NORTH BEACH WATER DISTRICT
PACIFIC COUNTY, WASHINGTON

RESOLUTION 01-2017

A RESOLUTION OF THE NORTH BEACH WATER DISTRICT OF PACIFIC COUNTY, WASHINGTON, APPROVING CHANGE ORDER NUMBER 03 TO THE WATER SUPPLY AND TREATMENT PROJECT CONTRACT WITH STETTLER SUPPLY COMPANY.

WHEREAS, North Beach Water District (District) awarded a construction contract to Stettler Supply Company (Stettler) for the DWSRF Water Supply and Treatment Project by approving Resolution 12-2016 on April 14, 2016; and

WHEREAS, a Construction Contract (Contract) to construct the Water Supply and Treatment Project by and between the District and Stettler was executed on May 5, 2016; and

WHEREAS, the District requested changes in the scope of work, contract amount, and contract time contained in Change Order Number 3, attached hereto and incorporated herein as Exhibit A; and

WHEREAS, the Engineer has reviewed, approves, and recommends Change Order Number 3 by affixing their signature to Change Order Number 3 on February 2, 2017; and

WHEREAS, Stettler approved Change Order Number 3 by affixing their signature to Change Order Number 3 on January 30, 2017;

NOW, THEREFORE, THE NORTH BEACH WATER DISTRICT BOARD OF COMMISSIONERS, DOES HEREBY RESOLVE AS FOLLOWS:

Section 1 Change Order Number 3 is hereby approved.

Section 2 Change Order Number 3 will result in a total increase in contract price of $13,750.00 (without tax). The new Contract Amount (without tax) due to CO#01 will be $1,519,378.00

Section 3 Change Order Number 3 will increase the Substantial Completion Contract Time by zero (0) days for a total of 230 working days and increase the Physical Completion

Contract Time by zero (0) days for a total of 240 working days.

Section 4 Change Order Number 3 will become a supplement to the Contract and all provisions in the Contract will apply hereto.

Section 5 The General Manager is hereby authorized and directed to do any and all things and to execute and deliver any and all documents which may be required or advisable in order to consummate Change Order Number 3 in accordance with the plans and specification contained in the bid documents.

ADOPTED BY THE NORTH BEACH WATER DISTRICT BOARD OF COMMISSIONERS, PACIFIC COUNTY, WASHINGTON THIS 17th DAY OF FEBRUARY, 2017

_____

Brian Sheldon, Commissioner
Position #1

_____

Gwen Brake, Commissioner
Position #2

_____

Glenn Ripley, Commissioner
Position #3

Gray & Osborne, Inc.
CONSULTING ENGINEERS

EXHIBIT "A"

February 2, 2017

Mr. Bill Neal
North Beach Water District
2212 272nd Street
Ocean Park, Washington 98640

SUBJECT: CHANGE ORDER NO. 3 TRANSMITTAL, WATER SUPPLY AND TREATMENT PROJECT
NORTH BEACH WATER DISTRICT, PACIFIC COUNTY, WASHINGTON
G&O #13224.05

Dear Mr. Neal:

Three copies of Change Order No. 3 for the above referenced project are enclosed, which have been signed by the Engineer and the Contractor. If the documents meet with the District's approval, the District should sign each change order.

Upon executing the Change Order, retain one copy for your files, return one copy to Stettler Supply Company and one copy to Gray & Osborne, Inc., Attn: Joe Plahuta.

Sincerely,

GRAY & OSBORNE, INC.

Joe Plahuta, P.E.

JP/sp
Encl.

cc: Mr. Jeff Hinckle, Federal Programs Unit, Washington State Department of Commerce.

CHANGE ORDER

Project Title	Water Supply and Treatment Project		
Owner	North Beach Water District	**Contractor Name**	Stettler Supply Company
Change Order No.	3	**Contractor Address**	4420 Ridge Drive NE Salem, OR 97301
Change Order Date	December 17, 2016		
G&O No.	13224.05		

The following changes are hereby made to the Contract Documents:

SCHEDULE A: SOUTH WELLFIELD IMPROVEMENTS

ITEM NO. 1: Wiegardt Wellfield Backup Generator

Furnish and install a propane-powered backup generator and automatic transfer switch on a concrete foundation slab at the Wiegardt Wellfield.

The lump sum cost for this work is: $43,180

Justification: The additional work is at the request of the Owner.

SCHEDULE B: NORTH WELLFIELD IMPROVEMENTS

ITEM NO. 1: Removal of Piping, Valves and Appurtenances from the Contract

The following bid item is deleted from the Contract.

No.	Description	Quantity	Unit Price	Total
6	Piping, Valves, and Appurtenances	1 LS	$77,090	$77,090

The lump sum cost for this work is: ..... ($77,090)

Justification: The deductive work is at the request of the Owner.

ITEM NO. 2: North Wellfield Well Pumps

Equip and test North Wellfield Water Wells 1, 4, 5, 6, and 8 in accordance with the attached proposal.

The lump sum cost for this work is: $47,660

Justification: The additional work is at the request of the Owner.

CHANGE TO CONTRACT PRICE

Original Contract Amount (without tax): $1,611,125.00
Current Contract Amount, as adjusted by previous change orders: $1,505,628.00
The Contract Amount due to this Change Order will be increased by: ..... $ 13,750.00
The new Contract Amount (without tax) due to this Change Order will be: $1,519,378.00

CHANGE TO CONTRACT TIME

The Substantial Completion Contract Time will be increased by 0 working days, for a total of 230 working days.
The Physical Completion Contract Time will be increased by 0 working days, for a total of 240 working days.

This document will become a supplement to the Contract and all provisions in the Contract will apply hereto. The Contractor acknowledges and agrees that by executing this change order he foregoes all rights and privileges of acquiring any additional compensation for any known or unknown claims of any type or nature, to include but not be limited to, any additional work, delays, extended office overhead, design omissions, changed site conditions, or any oral directions as of the date of the execution of this change order.

