration after completion of work prior to energizing transformer.
3. Using a vacuum pump, produce a vacuum in transformer tank, maintain minimum vacuum pressure as specified by manufacturer; maintain vacuum for length of time as specified by manufacturer.
4. Fill transformer with oil to level above core and coils, maintaining vacuum during filling process. Break vacuum and open transformer to atmosphere; install bushings.
5. If bushings cannot be installed immediately after vacuum is broken, fill transformer with dry nitrogen.
6. After parts have been installed, re-establish vacuum and maintain vacuum while adding oil to transformer to obtain proper level. Furnish high-capacity vacuum pump, heating equipment and piping hoses, connections, and accessories required to comply with manufacturer's recommendations.

3.03 PAINTING

- A. Apply 3-coat paint system over near white, grit-blasted metal, 4 to 6 mil minimum.
- B. Furnish Material Safety Data Sheet with shipping documents.

3.04 MANUFACTURER'S FIELD SERVICES

- A. Provide services of manufacturer's service representative(s) to supervise and/or check installation.
- B. Provide labor required to assist service representative(s) in checking and testing equipment.

DATA SHEETS 3-PHASE, 2-WINDING TRANSFORMER		Equipment Name: Tag No.: Option 1	
DESCRIPTION	UNITS	SPEC DATA	VENDOR DATA
Manufacturer	-	By Manufacturer	
Catalog/Serial No.	-	By Manufacturer	
SITE CONDITIONS			
24 Hr. Avg. Ambient Design Temperature	°C	30	
Maximum Ambient Temperature	°C	40	
Minimum Ambient Temperature	°C	-30	
Site Elevation Above Sea Level	ft	Less than 3,300 ft	
Seismic Requirements			
Site Class			
S _{DS} – Design Spectral Ground Acceleration at Short Periods (0.2 Seconds)			
I _p – Component Importance Factor			
R _p – Structure Response Modification Factor			
a _p – Component Amplification Factor			
Specific local Building Code and specific sections on seismic requirements used in equipment design	---	By Manufacturer	
Symmetrical short circuit current			
Limited Only by transformer impedance (ANSI standard)	Y/N	Y	
Minimum system short circuit current and X ₀ /X ₁	kA/#.#	NONE	
CHARACTERISTICS			
Operating Frequency	Hz	60	
Design Temperature Rise	°C	55	
Maximum Temperature Rise	°C	65	
Cooling Class	-	ONAN/ONAF/ONAF	
Capacity at Design Temp Rise	MVA	12/16/20	
Capacity at Maximum Temp Rise	MVA	13.4/17.9/22.4	
Impedance (Z%/ %Tolerance)	Z%/+-x	7.5%/+-7.5%	
HV to LV impedance at nominal voltage on Base Rating	Z%/+-x	7.5%/+-7.5%	
HV to Tertiary at nominal voltage on Base Rating	%	NONE	
LV to Tertiary at nominal voltage on Base Rating	%	NONE	
Transformer X/R Ratio	-	By Manufacturer	
Core and Coil Construction Type	-	Circular	
Type of Material Used in Coils	-	Cu	
SYSTEM CONFIGURATION			
Utilized as a Unit Auxiliary Transformer	Y/N	N	
Utilized as a Generator Step-Up Transformer	Y/N	N	
Utilized as a Substation Transformer	Y/N	Y	
Utilized as a Station Service Transformer	Y/N	N	
WINDINGS			
High Voltage:			
Nominal Rated Voltage	kV	34.5	
Basic Impulse Level	kV BIL	200	
Connection	D or Y	D	
Low Voltage:			
Nominal Rated Voltage	kV	12.47	
Basic Impulse Level	kV BIL	110	

