

Project Manual

GENERATOR PROCUREMENT REFERENCE INFORMATION

The following reference information documents the generator selection for incorporation into the project bids.

2026-07-15 ISSUED FOR TENDER
GENERATOR REFERENCE MANUAL

Cover Letter

Re: Kingston Memorial Hospital Expansion

We sincerely appreciate your consideration of Total Power Limited as a strategic partner for your Standby Power Generation upgrade.

Generator Set Offer:

With a clear understanding of the existing system, we have reviewed our proposed additional genset to ensure it will meet future integration requirements with the existing systems to be completed in the future. Our selected system would be based on a Deepsea non-proprietary control system allowing for competitive open processes in future system upgrades.

We have also reviewed the sequence of operations and have provided additional controls beyond the generator set to meet the specification sequence of operation requirements. This includes the additional bus tie breaker synchronization controller that will be required in a wall mounted cabinet, or this can be supplied loose for installation in the new switchboard supplied by others.

We look forward to meeting with you after your review of our offer to discuss any question and further review how our system will be implemented to meet your future requirements.

Regards,

Total Power Limited

GENERATOR SYSTEM QUOTATION

24-03113

DATE :	16-Apr-26	ENGINEER :	HDR INC. - RICHMOND HILL
CUSTOMER :	Kingston Health Sciences Centre	PROJECT :	KINGSTON HEALTH SCIENCES CENTRE
ATTENTION :		LOCATION :	Kingston

In accordance with our understanding of the project requirements and based on the following information received,
we are pleased to offer you the following equipment and services for your consideration;

EXCEPTIONS & CLARIFICATION

- * Fuel, fuel piping, exhaust piping beyond silencer for open units, and stack extension for enclosed units by others.
- * Permits and Installation of generator set including loose ship items will be the responsibility of others
- * Coordination study and any product changes as a result of same will be responsibility of others
- * Unit is configured to meet CSA-C282 standard for life safety
- * TSSA fuel tank inspection required under CSA CODE B-139. Cost and responsibilities for arranging inspections are not included,
- * Site to provide location and access for load bank placement within 50 feet of load bank connection point
- * Proposal based on current US/CDN exchange rate.
- * Any exhaust extension beyond the generator enclosure not included and by others
- * Clarifications: 2.3.5 OEM standard dry type air cleaner service indicators as per OEM
- * Clarifications: 2.11 Pressure and temperature are monitored by engine ECU and shutdown set by Genset controller backed up by ECU. These are analog not digital.
- * Clarifications: 2.17 Engine OEM crankcase recirculatory provided, designed to meet engine and modification to OEM design may impact engine warranty
- * Clarification: 1.7: Two-year service contract provided with unit spare parts are provided fresh at time for service. Listed quantities would not fit in any reasonable cabinet. Fuses and battery service kit provided in cabinet
- * Clarification: 1.15.3: Customer damage done by others not related to poor workmanship or materials supplied as part of contract are not warranted and would be the responsibility of the contractor or owner.
- * Clarification: 2.3.10: OEM closed crankcase system with OEM filter
- * Clarification: 2.7: OEM oil to coolant cooler not oil to air cooler.
- * Clarification: 2.9.10: Alternator breaker termination at bottom of breaker. Assuming as walk-enclosure either bottom entry or rear entry.
- * Clarification: 2.11: Engine ECU monitored, not separate snap switches.
- * Clarification: 2.13.5: Single bearing genset with engine and alternator to skid mounting on isolators.
- * Clarification: 2.17: OEM closed crankcase breather system
- * Clarification: 2.18: Integrated genset digital OEM control system, please refer to specification sheet for interface details. If more information is required, please advise.
- * Clarification: 2.18.4: Oil level is not provided on genset control panel.
- * Clarification: 2.18.12/13/14: New units at starting is not paralleled as tie breaker is in open state. In this configuration third genset would parallel to existing system on tie breaker close with tie breaker controller. If this is required system should be designed with tie breaker closed.
- * Clarification: 2.18.19: Not a parallel to utility system
- * Clarification: 2.27.8: FAT is a single genset only, synchronization and ATS(s) at FAT not provided.
- * Clarification: 3.2/3/4: Installation by others.

GENERATOR :

QTY	MAKE	MODEL	KW	RATING	FUEL	VOLTAGE	PHASE	RPM
1	Generac	SD2000	2000	Standby	Diesel	347/600	3	1800

In addition to the standard factory features and accessories, the generator will include the following major items:

- * Custom walk-in sound attenuated weather enclosure - approx. 60dBA @ 7m
- * Enclosure is configured to meet CAN/CSA-C282 c/w motorized louvres, heat, lighting, etc.
- * Stairs on outside of enclosure
- * 72 hour double walled sub-base style fuel tank
- * Generator mounted auto start control panel
- * 21 light remote annunciator panel - shipped loose
- * PMG Alternator
- * Heater relay disconnects
- * Batteries, rack & cables
- * Vulcan Battery Charger is 20A, 24V
- * Galvanized steel drip pan
- * External GFI
- * inline heater
- * CSA282 30 circuits load center
- * Hospital grade silencer
- * Main line circuit breaker - 2500A - LSI- 100% rated - c/w alarm contacts
- * Seismic isolators (isolators are installed beneath the generator, inside the enclosure)
- * Remote emergency stop button - shipped loose
- * Fan and belt guards
- * First fill of engine oil & antifreeze
- * Manuals
- * CSA approval or equivalent
- * 5-year comprehensive extended factory warranty

GAL Power Systems
2558 Carp Rd
Ottawa, ON
Telephone : (613) 831 3188
Fax : (613) 831 3188

SERVICES:

- * Extended factory testing - 4 hours - performed at 1.0PF
- * Freight (by GAL choice) prepaid to location site perimeter, unloading and protection at site by others
- * Start-up inspection c/w 4-hour load test to CSA 282 standards and instruction performed during regular business hours
- * Site testing; Additional 4 hour testing as per spec (3 Days 2 Techs)
- * Training as per spec
- * 1x visit before warranty expires
- * Pre-commissioning and post commissioning support as per spec.

NET PACKAGE PRICE : \$1,562,338 CDN - All taxes extra

ADD : \$67,500.00 for master control upgrades.

Terms :

• Price valid for 60 days	• Balance due in full prior to start-up
• Net 60 days OAC	• Standard GAL Power Terms and Conditions of Sale apply as attached

Prices are subject to market fluctuations and availability for raw materials. Please re-confirm pricing prior to issuing PO.

Shipment : * Up to 52 weeks after release of order and/or approved shop drawings. Please confirm at time of order.

Thank you for the opportunity to bid on this project. Please do not hesitate to call if we can be of further assistance.

Sincerely,

Dean McNeill
Territory Manager

SD2000 & MD2000 | 65.4 L | 2000 kW**INDUSTRIAL DIESEL GENERATOR SET**

EPA Certified Stationary Emergency

**GENERAC[®] INDUSTRIAL
ENERGY****Standby Power Rating**

2000 kW, 2500 kVA, 60 Hz



*Assembled in the USA using
domestic and foreign parts

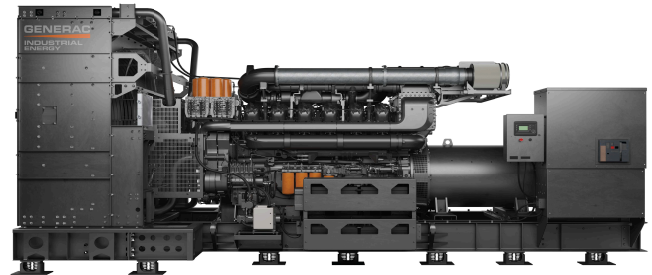


Image used for illustration purposes only

Codes and Standards

Not all codes and standards apply to all configurations. Contact factory for details.



UL2200, UL6200, UL1236, UL489



CSA 22.2-100, ULC S601



BS5514 and DIN 6271



SAE J1349



NFPA 20, 37, 70, 110



NEC700, 701, 702



NEMA ICS10, MG1, 250, ICS6, AB1



ANSI C62.41

Powering Ahead

For over 60 years, Generac has provided innovative design and superior manufacturing.

Generac provides superior quality by designing and manufacturing most of its generator components, including alternators, enclosures and base tanks, control systems and communications software.

Generac gensets utilize a wide variety of options, configurations and arrangements, allowing us to meet the standby power needs of practically every application.

Generac searched globally for the most reliable engines to power our generators. We choose only engines that have already been proven in heavy-duty industrial applications under adverse conditions.

Generac is committed to ensuring our customers' service support continues after their generator purchase.

SD2000 & MD2000 | 65.4 L | 2000 kW**INDUSTRIAL DIESEL GENERATOR SET**

EPA Certified Stationary Emergency

**GENERAC[®] INDUSTRIAL
ENERGY****STANDARD FEATURES****ENGINE SYSTEM**

- Oil Drain Extension
- Air Filter Restriction Indicator
- Air Cleaner
- Fan and Belt Guards
- Stainless Steel Flexible Exhaust Connection
- Factory Filled Oil and Coolant
- Radiator Duct Adapter
- Engine Oil Heater
- Engine Coolant Heater
- Engine Pre-lubrication Pump
- Coolant Heater Ball Valves
- Fuel Cooler

FUEL SYSTEM

- Flexible Fuel Lines
- Primary and Secondary Fuel Filter

COOLING SYSTEM

- Pressurized Closed System
- UV/Ozone Resistant Hoses
- Factory-Installed Radiator
- 50/50 Ethylene Glycol Antifreeze
- Radiator Drain Extension
- Closed Coolant Recovery System

ELECTRICAL SYSTEM

- Battery Charging Alternator
- Battery Cables
- Battery Tray
- Rubber-Booted Engine Electrical Connections
- Solenoid Activated Starter Motor

ALTERNATOR SYSTEM

- Class H Insulation Material
- 2/3 Pitch
- Skewed Stator
- Permanent Magnet Excitation
- Sealed Bearing
- Full Load Capacity Alternator
- Bearing/Winding Temperature Monitoring

GENERATOR SET

- Separation of Circuits
- Separation of Circuits - Multiple Breakers
- Standard Factory Testing
- 2 Year Limited Warranty (Standby Rated Units)

CONTROL SYSTEM**DSE G8601 Controller****Key Features**

- Advanced PLC Functionality
- Multi-Purpose PIDs
- Virtual Inputs
- On-Screen Mimic (SLDs)
- Multiple Application Support
- Multi-Level Pin Protected Front Panel Editor
- Integral LCD Display Heater
- Enhanced High-Resolution 240 x 128 Pixel Display
- Single Generator Control
- Latest ECU/ECM Support
- Touch Screen Panel PC Support
- Zero Sequence Voltage Protection
- Integral Gasket (IP65 protection)

Standard Protections

- Low Coolant Level
- High/Low Coolant Temperature
- Oil Temperature
- Overspeed
- Over/Under Voltage
- Over/Under Frequency

- Over/Under Current
- Over Load
- Battery Voltage
- Battery Charger Current
- Phase to Phase and Phase to Neutral Short Circuits (I²T Algorithm)
- Ground Fault

Control Panel

- Auto/Off/Manual
- Indication Through Display Screen
- Audible Alarm and Silence
- Not in Auto Indication

Voltage Regulation

- Digital Control
- Three-Phase Sensing
- Negative Power Limit
- Loss of Sensing Protection
- Fault Protection (I²T Function)
- High Voltage Limit
- Low Voltage Limit
- Maximum Power Limit
- $\pm 0.5\%$ Voltage Regulation

Governor Functionality

- Speed Control through ECM Integration
- Soft Start Ramping (Multiple Steps)

Qualification Testing

- Life Test in Environmental Chamber
- Temperature Rating -22 °F to +122 °F (-30 °C to +50 °C)
- Vibration Tested and Protected

Connections (Actual I/O May Vary Due to Configuration)

- 4 Analog Inputs
- 12 Digital Inputs
 - 9 Active Low Digital Outputs

Customer Ports

- Ethernet
- 2 RS-485
- 2 USB
- CANBus

Codes and Standards

- UL 6200
- CE
- NFPA 110 Capable

More Features

- Built-in Governor
- Digital AVR Support
- Multiple Language Support
- Three-Phase Generator Sensing and Protection
- Three-Phase Bus Sensing
- Generator Current, Protection and Power Monitoring
- Configurable Timers
- Integrated SNMP
- Data Logging
- PC Configuration
- DSENet[®] (Expansion Support)
- Flexible I/O (Inputs/Outputs)
- Automatic and Front Panel Breaker Control
- Power-Save Mode

SD2000 & MD2000 | 65.4 L | 2000 kW**INDUSTRIAL DIESEL GENERATOR SET**

EPA Certified Stationary Emergency

**GENERAC[®] INDUSTRIAL
ENERGY****CONFIGURABLE OPTIONS****ENGINE SYSTEM**

- Critical Grade Silencer
- Hospital Grade Silencer
- CCV (Closed Crankcase Ventilation)
- Oil Heater
- Radiator Duct Flange
- Radiator Stone Guard
- Duplex Fuel Water Separator
- Oil Make Up Kit

ELECTRICAL SYSTEM

- 20A UL Listed Battery Charger (x2)
- Battery Warmer
- Redundant Starting System

ALTERNATOR SYSTEM

- Alternator Upsizing
- Anti-Condensation Heater

CIRCUIT BREAKER OPTIONS

- Main Line Circuit Breaker
- 2nd Main Line Circuit Breaker
- 3rd Main Line Circuit Breaker
- 4th Main Line Circuit Breaker
- Shunt Trip and Auxiliary Contact
- Electronic Trip Breakers

GENERATOR SET

- Spring Isolators (Standard/Seismic)
- 24 Position Load Center
- Extended Factory Testing

CONTROL SYSTEM

- NFPA 110 Level 1 Compliant 21-Light Remote Annunciator
- Remote Output Relays (8 or 16)
- Remote E-Stop (Break Glass-Type, Surface Mount)
- Remote E-Stop (Red Mushroom-Type, Surface Mount)
- Remote E-Stop (Red Mushroom-Type, Flush Mount)
- 100 dB Alarm Horn
- Ground Fault Annunciator
- 10 Amp Engine Run Relay
- 120V GFCI Outlet
- Flush Mount Annunciator Kit
- Damper Alarm Contacts (with Motorized Dampers Only)

WARRANTY (Standby Gensets Only)

- 2 Year Extended Limited Warranty
- 5 Year Extended Limited Warranty
- 7 Year Extended Limited Warranty
- 10 Year Extended Limited Warranty

SD2000 & MD2000 | 65.4 L | 2000 kW**INDUSTRIAL DIESEL GENERATOR SET**

EPA Certified Stationary Emergency

**GENERAC[®] INDUSTRIAL
ENERGY****APPLICATION AND ENGINEERING DATA****ENGINE SPECIFICATIONS****General**

Make	Baudouin
EPA Emissions Compliance	Tier 2
EPA Emissions Reference	See Emissions Data Sheet
Cylinder #	20
Type	V
Displacement - in ³ (L)	3,991.0 (65.4)
Bore - in (mm)	5.91 (150)
Stroke - in (mm)	7.28 (185)
Compression Ratio	15:1
Intake Air Method	Turbocharged/Aftercooled
Cylinder Head	4-Valve

Engine Governing

Governor	Electronic
Frequency Regulation (Steady State)	5%

Lubrication System

Oil Pump Type	Gear Driven
Oil Filter Type	Full Flow Spin-On Cartridge
Crankcase Capacity - qt (L)	304 (288)

Cooling System

Cooling System Type	Pressurized Closed
Fan Type	Pusher
Fan Diameter - in (mm)	88 (2,235)

Fuel System

Fuel Type	Ultra Low Sulfur Diesel #2
Fuel Specifications	ASTM
Fuel Filtering (Microns)	4
Fuel Inject Pump	High Pressure Common Rail
Injector Type	Electronic
Fuel Supply Line O.D. Minimum - in (mm)	0.748 (19)
Fuel Return Line O.D. Minimum - in (mm)	0.748 (19)
Governor	ECU
Governor Steady State Speed Stability at Constant Load (ISO 8528-5 Class G3) ²	≤ ±0.5%
Max. restriction at fuel inlet (Bar)	0.1

Engine Electrical System

System Voltage	24 VDC
Battery Charger Alternator	Standard
Battery Size	See Battery Index 0161970SBY
Battery Voltage	24 VDC
Ground Polarity	Negative

ALTERNATOR SPECIFICATIONS

Standard Model	L2050064N24
Poles	4
Field Type	Revolving
Insulation Class - Rotor	H
Insulation Class - Stator	H
Total Harmonic Distortion	<5%
Telephone Interference Factor (TIF)	<50

Standard Excitation	Permanent Magnet
Coupling	Direct Drive
Bearings	Sealed Ball
Prototype Short Circuit Test	Yes
Voltage Regulator Type	Digital
Number of Sensed Phases	3
Regulation Accuracy (Steady State)	±0.25%

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**GENERAC[®] INDUSTRIAL
ENERGY****POWER RATINGS**

		Standby		Part Number
Three-Phase 240/416 VAC @0.8pf	2000 kW/2500 kVa	Amps: 3035.9		K3250064N24
Three-Phase 277/480 VAC @0.8pf	2000 kW/2500 kVa	Amps: 3,007.0		L2050064N24
Three-Phase 346/600 VAC @0.8pf	2000 kW/2500 kVa	Amps: 2405.6		L2100064N24

MOTOR STARTING CAPABILITIES (SKVA)

skVA vs. Voltage Dip					
240/416 VAC	30%	277/480 VAC	30%	346/600VAC	30%
K3250064N24	Contact Factory	L2050064N24	Contact Factory	L2100064N24	Contact Factory

FUEL CONSUMPTION RATES*

		Diesel - gph (Lph)	
Fuel Pump Lift- ft (m)		Percent Load	Standby
Contact Factory		25%	42.8 (162.0)
		50%	79.1 (299.5)
Total Fuel Pump Flow (Combustion + Return) - gph (Lph)		75%	119.7 (453.0)
Contact Factory		100%	153.1 (579.5)

*Fuel supply installation must accommodate fuel consumption rates at 100% load.

COOLING

		Standby
Air Flow (Fan Air Flow Across Radiator)	cfm (m³/min)	Contact Factory
Coolant Flow (LT)	gpm (Lpm)	213.5 (808.3)
Coolant Flow (HT)	gpm (Lpm)	420 (1590)
Coolant System Capacity	gal (L)	97 (367)
Maximum Operating Ambient Temperature	°F (°C)	122 (50)
Maximum Operating Ambient Temperature (Before Derate)	See Bulletin No. 0199280SSD	
Maximum Additional Radiator Backpressure	in H ₂ O (kPa)	Contact Factory

COMBUSTION AIR REQUIREMENTS

	Standby
Flow at Rated Power cfm — (m³/min)	6,339.0 (179.5)

ENGINE

		Standby
Rated Engine Speed	rpm	1,800
Horsepower at Rated kW**	hp	2,950.0
Piston Speed	ft/min (m/min)	2,185 (666)
BMEP	psi (kPa)	329.7 (2,273)

** See "Emissions Data Sheet" for maximum bHP for EPA and SCAQMD permitting purposes.

EXHAUST

		Standby
Exhaust Flow (Rated Output)	cfm (m³/min)	20,708.5 (586.4)
Maximum Allowable Back Pressure (Post Turbo)	inHg (kPa)	1.08 (7.5)
Exhaust Temperature (Rated Output - Post Turbo)	°F (°C)	957.2 (514)

Deration – Operational characteristics consider maximum ambient conditions. Derate factors may apply under atypical site conditions.
Please contact a Generac Power Systems Industrial Dealer for additional details. All performance ratings in accordance with BS5514 and DIN6271 standards.

Standby - See Bulletin 0187500SSB

Prime - See Bulletin 0187510SSB

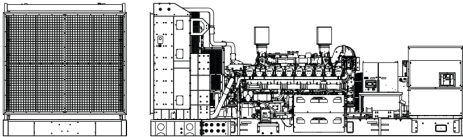
SD2000 & MD2000 | 65.4 L | 2000 kW

INDUSTRIAL DIESEL GENERATOR SET

EPA Certified Stationary Emergency

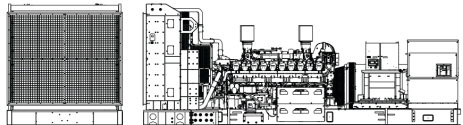


DIMENSIONS AND WEIGHTS*



OPEN SET 764 FRAME

Run Time - Hours	Usable Capacity - Gal (L)	L x W x H - in (mm)	Weight - lbs (kg) Unit Only
No Tank	—	288 (7,315.2) x 113 (2,870.2) x 121.4 (3084.7)	39,408 (17,963)



OPEN SET 1020 FRAME

Run Time - Hours	Usable Capacity - Gal (L)	L x W x H - in (mm)	Weight - lbs (kg) Unit Only
No Tank	—	310 (7,874) x 113 (2,870.2) x 121.4 (3084.7)	46,584 (21,157)

*Weights will vary based on options selected.

Project/Contract: KGH Emergency Power Upgrades

Bid Number: 10434805-ME-02

Scope: Engineering and Price for the 2 MW Enclosed Diesel Generator with
Integral Fuel Tank per Generator Technical Specifications (HHA #2250139)

From (Proponent): Total Power Limited.

Company name

2558 Carp Rd,

Street address or postal box number

Carp, Ontario , K0A 1L0

City/Town, Province and Postal Code

To (Owner): Procurement
Kingston Health Sciences Centre
76 Stuart Street
Kingston, ON
K7L 2V7

A. We, the undersigned, having examined the Bid Documents for the above-named project/contract, including Addendum Numbers(s) 3, hereby offer to perform the Work in accordance with the Bid Documents, for the stipulated price (base Bid Price) of:

\$ 1,562,338.37

amount in figures

in Canadian dollars, excluding Value Added Taxes.

\$1,562,338.37

amount in words

in Canadian dollars, excluding Value Added Taxes.

a. For this project the Value Added Taxes shall mean HST at 13%.

B. We declare that:

I. We will attain the following date for delivery of reviewed shop drawings/engineering deliverable review as follows:

a. ____4 - 6 weeks after receipt of order (engineering).

II. We will attain the following date for delivery of the Specified Equipment as follows:

a. ____~52 weeks after receipt of order (equipment μ I X O O Q R W L) F H W R S U R F H

C. We understand and declare that:

a. We have arrived at the bid without collusion with any competitor.

b. The Bid Price is open to acceptance by the Owner for a period of 60 days running from the Proposal Submission Deadline. Refer to the RFP.

c. The Bid Price is open to acceptance by the Owner and assignment to the successful Installation Contractor and/or General Contractor (as applicable) in accordance with the terms determined in the RFP.

d. We accept and agree that we shall perform work expeditiously and with adequate forces to attain delivery of engineering and shop drawings, and delivery of equipment within the completion times specified in Bid Documents. In order to maintain schedule we have allowed for overtime work in our bid price.

e. We have carefully reviewed and fully understand the Bid Documents (including the Instruction to Bidders), and, in particular, acknowledge the rights of the Owner expressly reserved in the Instructions to Bidders, to accept or reject any or all of the bids.

Signatures:

Signed and submitted by:

Total Power Limited

Company name

Alex Poyntz-Wright Senior Director -Equipment Sales
Name and title of authorized signing officer

Alex Poyntz-Wright

Signature of authorized signing officer

Dean McNeill

Name of witness

Dean McNeill

Signature of witness

Chad Gibson Senior Director - Projects & Engineering
Name and title of authorized signing officer

Chad Gibson

Signature of authorized signing officer

Dean McNeill

Name of witness

Dean McNeill

Signature of witness

Dated this: 17th day of April, 2026.

Note: Affix corporate seal as required by *Bid Documents*

END OF SECTION

Project/Contract: KGH Emergency Power Upgrades

Bid Number: 10434805-ME-02

From (Proponent): Total Power Limited

Company name

We, the above named Proponent, offer the Itemized Prices requested below. The values of Itemized Prices are included in the Bid Price but must be specifically set out in the event that these items will be deleted from the project; they are the amount to be added to, or deducted from, our base Bid Price (as entered in the Bid Form, Section 00 41 13 ME-02). Itemized Prices are to include costs of all required work.

Note: in this project, Itemized Prices are to be used to identify portions of the bid value to be paid in advance (engineering), and other portions to be assigned to the Contractor for payment through a future Construction Contract.

Schedule of Itemized Prices (VAT NOT INCLUDED)

Values are presented in Canadian dollars (CAD), and exclude Value Added Taxes (VAT). For this project Value Added Taxes shall mean the Harmonized Sales Tax (HST) at 13%.

	Item	Amount
1	Engineering and preparation of shop drawings of the Diesel Generator per Specifications (HDR 10434805 & HHA #2250139). If this scope is pre-purchased for future assignment to a General Contractor, the value presented is paid in advance. It would therefore be removed from the * H Q H U D O & R Q W U D F W R U ¶ V I X V B I D Price. & R Q V W U X	\$10,000.00
2	Site services including: - x inspection of equipment prior to unloading, witness of unloading, technical supervision of unloading, unloading report, - x factory-trained technician and service representative delivery of factory and field training for operating and maintenance, - x technical supervision of the installation, - x factory-trained technician and service representative for on-site start-up, and - x on-site testing and commissioning.	\$30,000.00
3		

END OF SECTION

Alternative Prices Bid Form Supplement

Project/Contract: KGH Emergency Power Upgrades

Bid Number: 10434805-ME-02

From (Proponent): Total Power Limited.

Company name

We, the above-named Proponent, offer the Alternative Prices requested below. The values of the Alternative Prices are not included in the Bid Price and are to reflect the net value of the change; they are the amount to be added to, or deducted from, our base Bid Price (as entered in the Bid Form, Section 00 41 13 ME-02). Alternative Prices are to include costs of all required work.

If there is no change to the base bid price for an alternative, we have so indicated.

It is understood that:

- a) The Owner may accept the alternatives and corresponding alternative prices in any order, including all or none,
- b) Alternative prices will be considered in determining the lowest bidder,
- c) Alternatives and alternative prices are open for acceptance by the Owner for the same period of time as the Bid Price, unless otherwise indicated,
- d) The Work of the Contract and the Contract Price will reflect the alternatives and alternative prices, if any, accepted by the Owner at the time of Contract award, and
- e) Acceptance of any alternatives will not affect the base bid contract completion time, unless we have specifically indicated an increase or decrease in time, in number of days, on account of a particular alternative.

Alternative Prices Bid Form Supplement

Project/Contract: KGH Emergency Power Upgrades

Bid Number: 10434805-ME-02

From (Proponent): Total Power Limited.

Company name

We, the above-named Proponent, offer the Alternative Prices requested below. The values of the Alternative Prices are not included in the Bid Price and are to reflect the net value of the change; they are the amount to be added to, or deducted from, our base Bid Price (as entered in the Bid Form, Section 00 41 13 ME-02). Alternative Prices are to include costs of all required work.

If there is no change to the base bid price for an alternative, we have so indicated.

It is understood that:

- a) The *Owner* may accept the alternatives and corresponding alternative prices in any order, including all or none,
- b) Alternative prices will be considered in determining the lowest bidder,
- c) Alternatives and alternative prices are open for acceptance by the *Owner* for the same period of time as the Bid Price, unless otherwise indicated,
- d) The *Work* of the *Contract* and the *Contract Price* will reflect the alternatives and alternative prices, if any, accepted by the *Owner* at the time of *Contract* award, and
- e) Acceptance of any alternatives will not affect the base bid contract completion time, unless we have specifically indicated an increase or decrease in time, in number of days, on account of a particular alternative.

Alternative Prices Bid Form Supplement

Schedule of Alternative Prices (VAT NOT INCLUDED)

Values are presented in Canadian dollars (CAD), and exclude Value Added Taxes (VAT). For this project Value Added Taxes shall mean the Harmonized Sales Tax (HST) at 13%.

Item	Description of Alternative Price	Effect on Base Bid Price	
		Add	Deduct
1	Net change in base Bid Price for supply of material described in this Diesel Generator RFP 10434805-ME-02 irrevocable in the form submitted by the Bidder for a period of two hundred and seventy (270) days running from the Proposal Submission Deadline. Engineering and shop drawings would be awarded within the same period of time as the base RFP terms. The contract completion time would remain effective relative to acceptance (full notice to proceed). For clarity: This Alternative Price is open to acceptance beyond the period of time for the base Bid Price.		
2	Price is valid for 60 days, <i>Dean McNeill</i>		
3			
4			
5			
6			
7			

END OF SECTION

Terms & Conditions of Sale

(together with the Quotation, the "Agreement")

The entity among G.A.L. Power Systems Toronto Ltd, G.A.L. Power Systems Ottawa Ltd, G.A.L. Power Systems Northern Ltd, Les Produits Énergétiques GAL Inc. and/or their affiliate whose name appears on the Quotation (the "Seller") agrees to sell the goods covered in the Quotation on, and subject to, these terms and conditions.

1. **ACCEPTANCE.** The Quotation may be withdrawn by the Seller at any time before it is accepted by the Purchaser. Acceptance is accomplished by the Purchaser giving the Seller written acceptance accompanied by a purchase order. The Quotation does not apply to any other orders from Purchaser for the same goods and/or services.
2. **TERMS OF AGREEMENT.** The Agreement supersedes all previous quotations for the same subject matter from the Seller, and all purchase orders and terms and conditions from Purchaser. No standard terms or conditions in any Purchaser purchase order shall modify, supplement or otherwise amend the terms of the Agreement or otherwise increase the liability of the Seller beyond the terms set forth in this Agreement. If there are any discrepancies or inconsistencies whatsoever between the Agreement and the terms and conditions of a purchase order or other document of Purchaser, then the terms and conditions of the Agreement govern, regardless of which document was first executed and regardless of the terms of the purchase order or other document. The Seller makes no representations or warranties other than as expressly set forth in the Quotation.
3. **PRICE.** All prices and discounts are in accordance with the Seller's Quotation. The total purchase price is due prior to start-up. Subject to establishment of satisfactory credit, payment is due in full on delivery unless credit is authorized and approved by the Seller. Credit is extended in the sole and absolute discretion of the Seller and may be reduced, suspended or terminated at any time, without cause and without notice. The Seller may change the terms of credit at any time.
4. **CREDIT CONDITIONS.** At any time, the Purchaser is or has been in default under the terms of this Agreement or any other agreement with the Seller, or if the Seller acting reasonably and in good faith determines the Purchaser's financial condition may impair the Purchaser's ability to perform its obligations under this Agreement, the Seller may demand adequate assurance of the Purchaser's financial condition and ability to perform. Such demand for assurance may require full payment of all amounts then due and owing by the Purchaser or may require partial or full advance payment of the purchase price of goods which have been scheduled for delivery but shall not be limited to the foregoing. If the Purchaser fails within 10 days of the Seller's demands to provide the Seller with such assurance, the Seller shall be entitled to cancel any order then outstanding, shall be entitled to receive reimbursement for its cancellation charges, and may proceed to collect, without limitations, any sums due and owing, its cancellation charges and all damages resulting from the Purchaser's default. In the event of bankruptcy or insolvency of the Purchaser, or in the event of any proceeding brought against the Purchaser, voluntary or involuntary, under bankruptcy or any insolvency laws, the Seller shall be entitled to cancel any orders then outstanding at any time during the period allowed for filing claims against the estate and shall receive reimbursement for its reasonable and proper cancellation charges. The Purchaser hereby consents to the Seller conducting a credit investigation of the Purchaser and to the Seller making inquiries with financial institutions or other persons in a business relationship with the Purchaser in connection therewith; the Purchaser hereby authorizes and directs persons to answer the Seller's inquiries.
5. **DELIVERY OF GOODS.** Delivery dates for the goods and services described in the Quotation are estimates only. The Seller will use commercially reasonable efforts to deliver such goods and services by the estimated delivery date specified in the Quotation for each item of the goods.
6. **INVOICING.** Invoices shall be payable in accordance with the terms of payment agreed upon in the Quotation by cheque, bank transfer or any other way accepted by the Seller. Unpaid invoices shall accrue interest at the rate of 2% per month (24% annually) for any amount remaining unpaid more than 30 days following the invoice date. All invoices shall be paid in full by the Purchaser without charge-back, set-off or deduction of any kind. The Purchaser shall be solely responsible for all costs and expenses incurred by the Seller in collecting any amounts payable by the Purchaser including all legal fees and disbursements, and all collection agency fees and disbursements.
7. **RETENTION OF TITLE (OTHER THAN QUÉBEC).** The Seller remains the owner of all goods sold to the Purchaser until full and complete payment is received from the Purchaser. To the extent the Purchaser acquires any interest in the goods prior to payment in full, the Purchaser grants to the Seller a security interest in such goods to secure payment in full of all amounts payable to the Seller, and the Seller is entitled to register and perfect a Personal Property Security registration against the Purchaser with respect to such goods as a secured creditor. The Purchaser waives, to the extent permitted by applicable law, all rights to receive copies of financing statements, financing change statements, verification statements or copies of other notices or filings made by the Seller at any time in connection with this Agreement.
8. **RETENTION OF TITLE (QUÉBEC).** If the goods sold will be located in Québec, or if the Purchaser is domiciled in Québec, the Purchaser and the Seller acknowledge that any sale hereunder constitutes an instalment sale governed by articles 1745 and following of the *Civil Code of Québec*. The Seller hereby reserves ownership of all merchandise until full payment of the purchase price, in accordance with the terms and conditions herein. For greater certainty, the Purchaser acknowledges and agrees that, from and after the date hereof, the Purchaser shall bear the risks of loss of the merchandise and all other property sold pursuant hereto and that the Seller may cause the registration of these terms and conditions as well as any other applicable terms and conditions in the appropriate registries. The Seller may publish its rights resulting from this Agreement at the *Register of Personal and Movable Real Rights* without notice to, or the consent of, the Purchaser.
9. **CHANGE ORDERS.** No modification, addition or deletion of any goods or services or any change in specification is effective unless a written change order is accepted and signed by an authorized signatory of the Seller. If a change order results in the imposition of costs or charges on the Seller or an increase in price or time required for supply of any part of the goods and/or services, then the Seller may adjust the price, delivery date or both as the Seller may determine and such adjustments are binding upon the Purchaser.
10. **SHIPPING.** All goods are at the risk of the Purchaser upon delivery for the goods to the Purchaser, its agent or a carrier for shipment, whichever delivery first occurs. The Purchaser shall pay the Seller all costs for special shipping or packaging. All insurance charges and related taxes and duties are for the Purchaser's account unless otherwise specified in the Quotation. Should the Purchaser not be ready to accept any shipment, the Purchaser will be responsible to find alternative storage at the Purchaser's sole cost. The Seller, at its sole discretion, may elect to store the goods for a limited period of time.
11. **STORAGE.** In the event that the Seller stores any goods at its facility on behalf of the Purchaser, such goods will be at the Purchaser's risk and the Purchaser will be charged at a rate of 0.75% of the total purchase price per month for as long as the goods are in storage. The Seller may cease storage of the goods at any time. All insurance on the equipment will be the sole responsibility of the Purchaser. Any and all outstanding milestones, warranty dates, payment due dates and other timelines will continue to run during the period of time the goods are in storage. Any additional handling charges related to storage will be solely for the Purchaser's account.
12. **LIMITED WARRANTY / DISCLAIMER.** The Seller does not guarantee, assume any responsibility for, or make any representation or warranty with respect to any goods or service or the performance thereof, save and except as expressly set forth in the Quotation. To the maximum extent permitted by applicable law, the Purchaser hereby waives the benefit of any implied or statutory representations or warranties. Without limiting the foregoing, the Seller makes no representations or warranties with respect to merchantability, fitness for purpose, profitability or expected savings.
13. **LIMITATION OF LIABILITY.** The liability of the Seller whether arising under this Agreement, contract, tort, negligence, statutory liability or other legal theory, shall be limited to the direct and actual money damages effectively incurred by the Purchaser and in any event such liability shall not exceed in the aggregate the purchase price actually paid by the Purchaser to the Seller pursuant to the Quotation for the goods or services in question, regardless of the number of claims. In no event shall the Seller be liable for (i) any loss of revenue, profits or goodwill, or loss of use of any equipment, or (ii) any special, indirect, aggravated, punitive or consequential damages, however caused and regardless of the cause of action under which they arise, including but not limited to, loss of profits, loss of revenue, loss of revenue, loss of goodwill, or loss of business opportunity, in either case even if the Seller has been notified of the possibility of such damages, and the Purchaser hereby waives any claim or recourse against the Seller for such damages.
14. **FORCE MAJEURE.** The Seller will not be held liable in any way for delays in performance or non-performance due to contingencies or events beyond its reasonable control, including any government order or war, civil insurrection, act of terrorism, riot, weather, labour or transportation, strikes, flood, fire, earthquake, volcanic eruption or act of God, shortages of materials or energy, epidemic, pandemic (including COVID-19) or any other causes beyond the reasonable control.
15. **CANCELLATION.** Purchaser may cancel orders only upon reasonable advance written notice and upon payment to the Seller of the Seller's cancellation charges which include among other things, all costs and expenses incurred, and to cover commitments made by the Seller. The Seller's determination of such termination charges shall be final.
16. **INITIAL START-UP.** The initial start-up of any equipment provided to the Purchaser must be preceded by submitting a duly completed "Start-Up Request" form to the Seller. The start-up of the equipment is considered complete when the equipment is performing in accordance with manufacturer's specifications.
17. **ASSIGNMENT.** The Purchaser shall not have the right to transfer or assign this Agreement or any rights, remedies, obligations or benefits hereunder. For purposes of the foregoing, transfer shall include any change in the ownership of shares in any Purchaser that is a corporation or any change in the effective control of the Purchaser, whether by transfer of shares, operation of law or otherwise.
18. **ENUREMENT.** Subject to the terms hereof, this Agreement shall enure to the benefit of and be binding upon the parties hereto and their respective heirs, executors, administrators, successors, permitted assigns and legal representatives.
19. **INTERPRETATION.** Whenever the context of this Agreement so requires, the singular shall include the plural and vice versa and words importing the masculine gender shall include the feminine and neuter genders. Headings are for convenience of reference only and do not affect interpretation. In this Agreement, the word "including" means "including without limitation".
20. **NOTICES.** Any notice required or permitted to be given hereunder must be in writing and will conclusively have been deemed to have been received by its recipient on the business day it is delivered or sent by electronic transmission to a party at the address indicated in the Agreement (or at such other address as such party specifies to the other party in writing) or, if sent by registered mail, provided there is no interruption in postal services, on the fifth business day after the day of mailing, addressed to such party at such address, or if delivered personally or by courier on the business day so delivered.
21. **SEVERABILITY.** Any provision of this Agreement prohibited by or unlawful or unenforceable under any applicable law shall, at the sole option of the Seller, be ineffective without invalidating the remaining provisions of this Agreement; provided, however, that to the extent that the provisions of any such applicable law can be waived, they are hereby waived by the Purchaser.
22. **FURTHER ASSURANCES.** The Purchaser agrees to do all things and execute or obtain all documents as may be required by the Seller in order to give effect to or better evidence this Agreement.
23. **ENTIRE AGREEMENT.** This Agreement, the Quotation and, if applicable, the Credit Application, contain the entire understanding between the parties and other than as expressly set forth herein there are no other terms, conditions, representations or warranties of any kind. This Agreement may not be modified except by another agreement, in writing, signed by both parties to this Agreement.
24. **LANGUAGE.** The parties have requested that this Agreement and all related documents be drawn up in English only. Les parties ont exigé que le présent contrat et tous les documents qui s'y rapportent soient rédigés en anglais seulement.
25. **APPLICABLE LAW AND JURISDICTION.** If the goods sold are located in Québec or if the Purchaser is domiciled in Québec, this Agreement shall be governed by the laws of the Province of Québec and the federal laws of Canada applicable therein, without regard to conflict of laws principles. In all other cases, this Agreement shall be governed by the laws of the Province of Ontario and the federal laws of Canada applicable therein, without regard to conflict of laws principles. The United Nations Convention on Contracts for the International Sale of Goods shall not apply to this Agreement and its application is strictly excluded.