GRAY & OSBORNE, INC.
(RECOMMENDED) _____ Date 2/2/17

STETTLER SUPPLY COMPANY
(ACCEPTED) _____ Date 1/30/17

NORTH BEACH WATER DISTRICT
(ACCEPTED) _____ Date _____

CHANGE ORDER

Project Title	Water Supply and Treatment Project		
Owner	North Beach Water District	**Contractor Name**	Stettler Supply Company
Change Order No.	3	**Contractor Address**	4420 Ridge Drive NE Salem, OR 97301
Change Order Date	December 17, 2016		
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STETTLER SUPPLY COMPANY
(ACCEPTED) _____ Date 1/30/17

NORTH BEACH WATER DISTRICT
(ACCEPTED) _____ Date _____

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Change Order Date	December 17, 2016		
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GRAY & OSBORNE, INC.
(RECOMMENDED) _____ Date 2/2/17

STETTLER SUPPLY COMPANY
(ACCEPTED) _____ Date 1/30/17

NORTH BEACH WATER DISTRICT
(ACCEPTED) _____ Date _____

Stettler Supply & Construction
"Committed to Service Excellence"
Since 1948
CCB #33228
4420 Ridge Drive NE, Salem OR 97301
503-585-5550 local 866-985-5550 toll-free 503-581-6799 fax

To	Joe Plahuta	**NOTIFICATION LETTER NO:**	CR 05
Company	Gray & Osborne, Inc.	**Date**	10/17/2016
Address:	2102 Carriage Drive SW, Bldg I	**Job No:**	23029
	Olympia, WA 98502	**Job Name:**	North Beach Water District
Phone:	360-292-7481		
Fax:	360-292-7517	**Regarding:**	Additional Well Pumps

Notification of:		**Request for Additional Time**	**X**	**Cost Proposal**	
Description					
Additional Well Pumps					
Date of Installation:		2016			

Labor Cost:	**Rate**	**Hours**	**Workers**	**Total**	**Markup**	**Total**
Laborer	$49.85	40	2	$3,988.00	15%	$4,586.20
Pipefitter	$47.63	40	1	$1,905.20	15%	$2,190.98
Operator	$63.12	10	1	$631.20	15%	$725.88
Cement Mason	$50.07			$0.00	15%	$0.00
Ironworker	$72.74			$0.00	15%	$0.00
Carpenter	$61.14			$0.00	15%	$0.00
Millwright	$62.75			$0.00	15%	$0.00
Total						$7,503

Materials:	**Quantity**	**Cost**	**Markup**	**Total**
Well Pumps	1	$18,167.48	15%	$20,892.60
Motors	1	$5,548.09	15%	$6,380.30
Transducers	1	$5,128.35	15%	$5,897.60
Misc Piping	1	$625.00	15%	$718.75
			15%	$0.00
Total				$33,889

Equipment	**Rate**	**Hours**	**Total**	**Markup**	**Total**
Pump Hoist	$100.00	40	$4,000.00	15%	$4,600.00
Mini Excavator	$45.00	10	$450.00	15%	$517.50
Tool Truck w/Tools	$25.00	40	$1,000.00	15%	$1,150.00
Total					$6,268

SubContractor	**Quantity**	**Cost**	**Markup**	**Total**
			10%	$0.00
			10%	$0.00
Total				$0

Sub-Total				$47,660
Bond Rate Increase - Included Above				$0.00
Insurance - Included Above				$0.00
Engineering - Safety - Supervision		Hours		$0.00
Total				$47,660

Upon acceptance of the noted cost impact, Stettler Supply Company request that a change order						
be issued to,		Decrease	**X**	Increase contract amount by:		$47,660
Stettler Supply requests that our contract duration be extended by:				5	Working Days	
Copy To				By	Chris Dunmire	
					Project Manager	
Attachments				Email	chrisd@stettlersupply.com	

Scope of Work

Contractor shall provide the materials and perform the work described in this scope of work for the testing and retrofitting of North Wellfield Water Wells (NWF) #1, #4, #5, #6, and #8. This work will be conducted during the time the North Wellfield is off line for improvements related to the DWSRF Project.

Phase I Testing and Inspection (By Owner)

In Phase I the Owner will:

1st. Using existing pumps in the wells, perform four hour pump tests on each well at no more than four controlled rates. Water level response to the pumping will be carefully measured in the well being pumped (Target Well) and the other wells (Observation Wells) referred to above during the pump test. Selection of the pumps to be installed in phase two will be made using the data collected during the above pump test.

2nd. Video inspect the wells.

3rd. Demolish the existing well houses, slabs and regrade the well sites as needed with the exception of well #1 which is located in the existing booster station.

Deliverables:

Phase I will be complete when Owner:

1. Has delivered the results of the pump test to Gray and Osborne for analysis and pump selection.

2. Delivered to the Contractor a notice of completion of Phase 1.

Number of Days required to complete Phase I:

Days: _____ Review: _____

Phase 2 Installation and Testing (By Contractor)

In Phase 2 the Contractor will:

1st. Remove existing pumps and appurtenances from NWF Water Wells #1, #4, #5, #6, and #8.

2nd. Installed pitless adapters and well caps, as specified below, on NWF Water Wells #4, #5, #6, #7. Well #1 will be outfitted with a well seal, as specified below.

3rd. Install pumps and appurtenances in NWF Water Wells #1, #4, #5, #6, #8, per plans and specifications described in the DWSRF Contract for the Wiegardt Well Field Water Wells #1, #2, and #3 with the exception of the depth of

setting and the size and selection of the pump to be determined following Stage 1. For the purpose of the estimate, and subject to change, the assumption will be that pumps will be set at 80’ below grade and the pumps will be as specified below.

4th. Preform a simultaneous constant rate four hour pump test on NWF Water Wells #1, #4, #5, #6, #8. The pump test will be conducted at flow rates determined by Phase 1 for each of the wells. Power for the pump test will be provided by the Owner to the well head. The Contractor will discharge water from the pump test to a location approved by the Owner and not more than 100 feet from each well head. The anticipated flow rate from each well is between 80 gpm and 125 gpm. During the pump test the Contractor will collect drawdown and recovery data from each well according to the following schedule:

Drawdown		Recovery	
Time (measured from Pump Start)	Time Intervals Between Measurements	Time (measured from Pump Stop)	Time Intervals Between Measurements
0 – 5 min.	30 sec.	0 – 5 min.	30 sec.
5 – 15 min.	1 min.	5 – 15 min.	1 min.
15 - 60 min.	5 min.	15 - 60 min.	5 min.
60 – 120 min.	20 min.	60 – 120 min.	20 min.
120 – 240 min.	60 min.	120 – 240 min	60 min.

Deliverables:

Phase 2 will be complete when Contractor:

1. Has delivered the results of the pump test to Gray and Osborne and Owner.

2. Gray and Osborne has issued a notice of completion of Phase 2.

Number of Days required to complete Phase II:

Days: _____ Review: _____

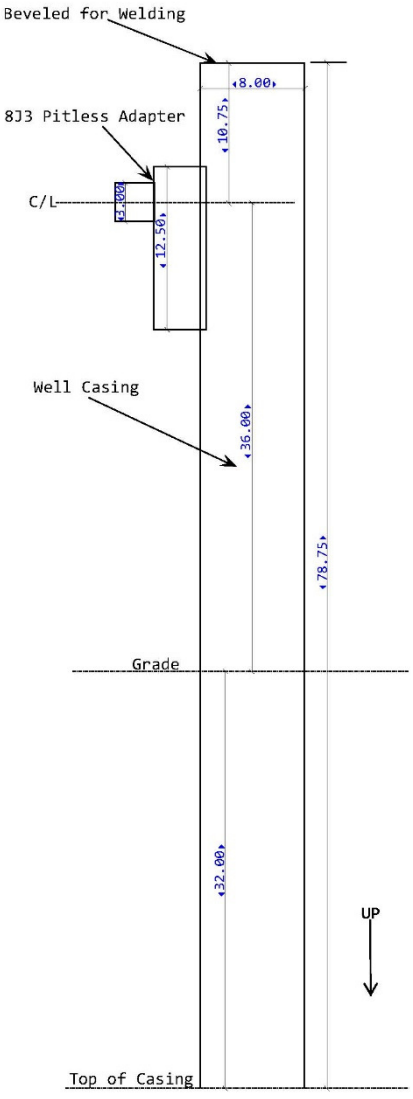
Material Specifications (not included in Water Supply and Treatment Project Specifications):