DATA SHEETS 3-PHASE, 2-WINDING TRANSFORMER		Equipment Name: Tag No.: Option 1	
DESCRIPTION	UNITS	SPEC DATA	VENDOR DATA
Connection	D or Y	Y	
Displacement Between HV and LV Windings	deg	30° (ANSI std)	
Tertiary:		NONE	
Nominal Rated Voltage	kV	N/A	
Capacity (MVA)	Xx/xx/xx	N/A	
External Connection	Y/N	N/A	
Basic Impulse Level (External connection)	kV	N/A	
Connection	----	N/A	
Neutral:			
Basic Impulse Level	kV BIL	110	
Connection (Un-Grd, Solid, H-Res, L-Res)	-	Solid	
Neutral Insulation (Uniform, Graded)	-	Graded	
BUSHINGS			
High Voltage:			
Manufacturer	-	By Manufacturer	
Type	-	Porcelain	
Location	-	Cover	
Segment	-	3	
HV bushing BIL	kV	200	
Minimum creepage distance	In	35	
Low Voltage:			
Manufacturer	-	By Manufacturer	
Type	-	Porcelain	
Location	-	Side	
Segment	-	1	
LV bushing BIL	kV	110	
Minimum creepage distance	In	11	
Tertiary Voltage:		NONE	
Manufacturer	-	N/A	
Type	-	N/A	
Location	-	N/A	
Segment	-	N/A	
Tertiary bushing BIL	kV	N/A	
Minimum creepage distance	In	N/A	
Manufacturer	-	N/A	
Type	-	N/A	
Location	-	N/A	
Segment	-	N/A	
Neutral bushing BIL	kV	110	
Minimum creepage distance	In	11	
CURRENT TRANSFORMERS			
High Voltage (Bushing Current Transformers):			
Quantity on Each Bushing	Qty	2	
Ratio of Each CT	Pri/Sec	600:5	
Multi-Ratio	Y/N	Y	
Accuracy Class	-	C800	

DATA SHEETS 3-PHASE, 2-WINDING TRANSFORMER		Equipment Name: Tag No.: Option 1	
DESCRIPTION	UNITS	SPEC DATA	VENDOR DATA
Low Voltage (Bushing Current Transformers)::			
Quantity on Each Bushing	Qty	1	
Ratio of Each CT	Pri/Sec	1200:5	
Multi-Ratio	Y/N	Y	
Accuracy Class	-	C800	
Tertiary Voltage (Bushing Current Transformers)::			
Quantity on Each Bushing	Qty	NONE	
Ratio of Each CT	Pri/Sec	N/A	
Multi-Ratio	Y/N	N/A	
Accuracy Class	-	N/A	
Tertiary (Internal Current Transformers):			
Quantity on Each Winding	Qty	NONE	
Ratio of Each CT	Pri/Sec	N/A	
Multi-Ratio	Y/N	N/A	
Accuracy Class	-	N/A	
Neutral Bushing (Bushing Current Transformers)::			
Quantity on Each Bushing	Qty	1	
Ratio of Each CT	Pri/Sec	600:5	
Multi-Ratio	Y/N	Y	
Accuracy Class	-	C800	
CONNECTIONS			
High Voltage (Select one):			
Overhead Cable – Open Air	Y/N	Y	
Underground Cable – Open Air	Y/N	N	
Underground Cable - Enclosed	Y/N	N	
Nonsegregated Bus Duct	Y/N	N	
Segregated Bus Duct	Y/N	N	
Isolated Phase Bus Duct	Y/N	N	
Gas insulated Bus Duct	Y/N	N	
Low Voltage Side (Select one):			
Overhead Cable – Open Air	Y/N	N	
Overhead Cable – Cable Bus	Y/N	Y	
Underground Cable – Open Air	Y/N	N	
Underground Cable – Enclosed	Y/N	N	
Nonsegregated Bus Duct	Y/N	N	
Segregated Bus Duct	Y/N	N	
Isolated Phase Bus Duct	Y/N	N	
Tertiary (Select one for external connected only):			
Overhead Cable – Open Air	Y/N	N/A	
Underground Cable – Open Air	Y/N	N/A	
Underground Cable – Enclosed	Y/N	N/A	
Nonsegregated Bus Duct	Y/N	N/A	
ARRESTERS			
High Voltage Side	Y/N	Y	
Manufacturer	-		
MCOV Rating	kV	22	