Kingston Health Sciences Centre

76 STUART STREET, KINGSTON, ONTARIO

KINGSTON GENERAL HOSPITAL EMERGENCY POWER SYSTEM UPGRADE

Request For Proposal 10434805-ME-02 Power Generation, Diesel Generator

Issued for Bid: 2026 March 24

HHA #2250139

HDR Project No. 10434805



Centre des sciences de
la santé de Kingston

REQUEST FOR PROPOSALS
KINGSTON HEALTH SCIENCES CENTRE
KINGSTON GENERAL HOSPITAL EMERGENCY POWER UPGRADE
DIESEL GENERATOR

10434805-ME-02

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ARTICLE 1: OVERVIEW

1.1 Introduction

The purpose of this RFP is to solicit firm proposals for the supply of one (1) diesel generator set. The diesel generator will be incorporated into the Kingston General Hospital Emergency Power System at Kingston General Hospital in Kingston, Ontario.

In preparation for a future project “Kingston General Hospital, Emergency Power Upgrade”, Kingston Health Sciences Centre (KHSC) is requesting proposals for diesel generator set. The process is to expedite the manufacture and delivery.

KHSC will award a separate CCDC2 2020 Stipulated Price Contract to a General Contractor for the construction of Kingston General Hospital, Emergency Power Upgrade Project. The diesel generator will be assigned to the future General Contractor through the CCDC2 2020 construction contract.

The diesel generator Supplier shall provide equipment, materials, labour and services to the eventual successful General Contractor, as appropriate to the diesel generator Supplier's scope of work, to allow the General Contractor to meet the requirements of the contract that will exist between KHSC and the eventual successful General Contractor.

Note: the General Contractor will be subject to a 10% holdback for the duration of the project and will not be allowed to invoice for the holdback until expiry of the lien period, 60 days after the project construction contract's Substantial Performance date. The diesel generator Supplier will be subject to this holdback and shall include all necessary allowances.

1.2 Objectives

Through the selection of the successful proposal, KHSC seeks to achieve the following goals:

- (a) Obtain the highest quality equipment.
- (b) Obtain best value for the required equipment.
- (c) Ensure the acquired products and services meet KHSC's requirements and timelines.
- (d) Facilitate the assignment of the Supplier's proposal to a future Contractor.

1.3 Rules of Interpretation

This RFP shall be interpreted according to the following provisions, unless the context requires a different meaning:

- (a) Unless the context otherwise requires, wherever used herein the plural includes the singular, the singular includes the plural, and each of the masculine and feminine includes the other gender.
- (b) Words in the RFP shall bear their natural meaning unless otherwise expressly defined.
- (c) In construing the RFP, general words introduced or followed by the word “other” or “including” or “in particular” shall not be given a restrictive meaning because they are followed or preceded (as the case may be) by particular examples intended to fall within the meaning of the general words.
- (d) Time periods will be strictly applied.
- (e) The following terminology applies in the RFP:
 - (i) Whenever the terms “must” or “shall” are used in relation to the Purchasing Organization or the Proponents, such terms shall be construed and interpreted as synonymous and shall be construed to read “the Purchasing Organization shall” or the “Proponent shall”, as the case may be.
 - (ii) The term “should” relates to a requirement which the Purchasing Organization would like the Proponent to address in its Proposal.
 - (iii) The term “will” describes a procedure that is intended to be followed.

1.4 Definitions

In this RFP, unless the context otherwise requires, the following terms have the meanings indicated below:

- (a) “Applicable Law” and “Applicable Laws” means any common law requirement and all applicable and enforceable statutes, regulations, directives, policies, administrative interpretations, orders, by-laws, rules, guidelines, approvals, and other legal requirements of any government and/or regulatory authority in effect from time to time.
- (b) “Broader Public Sector Procurement Directive” means the procurement directive issued by the Ontario Ministry of Finance effective April 1, 2024, as it may be amended from time to time.
- (c) “Business Day” or “Business Days” means Monday to Friday between the hours of 9:00 a.m. to 5:00 p.m., except when such a day is a public holiday, as defined in the Employment Standards Act (Ontario), or as otherwise agreed to by the parties in writing.

- (d) “Conflict of Interest” means any situation or circumstance where, in relation to the performance of its obligations under an agreement for Services, the Proponent’s other commitments, relationships or financial interests
 - (i) could or could be seen to exercise an improper influence over the objective, unbiased, and impartial exercise of its independent judgment; or
 - (ii) could or could be seen to compromise, impair, or be incompatible with the effective performance of its obligations under the agreement for Services.
- (e) “Days” means calendar days.
- (f) “Eligible Proposal”, has the meaning ascribed in Article 5 (Evaluation Process), means a Proposal that meets or exceeds a prescribed requirement, allowing it to proceed to the next phase.
- (g) “Evaluation Team” means the individuals who have been selected by the Purchasing Organization to evaluate the Proposals.
- (h) “Personal Information” means recorded information about an identifiable individual or that may identify an individual, but does not include the name, title, contact information or designation of an individual that identifies the individual in a business, professional or official capacity.
- (i) “Proponent” or “Proponents” means an individual, organization or entity that submits a Proposal in response to this RFP and, as the context may suggest, refers to a potential Proponent.
- (j) “Proposal” or “Proposals” means all of the documentation and information submitted by a Proponent in response to the RFP.
- (k) “Purchaser”, “Purchasers”, or “Purchasing Organization” means the Kingston Health Sciences Centre.
- (l) “Request for Proposals” or “RFP” means this Request for Proposals issued by the Purchasing Organization for the procurement of Equipment and Services, and all addenda thereto.
- (m) “RFP Submission Deadline” means the Proposal submission date and time as set out in Section 4.2 (RFP Schedule) and as may be amended from time to time in accordance with the terms of the RFP.
- (n) “RFP Coordinator” means the individual identified in Section 4.1 (RFP Coordinator).
- (o) “Schedule” or “Schedules” means the form or forms included with the RFP for Proponent to fill out and submit as part of Proposal.

- (p) “Services” means the services as outlined in Article 1 (Overview) and Article 2 (Services) of this RFP.
- (q) “Supplier” means successful Proponent, issued a letter of intent through this RFP.
- (r) “Unfair Advantage” means any conduct, direct or indirect, by a Proponent that may result in gaining an unfair advantage over other Proponents, including but not limited to
 - (i) possessing, or having access to, information in the preparation of its Proposal that is confidential to the Purchasing Organization and which is not available to other Proponents,
 - (ii) communicating with any person with a view to influencing, or being conferred preferred treatment in, the RFP process, or
 - (iii) engaging in conduct that compromises or could be seen to compromise the integrity of the RFP process and result in any unfairness.

ARTICLE 2: DELIVERABLES

2.1 Background Information

KHSC intent is to preselect the diesel generator based upon this specification and issue a purchase order for the engineering required for preparation of project-specific shop drawings. The purchase order for the purchase of the diesel generator will be issued by the successful General Contractor, at the direction of KHSC, approximately three (3) months after issuance of Letter of Award with firm commitment to purchase shop drawings.

Each Proponent shall provide a proposal for the supply of one (1) diesel generator.

The scope of work for this RFP generally includes the supply and delivery of the equipment, commissioning, and testing support. The Successful Proponent shall be responsible for all activities that are specific to the manufacturer of the equipment.

Equipment

1. Diesel Generator with outdoor weather-protective walk-in sound attenuating housing
2. Synchronous Generator with brushless exciter (600 V)
3. Independent Starting System
4. Fuel System including sub-base Fuel Tank
5. Control Panel and Human Machine Interface (HMI)
6. Generator Output (gross) Metering
7. Electronic Automatic Voltage Regulator, Automatic Synchronizer, Digital Governor and Speed Control System

Preliminary Project Schedule

The following dates identify the intended KHSC KGH Emergency Power Upgrade Project schedule. They are provided for reference only. Several dates depend on the information provided by Proponents:

2026-03 Diesel Generator RFP
2026-04 Diesel Generator letter of award and Diesel Generator Engineering
2026-06 Approved Diesel Generator Shop Drawings
2026-04 Issue Construction Contract RFP
2026-05 Award Construction Contract to General Contractor
2026-06 Contractor finalizes Diesel Generator assignment
2027-04 Diesel Generator shipped to site

2.2 Application of Purchaser's Rules to Proponent's Personnel

All rules and regulations applicable to employees of the Purchaser regarding their behaviour and conduct in connection with the business and affairs of the Purchaser shall, insofar as the same shall be required by the Purchaser, be applicable to the Proponent's Personnel when on the

Purchaser's premises. Without limiting the generality of the foregoing, the Proponent agrees that the Proponent's Personnel, when using the premises of the Purchaser, shall comply with all behaviour, conduct, and security regulations in effect at such premises. The Purchaser has the right to request specific personnel work on Projects or to request that specific personnel be removed from the Project if they are deemed to not be following the Purchaser's rules.

In the event that any of the Proponent's Personnel shall fail or refuse to abide by such rules or regulations, such person(s) shall be removed by the Proponent from performing any Services for the Purchaser. If such removal is not carried out within a reasonable time, or within the time period specified by the Purchaser, failure to so comply shall be deemed a breach of a material term of the agreement for Services. In the event of such removal of the Proponent's Personnel by the Proponent, no liability of any kind or nature whatsoever shall attach to the Purchaser. The Purchaser further reserves to itself the right to disallow any of the Proponent's Personnel admittance to the Purchaser's premises where such person fails or refuses to abide by such rules and regulations.

2.6 Indemnity

The Purchaser agrees that it will indemnify and hold harmless the Proponent, its directors, officers, employees and agents from and against any and all claims, demands, actions, suits, losses, costs, charges, expenses, damages and liabilities whatsoever which the Proponent may pay, sustain, suffer or incur by reason of or in connection with or arising from any failure of the Purchaser, its directors, officers and the Purchaser staff, to comply with the terms of this RFP, or by reason of any acts or omissions of the Purchaser, its directors, officers or staff in connection with or related to the Services.

The Proponent agrees that it will indemnify and hold harmless the Purchaser, its directors, officers, employees and agents from and against any and all claims, demands, actions, suits, losses, costs, charges, expenses, damages and liabilities whatsoever which the Purchaser may pay, sustain, suffer or incur by reason of or in connection with or arising from any failure of the Proponent, its directors, officers and the Proponent's staff, to comply with the terms of this RFP or by reason of any acts or omissions of the Proponent, its directors, officers or staff in connection with or related to the Services.

ARTICLE 3: RFP TERMS

3.1 Proprietary and Confidential Information

3.1.1 Proprietary Information of the Purchasing Organization and the Purchaser

All correspondence, documentation, and information of any kind provided by or on behalf of the Purchasing Organization or Purchaser to a Proponent in connection with or arising out of this RFP or the acceptance of any Proposal:

- (a) remains the property of the Purchasing Organization or Purchaser, as the case may be;
- (b) must not be used for any purpose other than for replying to this RFP and for the fulfillment of any related subsequent agreement, if applicable; and
- (c) must be returned to the Purchasing Organization upon request.

3.1.2 Confidential Information of the Purchaser

The Purchasing Organization reserves the right to require any Proponent to enter into a nondisclosure agreement satisfactory to the Purchasing Organization prior to disclosing any information that it considers confidential to the Purchasing Organization or the Purchaser under this RFP.

3.1.3 Intellectual Property of the Purchaser

The Proponent shall not use any intellectual property of the Purchasing Organization or any Purchaser, including but not limited to logos, registered trade-marks, or trade names of the Purchasing Organization or any Purchaser, without the prior written approval of the Purchaser.

3.1.4 Ownership of Proposals/Collection of Further Information

All Proposals submitted by the RFP Submission Deadline shall become the property of the Purchasing Organization and will not be returned to the Proponents. By submitting a Proposal, the Proponent authorizes the collection by the Purchasing Organization of the information identified in this RFP, which the Purchasing Organization may request from any third party.

3.1.5 Confidential Information of the Proponent

Except as required by Applicable Laws, the Purchasing Organization shall treat the Proponents' Proposals (including, but not limited to pricing and product information) and any information gathered as part of the RFP process as confidential. Proponents are advised that their Proposals will, as necessary, be disclosed on a confidential basis to employees and professional advisors assisting the Purchasing Organization. This obligation does not extend to any information that is or becomes generally available to the public other than as a result of disclosure by the Purchasing Organization.

During any part of this RFP process, the Purchasing Organization or any Purchaser, or any of their representatives or agents, shall be under no obligation to execute a confidentiality agreement.

3.1.6 Copies of Proponent's Proposal

All correspondence, documentation, and information provided in response to or because of this RFP may be reproduced for the purposes of evaluating the Proponent's Proposal.

3.1.7 Personal Information

Personal Information shall be treated as follows:

- (a) Submission of Information – The Proponent should not submit as part of its Proposal any information related to the qualifications or experience of individuals who will be assigned to provide services unless specifically requested. Should the Purchasing Organization request such information, the Purchasing Organization will treat this information in accordance with the provisions of this section and will maintain the information for a period of 7 years from the time of collection.
- (b) Use – Any Personal Information that is requested from each Proponent by the Purchasing Organization shall only be used to:
 - (i) to select the qualified individuals to undertake the project/services;
 - (ii) to confirm that the work performed is consistent with these qualifications;
 - (iii) for any audit of this procurement process; and
 - (iv) in the case of the successful Proponent, for contract management purposes.
- (c) Consent – It is the responsibility of each Proponent to obtain the consent of such individuals prior to providing the information to the Purchasing Organization. If any Personal Information is disclosed to the Purchasing Organization by a Proponent, the Purchasing Organization will consider that the appropriate consents have been obtained for the disclosure to and use by the Purchasing Organization of the requested information for the purposes described herein.

3.2 Freedom of Information and Protection of Privacy Act

The Freedom of Information and Protection of Privacy Act (Ontario) applies to records in the custody or control of Ontario hospitals and includes any information provided by Proponents in connection with this RFP. Such information may be subject to requests for access under that Act, and can only be withheld from disclosure in specific circumstances. A Proponent should identify any information in its Proposal that, if disclosed to any other person, would harm that Proponent's competitive position. Generally, only specific portions of a Proposal should be identified.

3.3 Competition Act

Under Canadian law, a Proponent's Proposal must be prepared without conspiracy, collusion, or fraud. For more information on this topic, visit the Competition Bureau website.

3.4 Trade Agreements

Proponents should note that procurements coming within the scope of either Chapter 5 of the Agreement on Internal Trade or within the scope of the Trade and Cooperation Agreement between Quebec and Ontario are subject to such agreements, although the rights and obligations of the parties shall be governed by the specific terms of this RFP. For more information, please refer to the Internal Trade Secretariat website.

3.5 Rights of the Purchasing Organization – General

In addition to any other express rights or any other rights which may be implied in the circumstances, the Purchasing Organization reserves the right to:

- (a) make public the names of any or all Proponents;
- (b) check references other than those provided by Proponents;
- (c) disqualify any Proponent whose Proposal contains misrepresentations or any other inaccurate or misleading information, or any Proponent whose reasonable failure to cooperate with the Purchasing Organization impedes the evaluation process, or whose Proposal is determined to be non-compliant with the mandatory requirements of the RFP;
- (d) disqualify any Proponent where that Proponent, or one or more principals or key personnel of that Proponent, have:
 - (i) previously breached a contract with any Purchaser,
 - (ii) otherwise failed to perform to the reasonable satisfaction of the Purchaser,
 - (iii) been charged or convicted of an offence in respect of a contract with any Purchaser, or
 - (iv) a Conflict of Interest or Unfair Advantage, or where reasonable evidence of any Unfair Advantage or Conflict of Interest is brought to the attention of the Purchasing Organization;
- (e) disqualify any Proponent that has breached any Applicable Laws or that has engaged in conduct prohibited by this RFP, including where there is any evidence that the Proponent or any of its employees or agents colluded with any other Proponent, its employees or agents in the preparation of its Proposal;

- (f) make changes, including substantial changes, to this RFP provided that those changes re issued by way of addenda in the manner set out in this RFP;
- (g) accept or reject a Proposal if only one Proposal is submitted;
- (h) reject a subcontractor proposed by a Proponent within a consortium;
- (i) select a Proponent other than the Proponent whose Proposal reflects the lowest cost to the Purchasing Organization;
- (j) accept all components of a Proposal or a portion thereof, unless the Proposal clearly states that it is based on all of the components being accepted;
- (k) cancel this RFP without providing reasons, and the Purchasing Organization may thereafter issue a new request for proposals, request for qualifications, sole source, or take no further action in respect of the matters contemplated by this RFP; and
- (l) reject any or all Proposals in its absolute discretion, including where a Proponent has launched legal proceedings against the Purchasing Organization and/or the Purchasers, or is otherwise engaged in a dispute with the Purchasing Organization and/or the Purchasers.

3.6 Assignment

The Proponent shall not assign any of its rights or obligations hereunder during the RFP process without the prior written consent of the Purchasing Organization. Any act in derogation of the foregoing shall be null and void.

3.7 Entire RFP

This RFP and all Schedules form an integral part of this RFP.

3.8 Priority of Documents

In the event of any inconsistencies between the terms, conditions, and provisions of the main part of the RFP and the Schedules, the RFP shall prevail over the Schedules during the RFP process.

3.9 Governing Law/Jurisdiction

The RFP, the Proponent's Proposal, and any resulting agreements for Services shall be governed by the laws of Ontario and the federal laws of Canada applicable therein.

The Proponent agrees that:

- (a) any action or proceeding relating to this RFP shall be brought in any court of competent jurisdiction in the Province of Ontario and for that purpose the Proponent irrevocably and unconditionally attorns and submits to the jurisdiction of that Ontario court;
- (b) it irrevocably waives any right to, and shall not, oppose any Ontario action or proceeding relating to this RFP process on any jurisdictional basis; and
- (c) it shall not oppose the enforcement against it, in any other jurisdiction, of any judgment or order duly obtained from an Ontario court as contemplated by this RFP.

ARTICLE 4: RFP PROCEDURES

4.1 RFP Coordinator

All communications with the Purchasing Organization (or any Purchaser) regarding any aspect of this RFP (up until any contract award notification) must be directed to the RFP Coordinator:

Name: Kevin Henry

Company: HDR Architecture Associates Inc

Address: Suite 400 – 27 Princess Street, Kingston, ON K7L 1A3

Phone #: 647-776-0508

E-mail: kevin.henry@hdrinc.com

Proponents that fail to comply with the requirement to direct all communications to the RFP Coordinator may be disqualified from the RFP process. Without limiting the generality of this provision, Proponents shall not communicate with or attempt to communicate with the following individuals with respect to the RFP:

- (a) any employee or agent of any Purchaser;
- (b) any member of the Evaluation Team;
- (c) any expert or advisor assisting the Evaluation Team;
- (d) any member of the Purchasers' governing bodies (such as Board of Governors, Board of Directors, Board of Advisors or Trustees); or
- (e) any elected official of any level of government, including any advisor to any elected official.

4.2 RFP Schedule

The following is a summary of the key dates in the RFP process:

Event	Date
RFP Issue Date	2026 March 24
Questions to be Submitted in Writing (see Section 4.4.1 (Submission of Questions))	2026 April 2
Addenda Deadline (see Section 4.4.3 (Issued Addenda))	2026 April 7
Proposal Submission Deadline	2026 April 9 at 3:00pm local time
Proposal Evaluations Complete	2026 April 15
Close of Debrief Period (see Section 4.13 (Debriefing))	2026 April 24

- (a) The Purchasing Organization may change any of the above dates and times, including the RFP Submission Deadline, in its sole discretion and without liability, cost, or penalty. In the event a change is made to any of the above dates, the Purchasing Organization will issue any such change by numbered Addenda to the Proponents.
- (b) In the event of any change in the RFP Submission Deadline, the Proponents shall thereafter be subject to the extended RFP Submission Deadline.

4.3 RFP Information

4.3.1 *Proponent to Review*

Every Proponent should carefully review the RFP to ensure that it has no reason to believe there are any uncertainties, inconsistencies, errors, omissions, or ambiguities in any part of the RFP.

Every Proponent is responsible for conducting its own investigations and due diligence necessary for the preparation of its Proposal.

4.3.2 *Proponent to Notify*

In the event a Proponent has any reason to believe that any of the circumstances listed in Section 4.3.1 (Proponent to Review) exist, the Proponent should notify the RFP Coordinator in writing prior to submitting a Proposal. The RFP Coordinator will then clarify the matter for the benefit of all Proponents.

4.3.3 Purchaser/Purchasing Organization Not Liable

Proponents shall not:

- (a) after submission of a Proposal, claim that there was any misunderstanding or that any of the circumstances set out in Section 4.3.1 (Proponent to Review) were present with respect to the RFP; or
- (b) claim that the Purchasing Organization or Purchaser is responsible for any of the circumstances listed in Section 4.3.1 (Proponent to Review).

4.4 Clarification and Questions

4.4.1 Submission of Questions

The following apply regarding any request for clarification of any aspect of the RFP:

- (a) Proponents must submit requests for clarification by email to the RFP Coordinator, or as may otherwise be directed by the RFP Coordinator.
- (b) In submitting a request for clarification, a Proponent must include its email address.
- (c) Where a question relates to a specific section of this RFP, reference should be made to the specific section number and page of the RFP.
- (d) Requests for clarification must be submitted by the deadline for questions set out in Section 4.2 (RFP Schedule).

4.4.2 Questions and Answers

The Purchasing Organization shall provide Proponents with written responses to questions that are submitted in accordance with Section 4.4.1 (Submission of Questions), subject to the provisions of this Section. Questions and answers will be distributed in numbered Addenda to Proponents. In answering a Proponent's questions, the Purchasing Organization will set out the question(s), but without identifying the Proponent that submitted the question(s). Also, the Purchasing Organization may, in its sole discretion:

- (a) edit the question(s) for clarity;
- (b) exclude questions that are either unclear or inappropriate; and
- (c) answer similar questions from various Proponents only once. Where an answer results in any change to the RFP, such answer will be formally documented through the issue of a separate addendum reflecting that change.

4.4.3 Issued Addenda

The Purchasing Organization shall have the right to amend or supplement this RFP in writing prior to the RFP Submission Deadline. Before submitting a Proposal, a Proponent shall be responsible to verify that it has received all of the addenda that have been issued, which shall be issued by the addenda deadline set out in Section 4.2 (RFP Schedule), unless it is an addendum that extends the RFP Submission Deadline. Any amendment or supplement to the RFP made in any other manner, or any information communicated about this RFP other than by the RFP Coordinator, will not be binding on the Purchasing Organization.

4.5 Proposal Submission

4.5.1 General

Proposals must be submitted by email to kevin.henry@hdrinc.com by the RFP Submission Deadline, as set out in Section 4.2 (RFP Schedule).

Proposals received after the RFP Submission Deadline shall not be considered. Proposals submitted by another means (such as courier, delivery service, Canada Post) will not be considered. Each Proponent is responsible for the delivery of its Proposal as required above.

Notwithstanding anything to the contrary contained in any applicable statute relating to electronic documents transactions, including the Electronic Commerce Act, 2000, S.O. 2000, c. 17, any notice, submission, statement, or other instrument provided in respect of the RFP may not be validly delivered by way of electronic communication, unless specifically allowed in this RFP.

Proposals are to be submitted in English only, and any Proposal received by the Purchasing Organization that is not entirely in English may be disqualified.

4.5.2 Receipt

Every Proposal received will be date/time stamped, and a receipt will be provided upon request. Under no circumstances will the Purchasing Organization be held responsible for late Proposals.

Proposals will not be opened publicly.

4.6 Withdrawal of Proposal

A Proponent may withdraw its Proposal only by providing written notice to the RFP Coordinator before the RFP Submission Deadline. A Proposal may not be withdrawn after the RFP Submission Deadline. The Purchasing Organization has no obligation to return withdrawn Proposals.

4.7 Amendment of Proposal

A Proponent may amend its Proposal after submission, but only if the Proposal is amended and resubmitted before the RFP Submission Deadline. The Proponent must provide notice to the RFP Coordinator in writing and replace its Proposal with a revised Proposal, in accordance with the requirements of this RFP. The Purchasing Organization has no obligation to return amended Proposals.

4.8 Acceptance of RFP

By submitting a Proposal, a Proponent agrees to accept and to be bound by all of the terms and conditions contained in this RFP, and by all of the representations, terms, and conditions contained in its Proposal.

4.9 Clarification of Proponent's Proposal

The Purchasing Organization shall have the right at any time after the RFP Submission Deadline to seek clarification from any Proponent in respect of that Proponent's Proposal. The Purchasing Organization shall not be obliged to seek clarification of any aspect of any Proposal. Any clarification sought shall not be an opportunity for the Proponent to either correct errors or to change the Proponent's Proposal in any substantive manner. Subject to the qualification in this provision, any written information received by the Purchasing Organization from a Proponent in response to a request for clarification from the Purchasing Organization may be considered to form an integral part of the Proponent's Proposal, in the Purchasing Organization's sole discretion.

4.10 Verification of Information

The Purchasing Organization shall have the right, in its sole discretion, to:

- (a) verify any Proponent's statement or claim made in the Proponent's Proposal or made subsequently in an interview, site visit, oral presentation, demonstration, or discussion by whatever means the Purchasing Organization may deem appropriate, including contacting persons in addition to those offered as references;
- (b) reject any Proponent's statement, claim or Proposal, if such statement, claim or Proposal is patently unwarranted or is questionable; or
- (c) access the Proponent's premises where any part of the work is to be carried out to confirm Proposal information, quality of processes, and to obtain assurances of viability, provided that, prior to providing such access, the Proponent and Purchasing Organization shall agree on reasonable access terms, including pre-notification, extent of access, security, confidentiality and the allocation and amount of any costs incurred in connection with such access.

The Proponent shall co-operate in the verification of information and is deemed to consent to the Purchasing Organization verifying such information.

4.11 Substantial Compliance

The Purchasing Organization will reject Proposals which are not compliant with the mandatory requirements in this RFP. The Purchasing Organization may waive formalities and accept Proposals that substantially comply with the requirements of this RFP, in the Purchaser's sole discretion.

4.12 No Publicity or Promotion

No Proponent, including the successful Proponent, shall make any public announcement or distribute any literature regarding this RFP or otherwise promote itself in connection with this RFP or any arrangement entered into under this RFP without the prior written approval of the Purchasing Organization.

In the event that a Proponent, including the successful Proponent, makes a public statement either in the media or otherwise in breach of this requirement, in addition to any other legal remedy it may have in law, in equity or within the context of this RFP, the Purchasing Organization shall be entitled to take all reasonable steps as may be deemed necessary by the Purchasing Organization, including disclosing any information about a Proponent's Proposal, to provide accurate information and/or to rectify any false impression which may have been created.

4.13 Debriefing

Not later than 30 Days following the date of RFP Evaluations Complete, as noted in Section 4.2 (RFP Schedule), a Proponent may contact the RFP Coordinator to request a debriefing from the Purchasing Organization, and the Purchasing Organization shall conduct such debriefing in accordance with the requirements of the Broader Public Sector Procurement Directive. The Purchasing Organization will choose which representative(s) of the Purchasing Organization and/or Purchaser will attend the debriefing.

Any request that is not received within the foregoing timeframe may not be considered and the Proponent will be notified of same in writing.

Proponents should note that, regardless of the time of submission of a request by a Proponent, debriefings will not be provided until a contract award notification has been posted, in compliance with the Broader Public Sector Procurement Directive.

4.14 Award

KHSC will issue letter of award to the successful Proponent. Upon receiving the letter of award the Proponent will be required to proceed with preparation of shop drawings. The Proponent will

enter into a contract with the installation contractor of the KGH Emergency Power Upgrade Project. KHSC will enter into a contract with the General Contractor. After assignment of the equipment there will be no direct contractual relationship between KHSC and the successful Proponent (equipment Supplier). Regardless, if the Project does not proceed, KHSC is committing via letter of award to pay the successful Proponent for the cost of the Shop Drawings required for the KGH Emergency Power Upgrade Project Construction Contract.

ARTICLE 5: PROPOSAL REQUIREMENTS & EVALUATION

5.1 Proposal Format

5.1.1 General

The Proponent's Proposal should be comprised of pdf copies of the documents outlined in Table 1 (Proposal Requirements and Scoring).

5.1.3 Naming of Documents

Documents shall be named according to the following format:

(Order#)_KHSC RFP 10434805-ME-02_(Document)_(Proponent Name)

Example: 1_KHSC RFP 10434805-ME-02_CoverLetter_(Proponent Name)

5.1.3 Technical Issues

In preparing its Proposal, the Proponent should adhere to the following:

- (a) adhere to the Proposal format requirements described above;
- (b) be completed without delineations, alterations, or erasures;
- (b) all pages should be numbered;
- (c) avoid using symbols in the file name such as &, #, etc.;
- (d) each electronic document should not exceed 10 MB in size; information may be split up into separate documents, if necessary;
- (e) avoid using scanned copies of documents, where possible (scanned copies tend to be of greater size than original electronic versions);
- (f) no embedded hyperlinks to online literature about the Services are permitted; and
- (g) completely address, on a point-by-point basis, each requirement identified in the requirements column of Table 1 (Proposal Requirements and Scoring).

5.2 Proposal Evaluation

5.2.1 Proposal Evaluation Team

The evaluation of the Proposals will be conducted by the Evaluation Team. The Evaluation Team will be selected by the Purchasers and chaired by HDR staff. It must be understood and accepted by any Proponent submitting a Proposal that all decisions as to the degree to which a

Proposal meets the requirements of this RFP are solely within the judgment of the Evaluation Team.

5.2.2. Proposal Evaluation Scoring

Points are awarded as described below for a total of 100 total points possible. The Proponent must provide sufficient information to demonstrate they meet the criteria to be awarded the various points below.

5.2.3 Rated Criteria

Points will be assigned based on how thoroughly each Proposal has addressed and met the following requirements.

Award Criteria is as follows:

CRITERIA	POINTS
Experience	10
Delivery Timeline	40
Price of Equipment	50
TOTAL SCORE	100

For further information on RFP submittal requirements to help demonstrate compliance with the above noted criteria, please refer to the Engineering documents attached.

5.2.4 Evaluation of Pricing

Points will be assigned to each proposal using the following formula:

$$\text{price criterion points} \quad \frac{\text{Lowest bid price}}{\text{Bidder's bid price}} = \text{points awarded}$$

For example, if the lowest proposal “A” is \$2 and proposal “B” is \$4, proposal “A” will receive 100% of the available 50 points, and proposal “B” will receive $40 \times \$2 / \$4 = 25$ points.

5.2.5 Cumulative Score and Selection of Bidder

At the conclusion of Evaluation of Pricing, all scores from Rated Criteria will be added and, subject to satisfactory reference checks and other due diligence and the express and implied rights of Kingston Health Sciences Centre, the successful Proponent will be issued a letter of intent to proceed with preparation of shop drawings.

5.2.6 Tie Score

In the event of a tie score, KHSC will select the Proponent with the highest score for Delivery Timeline.

END OF RFP

Table of Contents

Document Identification	DR	Pgs	Issued
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Division 00 – Procurement and Contracting Requirements

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00 43 22 ME-01	Itemized Prices Bid Form Supplement	1	
00 43 23 ME-01	Alternative Prices Bid Form Supplement	2	

Division 26 – Electrical, Communications, and Security

26 00 01	List of Sections – Electrical, Communications, and Security		
26 01 01	Electrical General Requirements		
26 08 16	Commissioning of Tendered Electrical Equipment		
26 32 13	Power Generation Diesel		

Drawings – Electrical

E-02	New Single Line Drawing		
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END OF SECTION

Project/Contract: KGH Emergency Power Upgrades

Bid Number: 10434805-ME-02

Scope: Engineering and Price for the 2 MW Enclosed Diesel Generator with
Integral Fuel Tank per Generator Technical Specifications (HHA #2250139)

From (Proponent):

Company name

Street address or postal box number

City/Town, Province and Postal Code

To (Owner): Procurement
Kingston Health Sciences Centre
76 Stuart Street
Kingston, ON
K7L 2V7

- A. We, the undersigned, having examined the *Bid Documents* for the above-named project/contract, including Addendum Numbers(s) _____, hereby offer to perform the *Work* in accordance with the *Bid Documents*, for the stipulated price (base *Bid Price*) of:

\$ _____
amount in figures

in Canadian dollars, excluding *Value Added Taxes*.

\$ _____
amount in words

in Canadian dollars, excluding *Value Added Taxes*.

- a. For this project the Value Added Taxes shall mean HST at 13%.

B. We declare that:

- I. We will attain the following date for delivery of *reviewed shop drawings/engineering deliverable review* as follows:
 - a. ____ weeks after receipt of order (engineering).
- II. We will attain the following date for delivery of the *Specified Equipment* as follows:
 - a. ____ weeks after receipt of order (equipment, 'full notice to proceed')

C. We understand and declare that:

- a. We have arrived at the bid without collusion with any competitor.
- b. The Bid Price is open to acceptance by the *Owner* for a period of 60 days running from the Proposal Submission Deadline. Refer to the RFP.
- c. The Bid Price is open to acceptance by the *Owner* and assignment to the successful Installation Contractor and/or General Contractor (as applicable) in accordance with the terms determined in the RFP.
- d. We accept and agree that we shall perform work expeditiously and with adequate forces to attain *delivery of engineering and shop drawings*, and *delivery of equipment* within the completion times specified in *Bid Documents*. In order to maintain schedule we have allowed for overtime work in our bid price.
- e. We have carefully reviewed and fully understand the *Bid Documents* (including the *Instruction to Bidders*), and, in particular, acknowledge the rights of the *Owner* expressly reserved in the *Instructions to Bidders*, to accept or reject any or all of the bids.

Signatures:

Signed and submitted by:

Company name

Name and title of authorized signing officer

Signature of authorized signing officer

Name of witness

Signature of witness

Name and title of authorized signing officer

Signature of authorized signing officer

Name of witness

Signature of witness

Dated this: _____ day of _____, 20____.

Note: Affix corporate seal as required by *Bid Documents*

END OF SECTION

Project/Contract: KGH Emergency Power Upgrades

Bid Number: 10434805-ME-02

From (Proponent): _____

Company name

We, the above named Proponent, offer the Itemized Prices requested below. The values of Itemized Prices are included in the Bid Price but must be specifically set out in the event that these items will be deleted from the project; they are the amount to be added to, or deducted from, our base Bid Price (as entered in the Bid Form, Section 00 41 13 ME-02). Itemized Prices are to include costs of all required work.

Note: in this project, Itemized Prices are to be used to identify portions of the bid value to be paid in advance (engineering), and other portions to be assigned to the Contractor for payment through a future Construction Contract.

Schedule of Itemized Prices (VAT NOT INCLUDED)

Values are presented in Canadian dollars (CAD), and exclude Value Added Taxes (VAT). For this project Value Added Taxes shall mean the Harmonized Sales Tax (HST) at 13%.

	Item	Amount
1	Engineering and preparation of shop drawings of the Diesel Generator per Specifications (HDR 10434805 & HHA #2250139). If this scope is pre-purchased for future assignment to a General Contractor, the value presented is paid in advance. It would therefore be removed from the General Contractor's future Construction Contract Bid Price.	
2	Site services including: • inspection of equipment prior to unloading, witness of unloading, technical supervision of unloading, unloading report, • factory-trained technician and service representative delivery of factory and field training for operating and maintenance, • technical supervision of the installation, • factory-trained technician and service representative for on-site start-up, and • on-site testing and commissioning.	
3		

END OF SECTION

Alternative Prices Bid Form Supplement

Project/Contract: KGH Emergency Power Upgrades

Bid Number: 10434805-ME-02

From (Proponent): _____

Company name

We, the above-named Proponent, offer the Alternative Prices requested below. The values of the Alternative Prices are not included in the Bid Price and are to reflect the net value of the change; they are the amount to be added to, or deducted from, our base Bid Price (as entered in the Bid Form, Section 00 41 13 ME-02). Alternative Prices are to include costs of all required work.

If there is no change to the base bid price for an alternative, we have so indicated.

It is understood that:

- a) The *Owner* may accept the alternatives and corresponding alternative prices in any order, including all or none,
- b) Alternative prices will be considered in determining the lowest bidder,
- c) Alternatives and alternative prices are open for acceptance by the *Owner* for the same period of time as the Bid Price, unless otherwise indicated,
- d) The *Work* of the *Contract* and the *Contract Price* will reflect the alternatives and alternative prices, if any, accepted by the *Owner* at the time of *Contract* award, and
- e) Acceptance of any alternatives will not affect the base bid contract completion time, unless we have specifically indicated an increase or decrease in time, in number of days, on account of a particular alternative.

Alternative Prices Bid Form Supplement

Schedule of Alternative Prices (VAT NOT INCLUDED)

Values are presented in Canadian dollars (CAD), and exclude Value Added Taxes (VAT). For this project Value Added Taxes shall mean the Harmonized Sales Tax (HST) at 13%.

Item	Description of Alternative Price	Effect on Base Bid Price	
		Add	Deduct
1	Net change in base Bid Price for supply of material described in this Diesel Generator RFP 10434805-ME-02 irrevocable in the form submitted by the Bidder for a period of two hundred and seventy (270) days running from the Proposal Submission Deadline. Engineering and shop drawings would be awarded within the same period of time as the base RFP terms. The contract completion time would remain effective relative to acceptance (full notice to proceed). For clarity: This Alternative Price is open to acceptance beyond the period of time for the base Bid Price.		
2			
3			
4			
5			
6			
7			

END OF SECTION



**Electrical
Specification**
FOR

KGH EMERGENCY POWER UPGRADE
Kingston Health Sciences Centre
Kingston General Hospital
76 Stuart St
Kingston, ON
K7L 2V7

Issued for Equipment Pre-Tender 2
03/06/2026

HHA #2250139

1176 Eglinton Ave E
North York, Ontario
M3C 0S1
T. (1) 416.443.8200
F. (1) 416.443.8290
www.hhangus.com

LIST OF SECTIONS – ELECTRICAL, COMMUNICATIONS, AND SECURITY
26 00 01

DIVISION 26 – ELECTRICAL

26	01	01	Electrical General Requirements
26	08	16	Commissioning of Tendered Electrical Equipment
26	32	13	Power Generation Diesel

END OF SECTION

ELECTRICAL GENERAL REQUIREMENTS

26 01 01

1 GENERAL

1.1 General Contract Documents

- .1 Comply with General Conditions of the Contract, Supplementary Conditions of the Contract and Division 01 - General Requirements.
- .2 Where content in this Specification section duplicates requirements in various Division 01 Specification sections, this section and the applicable Division 01 sections are to be read together and the most stringent requirements apply.