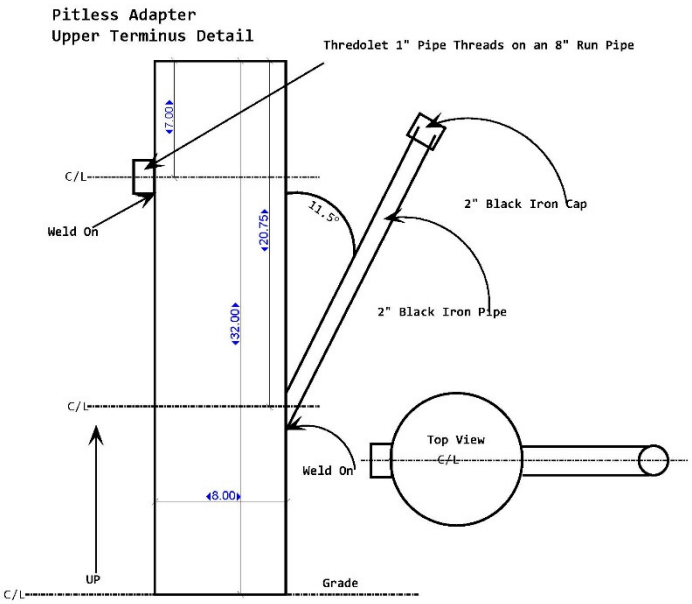
Pitless Adapter ----------Midwest Maass Model 8J3 or equal

Well Cap ----------Baker Monitor 8WPSM or equal

Well Seal ----------Midwest Maass Model 459S or equal

The pitless adapter will be installed on a section of 8" well casing (0.322 wall thickness) approximately 6' 6" long. The pitless adapter will be welded onto the well casing 8" above the the bottom of the pipe. Installation of the pitless adapter includes the removal of existing well casing and welding the new casing with pitless adapter onto the existing casing. The District will provide the excavation and backfill required to install the pitless adapter. The District will file all of the Department of Ecology notifications and reports and pay all Department of Ecology fees.





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"Committed to Service Excellence"
Since 1948
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4420 Ridge Drive NE, Salem OR 97301
503-585-5550 local 866-985-5550 toll-free 503-581-6799 fax

To	Joe Plahuta	**NOTIFICATION LETTER NO:**	CR 10
Company	Gray & Osborne, Inc.	**Date**	1/3/2016
Address:	2102 Carriage Drive SW, Bldg I	**Job No:**	23029
	Olympia, WA 98502	**Job Name:**	North Beach Water District
Phone:	360-292-7481		
Fax:	360-292-7517	**Regarding:**	SWF Backup Generator

Notification of:		**Request for Additional Time**	**X**	**Cost Proposal**	
Description					
SWF Backup Generator					
Date of Installation:		2017			

Labor Cost:	**Rate**	**Hours**	**Workers**	**Total**	**Markup**	**Total**
Laborer	$49.85	30	2	$2,991.00	15%	$3,439.65
Pipefitter	$47.63			$0.00	15%	$0.00
Operator	$63.12	10	1	$631.20	15%	$725.88
Cement Mason	$50.07	10	2	$1,001.40	15%	$1,151.61
Ironworker	$72.74			$0.00	15%	$0.00
Carpenter	$61.14			$0.00	15%	$0.00
Millwright	$62.75			$0.00	15%	$0.00
Total						$5,317

Materials:	**Quantity**	**Cost**	**Markup**	**Total**
Concrete	3	$165.00	15%	$569.25
Rebar	1	$368.75	15%	$424.06
Formwork	1	$85.00	15%	$97.75
Rock	1	$350.00	15%	$402.50
Generator	1	$24,737.00	15%	$28,447.55
Total				$29,941

Equipment	**Rate**	**Hours**	**Total**	**Markup**	**Total**
Crane	$335.00	10	$3,350.00	15%	$3,852.50
Mini Excavator	$45.00	10	$450.00	15%	$517.50
Tool Truck w/Tools	$25.00		$0.00	15%	$0.00
Total					$4,370

SubContractor	**Quantity**	**Cost**	**Markup**	**Total**
Electrician	1	$3,228.51	10%	$3,551.36
			10%	$0.00
Total				$3,551

Sub-Total				$43,180
Bond Rate Increase - Included Above				$0.00
Insurance - Included Above				$0.00
Engineering - Safety - Supervision		Hours		$0.00
Total				$43,180

Upon acceptance of the noted cost impact, Stettler Supply Company request that a change order						
be issued to,		Decrease	X	Increase contract amount by:		$43,180
Stettler Supply requests that our contract duration be extended by:					40	Working Days
Copy To				By	Chris Dunmire	
					Project Manager	
Attachments				Email	chrisd@stettlersupply.com	

SECTION 16230

GENERATOR ASSEMBLIES

PART 1 GENERAL

1.1 SCOPE

The work specified in this Section consists of an outdoor packaged **propane** engine generator set as specified herein.

1.2 DEFINITIONS

A. FULL LOAD

The generator delivering 100 percent of its rated output power.

B. MAXIMUM FREQUENCY DIP AND PEAK

The maximum allowable frequency deviation, in percent, below and above the generator's specified output frequency during application-specific starting and stopping steps as specified in 1.6.A.

Example: A 10 percent MAXIMUM FREQUENCY DIP AND PEAK on a 480 Vac, 3 PH, 60 Hz generator equates to ±10 percent (±6 Hz) maximum deviation from 60 Hz, or 54 Hz absolute minimum to 66 Hz absolute maximum frequency limits during the worse-case specified step changes while either loading or unloading.

C. MAXIMUM FREQUENCY RECOVERY TIME PERIOD

The maximum period of time, in seconds, for the frequency to recover back to its specified steady-state operating band following load transitions from no load to full load or from full load no load.

Example: A 5 second MAXIMUM VOLTAGE RECOVERY TIME PERIOD requires that the generator repeatedly recover from full load added or removed load steps within 5 seconds maximum. This means that during a full load transition, in either direction, the generator frequency may deviate from its specified steady-state operating band for a maximum of 5 seconds before it has fully recovered back to its specified steady-state operating band.