DATA SHEETS 3-PHASE, 2-WINDING TRANSFORMER		Equipment Name: Tag No.: Option 1	
DESCRIPTION	UNITS	SPEC DATA	VENDOR DATA
Location (Segment)	---	3	
Discharge monitor	Y/N	N	
Low Voltage Side	Y/N	N	
Manufacturer	-	N/A	
MCOV Rating	kV	N/A	
Location (Segment)	---	N/A	
Discharge monitor	Y/N	N/A	
Tertiary (External connection only):	Y/N	NONE	
Manufacturer	-	N/A	
MCOV Rating	kV	N/A	
Location (Segment)	---	N/A	
Discharge monitor	Y/N	N/A	
TAP CHANGER			
De-energized taps:	Y/N	Y	
Tap Location	HV/LV	HV	
No. of Steps Above Nominal (Std. 2 x +2.5%)	Qty / %	2 x +2.5%	
No. of Steps Below Nominal (Std. 2 x -2.5%)	Qty / %	2 x -2.5%	
Load Tap Changer:	Y/N	Y	
Tap Location	HV/LV	LV	
No. of Steps Above Nominal (Std. 16 x +5/8%)	Qty / %	16 / +5/8	
No. of Steps Below Nominal (Std. 16 x -5/8%)	Qty / %	16 / -5/8	
Digital Tap Changer Control	Y/N	Y	
Automatic, Manual, or Both	-	Both	
Transformer Paralleling Equipment	Y/N	N	
Preservation System (Select One):			
Conservator Tank or Inert Gas Pressure System	-	Inert Gas Pressure	
Conservator tank location	Segment	N/A	
OIL			
Total Gallons in System	gal	By Manufacturer	
Qty shipped Separately	gal	By Manufacturer	
Weight of Oil as Shipped/Quantity of Oil	Lb./Gal.	By Manufacturer	
Proposed Method of Oil Shipment	-	By Manufacturer	
COOLING			
Radiator/Cooler Location – Segment (1,2,3,4)	-	1,3	
Cooling Equipment Fans:			
Quantity of Fan Motors per Stage	Qty	By Manufacturer	
Horsepower rating of each motor	Hp	By Manufacturer	
Rated Voltage and Phases	V, ph	240V, 1 ph	
Full Load Current	A	By Manufacturer	
Cooling Equipment Pumps:			
Quantity of Pump Motors per Stage	Qty	N/A	
Horsepower rating of each motor	Hp	N/A	
Rated Voltage and Phases	V, ph	N/A	
Full Load Current	A	N/A	
Guaranteed Power Requirements of Cooling Equipment			
First Stage	kW	By Manufacturer	