1.2 Work Included

- .1 Work to be done is to include furnishing of materials, equipment and services to be assigned to a contractor required for the contractor to create a complete electrical systems as specified, as intended, and as otherwise required. Complete systems to be left ready for continuous and efficient satisfactory operation.
- .2 Read drawings and specifications together as a whole and in conjunction with other such documents included under the Construction Contract.

1.3 Document Organization

- .1 Applicable Divisions for Electrical Work:
 - .1 Division 26 - Electrical
- .2 The Specifications for these Division are arranged in Sections for convenience The supplier is required to provide a complete equipment package. .
- .3 Supplier is responsible for completion and supply of the equipment to the contractor.

1.4 Language

- .1 Specifications are written as a series of instructions addressed to the Supplier. For clarity and brevity, use is made of numbered lists and bulleted lists. Where the list follows a semi-colon (;) punctuation is for clarity, where the list follows a colon (:) punctuation is to be read as short-hand form of verb "to be" or "to have" as context requires.
- .2 It is not intended to debate with the Supplier reasons for these instructions, and words associated with justification for an instruction or restatement of anticipated performance have been omitted to avoid possible ambiguities.

1.5 Definitions and Abbreviations

- .1 Other specification sections of Divisions 26 of the Work may also include additional specific definitions and/or abbreviations that apply to that specification section.
- .2 The following terms apply to Divisions 26 of the Work:
 - .1 The words "indicated", "shown", "noted", "listed" or similar words or phrases used in these Specifications, mean that the material or item referred to is "indicated", "shown", "listed" or "noted" on the Drawings or in the Specifications.
 - .2 Wherever the word "listed" is used in conjunction with a product and a product certification standard (including but not limited to CSA, ULC, CGSB, BNQ, UL), it shall be understood to mean

that the product is "listed" by an accredited 3rd party testing laboratory as being certified to the referenced product standard.

- .3 Wherever the words "approved", or similar words or phrases are used in the Specification they shall be understood, unless the context otherwise provides to mean that material or item referred to shall be "approved by" the Owner.
- .4 Wherever the words "satisfactory", "as directed", "submit", "permitted", "reviewed", or similar words or phrases are used in the Specification they shall be understood, unless the context otherwise provides to mean that material or item referred to shall be "satisfactory to", "as directed by", "submitted to", "permitted by", or "reviewed by" the Consultant.
- .5 Instructions using any form of the word:
 - (a) "install" means to place in position for service or use.
 - (b) "supply" means to procure and deliver materials, or to make available labour or services for the stated purpose.
 - (c) "provide" means to supply material, labour and services to install the referenced item.
- .6 The term "building code" means the edition of the applicable building code at the location of the Work at the time of obtaining a building permit.
- .7 The terms "electrical code" and "electrical safety code" mean the edition of the applicable electrical safety code adopted by regulation at the location of the Work at the time of obtaining an electrical works permit.
- .8 The term "AHJ" and "local authority" means the "Authority Having Jurisdiction" and can include the local building inspector, the local fire department and the electrical safety inspector or their agents.
- .9 Wherever manufacturers or manufacturer's products are identified in lists under the phrase "Standard of Acceptance", these are manufacturers and/or products which meet the project standards in regard to performance, quality of material and workmanship.
- .3 The following abbreviations apply to this specification section:
 - .1 NECA – National Electrical Contractors Association

1.6 Design Services

- .1 Provide specialty design services for elements of the Work where specified in other sections of Division 26. Drawing and specifications prepared by such specialty design service providers shall be sealed by a professional engineer licensed in the jurisdiction of the Work.

2 SHIPPING, HANDLING AND STORAGE

2.1 Shipping

- .1 Equipment shipping terms shall be DDP 76 Stuart St, Kingston, Ontario per Incoterms 2020.
- .2 Provide adequate protection of equipment during shipping and handling to provide equipment at the site in ex-works condition when handled by commercial carrier systems.
- .3 Each drawout element such as high voltage circuit breakers, power circuit breakers, transfer switch modules, etc. to be packaged separately from its associated enclosure.
- .4 Provide as necessary, removable bracing of the internal components in each item of equipment so that the equipment can be moved on its side or back, without sustaining damage.
- .5 Where removeable internal bracing has been provided, the equipment to be provided with warning labels to call for the removal of the shipping bracing prior to energization.
- .6 Any component packaged or shipped separately to be individually crated and tagged with unit number and the equipment number of the assembly to which it belongs.

- .7 Provide each "shipping section" with a permanently-attached, readily-visible identification tag bearing the equipment number of the assembly of which it is a part.

2.2 Storage

- .1 Store generator and enclosure in a dry, clean location and cover with polyethylene plastic to preserve factory finish.

2.3 Provisions for Handling and Field Erection

- .1 For equipment that will require hoisting on site, provide removable side panels, lifting angles or lifting plates to accommodate the use of slings or crane hooks, for each shipping section.
- .2 For floor mounted equipment, provide on each shipping section, removable steel channel base plates to permit use of pipe rollers or dollies without damaging the equipment.

3 PROGRESS PAYMENT PROCEDURE

3.1 Payment Terms

- .1 Supplier shall propose typical and reasonable payment terms with their submission. Engineering and shop drawing costs shall be identified for progressing the equipment prior to selection of the construction General Contractor (GC). Payment terms shall be assigned to the GC via the Construction Contract.

4 SUBMITTALS

4.1 Shop Drawings and Product Data

- .1 Submit shop drawings, manufacturers and product data and samples in accordance with the requirements of Specification sections of Division 01, this Part, and as further required in other specification Sections of Division 26.
- .2 Submit for each item of equipment.
- .3 Submit shop drawings in the same unit of measure as used on the drawings. Both metric and U.S. customary measures may be included.
- .4 Submit shop drawings by email to: shopdrawings@hhangus.com , except where a project document management web-service is used.
- .5 Include an H.H. Angus shop drawing cover sheet form prepared for this project, for each shop drawing submittal (refer to part "Attachment" for an example of this form):
 - .1 Provide the following information on each submission;
 - (a) Client/Architect name,
 - (b) Project Name,
 - (c) H.H. Angus project number,
 - (d) Date,
 - (e) Contractor name,
 - (f) Contractor reference No.,
 - (g) Manufacturer name,
 - (h) Product type,
 - (i) Specification section number,
 - (j) Contractor trade category: architectural, structural, conveying equipment, user equipment, mechanical, electrical, telecommunications, civil or other.
 - (k) If a re-submission, the Consultant's previous submittal reference number.

- .6 Submit shop drawings in PDF format except as follows;
 - .1 if the Consultant agrees to a shop drawing to be submitted in hardcopy format, submit in 11 x 17, black and white originals of graphic quality suitable for photocopying and digital scanning. Allow one additional week for processing of shop drawings submitted in hardcopy format.
- .7 Manufacturers' printed product data sheets for standard items are acceptable in place of shop drawings provided that physical characteristics are identified and are related to specification references.
- .8 Submit manufacturers' data sheets with typed schedules listing manufacturers' and suppliers' name and catalogue model numbers for such items as fire alarm system components, etc.
- .9 For luminaires, submit bound sets of luminaire fixture sheets with manufacturers' names and catalogue numbers for all luminaires to be used on the project. Identify and arrange the luminaire fixture sheets and catalogue numbers in the same sequence as the Specification Luminaire List.
- .10 Shop drawings and/or product data sheets to show;
 - .1 CSA or equivalent approval,
 - .2 dimensioned outlines of equipment and construction details,
 - .3 equipment weights and center of gravity,
 - .4 performance ratings,
 - .5 dimensioned details showing service connection points,
 - .6 general routing of bus ducts and connecting services,
 - .7 mounting and fixing arrangements,
 - .8 operating and maintenance clearances,
 - .9 access door swing spaces,
- .11 Where applicable, include;
 - .1 wiring, single line and schematic diagrams,
 - .2 diagrams showing interconnection with work of other Sections,
 - .3 elevations illustrating locations of visible equipment such as pilot lights, breakers and their trip settings, windows, meters, and access doors,
 - .4 component assemblies,
 - .5 trip settings,
 - .6 description of operation.
- .12 Check and stamp each shop drawing as being correct before submission. Shop drawings without such stamps will be rejected and returned.
- .13 Keep one copy of each reviewed shop drawing and product data sheet on site and have them available for reference purposes.
- .14 Produce a final shop drawing incorporating all changes for record purposes – and for incorporation into the Construction Contract for the Contractor's reference.
- .15 Where equipment is delivered without reviewed shop drawings, equipment will be condemned and is to be removed from site and replaced with new equipment after shop drawings have been submitted and reviewed.

4.2 Effect of Consultants Review of Submittals

- .1 Consultant's review of shop drawings is performed on a sampling basis only, to confirm to Consultant's satisfaction that the Supplier understands the Work to be performed and is interpreting the design documents correctly, and such reviews are performed for the benefit of the Owner.

- .2 For greater certainty, the review of shop drawings by Consultant does not constitute a quality control function for the benefit of Supplier, nor does such a review relieve Supplier of their responsibility for complying with the Contract documents.

5 APPLICABLE CODES AND STANDARDS; PERMITS

5.1 Codes, Standards and Regulations

- .1 Where a published product standard or installation code is adopted by statute or regulation by an applicable AHJ, the applicable edition of the standard or code is the one that has been adopted
 - .1 at the time of obtaining a permit for the applicable portion of the Work, or
 - .2 in the absence of a requirement for a permit, the start date of construction.
- .2 Where a published product standard or installation code is not adopted by statute or regulation, then the most current edition of that standard or code at the start date of construction applies.
- .3 Install electrical systems in accordance with the electrical safety code adopted by the AHJ responsible for electrical safety at the location of the Work.
- .4 Install underground systems in accordance with the latest edition of CSA C22.3 No.7 *Underground Systems* except where specified otherwise.
- .5 Comply with CSA Certification Standards and safety bulletins issued by the AHJ for electrical safety applicable to the place of the Work
- .6 Where requirements of this specification exceed those of the above mentioned codes, standards, bulletins, this specification is to govern.
- .7 In the event of a conflict between codes, bulletins, regulations, or standards, or where work shown is in conflict with these documents, obtain interpretation before proceeding. Failure to clarify any ambiguity will result in an interpretation requiring the application of the most demanding requirements.

5.2 Permits, Fees and Inspections

- .1 Where required by legislation at the place of the Work, submit to the AHJ for electrical safety the necessary number of drawings and specifications for examination and approval prior to commencement of work.
- .2 Arrange and pay for permits, tests, and Certificates of Inspection required by the AHJ for electrical safety.
- .3 Consultant will provide drawings and specifications required by the AHJ for electrical safety at no cost.
- .4 Notify Consultant of changes required by the AHJ for electrical safety prior to making changes.
- .5 Furnish to Consultant, Certificates of Acceptance from the AHJ for electrical safety upon completion of the Work.

6 COMMON PRODUCT REQUIREMENTS

6.1 Standard of Material and Equipment

- .1 Provide materials and equipment in accordance with This Division.
- .2 Materials and equipment:
 - .1 new and of uniform pattern throughout the Work,
 - .2 of Canadian manufacture where obtainable,
 - .3 standard products of approved manufacture,

- .4 labelled or listed (certified) to applicable standards in accordance with specification sections of the Work and as required by the AHJ for electrical safety; where there is no alternative to supplying equipment which is not certified, obtain special approval from the AHJ for electrical safety.
- .5 in compliance with Standards and Regulations with respect to;
 - (a) chemical and physical properties of materials,
 - (b) design,
 - (c) performance characteristics, and
 - (d) methods of construction and installation,
- .6 identical units of equipment to be of same manufacture within any unit of equipment,
- .7 identical component parts to be of same manufacture, but various component parts comprising the unit need not be from one manufacturer.
- .3 Materials and equipment are described to establish standards of construction and workmanship. Where manufacturers and/or products are listed under "Standard of Acceptance", select manufacturers and or products from these lists. Use of manufacturers or products other than as listed are subject to specification requirements concerning requests for substitution.
- .4 Include items of material and equipment not specifically noted on Drawings or mentioned in Specifications but which are required to make a complete and operating system.
- .5 Confirm capacity or ratings of equipment being provided, when based on ratings of equipment being provided under other trade Sections, before such items are purchased.
- .6 Provide equipment marked for use with 75°C wiring or with a higher temperature rating. If equipment is not marked with a temperature rating or if the only rating available is less than 75°C, increase the associated conductor sizes accordingly, to the satisfaction of the consultant.
- .7 Factory fabricate control panels and component assemblies are to be listed for electrical safety requirements.
- .8 Select materials and equipment in accordance with manufacturer's recommendations and these Specifications, and install in accordance with manufacturer's instructions and these Specifications,
- .9 Materials and equipment not satisfying these selection criteria will be condemned. Remove condemned materials from job site and provide properly selected and approved materials.

6.2 Voltage Ratings

- .1 Operating voltages: to latest edition of CAN3-C235.
- .2 Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard. Equipment to operate in extreme operating conditions established in above standard without damage to equipment.

6.3 Manufacturers Nameplates

- .1 Provide manufactured equipment with metal nameplate with raised or recessed lettering, mounted on each piece of equipment.
- .2 Manufacturer's nameplate to indicate equipment size, capacity, model designation, manufacturer's name, serial number, voltage, cycle, phase and power rating, and approval listings.
- .3 Certified products are to clearly show the mark of the certification agency when in the final installed state.

6.4 Finishes

- .1 Equipment to be factory primed or finished.

- .2 Shop finish metal enclosure surfaces by application of rust resistant primer inside and outside, and at least two coats of finish enamel.
- .3 Touch-up factory painted prime and/or final coats damaged during construction, with colour matching paint recommended by the equipment manufacturer.
- .4 Leave a quart can or a pressurized spray can of paint, as used with switchboards, with Owner for touch-up purposes.
- .5 Clean and prime exposed non-galvanized hangers, racks and fastenings to prevent rusting.

6.5 Provision for Future

- .1 Where space is indicated as reserved for future equipment or for future extension to building, leave such space clear and install piping, raceways and equipment so that connections can be made to future apparatus or building.
- .2 Identify provisions and service terminations for future on Record Drawings.

6.6 Pre-purchased Equipment; Damage and Ownership

- .1 At time of receipt of pre-purchased or pre-tendered equipment at the job site by the installing electrical contractor, provide the services of the manufacturer/distributor/supplier's technical representative to:
 - .1 inspect the equipment prior to unloading,
 - .2 witness the unloading and advise the contractor on the appropriate method for handling the equipment in order to avoid damage during the unloading, moving and setting in place phase of the equipment, and
 - .3 report any damage to the Consultant.
- .2 In the event that the equipment or cable is found to be damaged before unloading it is to be returned immediately to the factory for repairs and/or replacement by the manufacturer/supplier.
- .3 In the event of damage occurring at any time during unloading and until the equipment is accepted by the Owner, the installing contractor is responsible for repairs and/or replacement of the damaged equipment to the satisfaction of the Owner.

7 OPERATING AND MAINTENANCE INSTRUCTIONS

7.1 Operating and Maintenance Data

- .1 Provide operating and maintenance manuals in accordance with Division 1 and as follows.
- .2 Provide operation and maintenance data bound in vinyl covered, hard back, three-ring covers, nominally 50 mm (2 in) thick, suitable for paper size of 210 mm x 300 mm (8½ in x 11 in)
 - .1 Organize material in volumes, generally grouped by Division Section;
 - (a) Table of Contents
 - (b) General Information
 - (c) Sub-contractors (list)
 - (d) Site services,
 - (e) Power,
 - (f) Lighting,
 - (g) Low Voltage Systems,
 - (h) Fire Alarm,
 - (i) Security,

- (j) Testing Reports,
 - (k) As-Built Drawings,
 - (l) Warranties.
- .2 Title sheet in each volume to be labeled "Operating and Maintenance Manual" and to bear;
 - (a) Project Name,
 - (b) Project Number,
 - (c) Date,
 - (d) Trade Section, and
 - (e) List of Contents.
- .3 Provide three hard-copies to Owner.
- .3 In addition, provide PDF files for each document, produced from original direct-to-digital file creations.
 - .1 Organize documents into separate PDF files for each Division Section identified above, and apply PDF Bookmarks to create a Table of Contents.
 - .2 Manuals will be rejected if Table of Contents and PDF Bookmark is not included.
- .4 Operating and maintenance data to include;
 - .1 details of design elements, construction features, component function and maintenance requirements, to permit effective start-up, operation, maintenance, repair, modification, extension and expansion of any portion or feature of installation,
 - .2 technical data, product data, supplemented by bulletins, component illustrations, exploded views, technical descriptions of items, and parts lists; advertising or sales literature not acceptable,
 - .3 wiring and schematic diagrams and performance curves,
 - .4 names and addresses of local suppliers for items included in maintenance manuals,
 - .5 reviewed shop drawings,
 - .6 operating characteristics of the equipment supplied such as calibration curves and coordination data to allow proper co-ordination with Owner's equipment,
 - .7 description of operation of the controls and protective devices used,
 - .8 maintenance and adjustment procedures,
 - .9 lifting and jacking instructions,
 - .10 fault locating guide,
 - .11 spare parts list and an itemized price list,
 - .12 name and telephone numbers of service organization and technical staff that will provide warranty service on the various items of equipment.
- .5 Approval procedure;
 - .1 submit one set of first draft of Operating and Maintenance Manuals for approval at least one month prior to planned substantial performance date,
 - .2 make corrections and resubmit for a final review,
 - .3 review contents of Operating and Maintenance Manuals with Owner's operating staff or representative to ensure thorough understanding of each item of equipment and its operation,
 - .4 hand-over two (2) copies and one (1) PDF copy on removable storage device of the Operating and Maintenance Manuals to the Owner's operating staff and obtain written confirmation of delivery. Provide a copy of the delivery record to the Consultant.

7.2 Operating and Maintenance Training

- .1 Provide operating and maintenance training in accordance with Division 1 and as follows.
- .2 Provide training to Owner's operations staff to thoroughly explain operation and maintenance of each system, incorporating specialized instruction by manufacturers as described under other Sections. Include classroom instruction and hands-on instruction, delivered by competent instructors.
- .3 Develop the proposed training plan, and submit an outline of the training program for review and adjustment by the Owner. Obtain approval from the Owner before commencing training.
- .4 Structure each session to start with the classroom instruction for the overall system, followed by hands-on instruction for each item of equipment, utilizing the services of the manufacturers' representative as required.
- .5 Organize and schedule each training session to deliver the required instruction in an efficient and effective manner on a schedule agreed upon with the Owner. Allow for two (2) training sessions for each training topic, separated by approximately one week each. Develop the proposed training plan and obtain approval from the Owner before commencing training.
- .6 All training to be scheduled and provided between the hours of 7 am to 5 pm, Monday to Friday. Where training is required to be performed outside of these hours due to availability of Owners operations personnel, if the trainers are paid for overtime outside of these hours, the overtime portion only is eligible to be paid by the Owner as an extra cost.
- .7 Complete the training as close to Substantial Performance as possible, so that the operations staff are prepared to operate the systems after Substantial Performance is certified.
- .8 Keep a record of date and duration of each instruction period together with names of persons attending. Submit signed records at completion of instruction.
- .9 For each training session, include the following topics;
 - .1 general purpose of the system (design intent),
 - .2 use of O & M manuals,
 - .3 review of single line drawings and control schematics,
 - .4 start-up, normal operation, shutdown, unoccupied operation, seasonal changeover, manual operation, control set-up and programming, troubleshooting and alarms,
 - .5 interaction with other systems,
 - .6 adjustments and optimizing methods for energy conservation,
 - .7 maintenance requirements,
 - .8 special maintenance and replacement sources,
 - .9 health and safety issues,
 - .10 occupancy interaction issues, and
 - .11 system response to different operating conditions.
- .10 Develop and provide training material, including printed documents and electronic presentation aids (e.g. MS PowerPoint) for each session. Submit three (3) copies of materials in both hardcopy and PDF format, in accordance with article on Operating and Maintenance Manuals.
- .11 Sessions may be videotaped by the Owner as an aid to ongoing training of Owner's staff.

8 CARE, OPERATION AND START-UP

- .1 Provide factory service technicians to supervise start-up of installation, check, adjust, balance and calibrate components and equipment as specified in the specification sections of Division 26.

- .2 Provide these services for such periods, and for as many visits as necessary to put equipment in operation, and ensure that operating personnel are conversant with every aspect of the operation, care and maintenance thereof.

9 COMMISSIONING

- .1 Participate in commissioning of equipment and systems in accordance with Section 26 08 16 Commissioning of Tendered Electrical Equipment.
- .2 Equipment supplied on this project will be subject to detailed factory inspection and/or on-site testing and commissioning prior to being placed in service. The Supplier will be required to participate in special commissioning meetings to review progress and status of the commissioning program.
- .3 The supplier is to include in the Bid amount the costs to accommodate and undertake factory and site testing.

10 TEMPORARY AND TRIAL USAGE

- .1 Temporary and trial usage by Owner of any electrical device, machinery, apparatus, equipment or any other work or materials before final completion and written acceptance, is not to be construed as evidence of acceptance by the Owner.
- .2 Owner to have the privilege of such temporary and trial usage, as soon as the Contractor claims that said work is completed and in accordance with specifications, for such reasonable length of time as is deemed to be sufficient for making a complete and thorough test of same.
- .3 No claims will be considered for damage to or failure of any parts of such work so used which may be discovered during temporary and trial usage, whether caused by weakness or inaccuracy of structural parts or by defective materials or workmanship of any kind whatsoever.
- .4 Defects in workmanship and materials identified during temporary and trial usage are to be rectified under warranty.

11 CORRECTION AFTER COMPLETION

11.1 General

- .1 At completion, submit a written warranty, undertaking to remedy defects in work for a period of one year from date of substantial performance of the Work. This warranty is not to supplant other warranties of longer period called for on certain equipment or materials.
- .2 Warranties are to encompass replacement of defective workmanship, parts, materials or equipment, and to include incidental fluids, gaskets, lubricants, supplies, and labour for removal and reinstallation of the corrected Work.
- .3 Submit similar warranties for one year from date of acceptance for any part of work accepted by Owner, before completion of the whole Work.

12 ATTACHEMENTS

12.1 Shop Drawing Submittal Form

- .1 Attached sample of shop drawings submittal form.



Toronto Montreal Vancouver Dallas Chicago

SHOP DRAWING SUBMITTAL

***Include this cover page with each shop drawing submission.
Submissions without this form will be returned without review.
Submit one submittal form per shop drawing; do not group under one submittal sheet***

Client/Architect: Click or tap here to enter text.

Project Name: Click or tap here to enter text.

HHA Project No: Click or tap here to enter text.

Contractor to complete the following for each submission.

Date:

Contractor Name:

Ref. No:

Manufacturer Name:

Product Type/Description:

Specification section number:

Contractor Trade Category:

- | | | | |
|--|-------------------------------------|--|---|
| ☐ Architectural | ☐ Structural | ☐ Conveying Equipment | ☐ User Equipment |
| ☐ Mechanical | ☐ Electrical | ☐ Telecommunications | ☐ Civil |
| ☐ Other | | | |

If this is a resubmission, check here:

☐

Previous submission HHA reference no.:

hhangus.com



END OF SECTION

Issued For
Equipment Pre-Tender 2

COMMISSIONING OF TENDERED ELECTRICAL EQUIPMENT 26 08 16

1 GENERAL

1.1 Scope

- .1 Commissioning of tendered equipment, as either supplied-by-owner or assigned equipment:
 - .1 Generator complete with exhaust silencer, fuel oil system and enclosure
- .2 In this specification, unless otherwise stated, all activities and actions are the responsibility of the Equipment Vendor.
- .3 Equipment Vendor shall include all labor and material as required to participate in the commissioning process for this purchased equipment.

1.2 Related Sections

- .1 Without limiting the scope of work or applicability of other specification sections, the work under this section directly integrates with or refers to the following specification sections:
 - .1 26 32 13 Power Generation Diesel

1.3 Definitions

- .1 The following definitions apply to this section.
 - .1 **Commissioning Agent** – means the person or organization responsible for the creation of the commissioning plan and for monitoring its execution.
 - .2 **Contractor** – means the general contractor or a construction manager who is under direct contract with the Owner for the execution of the work.
 - .3 **Equipment Vendor** - means the manufacturer of the equipment or their designated sales/service agency who are authorized by the manufacturer to perform start-up, testing, commissioning and related services on the manufacturer's equipment.
 - .4 **Major Deficiency** – means an item which if not corrected renders the equipment or system unsuitable or un-safe for use by the Owner. Major Deficiencies must be corrected as a condition for achieving Substantial Performance.
 - .5 **Minor Deficiency** – means an item which does not impact on the operation of the equipment or system and will allow the Owner to use the system safely. Minor Deficiencies may be corrected before or after Substantial Performance, but will not prevent certification of Substantial Performance of the Work.
 - .6 **Technical Specifications** – means the specification sections of Division 02 to 49 which form part of the equipment purchase tender documents.

1.4 Work Included

- .1 Equipment Vendor commissioning work includes but is not limited to:
 - .1 Factory Acceptance Testing of equipment as applicable where described under the equipment Technical Specifications.
 - .2 site start-up, testing and commissioning of equipment,
 - .3 detailed acceptance testing as described in the Owner's commissioning procedures, manufacturers standard test procedures, and in accordance with the requirements of the equipment Technical Specifications,
 - .4 coordination and cooperation with the Commissioning Agent and Contractor in developing and implementation of the commissioning plan,

- .5 providing qualified personnel for participation in implementing the applicable commissioning test procedures,
- .6 providing equipment, materials, and labor as necessary to correct equipment deficiencies found during the commissioning process,
- .7 providing operation and maintenance manuals in accordance with the Division 01 specifications and the Technical Specifications prior to turnover to Owner,
- .8 providing training and demonstrations for the equipment in accordance with the Division 01 specifications and the Technical Specifications prior to turnover to Owner,

2 PRODUCTS

2.1 Not Used

3 EXECUTION

3.1 General

- .1 The Commissioning Agent shall provide the commissioning procedures (checklists, etc.) for use by the Equipment Vendor. These commissioning procedures are considered a minimum requirement and supplement but do not replace the Equipment Vendor's or equipment manufacturer's standard test procedures and forms.
- .2 Execute the commissioning procedures including recording results, signing and dating the commissioning procedure test record and the Equipment Vendor's standard test forms.
- .3 Correct any deficiencies discovered during commissioning prior to sign-off of the commissioning test record.

3.2 Commissioning Schedule and Meetings

- .1 Participate in the development of the construction commissioning schedule for incorporation into the overall construction schedule, including providing expected durations and dates for factory testing, and durations for on-site testing and commissioning activities
- .2 Participate in commissioning team meetings when requested by the Contractor.
- .3 Coordinate specific timing of testing and commissioning activities with the Contractor to ensure availability of service representative(s) at the time when equipment is to be commissioned.

3.3 Test Equipment

- .1 Provide test equipment and personnel as required for the startup and testing of the equipment and assists in the commissioning process as needed.

3.4 Factory Acceptance Test

- .1 Where applicable, perform the Factory Acceptance Test in accordance with the technical specification.

3.5 Site Operating Verification Checks and Tests

- .1 Inspect and verify the installation of the equipment is in accordance with the equipment manufacturer's written instructions.
- .2 Inspect and verify the position of each device and interlock identified on the checklist.
- .3 For failed test items, provide appropriate comments to the checklist data sheet and classify whether it is a Major or Minor Deficiency. The Consultant shall review and make the final determination of all

noted deficiencies. Correct deficiencies classified as "Major" before acceptance of the verification stage; correction of Minor Deficiencies may occur before or after the verification testing stage.

3.6 Site Performance Validation Testing

- .1 Conduct performance tests and checks to validate that equipment and system components are providing the required performance, capacity, and control functionality for each equipment and system.
- .2 Adjust equipment as necessary to allow testing of each operating mode including:
 - .1 normal start up, operation, and shut-down,
 - .2 normal auto position,
 - .3 normal manual position,
 - .4 unoccupied cycle,
 - .5 emergency power operation, including transition states,
 - .6 status and alarm conditions.
- .3 Operate equipment in each mode of operation and validate operating functionality.

3.7 Deficiency Resolution

- .1 Any identified deficiencies will be reviewed by Consultant to determine if correction of the deficiency is as a result of a defect in the equipment or installation.
- .2 In the event that additional work is required to correct deficient performance under tested load conditions, assist the Contractor, Owner, Consultant and Commissioning Agent in developing an acceptable resolution to the problem.
- .3 If it is determined the performance deficiency is as a result of a defect in the equipment, Equipment Vendor shall rectify the deficiency and repeat the performance test until the required performance levels are achieved.
- .4 If it is determined the equipment has been manufactured in accordance with the contract documents, the Owner will decide whether to accept the performance as tested, or, direct the Equipment Vendor (through the Contractor) to make changes to the equipment as required to obtain performance levels which meet the design intent, and to then retest the equipment.
- .5 The Owner has final approval over any additional work required to achieve the required level of performance.
- .6 Complete corrective work in a timely fashion to permit the completion of the commissioning program.

3.8 Acceptance

- .1 Commissioning test acceptance criteria is defined in the applicable Technical Specifications except as otherwise stated in the commissioning procedures.
- .2 The final reports shall be reviewed by the Commissioning Agent and Consultant, to determine if verification is complete and the operating systems are functioning in accordance with the contract documents,
- .3 The Owner shall make the final acceptance of test results.

3.9 Additional Commissioning

- .1 Additional commissioning activities may be required after completion of system performance testing. Equipment Vendor shall include in the tender cost a reasonable reserve to complete this work, except where specifically stated otherwise in the Technical Specifications.

3.10 Training

- .1 Provide equipment training in accordance with Division 01 and the Technical Specifications.

END OF SECTION

POWER GENERATION DIESEL
26 32 13

1 GENERAL

1.1 General Requirements

- .1 Conform to Sections of Division 1 as applicable.
- .2 Conform to Section 26 01 01, Electrical General Requirements.

1.2 Work Included

- .1 Work to be done under this Section shall include furnishing of labour, materials, and equipment required for installation, testing and putting into proper operation complete systems as shown as specified and as otherwise required.
- .2 General Schedule of equipment to be provided:
 - .1 2000kW prime rated, 347/600 volt, 3 phase, 4 wire, meeting CSA C282-15 and CSA Z32-15 and additional requirements as noted herein. System shall comprise a fully automatic emergency generating plant capable of automatic starting, and producing rated power in the event of failure of normal supply.
 - .2 Engine generator control panels, with monitor alarm and control system.
 - .3 Starting battery and charger per diesel generator.
 - .4 Control battery and charger per diesel generator.
 - .5 Engine exhaust silencers and associated components.
 - .6 Generator output circuit breaker
- .3 The services to be provided by the supplier under this section shall include but shall not be limited to the following for a complete and satisfactory operating system.
 - .1 Shop drawings, fabrication and assembly as per "reviewed" shop drawings.
 - .2 Interface control wiring diagrams, schedules and wire running lists between all components supplied and to all external devices identified in the contract documents.
 - .3 Factory testing and supplementary witness testing. Witness testing procedure to be submitted as a shop drawing for review by the Engineer, Independent Testing Organization and Owner appointed Commissioning Agent.
 - .4 Delivery schedule and delivery DDP (Incoterms) – Kingston General Hospital – 76 Stuart St, Kingston, Ontario.
 - .5 Technical supervision of unloading, site assembly, installation of power and control cable connections, battery installation and connections, and all other work normal to the electrical trade.
 - .6 Commissioning, site testing including witness testing with temporary load banks. Witness testing procedure shall be submitted as a shop drawing for review by the Consultant. Rental cost of full capacity multi step load bank shall be included in Tender Price. Handling, installation, temporary wiring and removal shall be by the Contractor. Site testing procedure to be submitted as a shop drawing in accordance with the testing requirements of the contract documents and Owner appointed Commissioning Agents requirements. These shall be reviewed by the Engineer, Independent Testing Organization and Owner appointed Commissioning Agent.
 - .7 Providing technical staff and manuals for factory and field training of Owner's staff in the complete operation of the system.

- .8 Warranty service on a priority basis (within 4 hours).
 - .9 Data book including schematic diagrams of all circuit boards.
 - .10 Check out of system one month prior to expiry of warranty period.
 - .11 Services of a technical representative as required by the Owners to review production schedule, delivery dates, shop drawing changes, shop and field testing and training programs.
 - .12 Unloading, hoisting and setting into place, and work normal to the electrical, mechanical and millwright trades such as providing interface power and control wiring to terminals within the equipment components and installation of major components shall be done by the Installation Contractor.
 - .13 .
- .4 Include for the services of qualified factory trained technicians and service representatives to be on site for commissioning of systems and components and during the on-site "witness" testing program as long as necessary to make final adjustment for acceptance of the system.
 - .5 Include for the services of qualified factory trained technicians and service representatives to conduct training of the facility operating staff in the operation and maintenance of the overall emergency power system. Should equipment fail during a training session, conduct a repeat session.
 - .6 All on-site testing/commissioning, and site work requiring interruptions to Owner's existing systems, shall be performed at Owner approved times. Assume premium time, between the hours of 23:00 to 06:00 or on weekends exclusive of Owner imposed embargo dates. A list of presently known Owner embargo dates can be made available upon written request during the tender period.
 - .7 Complete systems shall be left ready for continuous and efficient satisfactory operation.

1.3 Warrantee

- .1 All equipment furnished under this contract shall be guaranteed by the Supplier for a period of 2 year following final site acceptance against:
 - .1 Faulty or inadequate design, manufacture or operation. improper assembly.
 - .2 Defective material or workmanship, or both.
 - .3 Leakage, breakage or other failure that might occur under normal and proper operation of the equipment.
- .2 The complete emergency power system, including all accessories specified herein, shall be guaranteed against faulty and improper material and workmanship for a period of two (2) years from the date of final acceptance by the owner. All system parts and component assemblies shall be guaranteed for two (2) years after acceptance.
- .3 The manufacturer shall correct any deficiencies in his equipment which occur during the two (2) year warranty period at no additional cost to the Owner. This shall include all costs for material and labour. The manufacturers technical representative shall be available on site on a priority basis i.e., within four (4) hours of being notified of a deficiency to repair the system.
- .4 Prior to the expiry of the warranty period, i.e. during the last month of the period, provide technical staff on a weekend to conduct an in depth checkout of the total emergency power system. Replace any components which have become degraded to the point where their long term performance is questionable. The cost of this service shall be included in the bid price.

- .5 Cost for service calls made necessary to maintain the total emergency power system in optimal operating conditions during the two year warranty period shall be included in the bid price.

1.4 References

- .1 Diesel-generator performance and accessories shall conform to latest CAN/CSA Standard C282.

1.5 Shop Drawings and Product Data

- .1 Submit shop drawings and product data
- .2 Submit the following information, contained in a binder, for approval indicating make, model, type, dimensions, ratings, etc...:
 - .1 list of components
 - .2 engine
 - .3 alternator
 - .4 voltage regulator
 - .5 governor
 - .6 battery charger
 - .7 battery
 - .8 best battery selector units
 - .9 cooling system
 - .10 engine and generator mounting, including vibration isolators
 - .11 silencer
 - .12 location of fuel and lube oil filters
 - .13 lube oil and coolant drain valves
 - .14 air cleaners
 - .15 engine instrument panel
 - .16 main control panel
 - .17 starting motor
 - .18 block heaters
 - .19 spares storage cabinets
 - .20 radiator sizing calculations
 - .21 power and control junction boxes
 - .22 weights of all components
 - .23 dimensioned outline of unit
 - .24 confirmation of Diesel exhaust pipe diameter
 - .25 brake horsepower versus rated speed curves
 - .26 diesel fuel consumption and cooling water data
 - .27 performance curves for local conditions and multipliers for ambient temperatures
 - .28 generator decrement curves against generator breaker in switchgear
 - .29 efficiency of generator

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- .30 confirmation of diesel exhaust back pressure and water coolant requirements.
 - .31 flow diagrams for fuel, lubricating oil, and cooling systems
 - .32 engine and generator control wiring diagrams
 - .33 muffler/silencer including back pressure calculations
- .3 Submit decrement and generator damage curves to show fault current sustaining ability of generator as outlined.
- .4 Submit description of set operation including
- .1 automatic starting and transfer to load and back to normal power, including time in seconds from start of cranking until unit reaches rated voltage and frequency.
 - .2 manual starting
 - .3 manual emergency stop
 - .4 interfaces with external connections including, but not limited to, intake air dampers, exhaust dampers, combustion dampers, fuel systems, building automation system, DC starting battery systems, Generator Switchboard and Automatic Transfer Switchboard.
- .5 submit description of automatic shutdown and alarms on
- .1 over cranking
 - .2 over speed
 - .3 high engine temperature
 - .4 low lube oil pressure
 - .5 short circuit
 - .6 alternator over voltage
 - .7 lube oil high temperature
 - .8 thermistor over temperature on alternator
- .6 Physical Construction Drawings, completely dimensioned, showing:
- .1 Arrangement.
 - .2 Plan, front view, and elevation views.
 - .3 Required clearances for opening doors and for removing breakers.
 - .4 Conduit or cable trays entrance locations and dimensions for both top and bottom entrance.
 - .5 Bus bar locations and configurations.
 - .6 Incoming and outgoing power cable terminator positions.
 - .7 Field wiring terminal block locations, and all other terminal block locations.
 - .8 Anchor bolt locations.
 - .9 Grounding connections.
 - .10 Weight of equipment.
- .7 Three line diagrams, with ANSI device function numbers used throughout, shall show all:
- .1 Instrument transformers.
 - .2 Relays.

- .3 Meters and meter switches.
- .4 Other pertinent devices.
- .8 Elementary Diagrams
 - .1 Elementary (schematic) wiring diagrams shall be furnished for the electrically-operated breaker control scheme.
 - .2 Each elementary diagram shall show all control devices and device contact, each of which shall be labelled with its proper ANSI device function number.
 - .3 Each elementary diagram shall show device and terminal block terminal numbers.
- .9 Control Switches
 - .1 Provide control switch development tables.
- .10 Detailed Connection (Wiring) Diagrams showing:
 - .1 Approximate physical location of all items in each unit.
 - .2 All wiring within each unit.
 - .3 All interconnecting wiring between units.
 - .4 Identification of all terminals, terminal blocks, and wires.
 - .5 Clear identification, by some distinguishing method, of all interface wiring to remote devices. This shall include, but not be limited to, leads from external current transformers, trip circuits from remote devices, auxiliary contacts to remote devices, AC control power, and separate incoming AC power. This shall also include spare auxiliary contacts and relay contacts which shall be wired to terminal blocks for future use.