D. MAXIMUM STEADY-STATE FREQUENCY OPERATING BAND

The maximum allowable frequency deviation, in percent, below and above the generator's specified operating frequency during steady-state operating conditions at any load between no load and full load.

Example: 0.5 percent MAXIMUM STEADY-STATE FREQUENCY OPERATING BAND on a 480 Vac, 3 PH, 60 Hz generator equates to ±0.5 percent (±0.3 Hz) maximum deviation from 60 Hz, or 59.7 Hz absolute minimum to 60.3 Hz absolute maximum frequency limits at any stable operating load from no load to full load.

E. MAXIMUM VOLTAGE DIP AND PEAK

The maximum allowable voltage deviation, in percent, below and above the generator's specified output voltage during application-specific starting and stopping steps as specified in 1.6.A.

Example: 25 percent MAXIMUM VOLTAGE DIP AND PEAK on a 480 Vac, 3 PH, 60 Hz generator equates to ±25 percent (±120 Vac) maximum deviation from 480 Vac, or 360 Vac absolute minimum to 600 Vac absolute maximum voltage limits during the worse-case specified step changes while either loading or unloading.

F. MAXIMUM VOLTAGE RECOVERY TIME PERIOD

The maximum period of time, in seconds, for the voltage to recover back to its specified steady-state operating band following load transitions from no load to full load or from full load no load.

Example: A 5 second MAXIMUM VOLTAGE RECOVERY TIME PERIOD requires that the generator repeatedly recover from full load added or removed load steps within 5 seconds maximum. This means that during a full load transition, in either direction, the generator voltage may deviate from its specified steady-state operating band for a maximum of 5 seconds before it has fully recovered back to its specified steady-state operating band.

G. MAXIMUM STEADY-STATE VOLTAGE OPERATING BAND

The maximum allowable voltage deviation, in percent, below and above the generator's specified operating voltage during steady-state operating conditions at any load between no load and full load.

Example: 2 percent MAXIMUM STEADY-STATE VOLTAGE OPERATING BAND on a 480 Vac, 3 PH, 60 Hz generator equates to ±2 percent (±9.6 Vac) maximum deviation from 480 Vac, or 470.4 Vac absolute minimum to 489.6 Vac absolute maximum voltage limits at any stable operating load from no load and full load.

H. NO LOAD

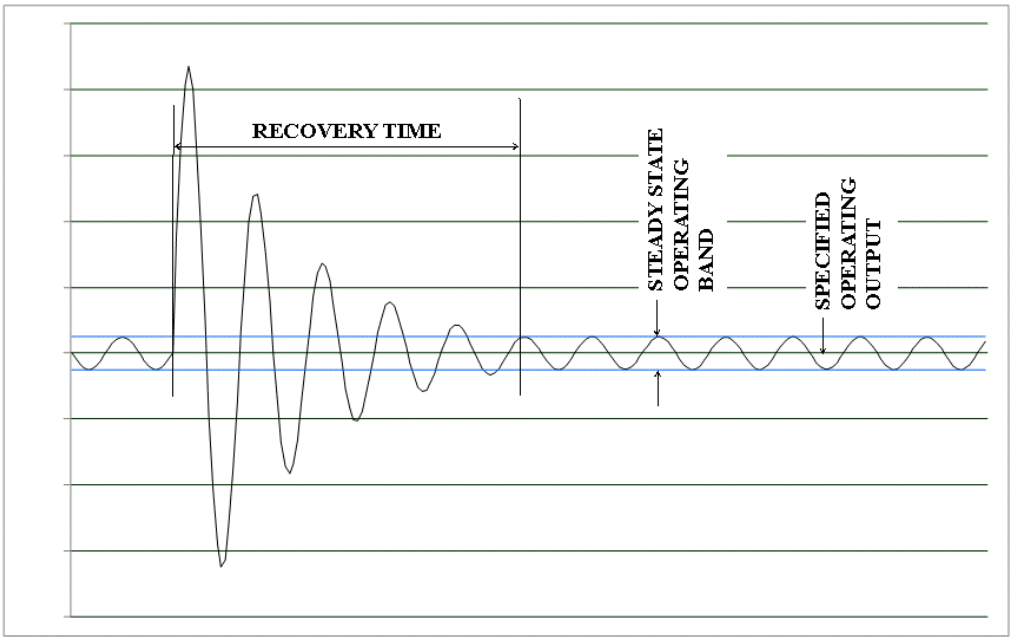
The generator delivering 0 percent of its rated output power.

I. STANDBY POWER OUTPUT RATING

The power output rating equal to the power the generator set delivers continuously under normally varying load factors for the duration of an electrical utility power outage. The power output rating is the gross electrical power output of the generator set minus the total power requirements of the electric motor driven cooling fan, water pump, and other auxiliary loads related to the generator set operations.

J. DEFINITIONS REFERENCE GRAPH

The following graph is a reference chart to better define the following terms "MAXIMUM VOLTAGE RECOVERY TIME PERIOD," "MAXIMUM STEADY-STATE VOLTAGE OPERATING BAND", "MAXIMUM FREQUENCY RECOVERY TIME PERIOD," and "MAXIMUM STEADY-STATE FREQUENCY OPERATING BAND." The Y axis can either be voltage or frequency and the X axis is time.



1.3 REFERENCES

A. The latest Washington State adopted, published edition of a reference shall be applicable.

B. All Washington State amendments adopted prior to the effective date of this Contract shall be applicable.

C. All materials, installation and workmanship shall comply with the applicable requirements and standards addressed within the following references:

1. National Fire Protection Association (NFPA)

   a. NFPA 30 Flammable and Combustible Liquids Code

   b. NFPA 37 Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines

   c. NFPA 70 National Electrical Code

2. International Fire Code (IFC)

3. International Building Code (IBC)

4. National Electrical Manufacturers Association (NEMA)

a. NEMA MG 1: Motors and Generators

5. International Mechanical Code (IMC)

6. Underwriters Laboratory (UL)

a. UL 2200 Generator Engine Generator Assemblies

b. UL 142 Steel Aboveground tanks for Flammable and combustible Liquids.

1.4 PERFORMANCE REQUIREMENTS

A. Engineering calculations indicate a standby power output rating requirement of 60 kW at 80 percent power factor at **480/277** volts, 3 phase, 60 hertz while operating under the site conditions listed in Part 1.8 of this Section in an ambient temperature range of 0 to 104 degrees F at less than 90 percent rated capacity. The manufacturer shall calculate generator unit size according to the following bus rated loads and starting steps:

Step No./ Device No.	Device Description	Motor Code	Load Hp	Load kVA
Step 1				
	Transformer, 480-240/120 V, 1 ph	-	-	5.0
01 MTR 01	Well Pump No. 1	H	15.0	-
Step 2				
02 MTR 01	Well Pump No. 2	H	15.0	-
Step 3				
03 MTR 01	Well Pump No. 3	H	15.0	-

B. The Generator shall be suitable for operation with pulse width modulated variable frequency drives without detrimental effects on voltage or frequency regulation and stability.