DATA SHEETS 3-PHASE, 2-WINDING TRANSFORMER		Equipment Name: Tag No.: Option 1	
DESCRIPTION	UNITS	SPEC DATA	VENDOR DATA
Second Stage	kW	By Manufacturer	
Third Stage	kW	By Manufacturer	
Maximum Expected Sound Level at Max. MVA Rating and All Fans Operating at:			
1 foot	dba	By Manufacturer	
6 feet	dba	By Manufacturer	
CONTROL CABINET			
Location – Segment (1,2,3,or4)	-	2	
Ac Auxiliary Power Voltage supplied to Control Cabinet	VAC	120/240V, 1 ph	
Qty of Ac Auxiliary Power sources supplied to Control Cabinet	1,2	1	
Power Required for AC Auxiliary Power Source	kVA	By Manufacturer	
Dc Control Power Voltage supplied to Control Cabinet	VDC	125	
Dc Rated Continuous Power Required	A	By Manufacturer	
Dc Rated Peak Power Required	A		
ACCESSORIES			
Nitrogen Pressurization Tanks	Y/N	Y	
Special Paint	Y/N	N	
Ground Resistor	Y/N	N	
Automatic Transfer Switch for Second Power Supply	Y/N	N	
Provisions (only) for Gas Analyzer	Y/N	N	
Wheels	Y/N	N	
100% spare gaskets	Y/N	N	
TESTS			
ANSI Routine Tests	Y/N	Y	
Winding Insulation	Y/N	Y	
Core Insulation	Y/N	Y	
Insulation Power Factor	Y/N	Y	
Auxiliary Cooling Losses	Y/N	Y	
Single Phase Excitation & Rated Voltage	Y/N	Y	
No Load Losses & Excitation Current	Y/N	Y	
Zero Sequence Impedance	Y/N	N	
Temperature Rise	Y/N	By Manufacturer	
Low Frequency on Auxiliary Devices	Y/N	Y	
Lightning Impulse	Y/N	By Manufacturer	
Front of Wave Impulse	Y/N	N	
Switching Impulse	Y/N	N	
Partial Discharge	Y/N	N	
Audible Noise	Y/N	Y	
Dissolved Gases in Oil Analysis	Y/N	Y	
EFFICIENCY			
At 100% of Maximum MVA	%	By Manufacturer	
At 75% of Maximum MVA	%	By Manufacturer	
At 50% of Maximum MVA	%	By Manufacturer	
VOLTAGE REGULATION			
100% of Maximum MVA at:			
Unity Power factor	%	By Manufacturer	

DATA SHEETS 3-PHASE, 2-WINDING TRANSFORMER		Equipment Name: Tag No.: Option 1	
DESCRIPTION	UNITS	SPEC DATA	VENDOR DATA
80% lagging power factor	%	By Manufacturer	
80% leading power factor	%	By Manufacturer	
Excitation Current at 100% Rated Voltage and Max. MVA	%	By Manufacturer	
GUARANTEED LOSSES			
Auxiliary Losses at full load and Max. MVA rating	kW	By Manufacturer	
No-Load Losses at 100% Rated Voltage	kW	By Manufacturer	
Load Losses at Max. MVA Rating	KW	By Manufacturer	
LOSS EVALUATION			
Auxiliary Losses	\$/kW	130.53	
No-Load Losses	\$/kW	1740.27	
Load Losses	\$/kW	502.58	
DIMENSIONS (APPROXIMATE)			
Overall Height	in.	By Manufacturer	
Overall Width	in.	162	
Overall Depth	in.	162	
Height over Tank	in.	By Manufacturer	
Height for Untanking	in.	By Manufacturer	
Minimum Distance Between Surge Arresters	in.	By Manufacturer	
Recommended Min. Space Between Transformer and Adjacent Structures	in.	By Manufacturer	
WEIGHTS (APPROXIMATE)			
Core and Coil	lbs.	By Manufacturer	
Tank and Fittings	lbs.	By Manufacturer	
Oil	lbs.	By Manufacturer	
Total Transformer With Oil	lbs.	By Manufacturer	
Total Shipping Weight	lbs.	By Manufacturer	
Weight of Largest Piece for Handling	lbs.	By Manufacturer	
DELIVERY			
Method of Shipment (truck, rail, barge, ship)	-	By Manufacturer	
Total No. of Weeks from Award of Contract, FOB site	wks	By Manufacturer	
Submittal of Review Drawings After Award of Contract	wks	By Manufacturer	
Manufacturing Time after Receipt of Approved Drawings	wks	By Manufacturer	
SPECIAL REQUIREMENTS			
System configuration See loading conditions in Table 1 below	-		
List parts Requiring Field Assembly	-	By Manufacturer	