1.6 Operation and Maintenance Data

- .1 Provide operation and maintenance data for diesel generator for incorporation into Operation and Maintenance Manual.
- .2 Include in Operation and Maintenance Manual instructions for particular unit supplied and not general description of units manufactured by supplier. Include all nameplate/sizing information.
- .3 Operating manual shall include fully detailed software program, documentation including descriptive sequence of operations and referenced to accompanying ladder logic diagrams. This material shall be used in training Owner's staff in the system operation, maintenance and diagnostics. Include the cost of the services of a technical representative for instructing the commissioning team in the system operation.
- .4 Five (5) complete sets of operation and maintenance manuals shall be provided for the system. Turn over one set to the Engineer. These manuals shall be applicable to the engine, generator, battery and charger, control panel including the circuit breakers, controls instrumentation and all other components of the assembly. The manuals shall include circuit and wiring diagrams, safety precautions, operating and maintenance instructions, including drawings, illustrations and identification of wiring. Coordinate breaker details and information with switchgear manufacturer.
- .5 Operation and maintenance instructions for engine and accessories, alternator and accessories, control panel, battery charger, battery, fuel system, engine room ventilation system, exhaust system and accessories, to permit effective operation, maintenance and repair.
- .6 Illustrated parts lists with parts catalogue numbers.

- .7 As Built schematic diagrams of electrical power, control, and logic circuits.
- .8 Flow diagrams for:
 - .1 Fuel system.
 - .2 Lubricating oil.
 - .3 Cooling system.
- .9 Certified copy of factory test results.
- .10 Maintenance and overhaul instructions and schedules.
- .11 Precise details for adjustment and setting of time delay relays or sensing controls which require on site adjustment.

1.7 Maintenance Materials

- .1 Provide maintenance materials. Include:
 - .1 2 sets of fuel filter replacement elements.
 - .2 2 sets of lube oil filter replacement elements.
 - .3 2 sets of air cleaner filter elements.
 - .4 2 sets of fuses for control panel.
- .2 Provide one complete set of all special tools required for unit servicing.
- .3 Provide one battery service safety kit including:
 - .1 Full face shield
 - .2 Acid resistant gloves
 - .3 Acid resistant apron
 - .4 Acid neutralizing compound
 - .5 Eye wash bottle
 - .6 Battery top up bottle
 - .7 Acid resistant wall mount rack to support the above
 - .8 Hydrometer with wall mount bracket and acid resistant drip cup
 - .9 10 Litres of distilled water.
- .4 Provide one heavy duty free standing spares storage cabinet of painted steel construction, approximately 40" wide by 18" deep, with not less than six heavy duty adjustable shelves each capable of supporting 175 kg. and with two hinged lockable doors. Cabinet to house the maintenance materials, special tools, Operation and Maintenance Manual plus a log book.

1.8 Training program

- .1 Include in the services of a qualified technical representative at the factory and at the site to conduct "hands-on" training programs for the Owner's staff.
- .2 The amount of time to be included in the tender is three (3) days at the site for a total of 24 hours.

- .3 The training shall include identification of components and diagnostic alarms as well as basic inspection, housekeeping and logging procedures.
- .4 Submit an outline of the training program for review, adjustment and approval by the engineer. Training will occur in three (3) separate one (1) day sessions, at a time convenient to the Owner, over the construction and warranty period.
- .5 Sessions may be videotaped by the Owner or Contractor as an aid to ongoing training of Owners staff.

1.9 Provisions For Handling And Field Erection

- .1 Each shipping split of stationary structures shall be furnished with removable lifting angles and/or plates suitable for crane hooks or slings.
- .2 Each shipping split shall also be furnished with removable steel channel base plates which will permit using pipe rollers or dollies without damaging the frame steel of the equipment.

1.10 Preparation For Shipment

- .1 Preparation for Shipment shall be in accordance with manufacturer's standards, unless otherwise noted.
- .2 The manufacturer shall be solely responsible for the adequacy of the Preparation for Shipment provision employed in respect of materials and application, to provide materials and their destination in ex-works condition when handled by commercial carrier systems.

1.11 Shipping

- .1 The engine generator set assembly shall be capable of withstanding normal shipping and handling shocks and vibration without damage or deterioration.
- .2 If shipped separately, any components shall be individually crated and tagged with its proper unit number and the equipment number of the assembly to which it belongs.
- .3 Each "shipping section" shall be provided with a permanently-attached, readily-visible identification tag bearing the equipment number of the assembly of which it is a part.
- .4 Cost associated with transportation, insurance and road permits for delivery of equipment to job site shall be included in the bid price.

1.12 Installation

- .1 Installation of the diesel generator equipment shall be in full accordance with, and under the technical supervision of the supplier. Provide drawings showing general arrangement of all components including batteries, interconnecting wiring drawings and schedules suitable for use by the successful contractor.
- .2 Equipment shall be arranged or crated with features which make it easy for hoisting, rolling and jacking into place without damage to the equipment.
- .3 Include in the bid, the cost of a factory engineer or technician to supervise the site assembly and to commission, test, and certify the installation on site.

1.13 Submittals with Bid

- .1 The following drawings and information are to be submitted with the bidders tender:
 - .1 Location of nearest local office staffed with regularly employed engineers and/or technicians who have been factory trained in the installation and service of the proposed equipment.
 - .2 Number of Professional Engineers on staff, licensed in the Province of Ontario.
 - .3 Name and location of factory trained engineers and technicians in regular employment with the system supplier qualified to service the proposed equipment, and their areas of expertise.
 - .4 Resumes for key project personnel and the project manager assigned to the project, and their areas of expertise. Include information on key personnel from sub-suppliers (paralleling and synchronization controls and switchgear).
 - .5 A list of similar installations in Canada (high voltage diesel generators and switchgear, critical facilities (data centers etc.)).
 - .6 Typical response time for a qualified factory trained service engineer or technician to be on site following an "emergency" service call.
 - .7 A document of compliance indicating compliance with each article of the specification, where compliance is not possible the article shall be noted and an explanation given, the document of compliance shall be signed by an officer of the company supplying the system.
 - .8 Failure to provide the above information will result, at the discretion of the engineer and Owner, in the rejection of the RFP submission.
- .2 Submit the following information, contained in a binder, for approval indicating make, model, type, dimensions, ratings, etc...:
 - .1 engine
 - .2 alternator
 - .3 voltage regulator
 - .4 governor
 - .5 control panel
 - .6 weights of all components
 - .7 Dimensioned outline of unit
 - .8 Confirmation of Diesel exhaust pipe diameter
 - .9 Brake horsepower versus rated speed curves
 - .10 Diesel fuel consumption and cooling water data
 - .11 Performance curves for local conditions and multipliers for ambient temperatures
 - .12 List of components
 - .13 Confirmation of diesel exhaust back pressure and water coolant requirements.
 - .14 Confirmation of transient frequency and voltage performance under specified step load conditions, including 0-100%, 0-50%, 25 - 75%, and 50-100% load steps.
- .3 Preliminary Physical Construction Drawings, completely dimensioned, showing:
 - .1 Arrangement.
 - .2 Plan, front view, and elevation views.

1.14 Source Quality Control

- .1 Factory test each generator set including engine, alternator, control panels, and accessories in presence of Engineer and Independent Testing Agent.
- .2 Notify Engineer ten (10) working days in advance of date of factory test.
- .3 Prepare blank forms and check sheet with spaces to record data. At top of first sheet record:
 - .1 Date
 - .2 Generator set serial no.
 - .3 Engine, make, model, serial no.
 - .4 Alternator, make, model, serial no.
 - .5 Voltage regulator, make and model.
 - .6 Rating of generator set, kW, kVA, V, A, r/min, Hz.
- .4 Mark check sheet and record data on forms in duplicate as test proceeds.
- .5 Demonstration of automatic start system
- .6 With 100% rated full load, operate set for 4 h, taking readings at 30 min intervals, and record following:
 - .1 Time of reading.
 - .2 Running time.
 - .3 Ambient temp in °C.
 - .4 Fuel consumption
 - .5 Lube oil pressure in kPa.
 - .6 Lube oil temp in °C.
 - .7 Engine coolant temp in °C.
 - .8 Exhaust stack temp in °C.
 - .9 Alternator voltage:
 - .10 Alternator current:
 - .11 Power in kW.
 - .12 Frequency in Hz.
 - .13 Power Factor.
 - .14 Battery charger current in A.
 - .15 Alternator cooling air outlet temp.
- .7 After completion of 4 h run, demonstrate following features, shut down devices and alarms: Demonstrate low oil pressure and high engine temperature shutdown devices operation without subjecting engine to these excesses.
 - .1 Cycle crank test
 - .2 Over cranking.
 - .3 Over speed.
 - .4 High engine temp.

- .5 Low lube oil pressure.
 - .6 [Deleted]
 - .7 Alternator over voltage.
 - .8 Low battery voltage, or no battery charge.
 - .9 Manual remote emergency stop.
 - .10 High alternator temperature.
 - .11 All other safety features
- .8 Next install continuous electronic power quality meter with sufficient storage capacity and of sufficient sampling rate to record frequency and voltage variations during load switching procedures. Each load change delayed until steady state conditions exist. Switching increments to include:
- .1 No load to full load to no load.
 - .2 No load to 75% load to no load.
 - .3 No load to 50% load to no load.
 - .4 25% load to 100% load to 25%.
 - .5 50% load to 100% load to 50%.
- .9 [Deleted]
- .10 Demonstrate
- .1 Automatic starting of set on failure of normal power.
 - .2 Operation of manual control switch.
 - .3 That battery charger reverts to high rate charge after cranking.

1.15 Temporary and Trial Usage

- .1 Temporary and trial usage by Owner of equipment or any other work or materials supplied before final completion and written acceptance shall not be construed as evidence of acceptance by Engineer.
- .2 Owner shall have the privilege of such temporary and trial usage, as soon as supplier shall claim that said work is completed and in accordance with specifications, for such reasonable length of time as is deemed to be sufficient for making a complete and thorough test of same.
- .3 Claims for damage shall not be made by supplier for the injury to or breaking of any parts of such work which may be used, whether caused by weakness or inaccuracy of structural parts or by defective materials or workmanship of any kind whatsoever.

1.16 Final Acceptance

- .1 Request for acceptance shall be submitted in writing. Written request shall not be submitted until:
 - .1 Deficiencies noted during job inspections have been completed.
 - .2 Systems have been pre-commissioned and tested and are ready for on-line operation.
 - .3 Completed data books have been submitted and approved.
 - .4 Diagrams have been submitted and approved, and equipment identification is completed.

- .5 The cleaning up is finished in every respect.
- .6 Spare parts and replacement parts specified have been provided and receipt of same acknowledged.
- .7 Record drawings are completed and approved.
- .8 Owner's operating personnel have been instructed in operation of systems.

2 PRODUCTS

2.1 Nominal Size and Rating

- .1 Unit shall meet the requirements of CAN/CSA Standard C282 for the supply of emergency power and have a minimum nameplate prime power rating of 2000 kW at 40°C ambient. 2000kW standby generator is acceptable if the generator is capable of delivery full load for a minimum of 500 hours of operation per year per CAN/CSA Standard C282 requirements.
- .2 The unit shall accommodate identified power transformer in-rush currents, motor starting, 100% step loads without stalling, fault current duties and exhaust stack back pressure limitations all within the tolerances specified herein.
- .3 The unit shall be sized and set to provide 100% load in a 40°C ambient without exceeding the limits specified herein.
- .4 The engine provided shall have additional BHP capacity for power requirements to drive engine driven components and accessories such as: radiator fan, fuel pump, water pump, as well as additional BHP allowances for power transformer in-rush currents, motor starting duties, step loading changes, stack back pressure levels at 40°C ambient, all within CSA specified tolerances for voltage, frequency and temperature, and the tolerances specified herein.
- .5 The engine manufacturer's catalogued BHP curves for Standby Rating shall be based on continuous duty conforming to or exceeding the following standards:
 - .1 SAE J816b (US)
 - .2 BS5514 (British)
 - .3 DIN "B" 6270 (European)
 - .4 ISO 3046/1

2.2 Performance Characteristics

- .1 The equipment shall be suitable for operation and providing full output power as per the manufacturers guaranteed performance profile under the following conditions:
 - .1 Altitude 100 meters above sea level
 - .2 Outside ambient -40°C to 35°C nominal
 - .3 Room ambient 10°C to 40°C nominal
 - .4 The engine and generator units shall be capable of being synchronized and operated in parallel under all load conditions within the total capacity of the units.
- .2 Frequency Control - Governor control on each unit shall maintain output frequency within the following limits:

- .1 Frequency drift - with any constant load between no load and rated load, the change in regulated frequency shall be +/- 0.25% from rated.
- .2 Steady-state - frequency control shall be within +/- 0.25% from rated when the load is varied from no load to rated load and all transients have decayed.
- .3 Frequency variations during steady-state conditions shall show a random nature (as opposed to cyclic variations).
- .3 Voltage Regulation - voltage control of generator output shall be within the following limits:
 - .1 Voltage drift - with any constant load between no load and rated kVA, the change in regulated output voltage shall not exceed +/- 0.5% within one-half hour and a constant ambient temperature.
 - .2 Steady-state voltage regulation - voltage regulation shall be +/- 1% of rated voltage when the load is varied from no load to rated kVA and all transients have decayed.
- .4 Transient voltage and frequency deviation and recovery time upon addition and deletion of a 100% step load shall not exceed
 - .1 25% voltage deviation
 - .2 10% frequency deviation
 - .3 5 second recovery time to reach normal stability requirements
 - .4 Addition of a 100% step load shall not cause the engine to stall.
 - .5 Removal of a 100% step load shall not cause the engine to shutdown.

2.3 Diesel Engine

- .1 Engine shall be a four stroke, single acting, full compression ignition type with a maximum crankshaft speed of 1800 rpm.
- .2 Engine shall be a low emissions type certified to meet the requirements of the U.S. Environmental Protection Agency Tier 2 limits for a stationary emergency application
- .3 Engine shall operate on commercial grades of diesel fuel oil readily available locally and shall give satisfactory performance on No. 2 Grade domestic fuel oil in an emergency.
- .4 A special operating condition is that the set be capable of operating at light loads for an extended period of time as normal power failure may occur when only part of the full output of the generator set is required.
- .5 Engine shall incorporate dry vortex type air cleaners equipped with service indicators, of replaceable element type, with an efficiency of at least 99.8%. Service indicators are not to be mounted in rubber hose.
- .6 Diesel engine shall be suitable for a stack back pressure of 6.70 kPa.
- .7 Flex connection at engine exhaust complete with gaskets, nuts, bolts and miscellaneous hardware.
- .8 All moving parts such as flywheels, pulleys, belts, etc., shall be enclosed with suitable guards to protect the engine operator from accidental injury. All guards shall be easily removable for servicing the equipment.

- .9 Engine shall be complete with inter-changeable cylinder heads, exhaust valves constructed of special alloy steel, and satellite faced exhaust valve inserts.
- .10 Provide with the engine a flexible 100mm diameter hose of proper diameter and sufficient length to reach from the engine crankcase vent connection to the atmosphere side of the radiator exhaust plenum, for venting of crankcase fumes to atmosphere.
- .11 Provide a crankcase emissions absorption system with a flexible 4" diameter hose of sufficient length to reach from the system to the atmosphere side of the radiator exhaust plenum, for venting of crankcase fumes to atmosphere. System to be Nelson-Winslow or equal.
- .12 Engine shall be equipped with 24 volt D.C. electric starting motors, and the starting pinion shall be arranged to disengage automatically when the engine starts.
- .13 Engine shall also be equipped with individual safety devices to shut-down the engine and to sound an alarm in the event of conditions specified later in this Section, and equipped with contacts to pre-alarm for conditions specified later in this Section.
- .14 Each engine flywheel housing shall be connected rigidly to the generator housing with an SAE adaptor. Each unit shall be mounted on a common, heavy duty, stress relieved, fabricated steel baseplate. Torsional approval of each entire assembly must be obtained and submitted in duplicate to the Consultant for review. Each report shall also outline the critical speeds of the assembly.
- .15 Removable guards shall be provided around all moving parts and high temperature areas to protect operating personnel.

2.4 Governor

- .1 Governor to be manufacturer's current OEM electronic high performance standard system for load sharing and speed control of the units. Governor package to be complete with magnetic pickup and synchronizing and load control modules.
- .2 The governor control system to include filtering of harmonics to provide true RMS electrical inputs to the speed control system.
- .3 Governor shall be capable of isochronous operation, no load to full load and capable, under any steady state condition, of maintaining engine speed within $\pm 0.25\%$.
- .4 The governor shall operate in an isochronous and shall provide load sharing functions when in parallel with similar units in isochronous.
- .5 Input voltage and current signals shall be fed into the governor from current and potential transformers supplied with the governor and installed in the switchboard as supplied as part of this Contract.
- .6 The governor shall be capable of the following performance:
 - .1 Operating the engine isochronously under steady state conditions from no load to full load.
 - .2 Transient regulation response as specified.
 - .3 Frequency drift as specified.
 - .4 Steady state speed regulation as specified.
 - .5 The governor control system shall include filtering of harmonics to provide true RMS electrical inputs to the speed control system.

- .6 Parallel operation so the sets operate isochronously.
- .7 Load sharing so that each engine generator set assumes an equal percentage of the total load while maintaining specified steady-state speed regulation.
- .8 Adjustable load sharing so that each engine can be selected to assume more or less load, up to 100% (for annual load testing purposes).

2.5 Engine Cooling System

- .1 Engine cooling system shall include built-in centrifugal type water circulating pump and thermostat to maintain proper jacket water temperature under each load condition.
- .2 Cooling system components and seals with flexible water hose connections.
- .3 Engine shall be cooled by an integral radiator and blower fan cooling system including permanent anti-freeze to -40°C as recommended by engine manufacturer.
- .4 Radiator fan to be sized to provide radiator design air flow rates at minimum static pressure of 1.0" WC (generator external air flow resistance) plus air flow resistance by generator radiator and air flow resistance by any other generator components.
- .5 Radiator shall have sufficient capacity for cooling the engine under full load conditions in an ambient temperature up to 40°C. Include for sizing to accommodate static pressure loss through louvers, silencers and dampers. Manufacturer shall verify this pressure drop and oversize as required to deliver full rated load under 40°C ambient temperature. At a minimum, unit shall be designed for 0.75" external static pressure drop. Division 20 contractor to supply flexible duct adapter, manufacturer shall coordinate requirements with installation contractor.
- .6 Radiator to be equipped with a coolant liquid level indicator.
- .7 Fan shall be pusher type, with ample means for adjustment to allow for belt stretching and shall be enclosed in an easily removable cage.
- .8 Engine shall be complete with thermostatically controlled engine coolant pre-heater, Kim Hotstart to maintain coolant around combustion chamber of approximately 10°C. Heater shall be rated 208 Volts, 1 phase. Preheater water circuit to be equipped with position indicating ball type shut off valves to permit removal of heater without draining of coolant from the system. Include heavy duty thermostat equal to United Electric Model #120 complete with heavy duty engine mounted relay to shut off heater when engine is running.
- .9 Ball drain valves shall be provided for draining coolant from each engine block, radiator and jacket heater.

2.6 Engine Monitoring Panel

- .1 The following gauges shall be supplied and shall be flexibly mounted on engine:
 - .1 Coolant in and out temperature gauges
 - .2 Engine water temperature gauge
 - .3 Lube oil pressure gauge
 - .4 Lube oil temperature
 - .5 Tachometer

- .6 Run Hour meter
 - .7 Exhaust temperature thermometer
- .2 Panel shall be equipped with an integral shrouded emergency stop pushbutton

2.7 Lube Oil System

- .1 Engine shall be provided with full pressure lubrication with high capacity positive displacement type gear driven pumps, with adjustable pressure regulators, replaceable element filter with bypass valve arrangement, supplying filtered lubricating oil under pressure to main bearings, crank pin bearings, piston pins, timing gears, camshaft bearings, valve rocker mechanism, governor and turbocharger. Full pressure lubrication shall be provided to all main bearings, connecting rod bearings and camshaft bearings.
- .2 Readily accessible ball valves with suitable piping shall be provided for convenient draining of complete lubricating oil system.
- .3 An air-cooled lubricating oil cooler shall be included.
- .4 Engine shall be complete with thermostatically controlled oil sump heater, rated 120 volts, single phase, complete with heavy duty engine mounted relay to shut off heater when engine is running.

2.8 Fuel System

- .1 Engine mounted high performance fuel transfer pump with filter assembly.
- .2 Fuel filter shall have replaceable elements that can be easily removed without disturbing other parts of engine. Equip engine with primary and secondary fuel filters.
- .3 Auxiliary Tuthill gear driven high lift fuel transfer pump (approximately 6 metre lift not including filter and line restrictions), complete with primary and secondary filter assemblies and check valve, hand operated priming pump with bypass valve, and fuel pressure switch to provide engine shutdown.
- .4 Equip engine with a fuel to water or fuel to air heat exchanger type fuel cooler to dissipate all waste heat transferred from engine to recirculated fuel. Size fuel cooler to ensure fuel returned to the fuel storage tank from the engine is maintained at a temperature below 38°C with a room ambient air temperature of up to 40°C, with allowances made for temperature rise as the air is heated by the machine before it reaches the heat exchanger. Submit calculations as a shop drawing.
- .5 Equip engine with a ULC listed fuel filter/water separator. Racor Fuel Filter/Water Separator, Model 79/1000 FG. Include a control panel mounted #18-1551 vacuum pressure gauge connected between engine and filter.
- .6 Provide braided stainless steel aircraft quality flexible fuel oil connections, supply and return, from engine to filters, between filter components, and from filters to valved connections left by Division 20. Flexible fuel lines shall be supplied by Diesel manufacturer and shall comply with the requirements of the Authority Having Jurisdiction and shall be ULC listed.

Standard of Acceptance

- Aeroquip
- OPW
- OEM

2.9 Generator

- .1 Three phase brushless, self-ventilating, revolving field synchronous machine of salient pole construction with amortisseur windings with permanent magnet pilot exciter, IP23 drip-proof construction, single bearing type connected to the engine through a flexible coupling with shear bolts.
- .2 Diesel-driven alternator shall be complete with necessary controls and accessories, to comprise a fully automatic standby generating plant capable of producing power in event of failure of normal supply. Generator shall be capable of operating on system voltage shown, 80% power factor and maximum 1800 rpm.
- .3 Generator enclosure shall be CSA Type 2 Drip-proof as per CSA C22.2 No. 100-M 1982 modified with air inlet and outlet louvres arranged in such a way as to prevent the sprinkler liquid from entering the equipment and/or interfering with its operation as per Electrical Safety Code Rule 26-008, equal to IP23 housing.
- .4 Generator shall include fully connected damper windings and stator windings shall be 2/3 pitch to provide low reactance at the 5th and 7th harmonics for three phase non-linear loads. Total harmonic distortion shall not exceed 4% on a 3 phase balanced harmonic free load. Telephone interference factor for harmonic content shall not exceed 50.
- .5 Generator insulation shall be Class H. When operating continuously at full load the average winding temperature in °C measured by rise of resistance method shall not exceed 130°C at an ambient of 40°C.
- .6 Generator shall be of rotating field type with permanent magnet pilot exciter and shall be capable of maintaining at an ambient of 40°C the following: 100% of full load continuously; 110% of full load for 1 hour; 150% of full load for 1 minute; and 300% of full load for 10 seconds, at terminals of generator, without damage to generator, for the following fault conditions:
 - .1 3 phase symmetrical fault,
 - .2 phase to phase fault,
 - .3 phase to ground fault.
- .7 Generator shall be complete with automatic voltage regulators, Stamford Series MX321 or equal (3 phase RMS voltage sensing) acting on each phase and capable of controlling voltage within $\pm 1/2\%$ of rated voltage, no load to full load, during steady state conditions.
- .8 Set shall be oversized as required, to accommodate motor in-rush duty, and 100% block loading.
- .9 Identify alternator windings with permanent tags.
- .10 Bring windings to insulated terminals in an oversized metal junction box mounted on the alternator. Size junction box to permit mounting of engine and alternator low voltage controls and wiring terminal blocks, and to provide adequate space for terminating outgoing power cables with 2 hole long barrel compression connectors exiting from the top with adequate allowance for cable bending radius. Provide barrier in junction box to separate control voltage and line voltage wiring.
- .11 Provide a tinned copper termination plate drilled to accept multiple 2-hole compression connector terminated cables per phase, and necessary bus bar extensions to generator winding terminals.
- .12 Thermistors shall be embedded in stator winding and connected to alternator control circuitry.

2.10 Generator Excitation System

- .1 Exciter shall be a brushless type using a rotating 3 phase full wave rectifier bridge circuit and a 3 phase rotating armature type alternating current generator mounted on the rotor shaft rated to provide excitation current necessary to operate alternator at rated output continuously for all overload conditions and to maintain specified voltage regulation under transient conditions.
- .2 Voltage regulator system to have frequency dependent circuitry with adjustable voltage roll-off feature to aid engine speed recovery for step loads. Include for fine tuning at the engine supplier's plant and at the site for optimization of the settings.
- .3 Voltage regulator to be solid state silicon controlled rectifiers with phase controlled sensing circuit, regulation $\pm 1/2\%$ no load to full load. Provide auto/manual control module, and individual hand trimmer adjustment located at control cubicle.
- .4 The voltage regulator circuitry shall include:
 - .1 Control to adjust the stabilizing or anti-hunt circuit which controls overshoot or undershoot of the alternator voltage or load changes.
 - .2 Current forcing circuit to supply a minimum of 300% of nominal alternator output for at least 10 seconds to allow proper co-ordination of system protective devices.
 - .3 Manual control for adjustment of the automatically regulated generator voltage by $\pm 5\%$.
- .5 Excitation system for each unit shall be complete with permanent magnet generator (PMG) pilot excitation system with a 3 phase RMS voltage sensing unit to provide $\pm 0.5\%$ voltage regulation. The AVR shall be immune to RIF and shall include built-in solid state overvoltage protection and adjustable short circuit current forcing controls and a separate trimmer unit mounted on the switchboard.
- .6 The voltage regulator shall have the following performance features:
 - .1 Regulating the output voltage of the generator when it is disconnected from the load, supplying load alone, supplying load in parallel with the other sets.
 - .2 Steady state voltage regulation as specified.
 - .3 Voltage drift as specified.
- .7 Mount the generator voltage regulator system in the generator control panel and provide suitable terminal blocks at each end to permit field interconnection to the generator terminal box with 8 #12 in 1" steel conduit. Components shall be protected against dust and moisture.

2.11 Safety and Alarm Devices

- .1 One set of temperature and pressure switches shall be included for coolant system and lube oil system to provide instant shut-down action. Settings of these switches shall be as recommended by Engine manufacturer. Over speed shall cause instant shut-down.

2.12 Starting System

- .1 Each engine shall be supplied with a complete and independent starting system.
- .2 Electric starting system, minimum 24 volts, shall include dual starting motors, one (1) battery charger, cutout, regulator and two (2) sets of lead acid batteries.

- .3 Batteries shall be capable of providing six consecutive 30 second cranking attempts without recharging, with terminal voltage not to fall below 75% of nominal voltage. Provide cranking limiter for one or more cranking cycles

Standard of Acceptance

- Surrette 8NS-23P
- Dekka East Penn DL Series
- GNB KDZ Series
- OEM

- .4 Provide a steel battery rack with a 3/4" plywood base both painted with acid resistant paint

- .5 Provide a hydrometer with wall mounting bracket

- .6 Batteries shall come complete with extra flexible 4/0AWG EPR insulated battery cables and compression connectors with battery rack with 3/4" painter plywood base.

- .7 Fully automatic dual rate battery charger capable of recharging batteries in 30 minutes following one normal start.

- .8 When battery voltage falls below a level suitable for starting, a contact on a secondary relay shall close to cause an alarm signal to be sounded at the Control Panel.

- .9 Battery charger shall be a dual rate silicon rectifier battery charger for automatic float charge operating from 208 volts, single phase, 60 Hz having the following accessories and capacities:

- .1 Wall mounted sprinkler proof enclosure
- .2 Silicon controlled rectifier assembly with DC protection, suitable for dual charging rates
- .3 AC power on indication
- .4 AC power failure indication
- .5 Float voltage adjustment
- .6 Equalize circuit and timer
- .7 Overload protected input switch
- .8 DC output breaker complete with normally closed auxiliary contacts
- .9 DC ammeter, 3" semi-flush, 250° scale taut band suspension
- .10 DC voltmeter, 3" semi-flush, 250° scale taut band suspension
- .11 Short circuit current limit
- .12 Low voltage alarm with 60 second time delay (relay contacts which open for alarm, close normally wired out to terminal strip with appropriate connection) for supervisory control.
- .13 DC output breaker trip alarm (wire out auxiliary contacts on DC output breaker as for low voltage alarm).
- .14 Minimum charge rate to be 30 amps for battery charging and maximum charging time for fully discharged battery to 90% full charge shall not exceed six (6) hours.
- .15 Enclosure to be finished and painted to match generator set enclosure; interior to be white.

Standard of Acceptance

- Mechtron
- Vulcan

- OEM

2.13 Mounting Base

- .1 Diesel-generator package shall be mounted on a structural steel base with suitable adjustable steel, restrained spring vibration isolators with 50 mm static deflection levelling bolts, oil proof snubbers, and 6mm thick sound pads mounted between steel base and concrete housekeeping pad. Isolation efficiency shall not be less than 95%. Isolators shall be suitable for noted seismic requirements.

Standard of Acceptance

- Mason Model
 - Vibro-Acoustics
 - Korfund
 - OEM
- .2 Vibration isolators to be anchored to the concrete floor with 5/8" anchors equal to Simpson Strong Tie Wedge All anchors with a minimum of 2 - 3/4' concrete cover
 - .3 The alternator set shall be complete with hooks and hubs for the attachment of slings suitable for moving the unit.
 - .4 Baseplates shall be of sufficient rigidity to maintain alignment of engine generator shafts and frames under all conditions during shipping, installation and service and shall be of all welded construction without bolt-on components.
 - .5 Engine generator feet and baseplate sole plates shall be machined parallel and true. Shimming shall be of the steel type and shall only be permitted underneath the generator feet.
 - .6 Provide all necessary piping, couplings, fittings, wiring and connections between all components mounted commonly on the steel base.
 - .7 Provide full size galvanized steel drip pan under engine and a separate pan under the Racor fuel filter assembly.

2.14 Outdoor Weather-Protective Walk-In Sound Attenuating Housing

- .1 The generator set shall be provided within a sound-attenuated housing which allows the generator set to operate at full rated load in the ambient conditions previously specified. The enclosure shall reduce the sound level of the generator set while operating at full rated load to a maximum of 60 dBA at any location 7 meters/23 feet from the generator set in a free field environment. Housing configuration and materials used may be of any suitable design which meets application needs, except that acoustical materials used shall be oil and water resistant.
- .2 The enclosure shall include hinged doors for access to both sides of the engine and alternator, and the control equipment. Key-locking and pad-lockable door latches shall be provided for all doors. Door hinges shall be stainless steel.
- .3 The enclosure shall be provided with an exhaust silencer Super Critical grade, which is mounted inside of the enclosure, and allows the generator, set package to meet specified sound level requirements. Silencer and exhaust shall include a rain-cap and rain-shield. Secondary silencer shall be on the roof of the enclosure to attain the sound level as required.
- .4 All sheet metal shall be primed for corrosion protection and finish painted with the manufacturer's standard color. All surfaces of all metal parts shall be primed and painted.

- .5 Painting of hoses, clamps, wiring harnesses, and other non-metallic service parts shall not be acceptable. Fasteners used shall be corrosion resistant, and designed to minimize marring of the painted surface when removed for normal installation or service work.
- .6 Space heater and adequately sized service switchboard for block heater, battery charger, internal lights, anti-condensation heater and receptacle shall be provided inside the enclosure.
- .7 Enclosure base shall have a double wall construction sub-base fuel tank, UL listed with 72 hours capacity at full load. Level gauge, low level switch, vent cap, fill cap, leak alarm switch shall be provided in the fuel tank.
- .8 The enclosure shall have a dedicated frame under the generator to allow the generator enclosure to be lifted off the belly tank for future service or replacement of the belly tank.
- .9 Properly sized three phase electrical service panel shall be provided with pre-wired engine block heater, oil pan heater, alternator anti-condensation heater, battery charger and internal lights and space heater.
- .10 External GFI receptacle shall be provided for electrical service connection.
- .11 Enclosure shall be provided with motorized louvers/dampers for ventilation to meet CSA-282 requirement for maintaining 10Deg.C internal temperature.
- .12 Units shall include battery operated emergency lighting to average value of 50 lux for 30 minutes.

2.15 Engine Alternator Finish

- .1 Finish and paint the complete engine generator assembly, base, and all accessories with one coat of primer followed by two coats of high temperature machinery enamel with color equal to manufacturer standard color.

2.16 Diesel Exhaust Silencer

- .1 Provide an exhaust silencer to meet the requirements of MOE and local noise ordinances. Muffler to possess as high an insertion loss as possible consistent with maximum allowable pressure drop and exhaust pipe dimensions and configuration.
- .2 Verify required inlet and exhaust port positions and the required flange dimensions for connections to the exhaust piping system with the Division 20 contractor prior to manufacturing silencer.
- .3 Attenuation to be a minimum of 35 dB in the 125 to 4000 Hz frequency range and consistent with that below. The diesel exhaust muffler/silencer system shall provide the following minimum attenuation requirements:.

Octave Band (Hz)	Silencer Insertion Loss (dB)
31.5	33
63	40
125	49
250	51

500	48
1000	47
2000	46
4000	47
8000	49

- .4 Provide flexible hose connections of stainless steel at diesel engines. Hoses shall have close pitch corrugations and flanged ends and be capable of taking up the movement of the diesel engines plus expansion of the exhaust mufflers and piping in the axial direction of the flexible hose.
- .5 Supply nuts, bolts, gaskets and all miscellaneous hardware required to complete the installation of the exhaust systems from the engines up to and including the flanged outlets of the silencers. The exhaust system components and hardware shall be delivered to the job-site, inspected and turned over to the Division 20 contractor for installation.
- .6 If engine has two outlet exhaust connections, provide two flexible hose connections and either a two inlet type muffler or an inverted "Y" type pipe fittings to transition from two to one exhaust connections.
- .7 Exhaust silencer shall be standard wall thickness, seamless welded steel pipe to A-53-63T Grade "B" Specifications. Exhaust silencer, flanges and hardware shall be manufactured from Type 316 stainless steel.
- .8 Expansion joints shall be provided.

Standard of Acceptance

- JP Environmental
- Silex
- York
- OEM

2.17 Recirculator

- .1 Provide a recirculator for removing the oil mist from the engine crankcase breather vent.
- .2 Recirculator is to be mounted in a horizontal position and above the crankcase oil level. A connection using rigid piping to be made between the recirculator and the engine crankcase breather.
- .3 The exhaust from the recirculator is to be piped so that the engine air flow provides a 0" to 0.3" positive pressure reading during normal engine operation. Provide a U-Tube manometer for measurement of pressure difference and a control valve to adjust the pressure difference.
- .4 Oil collected by the recirculator is to be returned to the engine with a tube from the bottom of the recirculator to the engine oil sump. Position oil drain tube below the oil level line of the engine oil sump.
- .5 Provide two (2) spare filters for each recirculator.
- .6 If recirculator is integral to the engine and meets the requirements of this section an external recirculator is not required.