C. MAXIMUM VOLTAGE DIP AND PEAK

Shall not exceed 25 percent.

D. MAXIMUM FREQUENCY DIP AND PEAK

Shall not exceed 10 percent.

E. MAXIMUM STEADY-STATE VOLTAGE OPERATING BAND

Shall not exceed 2 percent.

F. MAXIMUM STEADY-STATE FREQUENCY OPERATING BAND

Shall not exceed 0.5 percent.

G. MAXIMUM VOLTAGE RECOVERY TIME PERIOD

Shall not exceed 5 seconds.

H. MAXIMUM FREQUENCY RECOVERY TIME PERIOD

Shall not exceed 5 seconds.

I. ALTERNATOR OUTPUT WAVEFORM

At no load, harmonic content measured line-to-line or line-to-neutral does not exceed 5 percent total and 3 percent for single harmonics. The telephone influence factor, determined according to NEMA MG 1, does not exceed 50.

J. SUSTAINED SHORT-CIRCUIT CURRENT

For a 3-phase, bolted short circuit at the system output terminals, the system will supply 300 percent of rated full load current for not less than 10 seconds to coordinate circuit breaker tripping. This system shall include over-voltage relay protection to preclude damage to any generator system component.

K. TEMPERATURE RISE OF GENERATOR

Within limits permitted by NEMA MG 1, when operating continuously at full nameplate rating, the temperature rise of the generator shall not exceed 250 degrees F over 100 degrees F ambient.

L. STARTING TIME

The maximum allowable time period to cold start the generator, while operating at the low end of the specified temperature range, and have its voltage and frequency sufficiently stable for a transfer switch to accept or automatically initiate a power transfer, shall be 10 seconds.

1.5 SUBMITTALS

A. PRODUCT DATA

Provide the manufacturer and a full description of the generator set and associated components. Include features, ratings, and performance including, but not limited to:

1. Engine including the following:

    a. Horsepower at rated speed and load

    b. Emission Ratings

2. Overall dimensions of generator set system including the base and the enclosure.

3. Fuel consumption for 1/4, 1/2, 3/4, and full load of generator set

4. Coolant heater

5. Alternator

    a. Electrical rating (kVA, reactance, time constants, temperature rise, etc.).

6. Voltage regulator type, make, model, and wiring diagram

7. Noise levels at twenty-three feet (7 meters) in a free field

8. Warranty and Service Agreement documentation

9. Bill of Materials

10. Wiring Diagram

B. QUALITY ASSURANCE

Provide documentation showing all CD&Es (compliances, deviations, and exceptions) for this Specification.

C. GENERATOR SIZING CALCULATIONS

Submit calculations showing that the submitted generator's standby power output rating is capable of meeting the specified loads in the specified

steps listed. The calculations shall show that the generator meets the specified performance requirements.

D. OPERATION AND MAINTENANCE MANUAL

1. Field Test Reports

Indicate and interpret test results for compliance with manufacturer's published standards for unit provided. Provide written approval of installation in accordance with all manufacturers' recommendations.

2. Test Reports

The O&M manual shall include a copy of the factory test data and the field test report.

3. Service Agreement and Warranty

Include copies of the Service Agreement and Warranty in the Operation and Maintenance Manual.

1.6 QUALITY ASSURANCE

A. SOURCE LIMITATIONS

1. Obtain engine generator set from a single supplier with responsibility for the complete system. Furnish a new product built from components with proven reliability and compatibility. The generator set shall be coordinated to operate as a unit as evidenced by records of prototype testing by the OEM.

2. The warranty shall be supported by the original distributor, not offset to an engine manufacturer, an alternator manufacturer, or a new manufacturer's distributer.

3. Only a factory direct or a first tier distributor shall be acceptable. Second tier dealers are not approved.

4. Only approved local distributors shall supply equipment provided under this contract. Equipment by non-local distributors shall not be accepted.

5. The distributor shall be the authorized engine distributor for the prime mover.

B. Generator set to be UL 2200 listed "Stationary Engine Generator Assemblies."

C. EMISSIONS

EPA certified for all current EPA emissions requirements.

D. FACTORY TEST

Test assembled generator set at the factory prior to shipment to the job site. The power factor for the factory test shall be at 0.8 p.f.

1. Show the following conditions at load and no load on the Generator Set: Charging System Volts, Voltage Output, Frequency, Coolant Temperature, and Oil Pressure, and other pertinent information on the test report. Provide a plot of the transient voltage and a plot of the frequency response versus time as a result of a full load single step.

2. Perform manufacturer's standard factory tests.

3. Test for a minimum of 30 minutes at full load per NFPA 110.

1.7 PROJECT/SITE CONDITIONS

A. ENVIRONMENTAL REQUIREMENTS

Engine generator system is designed, engineered, and rated to withstand the following environmental conditions without mechanical or electrical damage or degradation of performance capability:

1. Ambient Temperature: Minus 5 degrees F to 122 degrees F.

2. Relative Humidity: 0 to 95 percent.

3. Elevation: Sea level to **500ft.**

B. SEISMIC REQUIREMENTS

The entire generator package including all mounted accessories shall comply with the requirements of the 2015 IBC and ASCE 7-05 Minimum Design Loads for Building and Other Structures, Chapter 13 "Seismic

Design for Nonstructural Components," as referenced and amended by the IBC. Seismic design parameters are as follows:

1. Building Occupancy Category **III**, Site Class D.

2. Component Importance Factor: Ip = 1.25.

3. Design response acceleration parameters:

   a. S_{DS} = 0.930g

   b. S_{D1} = 0.707g

1.8 WARRANTY AND MAINTENANCE

A. WARRANTY

1. The manufacturer shall warrant the materials and workmanship of the generator set for a minimum of 5 years, or 2,500 hours from the registered commissioning and startup.

2. The warranty shall be comprehensive and shall include all components included in the generator package. No deductibles shall be allowed for travel time, service hours, repair part costs, etc., during the warranty period.

1.9 EXTRA MATERIALS

1. Power Fuses (line power)

   Provide 3 spare power fuses of each type and rating.

2. Control Fuses

   Provide 10 percent (minimum of two) spare control fuses of each type and rating to cover all motor starters (not per starter).

   Provide 1 control fuse puller.

3. Filters

   Provide two sets each of lubricating oil, fuel, and combustion air filters.

4. V-Belts

Provide one complete replacement set of all V-belts.

5. Touchup Paint

   Provide 1 quart (minimum) of touchup paint matching each color utilized on generator set.