DATA SHEETS 3-PHASE, 2-WINDING TRANSFORMER		Equipment Name: Tag No.: Option 1	
DESCRIPTION	UNITS	SPEC DATA	VENDOR DATA
Describe Extent of Field Welding	-	By Manufacturer	
List of Required Maintenance Tools Furnished With Equipment	-	By Manufacturer	
List of Required Spare Parts Furnished With Equipment - High Side Bushing with Gasket – Qty. 1 - Low Side Bushing with Gasket – Qty. 1 - LTC Tank Gaskets – Qty. 1 set		Manufacturer to provide \$/part	
List any Special Considerations Maximum fault current available from tertiary in kA from both HV and LV windings:	-		

DATA SHEETS 3-PHASE, 2-WINDING TRANSFORMER		Equipment Name: Tag No.: Option 2	
DESCRIPTION	UNITS	SPEC DATA	VENDOR DATA
Manufacturer	-	By Manufacturer	
Catalog/Serial No.	-	By Manufacturer	
SITE CONDITIONS			
24 Hr. Avg. Ambient Design Temperature	°C	30	
Maximum Ambient Temperature	°C	40	
Minimum Ambient Temperature	°C	-30	
Site Elevation Above Sea Level	ft	Less than 3,300 ft	
Seismic Requirements			
Site Class			
S _{DS} – Design Spectral Ground Acceleration at Short Periods (0.2 Seconds)			
I _p – Component Importance Factor			
R _p – Structure Response Modification Factor			
a _p – Component Amplification Factor			
Specific local Building Code and specific sections on seismic requirements used in equipment design	---	By Manufacturer	
Symmetrical short circuit current			
Limited Only by transformer impedance (ANSI standard)	Y/N	Y	
Minimum system short circuit current and X ₀ /X ₁	kA/#.#	NONE	
CHARACTERISTICS			
Operating Frequency	Hz	60	
Design Temperature Rise	°C	55	
Maximum Temperature Rise	°C	65	
Cooling Class	-	KNAN/KNAF/KNAF	
Capacity at Design Temp Rise	MVA	12/16/20	
Capacity at Maximum Temp Rise	MVA	13.4/17.9/22.4	
Impedance (Z%/ %Tolerance)	Z%/+-x	7.5%/+-7.5%	
HV to LV impedance at nominal voltage on Base Rating	Z%/+-x	7.5%/+-7.5%	
HV to Tertiary at nominal voltage on Base Rating	%	NONE	
LV to Tertiary at nominal voltage on Base Rating	%	NONE	
Transformer X/R Ratio	-	By Manufacturer	
Core and Coil Construction Type	-	Circular	
Type of Material Used in Coils	-	Cu	
SYSTEM CONFIGURATION			
Utilized as a Unit Auxiliary Transformer	Y/N	N	
Utilized as a Generator Step-Up Transformer	Y/N	N	
Utilized as a Substation Transformer	Y/N	Y	
Utilized as a Station Service Transformer	Y/N	N	
WINDINGS			
High Voltage:			
Nominal Rated Voltage	kV	34.5	
Basic Impulse Level	kV BIL	200	
Connection	D or Y	D	
Low Voltage:			
Nominal Rated Voltage	kV	12.47	
Basic Impulse Level	kV BIL	110	