2.18 Engine Control Panel Elements

- .1 The generator set shall have a dedicated Engine Control Panel section..
- .2 Section to include engine and generator monitoring, instrumentation, controls, and starting systems.
- .3 Provide digital information screen capable of displaying the following information:
 - .1 Coolant in and out temperatures
 - .2 Engine water temperature
 - .3 Lube oil pressure
 - .4 Lube oil temperature
 - .5 Tachometer reading
 - .6 Run Hour meter reading
- .4 All engine control panel elements are to be completely accessible with all terminations for power and control wiring and any other items requiring torquing, infra-red thermal scanning, maintenance, or replacement all visible and accessible from the front, when respective hinged door is opened.
- .5 Provide two (2) Form C dry contacts, for each generator set, wired to a separate terminal strip in the panel for connection to the BAS by Division 20 for monitoring of the following conditions.
 - .1 Diesel Generator Set Summary Idle Trouble
 - .2 Diesel Generator Set Summary Running Trouble
 - .3 Diesel Generator Set Shutdown Alarm
 - .4 Diesel Generator Set Running Status
- .6 Provide two (2) Form C dry contacts, for each generator set, wired to a separate terminal strip in the panel for connection to the Fire Alarm System by Division 26 for monitoring of the following conditions.
 - .1 Diesel Generator Set Summary Idle Trouble
 - .2 Diesel Generator Set Summary Running Trouble
 - .3 Diesel Generator Set Shutdown Alarm
 - .4 Diesel Generator Set Running Status
- .7 Each engine control panel to include a programmable logic controller or a purpose built microprocessor based controller and is to include, but not be limited to, the following components:
 - .1 control system to initiate the diesel starting and stopping sequence, and annunciate any fault condition (local or remote indication);
 - .2 all required secondary and control wiring, type 'TEW' 105°C rated, extra flexible wire with thermoplastic insulation and an overall flame retarding cotton braid, neatly harnessed, suitably secured and identified with slip-on identification markers; Wiring shall be colour coded to suit application and standards; Note that wiring for the DC supply to control panel, wiring for cranking circuits and wiring for air box damper to be stranded minimum 10 AWG; wiring within control panel shall be stranded minimum 16 AWG; and wiring between control panel and engine generator set shall be stranded minimum 14 AWG

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- .3 Each cell to be complete with all required control wiring and terminal blocks. Control wiring to be neatly harnessed and suitably secured. Wiring to outgoing circuits and to door mounted equipment shall terminate on terminal blocks.
 - .8 The designer/manufacturers of the entire control system will be required to:
 - .1 supply complete design, erection and layout drawings for the system, clearly indicating to all wiring requirements, interfacing or interconnection provisions required to completely integrate the controls with all remote apparatus;
 - .2 assemble, wire and pretest the system components in their factory prior to shipment to the engine supplier for factory testing.
 - .3 assist in the installation and oversee the work to ensure that it meets with the generator supplier's requirements;
 - .4 carry out a site test of the system in conjunction with the other components in the standby power system and demonstrate its proper operation to the satisfaction of the Owner and Consultant.
 - .9 Selector and Control Switches per Engine
 - .1 Provide the following devices on the front panel of the engine control section external to the HMI display panel:
 - (a) Engine Mode Operation Selector Switch with Manual, Off, Auto and Reset options.
 - Switch in 'OFF' position shall cause an alarm to occur.
 - (b) Generator Start/Stop Momentary Contact Selector Switch with middle rest position
 - (c) Generator Breaker Open/Close Momentary Contact Selector Switch with middle rest position (with interlock to synchronization check protection scheme)
 - (d) Synchronization Auto/Manual Selector Switch
 - (e) Engine Speed Control
 - (f) Generator Voltage Adjust
 - (g) Alarm and Trouble audible notification
 - (h) Red Alarm Lamp
 - (i) Yellow Idle Trouble Lamp
 - (j) Yellow Running Trouble Lamp
 - (k) Illuminated White Alarm Silence Pushbutton
 - (l) Lamp Test Pushbutton
 - (m) Blue Engine Emergency Stop Shrouded mushroom type Pushbutton
 - (n) Synchroscope
 - .10 Metering and Instrumentation per engine
 - .1 automatic voltage regulator with provision for automatic voltage adjustment as specified
 - .2 radio suppression module (unless suppression with alternator meets Commercial Standards);
 - .3 digital governor and speed control system
 - .4 Provide the capabilities to monitor the following parameters through the engine HMI display:
 - (a) Generator Phase Currents
 - (b) Generator Voltage (L-L, L-N) at line side of generator breaker
 - (c) Bus Voltage (L-L, L-N) at load side of generator breaker
 - (d) Line-to-Load Voltage Difference between line and load side of generator breaker for all three (3) phases
 - (e) Power Factor (Average, Phase)
 - (f) kW, KVAR, kVA (Average, Phase, %)
 - (g) kW-hr, kVAR-hr (Total)
 - (h) Frequency
 - (i) Engine Speed
 - (j) Generator Elapsed Time

- (k) Oil temperature
 - (l) Oil pressure
 - (m) Oil level
 - (n) Engine Coolant In Temperature
 - (o) Engine Coolant Out Temperature
 - (p) Fuel Pressure
 - (q) Fuel In Temperature
 - (r) Fuel Out Temperature
 - (s) Fuel Oil/Water separator vacuum pressure
 - (t) Excitation Voltage and Current
 - (u) Generator Stator and bearing temperature
- .5 Note that current transformers and potential transformers for metering and protective relays are to be located in the switchgear. Individual engine information shall be accessible on the synchronizing control panel section HMI displays. Information shall be provided to the main control panel via modbus communication.
- .11 Synchronization ("Dead Bus" Operation)
- .1 A synchronization monitor, one per diesel generator set, shall sense voltage, frequency and phase angle of the unit to be paralleled. The monitor shall:
 - (a) Compare the voltage of an oncoming diesel generator set with the load voltage and initiate a correction signal to cause any voltage difference to be reduced to within that specified.
 - (b) Compare the frequency of an oncoming diesel generator set with the bus frequency and initiate a correction signal to the governor of the oncoming diesel generator set until the frequency difference is within that specified.
 - (c) Cause the phase angle of an oncoming diesel generator set with respect to the load voltage to be within that specified.
 - .2 The monitor shall permit a diesel generator set to be held in synchronization when both sources are available.
 - .3 When the above conditions have been satisfied, the monitor shall initiate a signal to close the circuit breaker of the incoming diesel generator set to the bus.
 - .4 The synchroscope shall be complete with an auto/manual selector switch.
 - .5 In the "auto" position the DG sets shall be automatically synchronized and paralleled to the bus. In the "manual" position the synchroscope shall allow the closing of the respective circuit breaker from the individual diesel generator control panel.
- .12 The system shall be designed to start and parallel two (2) diesel generator diesel generator sets.
- .13 The first diesel generator set to achieve 90% of nominal voltage and frequency shall be connected to the emergency bus. Monitor the switchgear for dead bus, lock-out other generator set (to avoid a race condition) and provide an instant connection.
- .14 As the second diesel generator set reaches nominal output it shall be automatically synchronized, paralleled and connected to the bus.
- .15 Prior to being paralleled to the bus, the oncoming unit shall be compared to the bus in frequency, voltage and phase angle. The set shall not be connected to the bus unless and until the following conditions have been satisfied:
- .1 Frequency difference less than 0.3 Hz
 - .2 Voltage difference less than 5%
 - .3 Phase angle less than 5° (electrical) with respect to the bus

- .16 The paralleling of a diesel generator set shall not cause a voltage fluctuation exceeding 8% or a frequency fluctuation exceeding +/- 0.3%.
- .17 Manual Control
- .1 Controls shall allow manual start and paralleling from respective generator control panel. Controls shall include:
- (a) A positive means of inhibiting out-of-phase paralleling.
 - (b) Means to operate diesel generator sets without connecting them to the main bus (Generator Start/Stop Selector Switch)
 - (c) Means to operate (trip/close) generator breakers that allow connection and disconnection of generators on the Generator Switchgear main bus (Generator Breaker Open/Close Selector Switch).
- .18 Automatic synchronizers shall be of unit chassis construction, utilizing solid state circuitry for all sensing and control functions. Necessary interface circuits for control of voltage adjustment and circuit breaker shall be through enclosed electro-magnetic relays with isolated output contacts rated 5A at 230 volts A.C. Control of the governor for frequency adjustment shall be through direct solid state circuitry.
- .19 Each synchronizer shall include a "check" selector switch to permit each diesel generator set to be held in synchronization when both normal and emergency sources are available.
- .20 Automatic synchronizers shall be part of the Engine Control Panel section.
- .21 Provide Remote monitoring software complete with all necessary licenses. Remote monitoring software shall be capable of running on Windows XP Professional or Windows 7 (64-Bit).
- .22 Event logging with time and date stamps.
- .23 Provision for exporting event logs/storing event logs on a personal computer. Include all necessary allowances for onsite set-up for remote storing of events.
- .24 Provide annunciation of the following Status, Alarm and Trip conditions for each engine through the associated engine HMI display (trouble idle = function included in summary trouble idle output contacts and annunciation lamps; trouble running = function included in summary trouble running output contacts and annunciation lamps; alarm = function to be included in summary alarm output contacts)

Function	Shutdown or Warning Condition	Summary Trouble Condition (Idle)	Summary Trouble Condition (Running)	Summary Alarm Condition
Emergency Stop Activated (Local and Remote)	Shutdown			X
Overcrank	Shutdown			X
High Engine Temperature Pre-alarm	Warning		X	
High Engine Temperature Alarm	Shutdown			X
Low Lube Oil Pressure Pre-alarm	Warning		X	
Low Lube Oil Pressure Alarm	Shutdown			X
High Lube Oil Temperature	Warning		X	

Function	Shutdown or Warning Condition	Summary Trouble Condition (Idle)	Summary Trouble Condition (Running)	Summary Alarm Condition
Low Lube Oil Level	Warning	X		
Over Frequency	Shutdown			X
Under Frequency	Shutdown			X
Low Coolant Level	Warning	X		
SCR System Trouble	Warning		X	
Low Coolant Temperature	Warning	X		
Under Voltage	Shutdown			X
Over Voltage	Shutdown			X
Damper Breaker Open	Warning	X		
Alternator Over Temperature	Warning		X	
Exciter Diode Failure	Warning		X	
Engine Control Switch Not in Auto	Warning	X		
Low DC Voltage (Starting Batteries)	Warning	X		
Battery Charger Failure (contact wired from battery charger by Division 26)	Warning	X		
Fuel System Trouble (contact wired from fuel system controls by Division 26)	Warning	X		
Fuel Leakage Detection (contact wired from leakage detection panel by Division 26)	Warning	X		
Breaker Fail to Close	Warning		X	
Cool Down Cycle				
Fuel oil filter clogged	Warning		X	
Ground Fault Alarm	Shutdown			X
Reverse Power Relay	Shutdown			X
Generator Fault (Differential Protection)	Shutdown			X
Low DC Voltage (Control Power)	Warning	X		

.25 [Deleted]

- .26 All instrumentation transformers shall have final ratios, burden and other characteristics selected by the Independent Testing Agent preparing the protection and coordination study. Coordinate final selections with Independent Testing Agent.
- .27 Current transformers to have positive action automatic short circuiting devices in secondary terminals.
- .28 Color coding wiring (D.C. - Blue, A.C. - Black, Dry Contact - Yellow), and necessary instrument transformers, nameplates, bus and terminal blocks.
- .29 One (1) remote Emergency Stop mushroom head pushbutton stations per engine with lift type guard, with size 6 label, wired to shut down the associated engine immediately. Turn over to Division 26 contractor for mounting near generator room exits, and wiring to control panel.

2.19 Equipment Identification

- .1 Provide equipment identification on generator, control panel, and all indication and control devices consisting of engraved, high quality plastic nameplates with black letters suitably inscribed on white background.
- .2 Engraved letters shall be 1/2" minimum, except 6mm minimum height may be provided for meters, relays, switches, signal lights, keys and key blocks, and all other devices.
- .3 All terminal blocks to have permanent labels
- .4 All control cables shall be clearly identified, at both ends, with permanent PVC wire markers, indicating Cable Number and wire numbers.
- .5 Also provide on generator connection, nameplate with red letters suitably inscribed on white background, reading "DANGER – 600VOLTS", and "DO NOT ENTER" as per Canadian Electrical Code. Engraved letters to be 1/2" minimum except "DANGER" which to be 3/4" minimum.

2.20 Main Control Panel Finish

- .1 Finish control panel as follows:
 - .1 basic rust-inhibiting metal process
 - .2 2 coats of powder coat finishing paint.
- .2 Exterior shall be finished with manufacturer standard color.
- .3 Manufacturer to provide quart of touch-up paint or several pressurized spray cans to touch-up small areas marred during installation.

2.21 Control and Wiring

- .1 Terminal blocks shall have numbered points for circuit identification. Terminal blocks to be General Electric Type EB or equal. Terminal blocks for current circuits to be shorting block type.
- .2 Wiring shall be type 'TA', 'TBS', or 'SIS', flame retardant #14 AWG size single conductor minimum, stranded, tinned copper, extra flexible type throughout. Wires shall be tagged at both ends with permanent plastic sleeve type markers. Insulation shall be 600 V, working and 1500 V test.
- .3 Secondary and control wiring within the rear bus compartment shall be completely shielded in a protective metal covering as far as practical.

- .4 Wiring from differential CT's shall be minimum #10 AWG.
- .5 Fuse and terminal blocks shall be easily accessible. Fuses shall be Class J HRC. DC fuses (one per pole) shall be in dead front enclosure.
- .6 Auxiliary wiring checks shall be made throughout the manufacture and assembly of the equipment to assure wiring correctness and continuity.
- .7 Final checkout of wiring shall be made with the complete switchgear lineup assembly to assure wiring correctness and continuity. Polarity of current and potential transformers and devices shall be checked to assure proper functioning of all protective devices and instrumentation.

2.22 Instrument Transformers

- .1 Potential transformers and current transformers required to operate relays, meters and other devices indicated in the drawings and specifications shall be coordinated so that the ratio and accuracy are suitable for each individual application, taking into account the burdens imposed. Construction of transformers shall conform to ANSI Standards. All terminals shall have permanent polarity designations and shall be wired accordingly. All applicable requirements of ANSI Standard C57.13 shall apply.
- .2 Primary potential bus or cable tap leads shall be designed with the same design integrity as the primary bus.
- .3 Both current and potential transformers shall be wired through test switches to provide quick and easy multi-circuit testing of switchboard relays, meters and instruments.

2.23 Potential Transformers

- .1 Potential transformers shall be housed in a separate compartment in the circuit breaker cubicle or superstructure.
- .2 Potential transformers shall be of the 0.3 accuracy class, per ANSI Standards and of sufficient capacity to serve the maximum burden imposed.
- .3 Each potential transformer shall be protected with current limiting primary fuses, and shall be designed to withstand the basic impulse level of the switchboard.

2.24 Current Transformers

- .1 Current transformers shall be easily removable and accessible and of the ring or bar-type.
- .2 Ring-type current transformers shall be used where burden and accuracy permit. Primary terminals on bar-type current transformers shall be silver plated and rigidly (2 bolt minimum) connected to the bus structure.
- .3 Secondary connections of all current transformers shall have provisions for short circuiting when not connected to instruments and shall be solidly grounded.
- .4 Current transformers shall be capable of carrying at least 125% of CT rating continuously and have a short time rating at least equivalent to that of the switchgear bus. Accuracy class: C100/ 0.6 B-1.

2.25 Synchronizing Protection and Control Panel Sections

- .1 General Operation
 - .1 The generator will normally operate in parallel with existing units. The controls shall be arranged to ensure the generator is automatically isolated under fault conditions.
- .2 Control Panel Components
 - .1 [Deleted]
 - .2 Horn complete with silencing button.
 - .3 Total kW load indicator
 - .4 Automatic Load Monitors
 - .5 Automatic Synchronizers
- .3 Metering and Instrumentation
 - .1 kW/kWhr meter
 - .2 Analogue Power Factor Meter (.5 lead to .5 lag)
 - .3 Analogue Ammeter and selector switch for 3 phases.
 - .4 Analogue Voltmeter and selector switch for 3 phases.
 - .5 Analogue Frequency meter.
 - .6 Analogue kVAr meter.
- .4 Status, Alarm and Trip Indication
 - .1 Lamp test button for all indicating lamps
 - .2 Alarm horn and silencing switch
 - .3 Controls not in auto
 - .4 Control battery alarm
 - .5 Ground fault alarm
 - .6 PLC failure
 - .7 System Overvoltage
 - .8 System Undervoltage
 - .9 Running, On line, Lock Out indication for each engine
 - .10 Bus over/under frequency
- .5 Synchronization
 - .1 A synchronization monitor, one per DG set, shall sense voltage, frequency and phase angle of the unit to be paralleled. The monitor shall:
 - (a) Compare the voltage of an oncoming DG set with the load voltage and initiate a correction signal to cause any voltage difference to be reduced to within that specified.
 - (b) Compare the frequency of an oncoming DG set with the bus frequency and initiate a correction signal to the governor of the oncoming DG set until the frequency difference is within that specified.
 - (c) Cause the phase angle of an oncoming DG set with respect to the load voltage to be within that specified.
 - .2 The monitor shall permit a DG set to be held in synchronization when both sources are available.

- .3 When the above conditions have been satisfied, the monitor shall initiate a signal to close the circuit breaker of the incoming DG set to the bus.
- .6 The system shall be designed to start and parallel all diesel generator (DG) sets
- .7 The first DG set to achieve 90% of nominal voltage and frequency shall be connected to the emergency bus.
- .8 As additional DG sets reach nominal output they shall be automatically synchronized, paralleled and connected to the bus in the sequence in which they achieve synchronization.
- .9 Prior to being paralleled to the bus, the oncoming unit shall be compared to the bus in frequency, voltage and phase angle. The set shall not be connected to the bus unless and until the following conditions have been satisfied:
 - .1 Frequency difference less than 0.3 Hz
 - .2 Voltage difference less than 5%
 - .3 Phase angle less than 5° (electrical) with respect to the bus
- .10 The paralleling of a DG set shall not cause a voltage fluctuation exceeding 8% or a frequency fluctuation exceeding +/- 0.3%.
- .11 Automatic synchronizers shall be of unit chassis construction, utilizing solid state circuitry for all sensing and control functions. Necessary interface circuits for control of voltage adjustment and circuit breaker shall be through enclosed electro-magnetic relays with isolated output contacts rated 5A at 230 volts A.C. Control of the governor for frequency adjustment shall be through direct solid state circuitry.
- .12 Each synchronizer shall include a "check" selector switch to permit each DG set to be held in synchronization when both normal and emergency sources are available.
- .13 Automatic synchronizers shall be part of the Load Management Control assembly and shall be complete with a sync check relay.

2.26 Generator Output Cables

- .1 Power cables interconnecting the generator to the generator control panel, and interconnecting the starting batteries to the engine, shall be extra-flexible locomotive cables installed in cable tray [per Section 12-2202 of the Electrical Safety Code] with the following characteristics:
 - (a) Type DLO & UL listed as Marine Shipboard Cable
 - (b) CSA Type TC listed
 - (c) CSA FT-4 rated
 - (d) Stranded coated copper, size as indicated, with EPR insulation, and thermoset jacket
- .2 Final connections of all control wiring terminating at the engine or generator to be installed in FT4 jacketed liquid tight flexible conduit.

2.27 Factory Test Procedure

- .1 Supplier shall conduct performance and full load tests in his factory, to be witnessed by Engineer and Independent Testing Organization (ITO) upon completion of assembly at factory and prior to shipping to prove that unit will start automatically, pick up load and operate as required, in accordance with the article "Source Quality Control" at the beginning of this specification.

- .2 Notification of factory test shall be given a minimum of ten (10) working days in advance. Dismantling and shipment from factory test bay shall not occur until deficiencies have been corrected and the system retested to the satisfaction of the Engineer and certified as being acceptable for shipment.
- .3 The test shall include:
 - .1 Demonstration of automatic start system
 - .2 A 4-hour full load test, utilizing an adjustable load at rated power factor
 - .3 Demonstration of safety features
 - .4 Demonstration of cycle crank tests.
 - .5 Block loading tests from cold start: 0%-25%, 0%-50%, 50%-100% and 0%-100%
- .4 During test, the following parameters shall be recorded at 30 minute intervals:
 - .1 Speed and frequency at steady state and step load changes
 - .2 Phase volts and amps at steady state and step load changes
 - .3 Load
 - .4 Coolant temperature
 - .5 Lubricating oil pressure
 - .6 Exhaust temperature
- .5 Fuel consumption for duration of test shall be stated.
- .6 Provide a photograph of an oscilloscope trace of the sine wave generator output 60 cycle.
- .7 [Deleted]
- .8 Synchronization and Automatic Transfer Tests
 - (a) Demonstrate the emergency start and synchronizing and paralleling features of all generators as a system
 - (b) Simulate utility power outages and demonstrate automatic operation of the system.
 - (c) Demonstrate the functioning of all transfer control and synchronization safety devices by creating the actual conditions or simulating these conditions if the actual conditions cause deterioration or damage to the emergency system.
 - (d) Demonstrate synchronization system, automatic transfer system and load management system with loadbanks, with a minimum capacity of 1350Kw. Tests shall include load steps to verify synchronization and load pick-up following simulated loss of utility power.

2.28 Acceptance Test (Final On-site Testing)

- .1 A competent Diesel-generator expert shall be supplied for as long as is necessary for commissioning and witness testing and for two working days, at a time convenient to Owners, to instruct Owners' staff in maintenance and operation, and in addition shall be present during on-site commissioning and acceptance test.

2.29 Manufacturers/Suppliers

- .1 The suppliers tendering the equipment and services under Division 26 shall include preparation and submission of technical documents listed herein as well as the services of a site technical representative to assist during installation in the performance of commissioning and witness testing program and conduct training of the Owners staff.

- .2 Diesel set shall be as manufactured by one of the following:

Standard of Acceptance

- Cummins Eastern Canada
- Total Power - Generac
- Toromont Cat Power Systems
- Wajax Power Systems
- Pritchard Power Systems – Kohler
- Paramount Power Systems
- LMR

3 EXECUTION

3.1 Installation General

- .1 Prior to project completion, revise all wiring diagrams submitted as Shop Drawings to "As-Built" condition, prepare photo reductions of same and include them in the Operation and Maintenance Manual.

3.2 Installation of Engine Generator Set

- .1 Mount Diesel-generator package on structural steel base with suitable adjustable steel spring vibration isolators with sound pads mounted between steel base and concrete base pad. Division 26 to provide concrete base pad and paint with oil resistant paint. Touch-up areas marred in transit or installation.
- .2 Install complete starting system including batteries, jumpers and cables and battery charger. Provide 2#4/0 EPR extra flex copper cable connections from starting battery to [each] starter.
- .3 Provide flexible fuel connections to fuel system isolating valves provided by Division 20, complete with all necessary flexible fuel connections between various filter components and engine.
- .4 Mount and assemble Racor water separator and provide flexible fuel connection to engine.
- .5 Provide full size galvanized steel drip pan under engine and a separate pan under the Racor fuel filter assembly.
- .6 Ground generator frame to building ground and/or perimeter ground system.
- .7 Install the flexible hose supplied by the engine manufacturer between the engine crankcase vent connection over to the atmosphere side of the radiator exhaust plenum, for venting of crankcase fumes to atmosphere. Provide necessary cutting and patching, and sleeve through plenum, with final connections of hose.
- .8 Install the engine exhaust silencer, flexible connection at engine, and miscellaneous nuts, bolts, gaskets and all miscellaneous hardware required to complete the installation of the exhaust system from the engine up to and including the flanged outlets of the silencers

3.3 Installation of Engine Control Panel

- .1 Provide incoming and outgoing cable connections.

- .2 Provide interconnecting power and control wiring between Diesel-generator and control panel.
- .3 Terminate all power cables with two-hole long barrel compression connectors equal to Burndy YA-2N.
- .4 Provide interconnecting control wiring connections as shown and as required.
- .5 Provide grounding of each control panel to building ground bus with two separate runs of a #4/O green insulated copper in conduit. Terminate with Burndy YA-2N lugs.
- .6 Install complete DC control power system including batteries, jumpers and cables and battery charger and connect to control panel with 2#8 + ground in conduit.
- .7 Extend DC control wiring 2#8+ ground in conduit to engine starting battery for control power
- .8 Touch up small areas marred in transit or during installation with touch up paint. Repaint entire switchboard using electrostatic process where large areas of significant damage to factory finish has occurred.
- .9 Provide and install new rubber mats 3' wide 1/4" thick 17,000 volt rating, American Biltrite Canada Ltd., in front and rear of control panels for a continuous and neat appearance. Do not place mats until work is completed and room has been thoroughly cleaned. Clean or replace any existing mats dirtied or damaged during the installation.

3.4 Installation of Miscellaneous Components

- .1 Provide power and control wiring between engine control panel and diesel combustion air dampers and ventilation dampers. Division 26 to provide 120 V secondary power source from local 120V emergency panel to the control panel switching relay to permit dampers to close when engine shuts down.
- .2 Division 26 to provide 8 conductor #12 MICC cable from each Automatic Transfer Switch to the diesel generator control panel for engine start contact, ATS in normal position status, ATS in emergency position status, and ATS in bypass position status.
- .3 Division 26 to provide 4 conductor #12 MICC cable from each Fire Pump ATS/Control Panel, and each Sprinkler Pump ATS/Control panel to the engine generator control panel for engine start contact and ATS in emergency position status.
- .4 Supply one per engine Remote Emergency Stop mushroom head pushbutton station with lift type guard, with size 6 label, wired to shut down the engine immediately. Contractor to mount outside of room, and wire to control panel.
- .5 Division 26 to provide connection from control panel to fire alarm panel to indicate engine running and trouble condition on fire alarm annunciator.
- .6 Provide power and control wiring between engine control panel and the diesel fuel tank level controller to obtain "Fuel Low Level" alarm contact.
- .7 Provide control wiring connection between engine control panel and fuel leakage detection system panel.
- .8 Provide control wiring to battery charger and automatic transfer switches for remote monitoring indication on the centralized electrical monitoring system.

- .9 Install 2- #10 AWG in 19 mm conduit interconnection the normal, emergency, and generator control switchboards for control power interconnection, for proper operation of centralized electrical monitoring system devices.
- .10 Provide control wiring connection between engine control panel and fuel leakage detection system panel.

3.5 Testing

- .1 Conduct an acceptance test of the complete emergency power system after preliminary runs and test have been made. Conduct this test on site after completion of installation. This acceptance test shall be as described under the article Site Tests in Section 2 above. In the event of equipment or component failures interrupting completion of test, correct the deficiency and repeat test until satisfactorily completed without failure.
- .2 Demonstrate functioning of safety devices, pilot lights, controls, remote monitoring on the Building Automation System and Fire Alarm system, operation of any remote controls and indicators on the remote annunciator, and operation of all interconnections and alarms to battery charger, fuel system, leak detection panel, dampers, Automatic Transfer Systems, etc...
- .3 Immediately following the load test a sample of lubricating oil shall be taken for lab analysis.
- .4 After completion of tests replace all air, fuel and lubricating oil filters with new elements and change the lube oil.
- .5 Provide temporary cables and temporary load bank for on-site testing, complete with terminal lugs on cables.

3.6 Site Tests

- .1 General
 - .1 Upon completion of the installation of the emergency power supply system, the installation shall be tested to ensure conformity to the requirements of Standard C282. Provide Engineer and ITO with a minimum of ten (10) working days written notification of the proposed test date
 - .2 All construction within the diesel generator room is to be completed and the room is to be thoroughly cleaned prior to starting the engine for the first time.
- .2 The generator manufacturer will be required to participate in the complete commissioning process including sub-systems affecting the operation of the diesel generators.
 - .1 The diesel generator manufacturer shall provide an initial review and start-up of the generators prior to any sub-system test requiring the use of the diesel generators. Provide documentation that sub-system pre-functional testing can be completed with the use of the diesel generators.
 - .2 There is no requirement for the presence of the diesel generator manufacturer at sub-system equipment non-running pre-functional verifications.
 - .3 The diesel generator manufacturer shall be present during the following sub-system equipment running and measurement functional tests:
 - (a) Fuel Pumps and associated controls.
 - (b) Day Tank Fuel Sensors and Alarms
 - (c) Main Tank Fuel Sensors and Alarms
 - (d) Fuel Inventory System
 - (e) Dampers

-
- (f) Generator Sound Measurements
 - (g) Generator Emission Measurements
 - (h) Generator Switchboard
 - (i) Automatic Transfer Switchboard including load management verification
 - (j) Connections to Building Automatic System
 - (k) Connections to Fire Alarm System
 - (l) 125VDC Power Plant
 - (m) Neutral Grounding Resistors (at Generators and at Generator Switchboard)
- .4 The diesel generator manufacturer shall include for a minimum of two (2) full day integrated system tests required to demonstrate that the complete emergency power system functions per the contract documents when all sub-systems and components have been installed and inter-connected.
- .3 Operational Test
- .1 Provide temporary loadbreak switch connected to the new loadbank quick connect
- .2 Prior to any system testing, individually perform the following tests on each diesel generators using the connected load banks through the Automatic Transfer Switchboard and Generators Switchboard:
- (a) Demonstration of automatic start system
 - (b) With 100% rated full load, operate set for four (4) hours, taking readings at 30 min intervals, and record following:
 - Time of reading.
 - Running time.
 - Ambient temp in °C.
 - Fuel consumption
 - Lube oil pressure in kPa.
 - Lube oil temp in °C.
 - Engine coolant temp in °C.
 - Exhaust stack temp in °C.
 - Alternator voltage.
 - Alternator current:
 - Power in kW.
 - Frequency in Hz.
 - Power Factor.
 - Battery charger current in A.
 - Alternator cooling air outlet temp.
 - (c) After completion of four (4) hour run, demonstrate following features, shut down devices and alarms: Demonstrate low oil pressure and high engine temperature shutdown devices operation without subjecting engine to these excesses.
 - Cycle crank test
 - Over cranking.
 - Over speed.
 - High engine temp.
 - Low lube oil pressure.
 - Simulated Short circuit, to verify operation of differential protection.
 - Alternator over voltage.
 - Low battery voltage, or no battery charge.
 - Manual remote emergency stop.
 - High alternator temperature.
 - All other safety features

- (d) Next install continuous electronic power quality meter with sufficient storage capacity and of sufficient sampling rate to record frequency and voltage variations during load switching procedures. Each load change delayed until steady state conditions exist. Switching increments to include:
 - No load to full load to no load.
 - No load to 75% load to no load.
 - No load to 50% load to no load.
 - 25% load to 100% load to 25%.
 - 50% load to 100% load to 50%.
- .3 With the engine in a "cold start" condition and the test load banks connected, power failures will be simulated by opening switch LIS-9 supplying the normal power to the normal terminals of the Automatic Transfer Switchboard.
- .4 On-site tests shall be completed to demonstrate all emergency power system sequences of operation, including:
 - (a) Normal power failure scenario
 - (b) Failure of one (1) generator to start following a utility failure. Repeat tests such that both generators are set as the failing generator.
 - With loading on the highest priority breaker below the rating of one (1) generator
 - With loading on the highest priority breaker above the rating of one (1) generator
 - (c) Failure of one (1) generator while the emergency power system is running on generator power supplied by two (2) generators. Repeat tests such that both generators are set as the failing generator.
 - With loading on the highest priority breaker below the rating of one (1) generator
 - With loading on the highest priority breaker above the rating of one (1) generator
 - (d) No Load Testing Mode
 - (e) Transfer Test Mode
 - With both generators available.
 - With failure of one (1) generator following the transfer to emergency power.
 - (f) Demonstration of ADD and SHED load management system.
- .5 The following data shall be observed and recorded for each testing scenario:
 - (a) time delay on start
 - (b) cranking time until the engine starts and runs
 - (c) time required to come up to operating speed
 - (d) time until first generator is connected to the bus
 - (e) time until second generator is paralleled with the bus
 - (f) time required to achieve steady-state condition with the Automatic Transfer Switchboard transferred to the emergency position
 - (g) voltage, frequency, and amperes at start-up and at any observed change in load
 - (h) Engine oil pressure, water temperature where applicable, and battery charge rate at 5 min intervals for the first 15 minutes, and at 15 minute intervals thereafter
 - (i) time delay on retransfer for Automatic Transfer Switchboard
 - (j) time delay on engine cooldown and shutdown.
- .6 Following the operational test prescribed above each the emergency generator system shall be subjected to an additional four (4) hour 100% load test (3300kW), using the temporary portable test load banks.
- .7 The building load shall not be used as part of the test load. Unity power factor is acceptable for on-site testing,
- .8 Demonstrate all alarm connections to remote systems including the fire alarm and building automation system.

.4 Pull the Plug Tests

- .1 At the conclusion of the migration activities, a Pull the Plug Test shall be completed using migrated Owner building load.
- .2 With the engine in a "cold start" condition, a power failure shall be simulated by opening switches supplying the normal power to the building.
- .3 The emergency power system shall support the load for one hour after which normal power shall be restored to the normal main breakers of the Automatic Transfer Switchboard.

3.7 Installation by Generator Supplier

- .1 Provide a complete Diesel-generator set and control panel power system. Deliver FOB job site on a flat bed tractor trailer, suitable protected during shipping from the environment.
- .2 Verify power and control wiring connections between engine generator, engine control panel and diesel combustion air dampers and ventilation dampers, battery charger and automatic transfer system, building automation system and fire alarm system.
- .3 Provide temporary cables and temporary load bank for on-site testing, complete with terminal lugs on cables.
- .4 Conduct an acceptance test after preliminary runs and set up / calibration tests have been made. Conduct this test on site after completion of installation. This acceptance test shall be a minimum of four hours duration with full rated load plus verification of the system performance. In the event of equipment or component failures interrupting completion of test, correct the deficiency and repeat test until satisfactorily completed without failure.
- .5 After completion of above test, perform tests to demonstrate overheat protection, low oil pressure protection and over-speed protection. Demonstrate functioning of safety devices.
- .6 After completion of tests replace all air, fuel and lubricating oil filters with new elements and change the lube oil.
- .7 Include costs of 1st year routine maintenance (with all filters) in bid price).
- .8 Revise all wiring diagrams submitted as Shop Drawings to "As-Built" condition, prepare photo reductions of same and include them in the Operation and Maintenance Manual.

END OF SECTION

Project Architect	HDR
Civil	HDR
Structural Engineer	HDR
Mechanical Engineer	HH ANGUS
Electrical Engineer	HH ANGUS

DISCREPANCIES MUST BE REPORTED IMMEDIATELY TO THE CONSULTANT BEFORE PROCEEDING.
ONLY FIGURED DIMENSIONS ARE TO BE USED AND CONTRACTOR MUST CHECK ALL DIMENSIONS ON SITE.
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FOR INFORMATION ONLY

		
NO.	DATE (YYYY-MM-DD)	DESCRIPTION
DRAWING REVISIONS		

04	2026-03-06	ISSUED FOR INFORMATION
03	2025-11-07	ISSUED FOR 100% CONSTRUCTION DOCUMENTS
02	2025-10-17	ISSUED FOR CLASS A COST ESTIMATE
01	2025-09-22	ISSUED FOR 30% REVIEW
NO.	DATE (YYYY-MM-DD)	DESCRIPTION
DRAWING ISSUE		

KEYPLAN

NORTH:

SEAL:

PROJECT:
KHSC KGH EMERGENCY POWER
SYSTEM CAPACITY &
INFRASTRUCTURE REMEDIATION

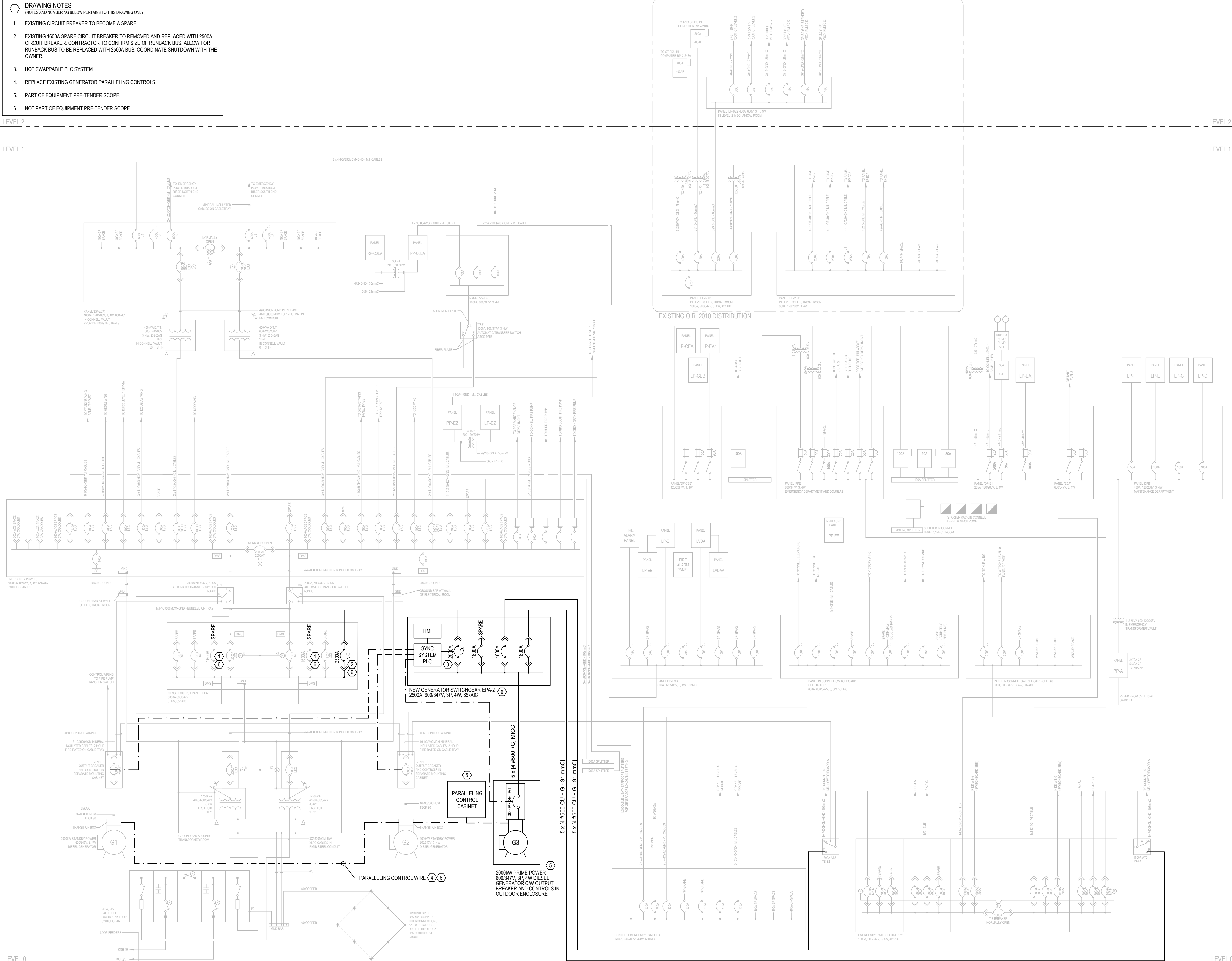
HHA PROJECT NUMBER: 2250139

DRAWING TITLE:

NEW SINGLE LINE DIAGRAM

PAGE SIZE:	ARCH D	DRAWN BY:	A. B
SCALE:	NOT TO SCALE	CHECKED BY:	V. R
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E-02





Addendum

Project: Kingston Health Sciences Centre
Kingston General Hospital
Emergency Power System Upgrade Project

Contract No.: 10434805 (HHA: 2250139)

Bid Number: 10434805-ME-02
Power Generation, Diesel Generator

Addendum No.: 01

Date Issued: Tuesday, March 31, 2026

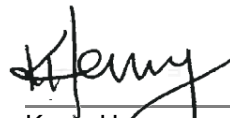
No. of Pages: 5 pages

The following Addendum shall be read in conjunction with and become part and parcel of the bid documents and shall supersede the drawings and or specifications where applicable. Upon receipt to same, staple this Addendum directly to the inside front cover of the specifications. The Proponent shall bring this Addendum to the attention of all subcontractors, trades and suppliers.

1. The following documentation is issued under this Addendum.

- | | | |
|-----|---|---------|
| 1.1 | HDR Addendum No. A01, dated 2026-03-31 | 3 pages |
| 1.2 | HHA Addendum No. E-01, dated 2026-03-31 | 1 page |

Per:



Kevin Henry, P.Eng
Project Manager

End of Addendum 01

The following Addendum shall be read in conjunction with and become part and parcel of the tendering documents and shall supersede the drawings and/or specifications where applicable. Upon receipt to same, staple this Addendum directly to the inside front cover of the specifications. The Proponent shall bring this Addendum to the attention of all subcontractors, trades and suppliers.