6. Provide spare parts in suitable boxed watertight container marked "GENERATOR SPARE PARTS" and deliver to the Owner. Label with supplier's/manufacturer's name, the model number of the generator set, and the 24-hour service telephone number.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. APPROVED MANUFACTURERS

1. Kohler as provided by EC Power Systems.

2. Cummins Power Generation as provided by Cummins Northwest.

3. MTU as provided by Pacific Power Products.

4. Caterpillar as provided by NC Power Systems.

5. Generac as provided by Energy Systems.

2.2 ENGINE

A. FEATURES

1. Industrial type specifically designed and engineered for use with **propane gas fuel** source.

2. Engine speed shall be governed by an electronic governor. Refer to frequency requirements specified earlier in this Specification.

B. COMPONENTS

1. Oil Pump

Gear type lubricating oil pump for supplying oil under pressure to main bearings, crankpin bearings, pistons, piston pins, timing gears, camshaft bearings, and valve rocker mechanism.

2. Oil Filters

   Full flow oil filters conveniently located for servicing, with a spring-loaded bypass valve to ensure oil circulation.

3. Air Filter

   Dry type air filter.

4. Cooling System

   Sufficient to cool the engine when the generator set is delivering full rated load in an ambient temperature of 104 degrees F.

   a. Engine-driven, centrifugal-type water circulating pump.

   b. Thermostatic valve.

5. Coolant/ Jacket/ Block Heater

   As described in Part 2.6-B of this Section.

6. Electrical starters sufficient to start the engine within 10 seconds of call to start.

7. Batteries

   Lead acid batteries shall be of sufficient capacity to permit starting the generator engine a minimum of four times without recharging. Batteries are to be mounted in an earthquake- and drip-proof rack on the skid, frame, or other approved separate location with required connections provided.

8. Battery Heater

   As described in Part 2.6-B of this Section.

9. Battery Charger

   a. Silicone rectifier static type, self regulated with high current and full float operation with a filtered output.

b. The charger shall be capable of providing a 10 A DC high current charging rate when the battery voltage is below the "float voltage set point." Full floating charging when voltage is above the set point.

c. Battery charger operates from 120 volts, single phase AC connected to Generator Auxiliary Device Panel (GADP) as per Section 2.6.A.

d. The charger shall be complete with voltmeter, ammeter, charging rheostat, automatic equalizing timer, and high/low battery voltage alarm.

e. The battery charger shall be factory mounted with vibration isolators to prolong service life.

f. Battery charger shall include standard NFPA outputs where generator is legally required for life safety.

10. Provide watertight flex connections for all conduits and piping attached to generator.

2.3 ALTERNATOR

A. Four pole, 1,800 rpm revolving field generator.

B. Enclosure shall be of drip-proof construction.

C. Insulation Class H.

D. Wiring shall be 12-lead, re-connectable, and configured for the specified voltage, phasing, neutral point, and frequency.

E. ALTERNATOR HEATER

As described in Part 2.6-B of this Section.

2.4 VOLTAGE REGULATOR

An electronic voltage regulator shall be provided.

2.5 CONTROL PANEL

The Control panel shall be of the rotatable dead-front type, vibration free mounted on the generator set. The generator control panel and the generator main circuit breaker shall be installed per NEC clearances and provide accessibility to equipment. The tops of control panels and the circuit breakers shall be mounted a maximum of 72 inches above the finished floor.

A. The control panel shall operate at 12 or 24 VDC from the generator/battery electrical system as required by manufacturer based on the size of the system.

B. Control panel shall include the following functions/devices:

1. Automatic Starting System

a. Provides three 15 second cranking cycles and two rest periods followed by a lockout and alarm.

b. Operation is initiated by the closing of a remote Form A contact in the automatic transfer switch control circuit.

2. Indicating light for alarm condition.

3. Indication for the following:

a. Running

b. Low coolant level

c. High coolant temperature

d. Low oil pressure

e. Over speed

f. Over crank

g. AC volts for each phase

h. AC current for each phase

i. Frequency

j. Lube oil pressure

k. Coolant temperature

l. Run Time

m. Number of Starts

4. Engine “AUTO-OFF-MANUAL” control selector switch.

5. Red colored emergency shutdown pushbutton/switch.

6. Time delay relay to permit operation at “NO-LOAD” after retransfer of load to normal source (cool down timer).

7. Automatic safety controls which shut down the engine on:

   a. Low lubricating oil pressure

   b. Low coolant level

   c. High jacket water temperature

   d. Engine over speed

8. Include a Form A (N.O. Dry) contact for remote connection for each of the following Generator functions.

   a. Running

   b. General Alarm

   c. Fail (shall include, as a minimum, any combination of conditions in 8 above)

   d. AUTO-OFF-MANUAL control switch in Auto Mode

   e. Low Battery Voltage

   f. Low Oil Pressure

   g. High Coolant Temperature

9. Control Cabinet Heater

   As described in Part 2.6-B of this Section.

2.6 ACCESSORIES

A. GENERATOR AUXILIARY DEVICE PANEL

The generator manufacturer shall provide, install, and prewire a Generator Auxiliary Device Panel (GADP) as part of the generator system with the following minimum features:

1. The GADP shall consist of a NEMA 1 gasketed 240/120 VAC single phase load center with a main breaker and appropriately sized branch circuit breakers for the battery charger and the heaters listed below under GENERATOR HEATERS. Available power to the panel is 240/120 VAC single phase.

   Exception:

   The GADP load center can be replaced with one or more 20 A, 4-plex receptacle sets in cast aluminum boxes under the following conditions:

   a. The battery charger and all heater loads are 120 VAC, single phase,

   b. The sum of the battery charger and all heater loads does not exceed 1920 VA (16 A),

   c. All loads are prewired by the manufacturer with grounded plug cables,

   d. The receptacles are placed within reach of all load plugs,

   e. If required, multiple 4-plex receptacle sets are connected together by the manufacturer (provide a single electrical connection point for the Contractor).

2. For outdoor generators, the GADP shall be securely mounted within the enclosure in a location easily accessible by the operator and to a Contractor-provided power conduit.

3. The GADP shall be internally connected to the described loads by the generator manufacturer.

4. It is the intent that the Contractor need only provide a single power conduit and associated conductors to the manufacturer-provided

GADP and terminate the conductors to a main circuit breaker, neutral, and ground. All connections for heater controls and devices shall be prewired and pretested by the manufacturer.

B. GENERATOR HEATERS

1. Alternator Heater

Thermostatically controlled alternator heater. Provide if shown in the table below.

2. Coolant Heater

Engine mounted, thermostatically controlled immersion type engine coolant heater to ensure a minimum coolant temperature of 120 degrees F at ambient room temperature of 5 degrees F. Provide as shown in the table below.

C. CIRCUIT BREAKERS

1. Provide an output main circuit breaker. This breaker shall be lockable in its open position. The breaker shall have an auxiliary contact that is open when the breaker is in the open position. This circuit shall be prewired by the generator manufacturer to dedicated terminals in the generator control panel. Wire between these devices in LFMC conduit.