DATA SHEETS 3-PHASE, 2-WINDING TRANSFORMER		Equipment Name: Tag No.: Option 2	
DESCRIPTION	UNITS	SPEC DATA	VENDOR DATA
Connection	D or Y	Y	
Displacement Between HV and LV Windings	deg	30° (ANSI std)	
Tertiary:		NONE	
Nominal Rated Voltage	kV	N/A	
Capacity (MVA)	Xx/xx/xx	N/A	
External Connection	Y/N	N/A	
Basic Impulse Level (External connection)	kV	N/A	
Connection	----	N/A	
Neutral:			
Basic Impulse Level	kV BIL	110	
Connection (Un-Grd, Solid, H-Res, L-Res)	-	Solid	
Neutral Insulation (Uniform, Graded)	-	Graded	
BUSHINGS			
High Voltage:			
Manufacturer	-	By Manufacturer	
Type	-	Porcelain	
Location	-	Cover	
Segment	-	3	
HV bushing BIL	kV	200	
Minimum creepage distance	In	35	
Low Voltage:			
Manufacturer	-	By Manufacturer	
Type	-	Porcelain	
Location	-	Side	
Segment	-	1	
LV bushing BIL	kV	110	
Minimum creepage distance	In	11	
Tertiary Voltage:		NONE	
Manufacturer	-	N/A	
Type	-	N/A	
Location	-	N/A	
Segment	-	N/A	
Tertiary bushing BIL	kV	N/A	
Minimum creepage distance	In	N/A	
Manufacturer	-	N/A	
Type	-	N/A	
Location	-	N/A	
Segment	-	N/A	
Neutral bushing BIL	kV	110	
Minimum creepage distance	In	11	
CURRENT TRANSFORMERS			
High Voltage (Bushing Current Transformers):			
Quantity on Each Bushing	Qty	2	
Ratio of Each CT	Pri/Sec	600:5	
Multi-Ratio	Y/N	Y	
Accuracy Class	-	C800	

DATA SHEETS 3-PHASE, 2-WINDING TRANSFORMER		Equipment Name: Tag No.: Option 2	
DESCRIPTION	UNITS	SPEC DATA	VENDOR DATA
Low Voltage (Bushing Current Transformers)::			
Quantity on Each Bushing	Qty	1	
Ratio of Each CT	Pri/Sec	1200:5	
Multi-Ratio	Y/N	Y	
Accuracy Class	-	C800	
Tertiary Voltage (Bushing Current Transformers)::			
Quantity on Each Bushing	Qty	NONE	
Ratio of Each CT	Pri/Sec	N/A	
Multi-Ratio	Y/N	N/A	
Accuracy Class	-	N/A	
Tertiary (Internal Current Transformers):			
Quantity on Each Winding	Qty	NONE	
Ratio of Each CT	Pri/Sec	N/A	
Multi-Ratio	Y/N	N/A	
Accuracy Class	-	N/A	
Neutral Bushing (Bushing Current Transformers)::			
Quantity on Each Bushing	Qty	1	
Ratio of Each CT	Pri/Sec	600:5	
Multi-Ratio	Y/N	Y	
Accuracy Class	-	C800	
CONNECTIONS			
High Voltage (Select one):			
Overhead Cable – Open Air	Y/N	Y	
Underground Cable – Open Air	Y/N	N	
Underground Cable - Enclosed	Y/N	N	
Nonsegregated Bus Duct	Y/N	N	
Segregated Bus Duct	Y/N	N	
Isolated Phase Bus Duct	Y/N	N	
Gas insulated Bus Duct	Y/N	N	
Low Voltage Side (Select one):			
Overhead Cable – Open Air	Y/N	N	
Overhead Cable – Cable Bus	Y/N	Y	
Underground Cable – Open Air	Y/N	N	
Underground Cable – Enclosed	Y/N	N	
Nonsegregated Bus Duct	Y/N	N	
Segregated Bus Duct	Y/N	N	
Isolated Phase Bus Duct	Y/N	N	
Tertiary (Select one for external connected only):			
Overhead Cable – Open Air	Y/N	N/A	
Underground Cable – Open Air	Y/N	N/A	
Underground Cable – Enclosed	Y/N	N/A	
Nonsegregated Bus Duct	Y/N	N/A	
ARRESTERS			
High Voltage Side	Y/N	Y	
Manufacturer	-		
MCOV Rating	kV	22	