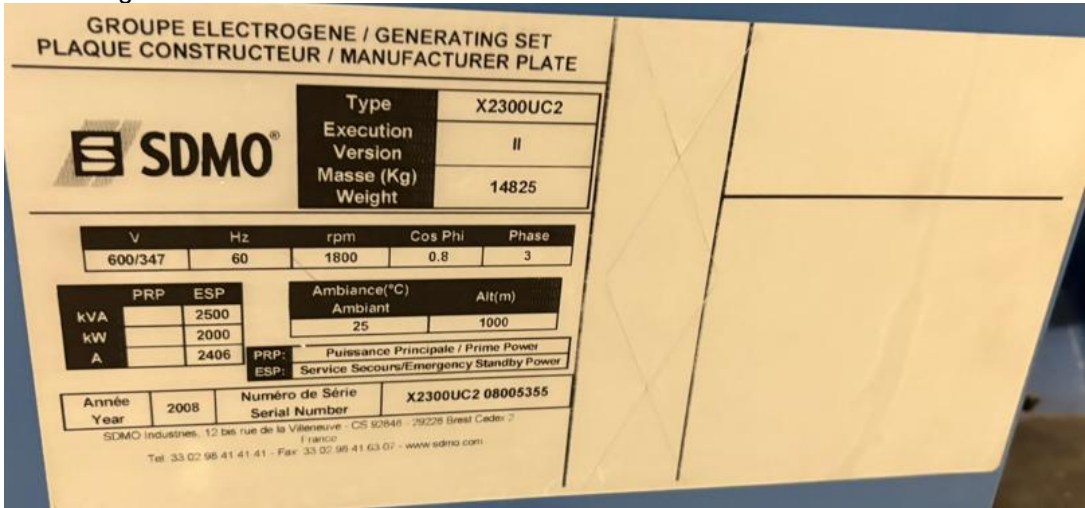
Addendum No. A01

1. General Clarifications

1.1. Proponent Questions:

1. Q: We would like to do a site visit to look at the existing set up. Can that be accommodated?
A: Proponents are asked to contact KHSC to coordinate a visit to review the existing set-up:
Jamie Thompson,
Project Manager
KHSC Planning Office
Jamie.Thompson@KingstonHSC.ca
2. Q: Specification Section 26 32 13 item 1.3.5 requires us to include "Cost for service calls made necessary to maintain the total emergency power system in optimal operating conditions during the two-year warranty period". We are interpreting this as service calls for warranty repairs. Please confirm this does not mean we are to include the Preventative maintenance service cost. (If Preventative maintenance service cost to be included, we would like to know call frequency to be covered in our quote).
A: Service calls are for warranty repairs. Preventative Maintenance service is excluded.
3. Q: Specification Section 26 32 13 item 2.18.11 requires synchronizing. Although the generators include synchronizing capability, its use may be limited in this application. As the generators need to parallel with existing unit, we would like to know if voltage bias and frequency bias signals can be provided by an external synchronizer provided by others. Our understanding is that the master controller, paralleling switchgear is excluded from this tender.
A: Refer to HHA addendum No. E-01.
4. Q: Specification Section 26 32 13 item 2.18.12 to 20 same as clarification request 3 above.
A: Refer to HHA addendum No. E-01.
5. Q: Specification Section 26 32 13 item 2.25. As the generator needs to run in parallel with two existing units compatibility between the units is critical. Please let us know the existing unit details. We understand the units are SDMO. However, we need to know the alternator pitch which is very critical. The generator specifications ask for 2/3 pitch alternators. Can you please confirm the existing alternators are also 2/3 pitch.
A: Information is limited to existing unit name plates as follows:

Generating Set



Alternator / A.C. Generator



Diesel Engine



6. Q: Specification Section 26 32 13 item 2.27. 8 requires the generator to be factory tested with the switchgear and load management system. Please Confirm this is excluded.
A: Refer to HHA addendum No. E-01.
7. Q: Extension of closing date by one week.
A: The closing date remains unchanged.
8. Q: Could you please advise if the April 2027 delivery date is a hard spec?
A: As noted in the RFP, the Preliminary Project Schedule is dependent on the information provided by the proponents. KHSC is interested in the earliest standard delivery to site.

2. RFP Documents

- 2.1. Refer to HHA addendum No. E-01.

End of Addendum No. A01

**ADDENDA
00 91 13**

Addendum No.: E-01

RFP 10434805-ME-02

The information listed below is to form part of the Contract Documents. All associated costs are to be included in the Bid Price shown on the Bid Form. Acknowledgment of this Addendum, by number, is to be shown in the space provided on the Bid Form.

1 SPECIFICATIONS

1.1 Section 26 32 13 Power Generation Diesel (not re-issued)

- .1 Items 2.18.11 through 2.18.20 included for information only. External synchronizer to be provided as part of future tender package. New generator to include synchronizing capability.
- .2 Delete 2.27.8 Synchronization and Automatic Transfer Tests

End of Section

March 31, 2026



Addendum

Project: Kingston Health Sciences Centre
Kingston General Hospital
Emergency Power System Upgrade Project

Contract No.: 10434805 (HHA: 2250139)

Bid Number: 10434805-ME-02
Power Generation, Diesel Generator

Addendum No.: 02

Date Issued: Monday, April 06, 2026

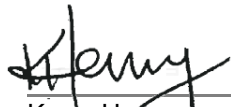
No. of Pages: 48 pages

The following Addendum shall be read in conjunction with and become part and parcel of the bid documents and shall supersede the drawings and or specifications where applicable. Upon receipt to same, staple this Addendum directly to the inside front cover of the specifications. The Proponent shall bring this Addendum to the attention of all subcontractors, trades and suppliers.

1. The following documentation is issued under this Addendum.

- | | | |
|-----|---|----------|
| 1.1 | HDR Addendum No. A02, dated 2026-04-06 | 05 pages |
| 1.2 | HHA Addendum No. E-02, dated 2026-04-02 | 42 pages |

Per:



Kevin Henry, P.Eng
Project Manager

End of Addendum 02

The following Addendum shall be read in conjunction with and become part and parcel of the tendering documents and shall supersede the drawings and/or specifications where applicable. Upon receipt to same, staple this Addendum directly to the inside front cover of the specifications. The Proponent shall bring this Addendum to the attention of all subcontractors, trades and suppliers.

Addendum No. A02

1. General Clarifications

1.1. RFP Terms:

The RFP Terms, including the *RFP Submission Deadline* are amended as follows:

- a. Revise the RFP Item 4.2 key dates table to reflect the following changes:

Event	Date
RFP Issue Date	2026 March 24
Questions to be Submitted in Writing (see Section 4.4.1 (Submission of Questions))	2026 April <u>9</u>
Addenda Deadline (see Section 4.4.3 (Issued Addenda))	2026 April <u>14</u>
<u>RFP</u> Submission Deadline	2026 April <u>17</u> at 3:00pm local time
Proposal Evaluations Complete	2026 April <u>22</u>
Close of Debrief Period (see Section 4.13 (Debriefing))	2026 April <u>30</u>

1.2. Proponent Questions:

1. Q: 26 32 13 Power Generation Diesel 1.5.2.8/2.12.2: Best battery selector is required in submittals, confirm requirement for dual redundant battery banks and chargers for each bank.
A: Refer to HHA addendum No. E-02
2. Q: 26 32 13 Power Generation Diesel 1.14.1.6 – Factory test at 100% full load. Please clarify if this test is of the open power unit, or the completed package with the generator in a custom enclosure. Also, please clarify if this test is 4 hours at 2000 kW, 1.0 PF (resistive test) or 4 hours at 2000 kW 0.8 PF (rated load/reactive test).
A: Refer to HHA addendum No. E-02
3. Q: 26 32 13 Power Generation Diesel 2.1.1: Specification allows for a standby-rated genset if it can deliver “full load” for a minimum of 500 hours per year. As standby and prime ratings are typically limited to a 70% average load factor per ISO 8252, please confirm this full load requirement. Also, would a 1980 kW prime-rated / 2200 kW standby-rated generator be acceptable?
A: Refer to HHA addendum No. E-02
4. Q: 26 32 13 Power Generation Diesel 2.1.2: Advise required transformer in-rush and motor starting step load currents.

A: Refer to HHA addendum No. E-02

5. Q: 26 32 13 Power Generation Diesel 2.1.5: Confirm genset engine size is to be based on standby/prime rating, not continuous use rating.
A: Refer to HHA addendum No. E-02
6. Q: 26 32 13 Power Generation Diesel 2.2.4: Confirm engine is not to be oversized to meet transient responses listed at 2000KW load step. Please provide the actual site load step for confirmation of transient performance.
A: Refer to HHA addendum No. E-02
7. Q: 26 32 13 Power Generation Diesel 2.3.4 – Please define light loads for extended operating periods.
A: Refer to HHA addendum No. E-02
8. Q: 26 32 13 Power Generation Diesel 2.8.3: As the unit has a base tank, confirm the auxiliary Tuthill pump with a six-meter lift is not required, as it adds a failure point to the system.
A: Refer to HHA addendum No. E-02
9. Q: 26 32 13 Power Generation Diesel 2.8.4: Maintaining 38 degree C fuel oil return temperature with an oil to air cooler is not possible in 40 degree C ambient. Please define the actual requirement.
A: Refer to HHA addendum No. E-02
10. Q: 26 32 13 Power Generation Diesel 2.8.5 – Racor 79/1000FG fuel filters are not available with a ULC listing. Please confirm OEM fuel water separators and primary filtration is adequate, or if a non-ULC filter is required, and site variance with TSSA will be covered in the installation contract.
A: Refer to HHA addendum No. E-02
11. Q: 26 32 13 Power Generation Diesel 2.21/2.22/2.23/2.24: Please confirm that control wiring requirements do not apply to actual gensets so that factory ULC2200 certification will not be voided.
A: Refer to HHA addendum No. E-02
12. Q: 26 32 13 Power Generation Diesel 2.13.2 – Confirm isolators are to be bolted to the top of the tank/support rails in the walk-in enclosure.
A: Refer to HHA addendum No. E-02
13. Q: 26 32 13 Power Generation Diesel 2.14.11 – Please confirm if recirculation dampers are required, or if only intake and exhaust dampers are required to maintain 10°C in stand-by conditions.
A: Refer to HHA addendum No. E-02
14. Q: 2.18.11 – Synchronizing
 - The current system on the existing SDMO X2300UC2 generators is proprietary controls (Kerys made by Sorel/SDMO). These controls load share via dedicated CANBUS, and are not compatible with 3rd party controls.
 - The current system utilizes true dead bus paralleling (close before excitation), bringing both units online synchronized in <10 seconds from a call to start.
 - This section of the RFP describes conventional on-speed paralleling.

A: Refer to HHA addendum No. E-02

15. Q: 26 32 13 Power Generation Diesel 2.18.12 – Should the system be designed for 2 or 3 generators?

A: Refer to HHA addendum No. E-02

16. Q: 26 32 13 Power Generation Diesel 2.18.13, 2.18.15 - Please confirm that on-speed paralleling is acceptable, and the loading of emergency loads can be managed not to overload the available generators on the bus during start and paralleling. (need to limit load to 2.0 MW until the 2nd unit syncs)

A: Refer to HHA addendum No. E-02

17. Q: 26 32 13 Power Generation Diesel 2.18.24 – existing generators have remote annunciators in the electrical room and maintenance hallway. These RA's have individual lamps meeting CSA-C282 table 1 plus additional lamps, and 2 analog meters. Please confirm if remote annunciators are needed for the new generator.

A: Refer to HHA addendum No. E-02

18. Q: 26 32 13 Power Generation Diesel 3.6.2.3.(a) (c) Will there be a transfer pump and main tank feeding the 72 hr base tank?

A: Refer to HHA addendum No. E-02

19. Q: 26 32 13 Power Generation Diesel 3.6.2.3.(f) – Please clarify if the sound test is with a calibrated meter, or by an accredited certified company?

A: Refer to HHA addendum No. E-02

20. Q: 26 32 13 Power Generation Diesel 3.6.2.3.(g) – Will emission testing be required on-site if the unit is Tier 2 certified?

A: Refer to HHA addendum No. E-02

21. Q: 26 32 13 Power Generation Diesel 3.6.2.3.(l) – Please clarify where the 125VDC system is needed.

A: Refer to HHA addendum No. E-02

22. Q: 26 32 13 Power Generation Diesel 3.6.3.2.(b) – Please confirm if the site test is 4 hours or 6 hours.

A: Refer to HHA addendum No. E-02

23. Q: 26 32 13 Power Generation Diesel 3.6.3.4 – Test describes 2 generators, please confirm if the final system will include 2 or 3 generators (2 existing plus one new)

A: Refer to HHA addendum No. E-02

24. Q: 3.6.3.6 – Please clarify the 3300 kW 100% load test. Should this read 2000 kW?

A: Refer to HHA addendum No. E-02

25. Q: Drawing E-02

- Note 5 shows that only the generator and enclosure are part of the pre-tender scope.
- How do the controls on the existing units get upgraded to match the new unit? Should this not be sourced from one vendor and be part of the pre-purchase?

A: Refer to HHA addendum No. E-02

-
26. Q: Please confirm if the new generator is to only sync across its unit-mounted breaker, or if synchronizing is also required across the 2500 A breaker noted as N.O in EPA-2, connecting EPA-2 to EPA.
A: Refer to HHA addendum No. E-02
27. Q: The current generator control system has management of the ATS to prevent 2 or more transfer switches from transferring at the same time due to allowable interrupting capacity. Please confirm if this is to be considered in the generator supply or if it will be part of the EAP-2 and PLC supply.
A: Refer to HHA addendum No. E-02
28. Q: Does the generator main breaker need to be 65 kA?
A: Refer to HHA addendum No. E-02
29. Q: an extension to the RFP closing date
A: Refer to Add A02 item 1.1

2. RFP Documents

- 2.1. Specification Section 00 43 23 ME-02 (Re-issued): Add the words "Existing Unit Controls Upgrade (Not part of Base Bid)" in the Description of Alternative Price as Item 2. Indicate the Effect on Base Bid Price to provide an Existing Unit Controls Upgrade.

End of Addendum No. A02

Alternative Prices Bid Form Supplement

Schedule of Alternative Prices (VAT NOT INCLUDED)

Values are presented in Canadian dollars (CAD), and exclude Value Added Taxes (VAT). For this project Value Added Taxes shall mean the Harmonized Sales Tax (HST) at 13%.

Item	Description of Alternative Price	Effect on Base Bid Price	
		Add	Deduct
1	Net change in base Bid Price for supply of material described in this Diesel Generator RFP 10434805-ME-02 irrevocable in the form submitted by the Bidder for a period of two hundred and seventy (270) days running from the Proposal Submission Deadline. Engineering and shop drawings would be awarded within the same period of time as the base RFP terms. The contract completion time would remain effective relative to acceptance (full notice to proceed). For clarity: This Alternative Price is open to acceptance beyond the period of time for the base Bid Price.		
2	Existing Unit Controls Upgrade (Not part of Base Bid)		
3			
4			
5			
6			
7			

END OF SECTION

ADDENDA
00 91 13

Addendum No.: E-02

RFP 10434805-ME-02

The information listed below is to form part of the Contract Documents. All associated costs are to be included in the Bid Price shown on the Bid Form. Acknowledgment of this Addendum, by number, is to be shown in the space provided on the Bid Form.

1 CLARIFICATIONS

1.1 Responses to questions asked during tender period:

- .1 Question: 26 32 13 Power Generation Diesel 1.5.2.8/2.12.2: Best battery selector is required in submittals, confirm requirement for dual redundant battery banks and chargers for each bank.
.1 Answer: Confirmed.
- .2 Question: 26 32 13 Power Generation Diesel 1.14.1.6 – Factory test at 100% full load. Please clarify if this test is of the open power unit, or the completed package with the generator in a custom enclosure. Also, please clarify if this test is 4 hours at 2000 kW, 1.0 PF (resistive test) or 4 hours at 2000 kW 0.8 PF (rated load/reactive test).
.1 Answer: Complete package, 1.0 PF.
- .3 Question: 26 32 13 Power Generation Diesel 2.1.1: Specification allows for a standby-rated genset if it can deliver “full load” for a minimum of 500 hours per year. As standby and prime ratings are typically limited to a 70% average load factor per ISO 8252, please confirm this full load requirement. Also, would a 1980 kW prime-rated / 2200 kW standby-rated generator be acceptable?
.1 Answer: full load to be 2000kW. 1980kW prime/2200kW standby would be acceptable if it can meet requirements listed.
- .4 Question: 26 32 13 Power Generation Diesel 2.1.2: Advise required transformer in-rush and motor starting step load currents.
.1 Answer: Refer to E02 – 450kVA TE3 and TE4 downstream. Motor currents not required.
- .5 Question: 26 32 13 Power Generation Diesel 2.1.5: Confirm genset engine size is to be based on standby/prime rating, not continuous use rating.
.1 Answer: standby/prime rating
- .6 Question: 26 32 13 Power Generation Diesel 2.2.4: Confirm engine is not to be oversized to meet transient responses listed at 2000KW load step. Please provide the actual site load step for confirmation of transient performance.
.1 Answer: Engine does not need to be oversized. Site step load estimated at 1000kW.
- .7 Question: 26 32 13 Power Generation Diesel 2.3.4 – Please define light loads for extended operating periods.
.1 Answer: Approximately 500kW
- .8 Question: 26 32 13 Power Generation Diesel 2.8.3: As the unit has a base tank, confirm the auxiliary Tuthill pump with a six-meter lift is not required, as it adds a failure point to the system.
.1 Answer: Not required.
- .9 Question: 26 32 13 Power Generation Diesel 2.8.4: Maintaining 38 degree C fuel oil return temperature with an oil to air cooler is not possible in 40 degree C ambient. Please define the actual requirement.

- .1 Answer: We do not anticipate 40C ambient temperature. Also, with the amount of liquid stored in the tank, the blended temperature will not reach to that level.
- .10 Question: 26 32 13 Power Generation Diesel 2.8.5 – Racor 79/1000FG fuel filters are not available with a ULC listing. Please confirm OEM fuel water separators and primary filtration is adequate, or if a non-ULC filter is required, and site variance with TSSA will be covered in the installation contract.
- .1 Answer: OEM fuel water separators and primary filtration are acceptable.
- .11 Question: 26 32 13 Power Generation Diesel 2.21/2.22/2.23/2.24: Please confirm that control wiring requirements do not apply to actual gensets so that factory ULC2200 certification will not be voided.
- .1 Answer: Confirmed
- .12 Question: 26 32 13 Power Generation Diesel 2.13.2 – Confirm isolators are to be bolted to the top of the tank/support rails in the walk-in enclosure.
- .1 Answer: Confirmed
- .13 Question: 26 32 13 Power Generation Diesel 2.14.11 – Please confirm if recirculation dampers are required, or if only intake and exhaust dampers are required to maintain 10°C in stand-by conditions.
- .1 Answer: the recirculation dampers are not required.
- .14 it will be a 72h subbase tank so no additional main tanks are needed and the fuel filling process will be done by a fuel truck. Question: 26 32 13 Power Generation Diesel 2.18.11 – Synchronizing. The current system on the existing SDMO X2300UC2 generators is proprietary controls (Kerys made by Sorel/SDMO). These controls load share via dedicated CANBUS, and are not compatible with 3rd party controls. The current system utilizes true dead bus paralleling (close before excitation), bringing both units online synchronized in <10 seconds from a call to start. This section of the RFP describes conventional on-speed paralleling.
- .1 Answer: Controllers to be updated in future package.
- .15 Question: 26 32 13 Power Generation Diesel Should the system be designed for 2 or 3 generators?
- .1 Answer: 3 generators .
- .16 Question: 26 32 13 Power Generation Diesel 2.18.13, 2.18.15 - Please confirm that on-speed paralleling is acceptable, and the loading of emergency loads can be managed not to overload the available generators on the bus during start and paralleling. (need to limit load to 2.0 MW until the 2nd unit syncs),
- .1 Answer: Yes, acceptable
- .17 Question: 26 32 13 Power Generation Diesel 2.18.24 – existing generators have remote annunciators in the electrical room and maintenance hallway. These RA's have individual lamps meeting CSA-C282 table 1 plus additional lamps, and 2 analog meters. Please confirm if remote annunciators are needed for the new generator.
- .1 Answer: Yes, required.
- .18 Question: 26 32 13 Power Generation Diesel 3.6.2.3.(a) (c) Will there be a transfer pump and main tank feeding the 72 hr base tank?
- .1 Answer: it will be a 72h subbase tank so no additional main tanks are needed and the fuel filling process will be done by a fuel truck.
- .19 Question: 26 32 13 Power Generation Diesel 3.6.2.3.(f) – Please clarify if the sound test is with a calibrated meter, or by an accredited certified company?
- .1 Answer: calibrated meter
- .20 Question: 26 32 13 Power Generation Diesel 3.6.2.3.(g) – Will emission testing be required on-site if the unit is Tier 2 certified?

- .1 Answer: Yes, required.
- .21 Question: 26 32 13 Power Generation Diesel 3.6.2.3.(l) – Please clarify where the 125VDC system is needed.
 - .1 Answer: If included as part of generator package, then needed.
- .22 Question: 26 32 13 Power Generation Diesel 3.6.3.2.(b) – Please confirm if the site test is 4 hours or 6 hours.
 - .1 Answer: 4 hours
- .23 Question: 26 32 13 Power Generation Diesel 3.6.3.4 – Test describes 2 generators, please confirm if the final system will include 2 or 3 generators (2 existing plus one new)
 - .1 Answer: 3 generators
- .24 Question: 3.6.3.6 – Please clarify the 3300 kW 100% load test. Should this read 2000 kW?
 - .1 Answer: Yes, 2000kW is correct.
- .25 Question: Drawing E-02 Note 5 shows that only the generator and enclosure are part of the pre-tender scope.
 - .1 Answer: Correct
- .26 Question: How do the controls on the existing units get upgraded to match the new unit? Should this not be sourced from one vendor and be part of the pre-purchase?
 - .1 Answer: Controls to be updated as part of the future tender package as the base scope. Provide a separate price to upgrade controls as part of this tender package.
- .27 Question: Please confirm if the new generator is to only sync across its unit-mounted breaker, or if synchronizing is also required across the 2500 A breaker noted as N.O in EPA-2, connecting EPA-2 to EPA.
 - .1 Answer: Yes, required to synchronize across both.
- .28 Question: The current generator control system has management of the ATS to prevent 2 or more transfer switches from transferring at the same time due to allowable interrupting capacity. Please confirm if this is to be considered in the generator supply or if it will be part of the EAP-2 and PLC supply.
 - .1 Answer: Existing generator control system to remain as is.
- .29 Question: Does the generator main breaker need to be 65 kA?
 - .1 Answer: Yes 65kA.

2 SPECIFICATIONS

2.1 26 32 13 Power Generation Diesel

- .1 Revise 2.1.2 – “The unit shall accommodate identified power transformer in-rush currents, ~~motor starting~~, 100% step loads without stalling, fault current duties and exhaust stack back pressure limitations all within the tolerances specified herein.”
- .2 Delete 2.8.3
- .3 Revise 2.8.5 – “Equip engine with a ULC listed fuel filter/water separator. ~~Racor Fuel Filter/Water Separator, Model 79/1000 FG.~~ Include a control panel mounted #18-1551 vacuum pressure gauge connected between engine and filter.”
- .4 Revise 2.18.12 – “System shall be designed to start and parallel ~~three~~ (3) diesel generator sets.”

- .5 Revise 3.6.3.6 – “Following the operational test prescribed above each the emergency generator system shall be subjected to an additional four (4) hour 100% load test (2000kW), using the temporary portable test load banks.”

3 DRAWINGS

3.1 E-02

- .1 Add Drawing Note 7 – “Provide two remote annunciators for new Generator G-03 to be located in electrical room and maintenance hallway”
- .2 Add Drawing Note 8 – “Base scope – Existing G01 and G02 controls to be upgraded as part of future tender package. Provide separate price to upgrade controls as part of this pre-tender package”

End of Section

April 2, 2026

POWER GENERATION DIESEL
26 32 13

1 GENERAL

1.1 General Requirements

- .1 Conform to Sections of Division 1 as applicable.
- .2 Conform to Section 26 01 01, Electrical General Requirements.

1.2 Work Included

- .1 Work to be done under this Section shall include furnishing of labour, materials, and equipment required for installation, testing and putting into proper operation complete systems as shown as specified and as otherwise required.
- .2 General Schedule of equipment to be provided:
 - .1 2000kW prime rated, 347/600 volt, 3 phase, 4 wire, meeting CSA C282-15 and CSA Z32-15 and additional requirements as noted herein. System shall comprise a fully automatic emergency generating plant capable of automatic starting, and producing rated power in the event of failure of normal supply.
 - .2 Engine generator control panels, with monitor alarm and control system.
 - .3 Starting battery and charger per diesel generator.
 - .4 Control battery and charger per diesel generator.
 - .5 Engine exhaust silencers and associated components.
 - .6 Generator output circuit breaker
- .3 The services to be provided by the supplier under this section shall include but shall not be limited to the following for a complete and satisfactory operating system.
 - .1 Shop drawings, fabrication and assembly as per "reviewed" shop drawings.
 - .2 Interface control wiring diagrams, schedules and wire running lists between all components supplied and to all external devices identified in the contract documents.
 - .3 Factory testing and supplementary witness testing. Witness testing procedure to be submitted as a shop drawing for review by the Engineer, Independent Testing Organization and Owner appointed Commissioning Agent.
 - .4 Delivery schedule and delivery DDP (Incoterms) – Kingston General Hospital – 76 Stuart St, Kingston, Ontario.
 - .5 Technical supervision of unloading, site assembly, installation of power and control cable connections, battery installation and connections, and all other work normal to the electrical trade.
 - .6 Commissioning, site testing including witness testing with temporary load banks. Witness testing procedure shall be submitted as a shop drawing for review by the Consultant. Rental cost of full capacity multi step load bank shall be included in Tender Price. Handling, installation, temporary wiring and removal shall be by the Contractor. Site testing procedure to be submitted as a shop drawing in accordance with the testing requirements of the contract documents and Owner appointed Commissioning Agents requirements. These shall be reviewed by the Engineer, Independent Testing Organization and Owner appointed Commissioning Agent.
 - .7 Providing technical staff and manuals for factory and field training of Owner's staff in the complete operation of the system.

- .8 Warranty service on a priority basis (within 4 hours).
 - .9 Data book including schematic diagrams of all circuit boards.
 - .10 Check out of system one month prior to expiry of warranty period.
 - .11 Services of a technical representative as required by the Owners to review production schedule, delivery dates, shop drawing changes, shop and field testing and training programs.
 - .12 Unloading, hoisting and setting into place, and work normal to the electrical, mechanical and millwright trades such as providing interface power and control wiring to terminals within the equipment components and installation of major components shall be done by the Installation Contractor.
 - .13 .
- .4 Include for the services of qualified factory trained technicians and service representatives to be on site for commissioning of systems and components and during the on-site "witness" testing program as long as necessary to make final adjustment for acceptance of the system.
 - .5 Include for the services of qualified factory trained technicians and service representatives to conduct training of the facility operating staff in the operation and maintenance of the overall emergency power system. Should equipment fail during a training session, conduct a repeat session.
 - .6 All on-site testing/commissioning, and site work requiring interruptions to Owner's existing systems, shall be performed at Owner approved times. Assume premium time, between the hours of 23:00 to 06:00 or on weekends exclusive of Owner imposed embargo dates. A list of presently known Owner embargo dates can be made available upon written request during the tender period.
 - .7 Complete systems shall be left ready for continuous and efficient satisfactory operation.

1.3 Warrantee

- .1 All equipment furnished under this contract shall be guaranteed by the Supplier for a period of 2 year following final site acceptance against:
 - .1 Faulty or inadequate design, manufacture or operation. improper assembly.
 - .2 Defective material or workmanship, or both.
 - .3 Leakage, breakage or other failure that might occur under normal and proper operation of the equipment.
- .2 The complete emergency power system, including all accessories specified herein, shall be guaranteed against faulty and improper material and workmanship for a period of two (2) years from the date of final acceptance by the owner. All system parts and component assemblies shall be guaranteed for two (2) years after acceptance.
- .3 The manufacturer shall correct any deficiencies in his equipment which occur during the two (2) year warranty period at no additional cost to the Owner. This shall include all costs for material and labour. The manufacturers technical representative shall be available on site on a priority basis i.e., within four (4) hours of being notified of a deficiency to repair the system.
- .4 Prior to the expiry of the warranty period, i.e. during the last month of the period, provide technical staff on a weekend to conduct an in depth checkout of the total emergency power system. Replace any components which have become degraded to the point where their long term performance is questionable. The cost of this service shall be included in the bid price.

- .5 Cost for service calls made necessary to maintain the total emergency power system in optimal operating conditions during the two year warranty period shall be included in the bid price.

1.4 References

- .1 Diesel-generator performance and accessories shall conform to latest CAN/CSA Standard C282.

1.5 Shop Drawings and Product Data

- .1 Submit shop drawings and product data
- .2 Submit the following information, contained in a binder, for approval indicating make, model, type, dimensions, ratings, etc...:
 - .1 list of components
 - .2 engine
 - .3 alternator
 - .4 voltage regulator
 - .5 governor
 - .6 battery charger
 - .7 battery
 - .8 best battery selector units
 - .9 cooling system
 - .10 engine and generator mounting, including vibration isolators
 - .11 silencer
 - .12 location of fuel and lube oil filters
 - .13 lube oil and coolant drain valves
 - .14 air cleaners
 - .15 engine instrument panel
 - .16 main control panel
 - .17 starting motor
 - .18 block heaters
 - .19 spares storage cabinets
 - .20 radiator sizing calculations
 - .21 power and control junction boxes
 - .22 weights of all components
 - .23 dimensioned outline of unit
 - .24 confirmation of Diesel exhaust pipe diameter
 - .25 brake horsepower versus rated speed curves
 - .26 diesel fuel consumption and cooling water data
 - .27 performance curves for local conditions and multipliers for ambient temperatures
 - .28 generator decrement curves against generator breaker in switchgear
 - .29 efficiency of generator

-
- .30 confirmation of diesel exhaust back pressure and water coolant requirements.
 - .31 flow diagrams for fuel, lubricating oil, and cooling systems
 - .32 engine and generator control wiring diagrams
 - .33 muffler/silencer including back pressure calculations
- .3 Submit decrement and generator damage curves to show fault current sustaining ability of generator as outlined.
- .4 Submit description of set operation including
- .1 automatic starting and transfer to load and back to normal power, including time in seconds from start of cranking until unit reaches rated voltage and frequency.
 - .2 manual starting
 - .3 manual emergency stop
 - .4 interfaces with external connections including, but not limited to, intake air dampers, exhaust dampers, combustion dampers, fuel systems, building automation system, DC starting battery systems, Generator Switchboard and Automatic Transfer Switchboard.
- .5 submit description of automatic shutdown and alarms on
- .1 over cranking
 - .2 over speed
 - .3 high engine temperature
 - .4 low lube oil pressure
 - .5 short circuit
 - .6 alternator over voltage
 - .7 lube oil high temperature
 - .8 thermistor over temperature on alternator
- .6 Physical Construction Drawings, completely dimensioned, showing:
- .1 Arrangement.
 - .2 Plan, front view, and elevation views.
 - .3 Required clearances for opening doors and for removing breakers.
 - .4 Conduit or cable trays entrance locations and dimensions for both top and bottom entrance.
 - .5 Bus bar locations and configurations.
 - .6 Incoming and outgoing power cable terminator positions.
 - .7 Field wiring terminal block locations, and all other terminal block locations.
 - .8 Anchor bolt locations.
 - .9 Grounding connections.
 - .10 Weight of equipment.
- .7 Three line diagrams, with ANSI device function numbers used throughout, shall show all:
- .1 Instrument transformers.
 - .2 Relays.

- .3 Meters and meter switches.
- .4 Other pertinent devices.
- .8 Elementary Diagrams
 - .1 Elementary (schematic) wiring diagrams shall be furnished for the electrically-operated breaker control scheme.
 - .2 Each elementary diagram shall show all control devices and device contact, each of which shall be labelled with its proper ANSI device function number.
 - .3 Each elementary diagram shall show device and terminal block terminal numbers.
- .9 Control Switches
 - .1 Provide control switch development tables.
- .10 Detailed Connection (Wiring) Diagrams showing:
 - .1 Approximate physical location of all items in each unit.
 - .2 All wiring within each unit.
 - .3 All interconnecting wiring between units.
 - .4 Identification of all terminals, terminal blocks, and wires.
 - .5 Clear identification, by some distinguishing method, of all interface wiring to remote devices. This shall include, but not be limited to, leads from external current transformers, trip circuits from remote devices, auxiliary contacts to remote devices, AC control power, and separate incoming AC power. This shall also include spare auxiliary contacts and relay contacts which shall be wired to terminal blocks for future use.

1.6 Operation and Maintenance Data

- .1 Provide operation and maintenance data for diesel generator for incorporation into Operation and Maintenance Manual.
- .2 Include in Operation and Maintenance Manual instructions for particular unit supplied and not general description of units manufactured by supplier. Include all nameplate/sizing information.
- .3 Operating manual shall include fully detailed software program, documentation including descriptive sequence of operations and referenced to accompanying ladder logic diagrams. This material shall be used in training Owner's staff in the system operation, maintenance and diagnostics. Include the cost of the services of a technical representative for instructing the commissioning team in the system operation.
- .4 Five (5) complete sets of operation and maintenance manuals shall be provided for the system. Turn over one set to the Engineer. These manuals shall be applicable to the engine, generator, battery and charger, control panel including the circuit breakers, controls instrumentation and all other components of the assembly. The manuals shall include circuit and wiring diagrams, safety precautions, operating and maintenance instructions, including drawings, illustrations and identification of wiring. Coordinate breaker details and information with switchgear manufacturer.
- .5 Operation and maintenance instructions for engine and accessories, alternator and accessories, control panel, battery charger, battery, fuel system, engine room ventilation system, exhaust system and accessories, to permit effective operation, maintenance and repair.
- .6 Illustrated parts lists with parts catalogue numbers.

- .7 As Built schematic diagrams of electrical power, control, and logic circuits.
- .8 Flow diagrams for:
 - .1 Fuel system.
 - .2 Lubricating oil.
 - .3 Cooling system.
- .9 Certified copy of factory test results.
- .10 Maintenance and overhaul instructions and schedules.
- .11 Precise details for adjustment and setting of time delay relays or sensing controls which require on site adjustment.

1.7 Maintenance Materials

- .1 Provide maintenance materials. Include:
 - .1 2 sets of fuel filter replacement elements.
 - .2 2 sets of lube oil filter replacement elements.
 - .3 2 sets of air cleaner filter elements.
 - .4 2 sets of fuses for control panel.
- .2 Provide one complete set of all special tools required for unit servicing.
- .3 Provide one battery service safety kit including:
 - .1 Full face shield
 - .2 Acid resistant gloves
 - .3 Acid resistant apron
 - .4 Acid neutralizing compound
 - .5 Eye wash bottle
 - .6 Battery top up bottle
 - .7 Acid resistant wall mount rack to support the above
 - .8 Hydrometer with wall mount bracket and acid resistant drip cup
 - .9 10 Litres of distilled water.
- .4 Provide one heavy duty free standing spares storage cabinet of painted steel construction, approximately 40" wide by 18" deep, with not less than six heavy duty adjustable shelves each capable of supporting 175 kg. and with two hinged lockable doors. Cabinet to house the maintenance materials, special tools, Operation and Maintenance Manual plus a log book.

1.8 Training program

- .1 Include in the services of a qualified technical representative at the factory and at the site to conduct "hands-on" training programs for the Owner's staff.
- .2 The amount of time to be included in the tender is three (3) days at the site for a total of 24 hours.

- .3 The training shall include identification of components and diagnostic alarms as well as basic inspection, housekeeping and logging procedures.
- .4 Submit an outline of the training program for review, adjustment and approval by the engineer. Training will occur in three (3) separate one (1) day sessions, at a time convenient to the Owner, over the construction and warranty period.
- .5 Sessions may be videotaped by the Owner or Contractor as an aid to ongoing training of Owners staff.

1.9 Provisions For Handling And Field Erection

- .1 Each shipping split of stationary structures shall be furnished with removable lifting angles and/or plates suitable for crane hooks or slings.
- .2 Each shipping split shall also be furnished with removable steel channel base plates which will permit using pipe rollers or dollies without damaging the frame steel of the equipment.

1.10 Preparation For Shipment

- .1 Preparation for Shipment shall be in accordance with manufacturer's standards, unless otherwise noted.
- .2 The manufacturer shall be solely responsible for the adequacy of the Preparation for Shipment provision employed in respect of materials and application, to provide materials and their destination in ex-works condition when handled by commercial carrier systems.

1.11 Shipping

- .1 The engine generator set assembly shall be capable of withstanding normal shipping and handling shocks and vibration without damage or deterioration.
- .2 If shipped separately, any components shall be individually crated and tagged with its proper unit number and the equipment number of the assembly to which it belongs.
- .3 Each "shipping section" shall be provided with a permanently-attached, readily-visible identification tag bearing the equipment number of the assembly of which it is a part.
- .4 Cost associated with transportation, insurance and road permits for delivery of equipment to job site shall be included in the bid price.

1.12 Installation

- .1 Installation of the diesel generator equipment shall be in full accordance with, and under the technical supervision of the supplier. Provide drawings showing general arrangement of all components including batteries, interconnecting wiring drawings and schedules suitable for use by the successful contractor.
- .2 Equipment shall be arranged or crated with features which make it easy for hoisting, rolling and jacking into place without damage to the equipment.
- .3 Include in the bid, the cost of a factory engineer or technician to supervise the site assembly and to commission, test, and certify the installation on site.

1.13 Submittals with Bid

- .1 The following drawings and information are to be submitted with the bidders tender:
 - .1 Location of nearest local office staffed with regularly employed engineers and/or technicians who have been factory trained in the installation and service of the proposed equipment.
 - .2 Number of Professional Engineers on staff, licensed in the Province of Ontario.
 - .3 Name and location of factory trained engineers and technicians in regular employment with the system supplier qualified to service the proposed equipment, and their areas of expertise.
 - .4 Resumes for key project personnel and the project manager assigned to the project, and their areas of expertise. Include information on key personnel from sub-suppliers (paralleling and synchronization controls and switchgear).
 - .5 A list of similar installations in Canada (high voltage diesel generators and switchgear, critical facilities (data centers etc.)).
 - .6 Typical response time for a qualified factory trained service engineer or technician to be on site following an "emergency" service call.
 - .7 A document of compliance indicating compliance with each article of the specification, where compliance is not possible the article shall be noted and an explanation given, the document of compliance shall be signed by an officer of the company supplying the system.
 - .8 Failure to provide the above information will result, at the discretion of the engineer and Owner, in the rejection of the RFP submission.
- .2 Submit the following information, contained in a binder, for approval indicating make, model, type, dimensions, ratings, etc...:
 - .1 engine
 - .2 alternator
 - .3 voltage regulator
 - .4 governor
 - .5 control panel
 - .6 weights of all components
 - .7 Dimensioned outline of unit
 - .8 Confirmation of Diesel exhaust pipe diameter
 - .9 Brake horsepower versus rated speed curves
 - .10 Diesel fuel consumption and cooling water data
 - .11 Performance curves for local conditions and multipliers for ambient temperatures
 - .12 List of components
 - .13 Confirmation of diesel exhaust back pressure and water coolant requirements.
 - .14 Confirmation of transient frequency and voltage performance under specified step load conditions, including 0-100%, 0-50%, 25 - 75%, and 50-100% load steps.
- .3 Preliminary Physical Construction Drawings, completely dimensioned, showing:
 - .1 Arrangement.
 - .2 Plan, front view, and elevation views.