2. Provide a generator field protection circuit breaker, or other means to protect the alternator.

D. DECALS, PLACARDS, AND SIGNS

1. The generator manufacturer shall provide all decals and signage as required by the regulatory and/or inspecting agency for the particular installation, including, but not limited to the following:

a. One hazardous material placard, diamond shape, 4 color (red, white, blue, yellow) for propane fuel source in accordance with NFPA 704.

E. VIBRATION ISOLATORS

1. Provide vibration isolators between the unit and the sub-base fuel tank. The isolation mountings shall consist of malleable cast iron top and bottom housings incorporating steel spring or elastomeric

construction and shall be provided with built-in leveling bolts, elastomeric pad and built-in resilient chocks to control oscillation and withstand lateral forces in all directions. Isolators shall be presized and installed in accordance with the recommendations of the generator set manufacturer.

2. Vibration isolation efficiency shall be 96 percent at 1,800 rpm. Provide Korfund or equal.

3. Calculations shall be provided with the vibration isolation submittal demonstrating that the specified efficiency can be met with the project specific system characteristics.

4. Vibration isolators may be waved with manufacturer's documentation that the entire generator package including mounted accessories is IBC certified without them.

F. ANCHORS

Anchors used to secure the generator to the base or other stable surface shall be designed and sized by the manufacturer. Anchors shall be cast-in-place 316 stainless steel anchor bolts or drilled-in 316 stainless steel anchors set with epoxy adhesive. Expansion type anchors shall not be acceptable. The Contractor shall provide and install these anchors.

2.7 EXHAUST SYSTEM

A. Sufficiently sized to ensure against loss of power due to excessive backpressure in accordance with engine manufacturer's recommendations. Include a drain plug and drip leg in low point of exhaust piping to protect engine. Terminate exhaust piping with a rain cap.

B. The exhaust systems shall be mounted inside the enclosure.

C. FLEX CONNECTION

Provide a stainless steel flexible exhaust connector, with an exhaust temperature test fitting, flanged for service disconnection.

D. SILENCER

Provide a critical grade silencer. Silencer construction shall be steel with high temperature paint or aluminized finish.

2.8 ENCLOSURE

A. ACOUSTICAL ENCLOSURE

The Generator shall be provided with a skintight acoustical weather protective enclosure suitable for use in costal enviornmnets.

1. The enclosure shall be the quietest standard factory option for enclosures without being custom 3rd party design.

2. The enclosure shall be constructed of minimum 12-gauge steel for framework and 14-gauge steel for panels. The enclosure shall have hinged access doors to maintain easy access for all operating and service functions. All hardware and hinges shall be stainless steel. All doors shall be lockable and include retainers to hold the door open during servicing. The roof shall be cambered to prevent the accumulation of water. The roof and walls shall be designed to withstand snow and wind loads per the IBC.

3. The air intake and exhausts shall be sized to provide ample airflow for the generator set operation at rated load in ambient temperature of 100 degrees F.

2.9 FINISH

The entire standby generator set assembly with accessories is to be factory painted, color chosen by Owner from manufacturer's standard colors. The enclosure finish shall be capable to withstand extreme coastal environmental conditions. Generator set manufacturer shall provide appropriate epoxy/polyurethane coating system for high heat conditions.

PART 3 EXECUTION

3.1 DELIVERY, STORAGE, AND HANDLING

Deliver engine generator set and system components to their final locations in protective wrappings, containers, and other protection that will exclude dirt and moisture and prevent damage from construction operations. Remove protection only after equipment is safe from such hazards. Field repair of material or equipment made defective by improper storage or site construction damage by other trades may be cause for rejection of installation.

3.2 INSTALLATION

A. Install the complete generator set and accessories per the manufacturer's installation instructions.

1. Anchor the generator set to concrete housekeeping base or pad with high strength anchors and adequate penetration suitable for the Seismic Design Category as specified in the Plans.

2. Make all electrical connections between accessory items, which are not factory wired, prior to requesting the test engineer.

B. Maintain minimum workspace around unit and components per manufacturer's installation shop plans and NFPA 70 NEC.

C. Provide a complete fill of lubricating oil.

D. Provide a complete fill of manufacturer approved antifreeze (ethylene-glycol) and water to protect the engine and heat exchanger cooling system to minus 25 degrees F.

E. Contractor shall locate generator control panel and the generator main circuit breaker per NEC clearances and provide accessibility to equipment. Neither shall be mounted more than 72 inches above grade. Include all costs associated with relocating the standard control/service panel arrangement on generator set to maintain code requirements in the Bid Cost.

F. The generator set shall not be started up or tested in the field until all exhaust piping has been insulated as specified and shown on the Plans. All intake and exhaust louvers and fuel system components shall be fully functional..

3.3 FIELD QUALITY CONTROL

A. Provide services of a factory authorized service representative to provide inspection results of field visit and field testing in writing.

B. TESTING

1. Prior to Energization

After installing disconnect switches and circuit breakers, perform visual and mechanical inspection of enclosure and devices.

Check connections and mounting for proper torque.

Remove any burrs, filings, or other foreign materials from enclosure. Completely wipe down and vacuum enclosure.

2. After Energization

After electrical circuitry has been energized, demonstrate product capability and compliance with requirements.

C. FIELD TEST

Test the assembled generator set after installation at the job site is complete.

1. Advise the Engineer, the Integrator, the Contractor, the local Fire Prevention Inspector, and the Owner of the proposed time and date of the field test at least 2 weeks in advance so that the test may be witnessed if desired.

2. Under supervision of a factory authorized service representative, pretest all system functions, operations, and protective features. Provide all instruments and equipment required for tests. Adjust to ensure operation is according to specifications.

3. Fuel, lubricating oil, and antifreeze shall be checked for conformity to the manufacturer's recommendations and these specifications under the environmental conditions present and expected.

4. Accessories that normally function while the set is standing by shall be checked prior to cranking the engine. These shall include, but not be limited to: all electric heaters, battery charger(s), etc.

5. Cold Start Test

   a. The unit shall demonstrate the ability to start from a "cold" standby condition (i.e., normal standby mode with engine coolant temperature established by properly functioning water-jacket heater).

6. Generator Load Testing

Generator load testing shall be provided using a manufacturer-provided temporary load bank at 1.0 power factor. The generator shall be operated at 50 percent of full load rating for thirty minutes, followed seamlessly by thirty minutes at 80 percent of full load

rating, followed seamlessly by one hour at 100 percent full load rating.

After the first fifteen minutes at full load, the following shall be recorded at fifteen minute intervals (four recordings).

a. Voltage (phase to phase and phase to ground) and phase rotation

b. Amperage (each phase)

c. Frequency

d. Fuel pressure, oil pressure, and water temperature

e. Exhaust gas temperature at engine exhaust outlet

f. Ambient temperature

During the load test period, check for exhaust leaks, path of exhaust gases outside the building or enclosure, cooling air flow, movement during starting and stopping, vibration during 80 percent and 100 percent loading.