DATA SHEETS 3-PHASE, 2-WINDING TRANSFORMER		Equipment Name: Tag No.: Option 2	
DESCRIPTION	UNITS	SPEC DATA	VENDOR DATA
Location (Segment)	---	3	
Discharge monitor	Y/N	N	
Low Voltage Side	Y/N	N	
Manufacturer	-	N/A	
MCOV Rating	kV	N/A	
Location (Segment)	---	N/A	
Discharge monitor	Y/N	N/A	
Tertiary (External connection only):	Y/N	NONE	
Manufacturer	-	N/A	
MCOV Rating	kV	N/A	
Location (Segment)	---	N/A	
Discharge monitor	Y/N	N/A	
TAP CHANGER			
De-energized taps:	Y/N	Y	
Tap Location	HV/LV	HV	
No. of Steps Above Nominal (Std. 2 x +2.5%)	Qty / %	2 x +2.5%	
No. of Steps Below Nominal (Std. 2 x -2.5%)	Qty / %	2 x -2.5%	
Load Tap Changer:	Y/N	Y	
Tap Location	HV/LV	LV	
No. of Steps Above Nominal (Std. 16 x +5/8%)	Qty / %	16 / +5/8	
No. of Steps Below Nominal (Std. 16 x -5/8%)	Qty / %	16 / -5/8	
Digital Tap Changer Control	Y/N	Y	
Automatic, Manual, or Both	-	Both	
Transformer Paralleling Equipment	Y/N	N	
Preservation System (Select One):			
Conservator Tank or Inert Gas Pressure System	-	Inert Gas Pressure	
Conservator tank location	Segment	N/A	
OIL			
Total Gallons in System	gal	By Manufacturer	
Qty shipped Separately	gal	By Manufacturer	
Weight of Oil as Shipped/Quantity of Oil	Lb./Gal.	By Manufacturer	
Proposed Method of Oil Shipment	-	By Manufacturer	
COOLING			
Radiator/Cooler Location – Segment (1,2,3,4)	-	1.3	
Cooling Equipment Fans:			
Quantity of Fan Motors per Stage	Qty	By Manufacturer	
Horsepower rating of each motor	Hp	By Manufacturer	
Rated Voltage and Phases	V, ph	240V, 1 ph	
Full Load Current	A	By Manufacturer	
Cooling Equipment Pumps:			
Quantity of Pump Motors per Stage	Qty	N/A	
Horsepower rating of each motor	Hp	N/A	
Rated Voltage and Phases	V, ph	N/A	
Full Load Current	A	N/A	
Guaranteed Power Requirements of Cooling Equipment			
First Stage	kW	By Manufacturer	

DATA SHEETS 3-PHASE, 2-WINDING TRANSFORMER		Equipment Name: Tag No.: Option 2	
DESCRIPTION	UNITS	SPEC DATA	VENDOR DATA
Second Stage	kW	By Manufacturer	
Third Stage	kW	By Manufacturer	
Maximum Expected Sound Level at Max. MVA Rating and All Fans Operating at:			
1 foot	dBa	By Manufacturer	
6 feet	dBa	By Manufacturer	
CONTROL CABINET			
Location – Segment (1,2,3,or4)	-	2	
Ac Auxiliary Power Voltage supplied to Control Cabinet	VAC	120/240V, 1 ph	
Qty of Ac Auxiliary Power sources supplied to Control Cabinet	1,2	1	
Power Required for AC Auxiliary Power Source	kVA	By Manufacturer	
Dc Control Power Voltage supplied to Control Cabinet	VDC	125	
Dc Rated Continuous Power Required	A	By Manufacturer	
Dc Rated Peak Power Required	A		
ACCESSORIES			
Nitrogen Pressurization Tanks	Y/N	Y	
Special Paint	Y/N	N	
Ground Resistor	Y/N	N	
Automatic Transfer Switch for Second Power Supply	Y/N	N	
Provisions (only) for Gas Analyzer	Y/N	N	
Wheels	Y/N	N	
100% spare gaskets	Y/N	N	
TESTS			
ANSI Routine Tests	Y/N	Y	
Winding Insulation	Y/N	Y	
Core Insulation	Y/N	Y	
Insulation Power Factor	Y/N	Y	
Auxiliary Cooling Losses	Y/N	Y	
Single Phase Excitation & Rated Voltage	Y/N	Y	
No Load Losses & Excitation Current	Y/N	Y	
Zero Sequence Impedance	Y/N	N	
Temperature Rise	Y/N	By Manufacturer	
Low Frequency on Auxiliary Devices	Y/N	Y	
Lightning Impulse	Y/N	By Manufacturer	
Front of Wave Impulse	Y/N	N	
Switching Impulse	Y/N	N	
Partial Discharge	Y/N	N	
Audible Noise	Y/N	Y	
Dissolved Gases in Oil Analysis	Y/N	Y	
EFFICIENCY			
At 100% of Maximum MVA	%	By Manufacturer	
At 75% of Maximum MVA	%	By Manufacturer	
At 50% of Maximum MVA	%	By Manufacturer	
VOLTAGE REGULATION			
100% of Maximum MVA at:			
Unity Power factor	%	By Manufacturer	