1.14 Source Quality Control

- .1 Factory test each generator set including engine, alternator, control panels, and accessories in presence of Engineer and Independent Testing Agent.
- .2 Notify Engineer ten (10) working days in advance of date of factory test.
- .3 Prepare blank forms and check sheet with spaces to record data. At top of first sheet record:
 - .1 Date
 - .2 Generator set serial no.
 - .3 Engine, make, model, serial no.
 - .4 Alternator, make, model, serial no.
 - .5 Voltage regulator, make and model.
 - .6 Rating of generator set, kW, kVA, V, A, r/min, Hz.
- .4 Mark check sheet and record data on forms in duplicate as test proceeds.
- .5 Demonstration of automatic start system
- .6 With 100% rated full load, operate set for 4 h, taking readings at 30 min intervals, and record following:
 - .1 Time of reading.
 - .2 Running time.
 - .3 Ambient temp in °C.
 - .4 Fuel consumption
 - .5 Lube oil pressure in kPa.
 - .6 Lube oil temp in °C.
 - .7 Engine coolant temp in °C.
 - .8 Exhaust stack temp in °C.
 - .9 Alternator voltage:
 - .10 Alternator current:
 - .11 Power in kW.
 - .12 Frequency in Hz.
 - .13 Power Factor.
 - .14 Battery charger current in A.
 - .15 Alternator cooling air outlet temp.
- .7 After completion of 4 h run, demonstrate following features, shut down devices and alarms: Demonstrate low oil pressure and high engine temperature shutdown devices operation without subjecting engine to these excesses.
 - .1 Cycle crank test
 - .2 Over cranking.
 - .3 Over speed.
 - .4 High engine temp.

- .5 Low lube oil pressure.
 - .6 [Deleted]
 - .7 Alternator over voltage.
 - .8 Low battery voltage, or no battery charge.
 - .9 Manual remote emergency stop.
 - .10 High alternator temperature.
 - .11 All other safety features
- .8 Next install continuous electronic power quality meter with sufficient storage capacity and of sufficient sampling rate to record frequency and voltage variations during load switching procedures. Each load change delayed until steady state conditions exist. Switching increments to include:
- .1 No load to full load to no load.
 - .2 No load to 75% load to no load.
 - .3 No load to 50% load to no load.
 - .4 25% load to 100% load to 25%.
 - .5 50% load to 100% load to 50%.
- .9 [Deleted]
- .10 Demonstrate
- .1 Automatic starting of set on failure of normal power.
 - .2 Operation of manual control switch.
 - .3 That battery charger reverts to high rate charge after cranking.

1.15 Temporary and Trial Usage

- .1 Temporary and trial usage by Owner of equipment or any other work or materials supplied before final completion and written acceptance shall not be construed as evidence of acceptance by Engineer.
- .2 Owner shall have the privilege of such temporary and trial usage, as soon as supplier shall claim that said work is completed and in accordance with specifications, for such reasonable length of time as is deemed to be sufficient for making a complete and thorough test of same.
- .3 Claims for damage shall not be made by supplier for the injury to or breaking of any parts of such work which may be used, whether caused by weakness or inaccuracy of structural parts or by defective materials or workmanship of any kind whatsoever.

1.16 Final Acceptance

- .1 Request for acceptance shall be submitted in writing. Written request shall not be submitted until:
 - .1 Deficiencies noted during job inspections have been completed.
 - .2 Systems have been pre-commissioned and tested and are ready for on-line operation.
 - .3 Completed data books have been submitted and approved.
 - .4 Diagrams have been submitted and approved, and equipment identification is completed.

- .5 The cleaning up is finished in every respect.
- .6 Spare parts and replacement parts specified have been provided and receipt of same acknowledged.
- .7 Record drawings are completed and approved.
- .8 Owner's operating personnel have been instructed in operation of systems.

2 PRODUCTS

2.1 Nominal Size and Rating

- .1 Unit shall meet the requirements of CAN/CSA Standard C282 for the supply of emergency power and have a minimum nameplate prime power rating of 2000 kW at 40°C ambient. 2000kW standby generator is acceptable if the generator is capable of delivery full load for a minimum of 500 hours of operation per year per CAN/CSA Standard C282 requirements.
- .2 The unit shall accommodate identified power transformer in-rush currents, ~~motor-starting~~, 100% step loads without stalling, fault current duties and exhaust stack back pressure limitations all within the tolerances specified herein.
- .3 The unit shall be sized and set to provide 100% load in a 40°C ambient without exceeding the limits specified herein.
- .4 The engine provided shall have additional BHP capacity for power requirements to drive engine driven components and accessories such as: radiator fan, fuel pump, water pump, as well as additional BHP allowances for power transformer in-rush currents, motor starting duties, step loading changes, stack back pressure levels at 40°C ambient, all within CSA specified tolerances for voltage, frequency and temperature, and the tolerances specified herein.
- .5 The engine manufacturer's catalogued BHP curves for Standby Rating shall be based on continuous duty conforming to or exceeding the following standards:
 - .1 SAE J816b (US)
 - .2 BS5514 (British)
 - .3 DIN "B" 6270 (European)
 - .4 ISO 3046/1

2.2 Performance Characteristics

- .1 The equipment shall be suitable for operation and providing full output power as per the manufacturers guaranteed performance profile under the following conditions:
 - .1 Altitude 100 meters above sea level
 - .2 Outside ambient -40°C to 35°C nominal
 - .3 Room ambient 10°C to 40°C nominal
 - .4 The engine and generator units shall be capable of being synchronized and operated in parallel under all load conditions within the total capacity of the units.
- .2 Frequency Control - Governor control on each unit shall maintain output frequency within the following limits:

- .1 Frequency drift - with any constant load between no load and rated load, the change in regulated frequency shall be +/- 0.25% from rated.
- .2 Steady-state - frequency control shall be within +/- 0.25% from rated when the load is varied from no load to rated load and all transients have decayed.
- .3 Frequency variations during steady-state conditions shall show a random nature (as opposed to cyclic variations).
- .3 Voltage Regulation - voltage control of generator output shall be within the following limits:
 - .1 Voltage drift - with any constant load between no load and rated kVA, the change in regulated output voltage shall not exceed +/- 0.5% within one-half hour and a constant ambient temperature.
 - .2 Steady-state voltage regulation - voltage regulation shall be +/- 1% of rated voltage when the load is varied from no load to rated kVA and all transients have decayed.
- .4 Transient voltage and frequency deviation and recovery time upon addition and deletion of a 100% step load shall not exceed
 - .1 25% voltage deviation
 - .2 10% frequency deviation
 - .3 5 second recovery time to reach normal stability requirements
 - .4 Addition of a 100% step load shall not cause the engine to stall.
 - .5 Removal of a 100% step load shall not cause the engine to shutdown.

2.3 Diesel Engine

- .1 Engine shall be a four stroke, single acting, full compression ignition type with a maximum crankshaft speed of 1800 rpm.
- .2 Engine shall be a low emissions type certified to meet the requirements of the U.S. Environmental Protection Agency Tier 2 limits for a stationary emergency application
- .3 Engine shall operate on commercial grades of diesel fuel oil readily available locally and shall give satisfactory performance on No. 2 Grade domestic fuel oil in an emergency.
- .4 A special operating condition is that the set be capable of operating at light loads for an extended period of time as normal power failure may occur when only part of the full output of the generator set is required.
- .5 Engine shall incorporate dry vortex type air cleaners equipped with service indicators, of replaceable element type, with an efficiency of at least 99.8%. Service indicators are not to be mounted in rubber hose.
- .6 Diesel engine shall be suitable for a stack back pressure of 6.70 kPa.
- .7 Flex connection at engine exhaust complete with gaskets, nuts, bolts and miscellaneous hardware.
- .8 All moving parts such as flywheels, pulleys, belts, etc., shall be enclosed with suitable guards to protect the engine operator from accidental injury. All guards shall be easily removable for servicing the equipment.

- .9 Engine shall be complete with inter-changeable cylinder heads, exhaust valves constructed of special alloy steel, and satellite faced exhaust valve inserts.
- .10 Provide with the engine a flexible 100mm diameter hose of proper diameter and sufficient length to reach from the engine crankcase vent connection to the atmosphere side of the radiator exhaust plenum, for venting of crankcase fumes to atmosphere.
- .11 Provide a crankcase emissions absorption system with a flexible 4" diameter hose of sufficient length to reach from the system to the atmosphere side of the radiator exhaust plenum, for venting of crankcase fumes to atmosphere. System to be Nelson-Winslow or equal.
- .12 Engine shall be equipped with 24 volt D.C. electric starting motors, and the starting pinion shall be arranged to disengage automatically when the engine starts.
- .13 Engine shall also be equipped with individual safety devices to shut-down the engine and to sound an alarm in the event of conditions specified later in this Section, and equipped with contacts to pre-alarm for conditions specified later in this Section.
- .14 Each engine flywheel housing shall be connected rigidly to the generator housing with an SAE adaptor. Each unit shall be mounted on a common, heavy duty, stress relieved, fabricated steel baseplate. Torsional approval of each entire assembly must be obtained and submitted in duplicate to the Consultant for review. Each report shall also outline the critical speeds of the assembly.
- .15 Removable guards shall be provided around all moving parts and high temperature areas to protect operating personnel.

2.4 Governor

- .1 Governor to be manufacturer's current OEM electronic high performance standard system for load sharing and speed control of the units. Governor package to be complete with magnetic pickup and synchronizing and load control modules.
- .2 The governor control system to include filtering of harmonics to provide true RMS electrical inputs to the speed control system.
- .3 Governor shall be capable of isochronous operation, no load to full load and capable, under any steady state condition, of maintaining engine speed within $\pm 0.25\%$.
- .4 The governor shall operate in an isochronous and shall provide load sharing functions when in parallel with similar units in isochronous.
- .5 Input voltage and current signals shall be fed into the governor from current and potential transformers supplied with the governor and installed in the switchboard as supplied as part of this Contract.
- .6 The governor shall be capable of the following performance:
 - .1 Operating the engine isochronously under steady state conditions from no load to full load.
 - .2 Transient regulation response as specified.
 - .3 Frequency drift as specified.
 - .4 Steady state speed regulation as specified.
 - .5 The governor control system shall include filtering of harmonics to provide true RMS electrical inputs to the speed control system.

- .6 Parallel operation so the sets operate isochronously.
- .7 Load sharing so that each engine generator set assumes an equal percentage of the total load while maintaining specified steady-state speed regulation.
- .8 Adjustable load sharing so that each engine can be selected to assume more or less load, up to 100% (for annual load testing purposes).

2.5 Engine Cooling System

- .1 Engine cooling system shall include built-in centrifugal type water circulating pump and thermostat to maintain proper jacket water temperature under each load condition.
- .2 Cooling system components and seals with flexible water hose connections.
- .3 Engine shall be cooled by an integral radiator and blower fan cooling system including permanent anti-freeze to -40°C as recommended by engine manufacturer.
- .4 Radiator fan to be sized to provide radiator design air flow rates at minimum static pressure of 1.0" WC (generator external air flow resistance) plus air flow resistance by generator radiator and air flow resistance by any other generator components.
- .5 Radiator shall have sufficient capacity for cooling the engine under full load conditions in an ambient temperature up to 40°C. Include for sizing to accommodate static pressure loss through louvers, silencers and dampers. Manufacturer shall verify this pressure drop and oversize as required to deliver full rated load under 40°C ambient temperature. At a minimum, unit shall be designed for 0.75" external static pressure drop. Division 20 contractor to supply flexible duct adapter, manufacturer shall coordinate requirements with installation contractor.
- .6 Radiator to be equipped with a coolant liquid level indicator.
- .7 Fan shall be pusher type, with ample means for adjustment to allow for belt stretching and shall be enclosed in an easily removable cage.
- .8 Engine shall be complete with thermostatically controlled engine coolant pre-heater, Kim Hotstart to maintain coolant around combustion chamber of approximately 10°C. Heater shall be rated 208 Volts, 1 phase. Preheater water circuit to be equipped with position indicating ball type shut off valves to permit removal of heater without draining of coolant from the system. Include heavy duty thermostat equal to United Electric Model #120 complete with heavy duty engine mounted relay to shut off heater when engine is running.
- .9 Ball drain valves shall be provided for draining coolant from each engine block, radiator and jacket heater.

2.6 Engine Monitoring Panel

- .1 The following gauges shall be supplied and shall be flexibly mounted on engine:
 - .1 Coolant in and out temperature gauges
 - .2 Engine water temperature gauge
 - .3 Lube oil pressure gauge
 - .4 Lube oil temperature
 - .5 Tachometer

- .6 Run Hour meter
 - .7 Exhaust temperature thermometer
- .2 Panel shall be equipped with an integral shrouded emergency stop pushbutton

2.7 Lube Oil System

- .1 Engine shall be provided with full pressure lubrication with high capacity positive displacement type gear driven pumps, with adjustable pressure regulators, replaceable element filter with bypass valve arrangement, supplying filtered lubricating oil under pressure to main bearings, crank pin bearings, piston pins, timing gears, camshaft bearings, valve rocker mechanism, governor and turbocharger. Full pressure lubrication shall be provided to all main bearings, connecting rod bearings and camshaft bearings.
- .2 Readily accessible ball valves with suitable piping shall be provided for convenient draining of complete lubricating oil system.
- .3 An air-cooled lubricating oil cooler shall be included.
- .4 Engine shall be complete with thermostatically controlled oil sump heater, rated 120 volts, single phase, complete with heavy duty engine mounted relay to shut off heater when engine is running.

2.8 Fuel System

- .1 Engine mounted high performance fuel transfer pump with filter assembly.
- .2 Fuel filter shall have replaceable elements that can be easily removed without disturbing other parts of engine. Equip engine with primary and secondary fuel filters.
- ~~.3 Auxiliary Tuthill gear driven high lift fuel transfer pump (approximately 6 metre lift not including filter and line restrictions), complete with primary and secondary filter assemblies and check valve, hand operated priming pump with bypass valve, and fuel pressure switch to provide engine shutdown.~~
- .4 Equip engine with a fuel to water or fuel to air heat exchanger type fuel cooler to dissipate all waste heat transferred from engine to recirculated fuel. Size fuel cooler to ensure fuel returned to the fuel storage tank from the engine is maintained at a temperature below 38°C with a room ambient air temperature of up to 40°C, with allowances made for temperature rise as the air is heated by the machine before it reaches the heat exchanger. Submit calculations as a shop drawing.
- .5 Equip engine with a ULC listed fuel filter/water separator. ~~Racor Fuel Filter/Water Separator, Model 79/1000 FG.~~ Include a control panel mounted #18-1551 vacuum pressure gauge connected between engine and filter.
- .6 Provide braided stainless steel aircraft quality flexible fuel oil connections, supply and return, from engine to filters, between filter components, and from filters to valved connections left by Division 20. Flexible fuel lines shall be supplied by Diesel manufacturer and shall comply with the requirements of the Authority Having Jurisdiction and shall be ULC listed.

Standard of Acceptance

- Aeroquip
- OPW
- OEM

2.9 Generator

- .1 Three phase brushless, self-ventilating, revolving field synchronous machine of salient pole construction with amortisseur windings with permanent magnet pilot exciter, IP23 drip-proof construction, single bearing type connected to the engine through a flexible coupling with shear bolts.
- .2 Diesel-driven alternator shall be complete with necessary controls and accessories, to comprise a fully automatic standby generating plant capable of producing power in event of failure of normal supply. Generator shall be capable of operating on system voltage shown, 80% power factor and maximum 1800 rpm.
- .3 Generator enclosure shall be CSA Type 2 Drip-proof as per CSA C22.2 No. 100-M 1982 modified with air inlet and outlet louvres arranged in such a way as to prevent the sprinkler liquid from entering the equipment and/or interfering with its operation as per Electrical Safety Code Rule 26-008, equal to IP23 housing.
- .4 Generator shall include fully connected damper windings and stator windings shall be 2/3 pitch to provide low reactance at the 5th and 7th harmonics for three phase non-linear loads. Total harmonic distortion shall not exceed 4% on a 3 phase balanced harmonic free load. Telephone interference factor for harmonic content shall not exceed 50.
- .5 Generator insulation shall be Class H. When operating continuously at full load the average winding temperature in °C measured by rise of resistance method shall not exceed 130°C at an ambient of 40°C.
- .6 Generator shall be of rotating field type with permanent magnet pilot exciter and shall be capable of maintaining at an ambient of 40°C the following: 100% of full load continuously; 110% of full load for 1 hour; 150% of full load for 1 minute; and 300% of full load for 10 seconds, at terminals of generator, without damage to generator, for the following fault conditions:
 - .1 3 phase symmetrical fault,
 - .2 phase to phase fault,
 - .3 phase to ground fault.
- .7 Generator shall be complete with automatic voltage regulators, Stamford Series MX321 or equal (3 phase RMS voltage sensing) acting on each phase and capable of controlling voltage within $\pm 1/2\%$ of rated voltage, no load to full load, during steady state conditions.
- .8 Set shall be oversized as required, to accommodate motor in-rush duty, and 100% block loading.
- .9 Identify alternator windings with permanent tags.
- .10 Bring windings to insulated terminals in an oversized metal junction box mounted on the alternator. Size junction box to permit mounting of engine and alternator low voltage controls and wiring terminal blocks, and to provide adequate space for terminating outgoing power cables with 2 hole long barrel compression connectors exiting from the top with adequate allowance for cable bending radius. Provide barrier in junction box to separate control voltage and line voltage wiring.
- .11 Provide a tinned copper termination plate drilled to accept multiple 2-hole compression connector terminated cables per phase, and necessary bus bar extensions to generator winding terminals.
- .12 Thermistors shall be embedded in stator winding and connected to alternator control circuitry.

2.10 Generator Excitation System

- .1 Exciter shall be a brushless type using a rotating 3 phase full wave rectifier bridge circuit and a 3 phase rotating armature type alternating current generator mounted on the rotor shaft rated to provide excitation current necessary to operate alternator at rated output continuously for all overload conditions and to maintain specified voltage regulation under transient conditions.
- .2 Voltage regulator system to have frequency dependent circuitry with adjustable voltage roll-off feature to aid engine speed recovery for step loads. Include for fine tuning at the engine supplier's plant and at the site for optimization of the settings.
- .3 Voltage regulator to be solid state silicon controlled rectifiers with phase controlled sensing circuit, regulation $\pm 1/2\%$ no load to full load. Provide auto/manual control module, and individual hand trimmer adjustment located at control cubicle.
- .4 The voltage regulator circuitry shall include:
 - .1 Control to adjust the stabilizing or anti-hunt circuit which controls overshoot or undershoot of the alternator voltage or load changes.
 - .2 Current forcing circuit to supply a minimum of 300% of nominal alternator output for at least 10 seconds to allow proper co-ordination of system protective devices.
 - .3 Manual control for adjustment of the automatically regulated generator voltage by $\pm 5\%$.
- .5 Excitation system for each unit shall be complete with permanent magnet generator (PMG) pilot excitation system with a 3 phase RMS voltage sensing unit to provide $\pm 0.5\%$ voltage regulation. The AVR shall be immune to RIF and shall include built-in solid state overvoltage protection and adjustable short circuit current forcing controls and a separate trimmer unit mounted on the switchboard.
- .6 The voltage regulator shall have the following performance features:
 - .1 Regulating the output voltage of the generator when it is disconnected from the load, supplying load alone, supplying load in parallel with the other sets.
 - .2 Steady state voltage regulation as specified.
 - .3 Voltage drift as specified.
- .7 Mount the generator voltage regulator system in the generator control panel and provide suitable terminal blocks at each end to permit field interconnection to the generator terminal box with 8 #12 in 1" steel conduit. Components shall be protected against dust and moisture.

2.11 Safety and Alarm Devices

- .1 One set of temperature and pressure switches shall be included for coolant system and lube oil system to provide instant shut-down action. Settings of these switches shall be as recommended by Engine manufacturer. Over speed shall cause instant shut-down.

2.12 Starting System

- .1 Each engine shall be supplied with a complete and independent starting system.
- .2 Electric starting system, minimum 24 volts, shall include dual starting motors, one (1) battery charger, cutout, regulator and two (2) sets of lead acid batteries.

- .3 Batteries shall be capable of providing six consecutive 30 second cranking attempts without recharging, with terminal voltage not to fall below 75% of nominal voltage. Provide cranking limiter for one or more cranking cycles

Standard of Acceptance

- Surrette 8NS-23P
- Dekka East Penn DL Series
- GNB KDZ Series
- OEM

- .4 Provide a steel battery rack with a 3/4" plywood base both painted with acid resistant paint

- .5 Provide a hydrometer with wall mounting bracket

- .6 Batteries shall come complete with extra flexible 4/0AWG EPR insulated battery cables and compression connectors with battery rack with 3/4" painter plywood base.

- .7 Fully automatic dual rate battery charger capable of recharging batteries in 30 minutes following one normal start.

- .8 When battery voltage falls below a level suitable for starting, a contact on a secondary relay shall close to cause an alarm signal to be sounded at the Control Panel.

- .9 Battery charger shall be a dual rate silicon rectifier battery charger for automatic float charge operating from 208 volts, single phase, 60 Hz having the following accessories and capacities:

- .1 Wall mounted sprinkler proof enclosure
- .2 Silicon controlled rectifier assembly with DC protection, suitable for dual charging rates
- .3 AC power on indication
- .4 AC power failure indication
- .5 Float voltage adjustment
- .6 Equalize circuit and timer
- .7 Overload protected input switch
- .8 DC output breaker complete with normally closed auxiliary contacts
- .9 DC ammeter, 3" semi-flush, 250° scale taut band suspension
- .10 DC voltmeter, 3" semi-flush, 250° scale taut band suspension
- .11 Short circuit current limit
- .12 Low voltage alarm with 60 second time delay (relay contacts which open for alarm, close normally wired out to terminal strip with appropriate connection) for supervisory control.
- .13 DC output breaker trip alarm (wire out auxiliary contacts on DC output breaker as for low voltage alarm).
- .14 Minimum charge rate to be 30 amps for battery charging and maximum charging time for fully discharged battery to 90% full charge shall not exceed six (6) hours.
- .15 Enclosure to be finished and painted to match generator set enclosure; interior to be white.

Standard of Acceptance

- Mechtron
- Vulcan

- OEM

2.13 Mounting Base

- .1 Diesel-generator package shall be mounted on a structural steel base with suitable adjustable steel, restrained spring vibration isolators with 50 mm static deflection levelling bolts, oil proof snubbers, and 6mm thick sound pads mounted between steel base and concrete housekeeping pad. Isolation efficiency shall not be less than 95%. Isolators shall be suitable for noted seismic requirements.

Standard of Acceptance

- Mason Model
 - Vibro-Acoustics
 - Korfund
 - OEM
- .2 Vibration isolators to be anchored to the concrete floor with 5/8" anchors equal to Simpson Strong Tie Wedge All anchors with a minimum of 2 - 3/4' concrete cover
 - .3 The alternator set shall be complete with hooks and hubs for the attachment of slings suitable for moving the unit.
 - .4 Baseplates shall be of sufficient rigidity to maintain alignment of engine generator shafts and frames under all conditions during shipping, installation and service and shall be of all welded construction without bolt-on components.
 - .5 Engine generator feet and baseplate sole plates shall be machined parallel and true. Shimming shall be of the steel type and shall only be permitted underneath the generator feet.
 - .6 Provide all necessary piping, couplings, fittings, wiring and connections between all components mounted commonly on the steel base.
 - .7 Provide full size galvanized steel drip pan under engine and a separate pan under the Racor fuel filter assembly.

2.14 Outdoor Weather-Protective Walk-In Sound Attenuating Housing

- .1 The generator set shall be provided within a sound-attenuated housing which allows the generator set to operate at full rated load in the ambient conditions previously specified. The enclosure shall reduce the sound level of the generator set while operating at full rated load to a maximum of 60 dBA at any location 7 meters/23 feet from the generator set in a free field environment. Housing configuration and materials used may be of any suitable design which meets application needs, except that acoustical materials used shall be oil and water resistant.
- .2 The enclosure shall include hinged doors for access to both sides of the engine and alternator, and the control equipment. Key-locking and pad-lockable door latches shall be provided for all doors. Door hinges shall be stainless steel.
- .3 The enclosure shall be provided with an exhaust silencer Super Critical grade, which is mounted inside of the enclosure, and allows the generator, set package to meet specified sound level requirements. Silencer and exhaust shall include a rain-cap and rain-shield. Secondary silencer shall be on the roof of the enclosure to attain the sound level as required.
- .4 All sheet metal shall be primed for corrosion protection and finish painted with the manufacturer's standard color. All surfaces of all metal parts shall be primed and painted.

- .5 Painting of hoses, clamps, wiring harnesses, and other non-metallic service parts shall not be acceptable. Fasteners used shall be corrosion resistant, and designed to minimize marring of the painted surface when removed for normal installation or service work.
- .6 Space heater and adequately sized service switchboard for block heater, battery charger, internal lights, anti-condensation heater and receptacle shall be provided inside the enclosure.
- .7 Enclosure base shall have a double wall construction sub-base fuel tank, UL listed with 72 hours capacity at full load. Level gauge, low level switch, vent cap, fill cap, leak alarm switch shall be provided in the fuel tank.
- .8 The enclosure shall have a dedicated frame under the generator to allow the generator enclosure to be lifted off the belly tank for future service or replacement of the belly tank.
- .9 Properly sized three phase electrical service panel shall be provided with pre-wired engine block heater, oil pan heater, alternator anti-condensation heater, battery charger and internal lights and space heater.
- .10 External GFI receptacle shall be provided for electrical service connection.
- .11 Enclosure shall be provided with motorized louvers/dampers for ventilation to meet CSA-282 requirement for maintaining 10Deg.C internal temperature.
- .12 Units shall include battery operated emergency lighting to average value of 50 lux for 30 minutes.

2.15 Engine Alternator Finish

- .1 Finish and paint the complete engine generator assembly, base, and all accessories with one coat of primer followed by two coats of high temperature machinery enamel with color equal to manufacturer standard color.

2.16 Diesel Exhaust Silencer

- .1 Provide an exhaust silencer to meet the requirements of MOE and local noise ordinances. Muffler to possess as high an insertion loss as possible consistent with maximum allowable pressure drop and exhaust pipe dimensions and configuration.
- .2 Verify required inlet and exhaust port positions and the required flange dimensions for connections to the exhaust piping system with the Division 20 contractor prior to manufacturing silencer.
- .3 Attenuation to be a minimum of 35 dB in the 125 to 4000 Hz frequency range and consistent with that below. The diesel exhaust muffler/silencer system shall provide the following minimum attenuation requirements:.

Octave Band (Hz)	Silencer Insertion Loss (dB)
31.5	33
63	40
125	49
250	51

500	48
1000	47
2000	46
4000	47
8000	49

- .4 Provide flexible hose connections of stainless steel at diesel engines. Hoses shall have close pitch corrugations and flanged ends and be capable of taking up the movement of the diesel engines plus expansion of the exhaust mufflers and piping in the axial direction of the flexible hose.
- .5 Supply nuts, bolts, gaskets and all miscellaneous hardware required to complete the installation of the exhaust systems from the engines up to and including the flanged outlets of the silencers. The exhaust system components and hardware shall be delivered to the job-site, inspected and turned over to the Division 20 contractor for installation.
- .6 If engine has two outlet exhaust connections, provide two flexible hose connections and either a two inlet type muffler or an inverted "Y" type pipe fittings to transition from two to one exhaust connections.
- .7 Exhaust silencer shall be standard wall thickness, seamless welded steel pipe to A-53-63T Grade "B" Specifications. Exhaust silencer, flanges and hardware shall be manufactured from Type 316 stainless steel.
- .8 Expansion joints shall be provided.

Standard of Acceptance

- JP Environmental
- Silex
- York
- OEM

2.17 Recirculator

- .1 Provide a recirculator for removing the oil mist from the engine crankcase breather vent.
- .2 Recirculator is to be mounted in a horizontal position and above the crankcase oil level. A connection using rigid piping to be made between the recirculator and the engine crankcase breather.
- .3 The exhaust from the recirculator is to be piped so that the engine air flow provides a 0" to 0.3" positive pressure reading during normal engine operation. Provide a U-Tube manometer for measurement of pressure difference and a control valve to adjust the pressure difference.
- .4 Oil collected by the recirculator is to be returned to the engine with a tube from the bottom of the recirculator to the engine oil sump. Position oil drain tube below the oil level line of the engine oil sump.
- .5 Provide two (2) spare filters for each recirculator.
- .6 If recirculator is integral to the engine and meets the requirements of this section an external recirculator is not required.

2.18 Engine Control Panel Elements

- .1 The generator set shall have a dedicated Engine Control Panel section..
- .2 Section to include engine and generator monitoring, instrumentation, controls, and starting systems.
- .3 Provide digital information screen capable of displaying the following information:
 - .1 Coolant in and out temperatures
 - .2 Engine water temperature
 - .3 Lube oil pressure
 - .4 Lube oil temperature
 - .5 Tachometer reading
 - .6 Run Hour meter reading
- .4 All engine control panel elements are to be completely accessible with all terminations for power and control wiring and any other items requiring torquing, infra-red thermal scanning, maintenance, or replacement all visible and accessible from the front, when respective hinged door is opened.
- .5 Provide two (2) Form C dry contacts, for each generator set, wired to a separate terminal strip in the panel for connection to the BAS by Division 20 for monitoring of the following conditions.
 - .1 Diesel Generator Set Summary Idle Trouble
 - .2 Diesel Generator Set Summary Running Trouble
 - .3 Diesel Generator Set Shutdown Alarm
 - .4 Diesel Generator Set Running Status
- .6 Provide two (2) Form C dry contacts, for each generator set, wired to a separate terminal strip in the panel for connection to the Fire Alarm System by Division 26 for monitoring of the following conditions.
 - .1 Diesel Generator Set Summary Idle Trouble
 - .2 Diesel Generator Set Summary Running Trouble
 - .3 Diesel Generator Set Shutdown Alarm
 - .4 Diesel Generator Set Running Status
- .7 Each engine control panel to include a programmable logic controller or a purpose built microprocessor based controller and is to include, but not be limited to, the following components:
 - .1 control system to initiate the diesel starting and stopping sequence, and annunciate any fault condition (local or remote indication);
 - .2 all required secondary and control wiring, type 'TEW' 105°C rated, extra flexible wire with thermoplastic insulation and an overall flame retarding cotton braid, neatly harnessed, suitably secured and identified with slip-on identification markers; Wiring shall be colour coded to suit application and standards; Note that wiring for the DC supply to control panel, wiring for cranking circuits and wiring for air box damper to be stranded minimum 10 AWG; wiring within control panel shall be stranded minimum 16 AWG; and wiring between control panel and engine generator set shall be stranded minimum 14 AWG

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- .3 Each cell to be complete with all required control wiring and terminal blocks. Control wiring to be neatly harnessed and suitably secured. Wiring to outgoing circuits and to door mounted equipment shall terminate on terminal blocks.
 - .8 The designer/manufacturers of the entire control system will be required to:
 - .1 supply complete design, erection and layout drawings for the system, clearly indicating to all wiring requirements, interfacing or interconnection provisions required to completely integrate the controls with all remote apparatus;
 - .2 assemble, wire and pretest the system components in their factory prior to shipment to the engine supplier for factory testing.
 - .3 assist in the installation and oversee the work to ensure that it meets with the generator supplier's requirements;
 - .4 carry out a site test of the system in conjunction with the other components in the standby power system and demonstrate its proper operation to the satisfaction of the Owner and Consultant.
 - .9 Selector and Control Switches per Engine
 - .1 Provide the following devices on the front panel of the engine control section external to the HMI display panel:
 - (a) Engine Mode Operation Selector Switch with Manual, Off, Auto and Reset options.
 - Switch in 'OFF' position shall cause an alarm to occur.
 - (b) Generator Start/Stop Momentary Contact Selector Switch with middle rest position
 - (c) Generator Breaker Open/Close Momentary Contact Selector Switch with middle rest position (with interlock to synchronization check protection scheme)
 - (d) Synchronization Auto/Manual Selector Switch
 - (e) Engine Speed Control
 - (f) Generator Voltage Adjust
 - (g) Alarm and Trouble audible notification
 - (h) Red Alarm Lamp
 - (i) Yellow Idle Trouble Lamp
 - (j) Yellow Running Trouble Lamp
 - (k) Illuminated White Alarm Silence Pushbutton
 - (l) Lamp Test Pushbutton
 - (m) Blue Engine Emergency Stop Shrouded mushroom type Pushbutton
 - (n) Synchroscope
 - .10 Metering and Instrumentation per engine
 - .1 automatic voltage regulator with provision for automatic voltage adjustment as specified
 - .2 radio suppression module (unless suppression with alternator meets Commercial Standards);
 - .3 digital governor and speed control system
 - .4 Provide the capabilities to monitor the following parameters through the engine HMI display:
 - (a) Generator Phase Currents
 - (b) Generator Voltage (L-L, L-N) at line side of generator breaker
 - (c) Bus Voltage (L-L, L-N) at load side of generator breaker
 - (d) Line-to-Load Voltage Difference between line and load side of generator breaker for all three (3) phases
 - (e) Power Factor (Average, Phase)
 - (f) kW, KVAR, kVA (Average, Phase, %)
 - (g) kW-hr, kVAR-hr (Total)
 - (h) Frequency
 - (i) Engine Speed
 - (j) Generator Elapsed Time

- (k) Oil temperature
 - (l) Oil pressure
 - (m) Oil level
 - (n) Engine Coolant In Temperature
 - (o) Engine Coolant Out Temperature
 - (p) Fuel Pressure
 - (q) Fuel In Temperature
 - (r) Fuel Out Temperature
 - (s) Fuel Oil/Water separator vacuum pressure
 - (t) Excitation Voltage and Current
 - (u) Generator Stator and bearing temperature
- .5 Note that current transformers and potential transformers for metering and protective relays are to be located in the switchgear. Individual engine information shall be accessible on the synchronizing control panel section HMI displays. Information shall be provided to the main control panel via modbus communication.
- .11 Synchronization ("Dead Bus" Operation)
- .1 A synchronization monitor, one per diesel generator set, shall sense voltage, frequency and phase angle of the unit to be paralleled. The monitor shall:
 - (a) Compare the voltage of an oncoming diesel generator set with the load voltage and initiate a correction signal to cause any voltage difference to be reduced to within that specified.
 - (b) Compare the frequency of an oncoming diesel generator set with the bus frequency and initiate a correction signal to the governor of the oncoming diesel generator set until the frequency difference is within that specified.
 - (c) Cause the phase angle of an oncoming diesel generator set with respect to the load voltage to be within that specified.
 - .2 The monitor shall permit a diesel generator set to be held in synchronization when both sources are available.
 - .3 When the above conditions have been satisfied, the monitor shall initiate a signal to close the circuit breaker of the incoming diesel generator set to the bus.
 - .4 The synchroscope shall be complete with an auto/manual selector switch.
 - .5 In the "auto" position the DG sets shall be automatically synchronized and paralleled to the bus. In the "manual" position the synchroscope shall allow the closing of the respective circuit breaker from the individual diesel generator control panel.
- .12 The system shall be designed to start and parallel **three (3)** diesel generator sets."
- .13 The first diesel generator set to achieve 90% of nominal voltage and frequency shall be connected to the emergency bus. Monitor the switchgear for dead bus, lock-out other generator set (to avoid a race condition) and provide an instant connection.
- .14 As the second diesel generator set reaches nominal output it shall be automatically synchronized, paralleled and connected to the bus.
- .15 Prior to being paralleled to the bus, the oncoming unit shall be compared to the bus in frequency, voltage and phase angle. The set shall not be connected to the bus unless and until the following conditions have been satisfied:
- .1 Frequency difference less than 0.3 Hz
 - .2 Voltage difference less than 5%
 - .3 Phase angle less than 5° (electrical) with respect to the bus

- .16 The paralleling of a diesel generator set shall not cause a voltage fluctuation exceeding 8% or a frequency fluctuation exceeding +/- 0.3%.
- .17 Manual Control
- .1 Controls shall allow manual start and paralleling from respective generator control panel. Controls shall include:
- (a) A positive means of inhibiting out-of-phase paralleling.
 - (b) Means to operate diesel generator sets without connecting them to the main bus (Generator Start/Stop Selector Switch)
 - (c) Means to operate (trip/close) generator breakers that allow connection and disconnection of generators on the Generator Switchgear main bus (Generator Breaker Open/Close Selector Switch).
- .18 Automatic synchronizers shall be of unit chassis construction, utilizing solid state circuitry for all sensing and control functions. Necessary interface circuits for control of voltage adjustment and circuit breaker shall be through enclosed electro-magnetic relays with isolated output contacts rated 5A at 230 volts A.C. Control of the governor for frequency adjustment shall be through direct solid state circuitry.
- .19 Each synchronizer shall include a "check" selector switch to permit each diesel generator set to be held in synchronization when both normal and emergency sources are available.
- .20 Automatic synchronizers shall be part of the Engine Control Panel section.
- .21 Provide Remote monitoring software complete with all necessary licenses. Remote monitoring software shall be capable of running on Windows XP Professional or Windows 7 (64-Bit).
- .22 Event logging with time and date stamps.
- .23 Provision for exporting event logs/storing event logs on a personal computer. Include all necessary allowances for onsite set-up for remote storing of events.
- .24 Provide annunciation of the following Status, Alarm and Trip conditions for each engine through the associated engine HMI display (trouble idle = function included in summary trouble idle output contacts and annunciation lamps; trouble running = function included in summary trouble running output contacts and annunciation lamps; alarm = function to be included in summary alarm output contacts)

Function	Shutdown or Warning Condition	Summary Trouble Condition (Idle)	Summary Trouble Condition (Running)	Summary Alarm Condition
Emergency Stop Activated (Local and Remote)	Shutdown			X
Overcrank	Shutdown			X
High Engine Temperature Pre-alarm	Warning		X	
High Engine Temperature Alarm	Shutdown			X
Low Lube Oil Pressure Pre-alarm	Warning		X	
Low Lube Oil Pressure Alarm	Shutdown			X
High Lube Oil Temperature	Warning		X	

Function	Shutdown or Warning Condition	Summary Trouble Condition (Idle)	Summary Trouble Condition (Running)	Summary Alarm Condition
Low Lube Oil Level	Warning	X		
Over Frequency	Shutdown			X
Under Frequency	Shutdown			X
Low Coolant Level	Warning	X		
SCR System Trouble	Warning		X	
Low Coolant Temperature	Warning	X		
Under Voltage	Shutdown			X
Over Voltage	Shutdown			X
Damper Breaker Open	Warning	X		
Alternator Over Temperature	Warning		X	
Exciter Diode Failure	Warning		X	
Engine Control Switch Not in Auto	Warning	X		
Low DC Voltage (Starting Batteries)	Warning	X		
Battery Charger Failure (contact wired from battery charger by Division 26)	Warning	X		
Fuel System Trouble (contact wired from fuel system controls by Division 26)	Warning	X		
Fuel Leakage Detection (contact wired from leakage detection panel by Division 26)	Warning	X		
Breaker Fail to Close	Warning		X	
Cool Down Cycle				
Fuel oil filter clogged	Warning		X	
Ground Fault Alarm	Shutdown			X
Reverse Power Relay	Shutdown			X
Generator Fault (Differential Protection)	Shutdown			X
Low DC Voltage (Control Power)	Warning	X		

.25 [Deleted]

- .26 All instrumentation transformers shall have final ratios, burden and other characteristics selected by the Independent Testing Agent preparing the protection and coordination study. Coordinate final selections with Independent Testing Agent.
- .27 Current transformers to have positive action automatic short circuiting devices in secondary terminals.
- .28 Color coding wiring (D.C. - Blue, A.C. - Black, Dry Contact - Yellow), and necessary instrument transformers, nameplates, bus and terminal blocks.
- .29 One (1) remote Emergency Stop mushroom head pushbutton stations per engine with lift type guard, with size 6 label, wired to shut down the associated engine immediately. Turn over to Division 26 contractor for mounting near generator room exits, and wiring to control panel.