A certified copy of the test results shall be given to the Engineer and supplied with the O&M manuals.

7. The Contractor shall demonstrate the backup power system is fully functional by simulating power outages. Coordinate phase rotation with the Contractor prior to transferring power.

D. RETEST

Correct deficiencies identified by field tests and observations, and retest until specified requirements are fully met.

3.4 TRAINING

A. The manufacturer of the generator set shall conduct specifically organized training sessions covering operation and maintenance of the unit for personnel employed by the Owner. The training sessions shall be conducted to educate and train the personnel in maintenance and operation of all components of the unit. Training shall include, but not be limited to, the following:

1. Preventative maintenance procedures

2. Trouble-shooting

3. Calibration

4. Testing

5. Replacement of components

6. Automatic mode operation

7. Manual mode operation

8. Fuel and monitoring system

9. Spare parts that have been provided

B. At least one training session, at least 3 hours in duration, shall be conducted at the site after startup of the system. The manufacturer shall prepare and assemble specific instruction materials for each training session and shall supply such materials to the Owner at least 2 weeks prior to the time of the training.

3.5 FINAL ADJUSTMENTS

A. Adjust voltage and frequency output of generator set to nominal ratings and mark gauges with plastic pen for normal, operation references for Owner.

B. Adjust time response of control system to meet site performance requirements.

C. Check all remote connections again for proper tightness.

3.8 CLEANING

Upon completion of installation and startup, inspect engine generator set. Remove paint splatters, other spots, dirt, and debris. Perform touchup painting to cover scratches and marks to finish. Match original finish of generator set.

***** END OF SECTION *****

SECTION 16415

TRANSFER SWITCHES

PART 1 PRODUCTS

1.1 AUTOMATIC TRANSFER SWITCHES

A. RATINGS

1. Phases: 3
2. Poles: 3
3. Voltage Rating: 480/277
4. Current Rating: 100 A min.
5. Fault Current Rating: 10 kAIC min.
6. Neutral – un-switched bus
7. Enclosure: NEMA 3R and factor finish as recommended by manufacturer for coastal environments.

B. FEATURES

1. UL 1008/CSA certification.
2. Open Transition
3. Conventional 2-position switch, capable of transferring the connected load from its “normal” power source to its "standby" power source and retransferring back from its “standby” power source to its “normal” power source.
4. Switch transfer control sensing shall be provided on all phases.
5. Switching mechanism shall be a discrete purpose device specifically designed for Automatic Transfer Switches.
6. Electrically operated by solenoid mechanisms and held by mechanical latches.

7. High current-breaking capacity with silver-surfaced contacts equipped with arc barriers and magnetic blow-out coils.

8. Contacts rated in accordance with UL 1008 for current carrying and switching capabilities.

9. Adjustable close differential voltage monitoring relays provided on all three phases to sense voltage on the "NORMAL" and "STANDBY" sources.

10. Molded case breakers are not acceptable.

11. Intelligent display panel with push-button navigation switches. The display shall be clearly visible in both bright (sunlight) and no light conditions. It shall be visible over an angle of at least 120 degrees. The display panel shall be capable of providing the following functions and capabilities:

    a. Display source condition information, including AC voltage for each phase of normal and emergency source, frequency of each source. Voltage for all three phases shall be displayed on a single screen for easy viewing of voltage balance. Line to neutral voltages shall be displayed for 4-wire systems.

    b. Display source status, to indicate source is connected or not connected.

    c. Display load data, including 3-phase AC voltage, 3-phase, frequency, kW, and kVA. Voltage and current data for all phases shall be displayed on a single screen.

    d. The display panel shall allow the operator to view and make the following adjustments in the control system, after entering an access code:

        i. Set nominal voltage and frequency for the transfer switch.

        ii. Adjust voltage and frequency sensor operation set points.

        iii. Set up time clock functions.

iv. Set up load sequence functions.

v. Enable or disable control functions in the transfer switch, including program transition.

vi. Set up exercise and load test operation conditions, as well as normal system time delays for transfer time, time delay start, stop, transfer, and retransfer.

e. Display real time clock data, including date, and time in hours, minutes, and seconds. The real time clock shall incorporate provisions for automatic daylight saving time and leap year adjustments. The control shall also log total operating hours for the control system.

f. Display fault history on the transfer switch, including condition, and date and time of fault. Faults to include controller checksum error, low controller DC voltage, ATS fail to close on transfer, ATS fail to close on retransfer, battery charger malfunction, network battery voltage low, and network communications error.

12. Initially preset the UVTL at:

a. Valid >= 90 percent nominal system voltage

b. Invalid <= 80 percent nominal system voltage

c. Relay will pull in at the “valid” level and drop out at the “invalid” level.

13. Initially preset the GVTL at:

a. Valid >= 90 percent nominal system voltage

b. Invalid <= 75 percent nominal system voltage

c. Relay will pull in at the “valid” level and drop out at the “invalid” level.

14. Initially preset the utility and generator frequency transition levels at:

a. Valid >= 95 percent of system frequency

b. Invalid >= 90 percent of system frequency

PART 2 EXECUTION

2.1 MANUFACTURERS

Automatic transfer switch shall be provided by the supplier of the genset such that the supplier of the generator in Specification Section 16230 shall be a single source of responsibility for products provided, for warranty, startup and service purposes.

2.2 DELIVERY, STORAGE, AND HANDLING

Deliver transfer switch components to their final locations in protective wrappings, containers, and other means of protection that will exclude dirt and moisture and prevent damage from construction operations. Remove protection only after equipment is safe from such hazards. Field repair of material or equipment made defective by improper storage or site construction damage by other trades may be cause for rejection of installation.

2.3 INSTALLATION

A. Install transfer switch per the manufacturer's installation instructions.

B. Maintain minimum workspace around unit and components per manufacturer's installation shop drawings and NFPA 70 NEC.

2.4 FIELD QUALITY CONTROL

A. Provide a factory-authorized service representative to supervise installation and connections to the unit. Provide the inspection results of field visit and field testing in writing.

B. SUPERVISED ADJUSTING AND PRETESTING

Under supervision of a factory authorized service representative pretest all system functions, operations, and protective features. Provide all instruments and equipment required for testing. Adjust the time delays, and trip point settings to ensure operation is within accordance to the specifications.

C. FIELD TEST

Test the transfer switch after installation is complete.

1. Advise the Engineer of the test date well in advance so that the test may be witnessed if desired.

2. Perform manufacturer's standard field tests.

3. Provide documented field test results to Owner and Engineer.

4. Provide trip set points and time delays in the O&M manual.

***** END OF SECTION *****