DATA SHEETS		Equipment Name: Tag No.: Option 2	
3-PHASE, 2-WINDING TRANSFORMER			
DESCRIPTION	UNITS	SPEC DATA	VENDOR DATA
80% lagging power factor	%	By Manufacturer	
80% leading power factor	%	By Manufacturer	
Excitation Current at 100% Rated Voltage and Max. MVA	%	By Manufacturer	
GUARANTEED LOSSES			
Auxiliary Losses at full load and Max. MVA rating	kW	By Manufacturer	
No-Load Losses at 100% Rated Voltage	kW	By Manufacturer	
Load Losses at Max. MVA Rating	KW	By Manufacturer	
LOSS EVALUATION			
Auxiliary Losses	\$/kW	130.53	
No-Load Losses	\$/kW	1740.27	
Load Losses	\$/kW	502.58	
DIMENSIONS (APPROXIMATE)			
Overall Height	in.	By Manufacturer	
Overall Width	in.	162	
Overall Depth	in.	162	
Height over Tank	in.	By Manufacturer	
Height for Untanking	in.	By Manufacturer	
Minimum Distance Between Surge Arresters	in.	By Manufacturer	
Recommended Min. Space Between Transformer and Adjacent Structures	in.	By Manufacturer	
WEIGHTS (APPROXIMATE)			
Core and Coil	lbs.	By Manufacturer	
Tank and Fittings	lbs.	By Manufacturer	
Oil	lbs.	By Manufacturer	
Total Transformer With Oil	lbs.	By Manufacturer	
Total Shipping Weight	lbs.	By Manufacturer	
Weight of Largest Piece for Handling	lbs.	By Manufacturer	
DELIVERY			
Method of Shipment (truck, rail, barge, ship)	-	By Manufacturer	
Total No. of Weeks from Award of Contract, FOB site	wks	By Manufacturer	
Submittal of Review Drawings After Award of Contract	wks	By Manufacturer	
Manufacturing Time after Receipt of Approved Drawings	wks	By Manufacturer	
SPECIAL REQUIREMENTS			
System configuration See loading conditions in Table 1 below	-		
List parts Requiring Field Assembly	-	By Manufacturer	

DATA SHEETS 3-PHASE, 2-WINDING TRANSFORMER		Equipment Name: Tag No.: Option 2	
DESCRIPTION	UNITS	SPEC DATA	VENDOR DATA
Describe Extent of Field Welding	-	By Manufacturer	
List of Required Maintenance Tools Furnished With Equipment	-	By Manufacturer	
List of Required Spare Parts Furnished With Equipment - High Side Bushing with Gasket – Qty. 1 - Low Side Bushing with Gasket – Qty. 1 - LTC Tank Gaskets – Qty. 1 set		Manufacturer to provide \$/part	
List any Special Considerations Maximum fault current available from tertiary in kA from both HV and LV windings:	-		

END OF SECTION

- 1) P. E. Schulz
- 2) P. K. Mitchell