2.19 Equipment Identification

- .1 Provide equipment identification on generator, control panel, and all indication and control devices consisting of engraved, high quality plastic nameplates with black letters suitably inscribed on white background.
- .2 Engraved letters shall be 1/2" minimum, except 6mm minimum height may be provided for meters, relays, switches, signal lights, keys and key blocks, and all other devices.
- .3 All terminal blocks to have permanent labels
- .4 All control cables shall be clearly identified, at both ends, with permanent PVC wire markers, indicating Cable Number and wire numbers.
- .5 Also provide on generator connection, nameplate with red letters suitably inscribed on white background, reading "DANGER – 600VOLTS", and "DO NOT ENTER" as per Canadian Electrical Code. Engraved letters to be 1/2" minimum except "DANGER" which to be 3/4" minimum.

2.20 Main Control Panel Finish

- .1 Finish control panel as follows:
 - .1 basic rust-inhibiting metal process
 - .2 2 coats of powder coat finishing paint.
- .2 Exterior shall be finished with manufacturer standard color.
- .3 Manufacturer to provide quart of touch-up paint or several pressurized spray cans to touch-up small areas marred during installation.

2.21 Control and Wiring

- .1 Terminal blocks shall have numbered points for circuit identification. Terminal blocks to be General Electric Type EB or equal. Terminal blocks for current circuits to be shorting block type.
- .2 Wiring shall be type 'TA', 'TBS', or 'SIS', flame retardant #14 AWG size single conductor minimum, stranded, tinned copper, extra flexible type throughout. Wires shall be tagged at both ends with permanent plastic sleeve type markers. Insulation shall be 600 V, working and 1500 V test.
- .3 Secondary and control wiring within the rear bus compartment shall be completely shielded in a protective metal covering as far as practical.

- .4 Wiring from differential CT's shall be minimum #10 AWG.
- .5 Fuse and terminal blocks shall be easily accessible. Fuses shall be Class J HRC. DC fuses (one per pole) shall be in dead front enclosure.
- .6 Auxiliary wiring checks shall be made throughout the manufacture and assembly of the equipment to assure wiring correctness and continuity.
- .7 Final checkout of wiring shall be made with the complete switchgear lineup assembly to assure wiring correctness and continuity. Polarity of current and potential transformers and devices shall be checked to assure proper functioning of all protective devices and instrumentation.

2.22 Instrument Transformers

- .1 Potential transformers and current transformers required to operate relays, meters and other devices indicated in the drawings and specifications shall be coordinated so that the ratio and accuracy are suitable for each individual application, taking into account the burdens imposed. Construction of transformers shall conform to ANSI Standards. All terminals shall have permanent polarity designations and shall be wired accordingly. All applicable requirements of ANSI Standard C57.13 shall apply.
- .2 Primary potential bus or cable tap leads shall be designed with the same design integrity as the primary bus.
- .3 Both current and potential transformers shall be wired through test switches to provide quick and easy multi-circuit testing of switchboard relays, meters and instruments.

2.23 Potential Transformers

- .1 Potential transformers shall be housed in a separate compartment in the circuit breaker cubicle or superstructure.
- .2 Potential transformers shall be of the 0.3 accuracy class, per ANSI Standards and of sufficient capacity to serve the maximum burden imposed.
- .3 Each potential transformer shall be protected with current limiting primary fuses, and shall be designed to withstand the basic impulse level of the switchboard.

2.24 Current Transformers

- .1 Current transformers shall be easily removable and accessible and of the ring or bar-type.
- .2 Ring-type current transformers shall be used where burden and accuracy permit. Primary terminals on bar-type current transformers shall be silver plated and rigidly (2 bolt minimum) connected to the bus structure.
- .3 Secondary connections of all current transformers shall have provisions for short circuiting when not connected to instruments and shall be solidly grounded.
- .4 Current transformers shall be capable of carrying at least 125% of CT rating continuously and have a short time rating at least equivalent to that of the switchgear bus. Accuracy class: C100/ 0.6 B-1.

2.25 Synchronizing Protection and Control Panel Sections

- .1 General Operation
 - .1 The generator will normally operate in parallel with existing units. The controls shall be arranged to ensure the generator is automatically isolated under fault conditions.
- .2 Control Panel Components
 - .1 [Deleted]
 - .2 Horn complete with silencing button.
 - .3 Total kW load indicator
 - .4 Automatic Load Monitors
 - .5 Automatic Synchronizers
- .3 Metering and Instrumentation
 - .1 kW/kWhr meter
 - .2 Analogue Power Factor Meter (.5 lead to .5 lag)
 - .3 Analogue Ammeter and selector switch for 3 phases.
 - .4 Analogue Voltmeter and selector switch for 3 phases.
 - .5 Analogue Frequency meter.
 - .6 Analogue kVAr meter.
- .4 Status, Alarm and Trip Indication
 - .1 Lamp test button for all indicating lamps
 - .2 Alarm horn and silencing switch
 - .3 Controls not in auto
 - .4 Control battery alarm
 - .5 Ground fault alarm
 - .6 PLC failure
 - .7 System Overvoltage
 - .8 System Undervoltage
 - .9 Running, On line, Lock Out indication for each engine
 - .10 Bus over/under frequency
- .5 Synchronization
 - .1 A synchronization monitor, one per DG set, shall sense voltage, frequency and phase angle of the unit to be paralleled. The monitor shall:
 - (a) Compare the voltage of an oncoming DG set with the load voltage and initiate a correction signal to cause any voltage difference to be reduced to within that specified.
 - (b) Compare the frequency of an oncoming DG set with the bus frequency and initiate a correction signal to the governor of the oncoming DG set until the frequency difference is within that specified.
 - (c) Cause the phase angle of an oncoming DG set with respect to the load voltage to be within that specified.
 - .2 The monitor shall permit a DG set to be held in synchronization when both sources are available.

- .3 When the above conditions have been satisfied, the monitor shall initiate a signal to close the circuit breaker of the incoming DG set to the bus.
- .6 The system shall be designed to start and parallel all diesel generator (DG) sets
- .7 The first DG set to achieve 90% of nominal voltage and frequency shall be connected to the emergency bus.
- .8 As additional DG sets reach nominal output they shall be automatically synchronized, paralleled and connected to the bus in the sequence in which they achieve synchronization.
- .9 Prior to being paralleled to the bus, the oncoming unit shall be compared to the bus in frequency, voltage and phase angle. The set shall not be connected to the bus unless and until the following conditions have been satisfied:
 - .1 Frequency difference less than 0.3 Hz
 - .2 Voltage difference less than 5%
 - .3 Phase angle less than 5° (electrical) with respect to the bus
- .10 The paralleling of a DG set shall not cause a voltage fluctuation exceeding 8% or a frequency fluctuation exceeding +/- 0.3%.
- .11 Automatic synchronizers shall be of unit chassis construction, utilizing solid state circuitry for all sensing and control functions. Necessary interface circuits for control of voltage adjustment and circuit breaker shall be through enclosed electro-magnetic relays with isolated output contacts rated 5A at 230 volts A.C. Control of the governor for frequency adjustment shall be through direct solid state circuitry.
- .12 Each synchronizer shall include a "check" selector switch to permit each DG set to be held in synchronization when both normal and emergency sources are available.
- .13 Automatic synchronizers shall be part of the Load Management Control assembly and shall be complete with a sync check relay.

2.26 Generator Output Cables

- .1 Power cables interconnecting the generator to the generator control panel, and interconnecting the starting batteries to the engine, shall be extra-flexible locomotive cables installed in cable tray [per Section 12-2202 of the Electrical Safety Code] with the following characteristics:
 - (a) Type DLO & UL listed as Marine Shipboard Cable
 - (b) CSA Type TC listed
 - (c) CSA FT-4 rated
 - (d) Stranded coated copper, size as indicated, with EPR insulation, and thermoset jacket
- .2 Final connections of all control wiring terminating at the engine or generator to be installed in FT4 jacketed liquid tight flexible conduit.

2.27 Factory Test Procedure

- .1 Supplier shall conduct performance and full load tests in his factory, to be witnessed by Engineer and Independent Testing Organization (ITO) upon completion of assembly at factory and prior to shipping to prove that unit will start automatically, pick up load and operate as required, in accordance with the article "Source Quality Control" at the beginning of this specification.

- .2 Notification of factory test shall be given a minimum of ten (10) working days in advance. Dismantling and shipment from factory test bay shall not occur until deficiencies have been corrected and the system retested to the satisfaction of the Engineer and certified as being acceptable for shipment.
- .3 The test shall include:
 - .1 Demonstration of automatic start system
 - .2 A 4-hour full load test, utilizing an adjustable load at rated power factor
 - .3 Demonstration of safety features
 - .4 Demonstration of cycle crank tests.
 - .5 Block loading tests from cold start: 0%-25%, 0%-50%, 50%-100% and 0%-100%
- .4 During test, the following parameters shall be recorded at 30 minute intervals:
 - .1 Speed and frequency at steady state and step load changes
 - .2 Phase volts and amps at steady state and step load changes
 - .3 Load
 - .4 Coolant temperature
 - .5 Lubricating oil pressure
 - .6 Exhaust temperature
- .5 Fuel consumption for duration of test shall be stated.
- .6 Provide a photograph of an oscilloscope trace of the sine wave generator output 60 cycle.
- .7 [Deleted]
- .8 Synchronization and Automatic Transfer Tests
 - (a) Demonstrate the emergency start and synchronizing and paralleling features of all generators as a system
 - (b) Simulate utility power outages and demonstrate automatic operation of the system.
 - (c) Demonstrate the functioning of all transfer control and synchronization safety devices by creating the actual conditions or simulating these conditions if the actual conditions cause deterioration or damage to the emergency system.
 - (d) Demonstrate synchronization system, automatic transfer system and load management system with loadbanks, with a minimum capacity of 1350Kw. Tests shall include load steps to verify synchronization and load pick-up following simulated loss of utility power.

2.28 Acceptance Test (Final On-site Testing)

- .1 A competent Diesel-generator expert shall be supplied for as long as is necessary for commissioning and witness testing and for two working days, at a time convenient to Owners, to instruct Owners' staff in maintenance and operation, and in addition shall be present during on-site commissioning and acceptance test.

2.29 Manufacturers/Suppliers

- .1 The suppliers tendering the equipment and services under Division 26 shall include preparation and submission of technical documents listed herein as well as the services of a site technical representative to assist during installation in the performance of commissioning and witness testing program and conduct training of the Owners staff.

- .2 Diesel set shall be as manufactured by one of the following:

Standard of Acceptance

- Cummins Eastern Canada
- Total Power - Generac
- Toromont Cat Power Systems
- Wajax Power Systems
- Pritchard Power Systems – Kohler
- Paramount Power Systems
- LMR

3 EXECUTION

3.1 Installation General

- .1 Prior to project completion, revise all wiring diagrams submitted as Shop Drawings to "As-Built" condition, prepare photo reductions of same and include them in the Operation and Maintenance Manual.

3.2 Installation of Engine Generator Set

- .1 Mount Diesel-generator package on structural steel base with suitable adjustable steel spring vibration isolators with sound pads mounted between steel base and concrete base pad. Division 26 to provide concrete base pad and paint with oil resistant paint. Touch-up areas marred in transit or installation.
- .2 Install complete starting system including batteries, jumpers and cables and battery charger. Provide 2#4/0 EPR extra flex copper cable connections from starting battery to [each] starter.
- .3 Provide flexible fuel connections to fuel system isolating valves provided by Division 20, complete with all necessary flexible fuel connections between various filter components and engine.
- .4 Mount and assemble Racor water separator and provide flexible fuel connection to engine.
- .5 Provide full size galvanized steel drip pan under engine and a separate pan under the Racor fuel filter assembly.
- .6 Ground generator frame to building ground and/or perimeter ground system.
- .7 Install the flexible hose supplied by the engine manufacturer between the engine crankcase vent connection over to the atmosphere side of the radiator exhaust plenum, for venting of crankcase fumes to atmosphere. Provide necessary cutting and patching, and sleeve through plenum, with final connections of hose.
- .8 Install the engine exhaust silencer, flexible connection at engine, and miscellaneous nuts, bolts, gaskets and all miscellaneous hardware required to complete the installation of the exhaust system from the engine up to and including the flanged outlets of the silencers

3.3 Installation of Engine Control Panel

- .1 Provide incoming and outgoing cable connections.

- .2 Provide interconnecting power and control wiring between Diesel-generator and control panel.
- .3 Terminate all power cables with two-hole long barrel compression connectors equal to Burndy YA-2N.
- .4 Provide interconnecting control wiring connections as shown and as required.
- .5 Provide grounding of each control panel to building ground bus with two separate runs of a #4/O green insulated copper in conduit. Terminate with Burndy YA-2N lugs.
- .6 Install complete DC control power system including batteries, jumpers and cables and battery charger and connect to control panel with 2#8 + ground in conduit.
- .7 Extend DC control wiring 2#8+ ground in conduit to engine starting battery for control power
- .8 Touch up small areas marred in transit or during installation with touch up paint. Repaint entire switchboard using electrostatic process where large areas of significant damage to factory finish has occurred.
- .9 Provide and install new rubber mats 3' wide 1/4" thick 17,000 volt rating, American Biltrite Canada Ltd., in front and rear of control panels for a continuous and neat appearance. Do not place mats until work is completed and room has been thoroughly cleaned. Clean or replace any existing mats dirtied or damaged during the installation.

3.4 Installation of Miscellaneous Components

- .1 Provide power and control wiring between engine control panel and diesel combustion air dampers and ventilation dampers. Division 26 to provide 120 V secondary power source from local 120V emergency panel to the control panel switching relay to permit dampers to close when engine shuts down.
- .2 Division 26 to provide 8 conductor #12 MICC cable from each Automatic Transfer Switch to the diesel generator control panel for engine start contact, ATS in normal position status, ATS in emergency position status, and ATS in bypass position status.
- .3 Division 26 to provide 4 conductor #12 MICC cable from each Fire Pump ATS/Control Panel, and each Sprinkler Pump ATS/Control panel to the engine generator control panel for engine start contact and ATS in emergency position status.
- .4 Supply one per engine Remote Emergency Stop mushroom head pushbutton station with lift type guard, with size 6 label, wired to shut down the engine immediately. Contractor to mount outside of room, and wire to control panel.
- .5 Division 26 to provide connection from control panel to fire alarm panel to indicate engine running and trouble condition on fire alarm annunciator.
- .6 Provide power and control wiring between engine control panel and the diesel fuel tank level controller to obtain "Fuel Low Level" alarm contact.
- .7 Provide control wiring connection between engine control panel and fuel leakage detection system panel.
- .8 Provide control wiring to battery charger and automatic transfer switches for remote monitoring indication on the centralized electrical monitoring system.

- .9 Install 2- #10 AWG in 19 mm conduit interconnection the normal, emergency, and generator control switchboards for control power interconnection, for proper operation of centralized electrical monitoring system devices.
- .10 Provide control wiring connection between engine control panel and fuel leakage detection system panel.

3.5 Testing

- .1 Conduct an acceptance test of the complete emergency power system after preliminary runs and test have been made. Conduct this test on site after completion of installation. This acceptance test shall be as described under the article Site Tests in Section 2 above. In the event of equipment or component failures interrupting completion of test, correct the deficiency and repeat test until satisfactorily completed without failure.
- .2 Demonstrate functioning of safety devices, pilot lights, controls, remote monitoring on the Building Automation System and Fire Alarm system, operation of any remote controls and indicators on the remote annunciator, and operation of all interconnections and alarms to battery charger, fuel system, leak detection panel, dampers, Automatic Transfer Systems, etc...
- .3 Immediately following the load test a sample of lubricating oil shall be taken for lab analysis.
- .4 After completion of tests replace all air, fuel and lubricating oil filters with new elements and change the lube oil.
- .5 Provide temporary cables and temporary load bank for on-site testing, complete with terminal lugs on cables.

3.6 Site Tests

- .1 General
 - .1 Upon completion of the installation of the emergency power supply system, the installation shall be tested to ensure conformity to the requirements of Standard C282. Provide Engineer and ITO with a minimum of ten (10) working days written notification of the proposed test date
 - .2 All construction within the diesel generator room is to be completed and the room is to be thoroughly cleaned prior to starting the engine for the first time.
- .2 The generator manufacturer will be required to participate in the complete commissioning process including sub-systems affecting the operation of the diesel generators.
 - .1 The diesel generator manufacturer shall provide an initial review and start-up of the generators prior to any sub-system test requiring the use of the diesel generators. Provide documentation that sub-system pre-functional testing can be completed with the use of the diesel generators.
 - .2 There is no requirement for the presence of the diesel generator manufacturer at sub-system equipment non-running pre-functional verifications.
 - .3 The diesel generator manufacturer shall be present during the following sub-system equipment running and measurement functional tests:
 - (a) Fuel Pumps and associated controls.
 - (b) Day Tank Fuel Sensors and Alarms
 - (c) Main Tank Fuel Sensors and Alarms
 - (d) Fuel Inventory System
 - (e) Dampers

-
- (f) Generator Sound Measurements
 - (g) Generator Emission Measurements
 - (h) Generator Switchboard
 - (i) Automatic Transfer Switchboard including load management verification
 - (j) Connections to Building Automatic System
 - (k) Connections to Fire Alarm System
 - (l) 125VDC Power Plant
 - (m) Neutral Grounding Resistors (at Generators and at Generator Switchboard)
- .4 The diesel generator manufacturer shall include for a minimum of two (2) full day integrated system tests required to demonstrate that the complete emergency power system functions per the contract documents when all sub-systems and components have been installed and inter-connected.
- .3 Operational Test
- .1 Provide temporary loadbreak switch connected to the new loadbank quick connect
- .2 Prior to any system testing, individually perform the following tests on each diesel generators using the connected load banks through the Automatic Transfer Switchboard and Generators Switchboard:
- (a) Demonstration of automatic start system
 - (b) With 100% rated full load, operate set for four (4) hours, taking readings at 30 min intervals, and record following:
 - Time of reading.
 - Running time.
 - Ambient temp in °C.
 - Fuel consumption
 - Lube oil pressure in kPa.
 - Lube oil temp in °C.
 - Engine coolant temp in °C.
 - Exhaust stack temp in °C.
 - Alternator voltage.
 - Alternator current:
 - Power in kW.
 - Frequency in Hz.
 - Power Factor.
 - Battery charger current in A.
 - Alternator cooling air outlet temp.
 - (c) After completion of four (4) hour run, demonstrate following features, shut down devices and alarms: Demonstrate low oil pressure and high engine temperature shutdown devices operation without subjecting engine to these excesses.
 - Cycle crank test
 - Over cranking.
 - Over speed.
 - High engine temp.
 - Low lube oil pressure.
 - Simulated Short circuit, to verify operation of differential protection.
 - Alternator over voltage.
 - Low battery voltage, or no battery charge.
 - Manual remote emergency stop.
 - High alternator temperature.
 - All other safety features

- (d) Next install continuous electronic power quality meter with sufficient storage capacity and of sufficient sampling rate to record frequency and voltage variations during load switching procedures. Each load change delayed until steady state conditions exist. Switching increments to include:
 - No load to full load to no load.
 - No load to 75% load to no load.
 - No load to 50% load to no load.
 - 25% load to 100% load to 25%.
 - 50% load to 100% load to 50%.
- .3 With the engine in a "cold start" condition and the test load banks connected, power failures will be simulated by opening switch LIS-9 supplying the normal power to the normal terminals of the Automatic Transfer Switchboard.
- .4 On-site tests shall be completed to demonstrate all emergency power system sequences of operation, including:
 - (a) Normal power failure scenario
 - (b) Failure of one (1) generator to start following a utility failure. Repeat tests such that both generators are set as the failing generator.
 - With loading on the highest priority breaker below the rating of one (1) generator
 - With loading on the highest priority breaker above the rating of one (1) generator
 - (c) Failure of one (1) generator while the emergency power system is running on generator power supplied by two (2) generators. Repeat tests such that both generators are set as the failing generator.
 - With loading on the highest priority breaker below the rating of one (1) generator
 - With loading on the highest priority breaker above the rating of one (1) generator
 - (d) No Load Testing Mode
 - (e) Transfer Test Mode
 - With both generators available.
 - With failure of one (1) generator following the transfer to emergency power.
 - (f) Demonstration of ADD and SHED load management system.
- .5 The following data shall be observed and recorded for each testing scenario:
 - (a) time delay on start
 - (b) cranking time until the engine starts and runs
 - (c) time required to come up to operating speed
 - (d) time until first generator is connected to the bus
 - (e) time until second generator is paralleled with the bus
 - (f) time required to achieve steady-state condition with the Automatic Transfer Switchboard transferred to the emergency position
 - (g) voltage, frequency, and amperes at start-up and at any observed change in load
 - (h) Engine oil pressure, water temperature where applicable, and battery charge rate at 5 min intervals for the first 15 minutes, and at 15 minute intervals thereafter
 - (i) time delay on retransfer for Automatic Transfer Switchboard
 - (j) time delay on engine cooldown and shutdown.
- .6 Following the operational test prescribed above each the emergency generator system shall be subjected to an additional four (4) hour 100% load test (**2000kW**), using the temporary portable test load banks.
- .7 The building load shall not be used as part of the test load. Unity power factor is acceptable for on-site testing,
- .8 Demonstrate all alarm connections to remote systems including the fire alarm and building automation system.

.4 Pull the Plug Tests

- .1 At the conclusion of the migration activities, a Pull the Plug Test shall be completed using migrated Owner building load.
- .2 With the engine in a "cold start" condition, a power failure shall be simulated by opening switches supplying the normal power to the building.
- .3 The emergency power system shall support the load for one hour after which normal power shall be restored to the normal main breakers of the Automatic Transfer Switchboard.

3.7 Installation by Generator Supplier

- .1 Provide a complete Diesel-generator set and control panel power system. Deliver FOB job site on a flat bed tractor trailer, suitable protected during shipping from the environment.
- .2 Verify power and control wiring connections between engine generator, engine control panel and diesel combustion air dampers and ventilation dampers, battery charger and automatic transfer system, building automation system and fire alarm system.
- .3 Provide temporary cables and temporary load bank for on-site testing, complete with terminal lugs on cables.
- .4 Conduct an acceptance test after preliminary runs and set up / calibration tests have been made. Conduct this test on site after completion of installation. This acceptance test shall be a minimum of four hours duration with full rated load plus verification of the system performance. In the event of equipment or component failures interrupting completion of test, correct the deficiency and repeat test until satisfactorily completed without failure.
- .5 After completion of above test, perform tests to demonstrate overheat protection, low oil pressure protection and over-speed protection. Demonstrate functioning of safety devices.
- .6 After completion of tests replace all air, fuel and lubricating oil filters with new elements and change the lube oil.
- .7 Include costs of 1st year routine maintenance (with all filters) in bid price).
- .8 Revise all wiring diagrams submitted as Shop Drawings to "As-Built" condition, prepare photo reductions of same and include them in the Operation and Maintenance Manual.

END OF SECTION

Project Architect	HDR
Civil	HDR
Structural Engineer	HDR
Mechanical Engineer	HH ANGUS
Electrical Engineer	HH ANGUS

DISCREPANCIES MUST BE REPORTED IMMEDIATELY TO THE CONSULTANT BEFORE
PROCEEDING.
ONLY FIGURED DIMENSIONS ARE TO BE USED AND CONTRACTOR MUST CHECK ALL
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NO.	DATE (YYYY-MM-DD)	DESCRIPTION
DRAWING REVISIONS		

04	2026-03-06	ISSUED FOR INFORMATION
03	2025-11-07	ISSUED FOR 100% CONSTRUCTION DOCUMENTS
02	2025-10-17	ISSUED FOR CLASS A COST ESTIMATE
01	2025-09-22	ISSUED FOR 30% REVIEW
NO.	DATE (YYYY-MM-DD)	DESCRIPTION
DRAWING ISSUE		

KEYPLAN

NORTH

SEAL:

PROJECT:
KHSC KGH EMERGENCY POWER
SYSTEM CAPACITY &
INFRASTRUCTURE REMEDIATION

HHA PROJECT NUMBER: 2250139

DRAWING TITLE:

NEW SINGLE LINE DIAGRAM

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E-02





Addendum

Project: Kingston Health Sciences Centre
Kingston General Hospital
Emergency Power System Upgrade Project

Contract No.: 10434805 (HHA: 2250139)

Bid Number: 10434805-ME-02
Power Generation, Diesel Generator

Addendum No.: 03

Date Issued: Tuesday, April 14, 2026

No. of Pages: 04 pages

The following Addendum shall be read in conjunction with and become part and parcel of the bid documents and shall supersede the drawings and or specifications where applicable. Upon receipt to same, staple this Addendum directly to the inside front cover of the specifications. The Proponent shall bring this Addendum to the attention of all subcontractors, trades and suppliers.

1. The following documentation is issued under this Addendum.

- | | | |
|-----|---|----------|
| 1.1 | HDR Addendum No. A03, dated 2026-04-14 | 02 pages |
| 1.2 | HHA Addendum No. E-03, dated 2026-04-13 | 01 pages |

Per:


Kevin Henry, P.Eng
Project Manager

End of Addendum 03

The following Addendum shall be read in conjunction with and become part and parcel of the tendering documents and shall supersede the drawings and/or specifications where applicable. Upon receipt to same, staple this Addendum directly to the inside front cover of the specifications. The Proponent shall bring this Addendum to the attention of all subcontractors, trades and suppliers.

Addendum No. A03

1. General Clarifications

1.1. Proponent Questions:

1. Q: Addendum 02 included Q&A related to generator paralleling. Please confirm whether the optional item requested is only for upgrading the existing generator controllers, and that the paralleling gear (EPA-2) and paralleling controls are not included in this package.
A: Refer to HHA addendum No. E-03

2. RFP Documents

- 2.1. Specification Section 00 43 23 ME-02 (Re-issued): Add the words "extend the generator warranty to five (5) years total, where the base warranty is identified as two (2) years" in the Description of Alternative Price as Item 3. Indicate the Effect on Base Bid Price to provide an Extended warranty.
- 2.2. Refer to HHA addendum No. E-03

End of Addendum No. A03

Alternative Prices Bid Form Supplement

Schedule of Alternative Prices (VAT NOT INCLUDED)

Values are presented in Canadian dollars (CAD), and exclude Value Added Taxes (VAT). For this project Value Added Taxes shall mean the Harmonized Sales Tax (HST) at 13%.

Item	Description of Alternative Price	Effect on Base Bid Price	
		Add	Deduct
1	Net change in base Bid Price for supply of material described in this Diesel Generator RFP 10434805-ME-02 irrevocable in the form submitted by the Bidder for a period of two hundred and seventy (270) days running from the Proposal Submission Deadline. Engineering and shop drawings would be awarded within the same period of time as the base RFP terms. The contract completion time would remain effective relative to acceptance (full notice to proceed). For clarity: This Alternative Price is open to acceptance beyond the period of time for the base Bid Price.		
2	Existing Unit Controls Upgrade (Not part of Base Bid)		
3	Provide the additional cost to extend the generator warranty to five (5) years total, where the base warranty is identified as two (2) years.		
4			
5			
6			
7			

END OF SECTION

ADDENDA

Addendum No.: E-03

RFP 10434805-ME-02

The information listed below is to form part of the Contract Documents. All associated costs are to be included in the Bid Price shown on the Bid Form. Acknowledgment of this Addendum, by number, is to be shown in the space provided on the Bid Form.

1 Q: Addendum 02 included Q&A related to generator paralleling. Please confirm whether the optional item requested is only for upgrading the existing generator controllers, and that the paralleling gear (EPA-2) and paralleling controls are not included in this package.

A: Addendum 02 requires proponents to provide a separate price for upgrading the existing generator controllers as part of the package. The paralleling gear (EPA-2) and paralleling controls are not included in this package.

End of Section

April 13, 2026



**KGH - KINGSTON HEALTH SCIENCES
CENTRE**

PROJECT: O27961

**WALK-IN 2000kW STANDBY DIESEL
PRELIMINARY/REFERENCE SHOP
DRAWINGS R1**

REVISED PER DISCUSSIONS VIA EMAIL

**Total Power Ottawa/
Sudbury/Thunder
Bay**

Project Manager: Laura-Ann Stephenson
lstephenson@totalpower.ca

Technical Project Manager: Adam Bergeron
abergeron@totalpower.ca





TABLE OF CONTENTS

1. Bill of Materials
2. Genset Data Sheets
3. Control Panel
4. Engine
5. Alternator
6. Circuit Breaker
7. Genset Layout Drawing
8. Enclosure Drawings
9. Enclosure Accessories
10. Genset Accessories
11. Warranty and Commissioning
Guidelines

***TOTAL
POWER***

1



BILL OF MATERIALS
027961

DATE :		ENGINEER :	HDR INC. - RICHMOND HILL
CUSTOMER :	Kingston Health Sciences Centre	PROJECT :	KINGSTON HEALTH SCIENCES CENTRE
ATTENTION :		LOCATION :	Kingston

In accordance with our understanding of the project requirements and based on the following information received,
we are pleased to offer you the following equipment and services for your consideration;

EXCEPTIONS & CLARIFICATION

- * Fuel, fuel piping, exhaust piping beyond silencer for open units, and stack extension for enclosed units by others.
- * Permits and Installation of generator set including loose ship items will be the responsibility of others
- * Coordination study and any product changes as a result of same will be responsibility of others
- * Unit is configured to meet CSA-C282 standard for life safety
- * TSSA fuel tank inspection required under CSA CODE B-139. Cost and responsibilities for arranging inspections are not included,
- * Site to provide location and access for load bank placement within 50 feet of load bank connection point
- * Any exhaust extension beyond the generator enclosure not included and by others
- * Clarifications: 2.3.5 OEM standard dry type air cleaner service indicators as per OEM
- * Clarifications: 2.11 Pressure and temperature are monitored by engine ECU and shutdown set by Genset controller backed up by ECU. These are analog not digital.
- * Clarifications: 2.17 Engine OEM crankcase recirculatory provided, designed to meet engine and modification to OEM design may impact engine warranty
- * Clarification: 1.7: Two-year service contract provided with unit spare parts are provided fresh at time for service. Listed quantities would not fit in any reasonable cabinet. Fuses and battery service kit provided in cabinet
- * Clarification: 1.15.3: Customer damage done by others not related to poor workmanship or materials supplied as part of contract are not warranted and would be the responsibility of the contractor or owner.
- * Clarification: 2.3.10: OEM closed crankcase system with OEM filter
- * Clarification: 2.7: OEM oil to coolant cooler not oil to air cooler.
- * Clarification: 2.9.10: Alternator breaker termination at bottom of breaker. Assuming as walk-enclosure either bottom entry or rear entry.
- * Clarification: 2.11: Engine ECU monitored, not separate snap switches.
- * Clarification: 2.13.5: Single bearing genset with engine and alternator to skid mounting on isolators.
- * Clarification: 2.17: OEM closed crankcase breather system
- * Clarification: 2.18: Integrated genset digital OEM control system, please refer to specification sheet for interface details. If more information is required, please advise.
- * Clarification: 2.18.4: Oil level is not provided on genset control panel.
- * Clarification: 2.18.12/13/14: New units at starting is not paralleled as tie breaker is in open state. In this configuration third genset would parallel to existing system on tie breaker close with tie breaker controller. If this is required system should be designed with tie breaker closed.
- * Clarification: 2.18.19: Not a parallel to utility system
- * Clarification: 2.27.8: FAT is a single genset only, synchronization and ATS(s) at FAT not provided.
- * Clarification: 3.2/3/4: Installation by others.
- * Clarification: New unit will not synchronize with existing units due to proprietary, obsolete controls on existing units (SDMO Kerys). Controls will need to be upgraded on existing generators to be capable to parallel with any new generator.

GENERATOR :

QTY	MAKE	MODEL	KW	RATING	FUEL	VOLTAGE	PHASE	RPM
1	Generac	SD2000	2000	Standby	Diesel	347/600	3	1800

In addition to the standard factory features and accessories, the generator will include the following major items:

- * Custom walk-in sound attenuated weather enclosure - approx. 60dBA @ 7m
- * Enclosure is configured to meet CAN/CSA-C282 c/w motorized louvres, heat, lighting, etc.
- * 72 hour double walled sub-base style fuel tank
- * Generator mounted auto start control panel - DSE G8601
- * PMG Alternator
- * Batteries, rack & cables
- * Vulcan Battery Charger - 20A, 24V
- * External GFI
- * 12kW Block Heater, 3kW Oil Heater, and 1.2kW Alternator Heater (240V)
- * CSA282 - 30 circuits load center
- * Hospital grade silencer
- * Main line circuit breaker - 3000AF/2500AT - LSI - 100% rated - Motorized - c/w aux. contacts
- * Seismic isolators (isolators are installed beneath the generator, inside the enclosure)
- * Fan and belt guards
- * First fill of engine oil & antifreeze
- * 5-year comprehensive extended factory warranty

SERVICES:

- * Extended factory testing - 4 hours - performed at 1.0PF
- * Freight (by GAL choice) prepaid to location site perimeter, unloading and protection at site by others
- * Start-up inspection c/w 6-hour load test to CSA 282 standards and instruction performed during regular business hours
- * Site testing; Additional 4 hour testing as per spec (3 Days 2 Techs)
- * Training as per spec
- * 1x visit before warranty expires
- * Pre-commissioning and post commissioning support as per spec.

***TOTAL
POWER***

2

SD2000 & MD2000 | 65.4 L | 2000 kW

INDUSTRIAL DIESEL GENERATOR SET

EPA Certified Stationary Emergency

GENERAC INDUSTRIAL
ENERGY

Standby Power Rating

2000 kW, 2500 kVA, 60 Hz



*Assembled in the USA using domestic and foreign parts

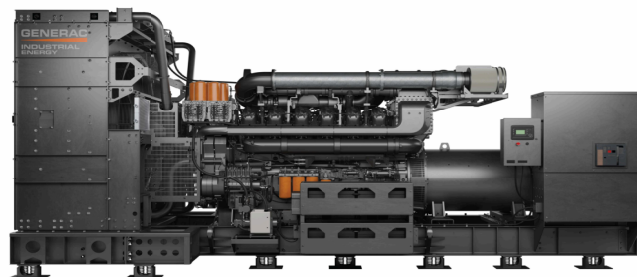


Image used for illustration purposes only

Codes and Standards

Not all codes and standards apply to all configurations. Contact factory for details.



UL2200, UL6200, UL1236, UL489



CSA 22.2-100, ULC S601



BS5514 and DIN 6271



SAE J1349



NFPA 20, 37, 70, 110



NEC700, 701, 702



NEMA ICS10, MG1, 250, ICS6, AB1



ANSI C62.41

Powering Ahead

For over 60 years, Generac has provided innovative design and superior manufacturing.

Generac provides superior quality by designing and manufacturing most of its generator components, including alternators, enclosures and base tanks, control systems and communications software.

Generac gensets utilize a wide variety of options, configurations and arrangements, allowing us to meet the standby power needs of practically every application.

Generac searched globally for the most reliable engines to power our generators. We choose only engines that have already been proven in heavy-duty industrial applications under adverse conditions.

Generac is committed to ensuring our customers' service support continues after their generator purchase.

STANDARD FEATURES

ENGINE SYSTEM

- Oil Drain Extension
- Air Filter Restriction Indicator
- Air Cleaner
- Fan and Belt Guards
- Stainless Steel Flexible Exhaust Connection
- Factory Filled Oil and Coolant
- Radiator Duct Adapter
- Engine Oil Heater
- Engine Coolant Heater
- Engine Pre-lubrication Pump
- Coolant Heater Ball Valves
- Fuel Cooler

FUEL SYSTEM

- Flexible Fuel Lines
- Primary and Secondary Fuel Filter

COOLING SYSTEM

- Pressurized Closed System
- UV/Ozone Resistant Hoses
- Factory-Installed Radiator
- 50/50 Ethylene Glycol Antifreeze
- Radiator Drain Extension
- Closed Coolant Recovery System

ELECTRICAL SYSTEM

- Battery Charging Alternator
- Battery Cables
- Battery Tray
- Rubber-Booted Engine Electrical Connections
- Solenoid Activated Starter Motor

ALTERNATOR SYSTEM

- Class H Insulation Material
- 2/3 Pitch
- Skewed Stator
- Permanent Magnet Excitation
- Sealed Bearing
- Full Load Capacity Alternator
- Bearing/Winding Temperature Monitoring

GENERATOR SET

- Separation of Circuits
- Separation of Circuits - Multiple Breakers
- Standard Factory Testing
- 2 Year Limited Warranty (Standby Rated Units)

CONTROL SYSTEM



DSE G8601 Controller

Key Features

- Advanced PLC Functionality
- Multi-Purpose PIDs
- Virtual Inputs
- On-Screen Mimic (SLDs)
- Multiple Application Support
- Multi-Level Pin Protected Front Panel Editor
- Integral LCD Display Heater
- Enhanced High-Resolution 240 x 128 Pixel Display
- Single Generator Control
- Latest ECU/ECM Support
- Touch Screen Panel PC Support
- Zero Sequence Voltage Protection
- Integral Gasket (IP65 protection)

Standard Protections

- Low Coolant Level
- High/Low Coolant Temperature
- Oil Temperature
- Overspeed
- Over/Under Voltage
- Over/Under Frequency

- Over/Under Current
- Over Load
- Battery Voltage
- Battery Charger Current
- Phase to Phase and Phase to Neutral Short Circuits (I²T Algorithm)
- Ground Fault

Control Panel

- Auto/Off/Manual
- Indication Through Display Screen
- Audible Alarm and Silence
- Not in Auto Indication

Voltage Regulation

- Digital Control
- Three-Phase Sensing
- Negative Power Limit
- Loss of Sensing Protection
- Fault Protection (I²T Function)
- High Voltage Limit
- Low Voltage Limit
- Maximum Power Limit
- $\pm 0.5\%$ Voltage Regulation

Governor Functionality

- Speed Control through ECM Integration
- Soft Start Ramping (Multiple Steps)

Qualification Testing

- Life Test in Environmental Chamber
- Temperature Rating -22 °F to +122 °F (-30 °C to +50 °C)
- Vibration Tested and Protected

Connections (Actual I/O May Vary Due to Configuration)

- 4 Analog Inputs
- 12 Digital Inputs
 - 9 Active Low Digital Outputs

Customer Ports

- Ethernet
- 2 RS-485
- 2 USB
- CANBus

Codes and Standards

- UL 6200
- CE
- NFPA 110 Capable

More Features

- Built-in Governor
- Digital AVR Support
- Multiple Language Support
- Three-Phase Generator Sensing and Protection
- Three-Phase Bus Sensing
- Generator Current, Protection and Power Monitoring
- Configurable Timers
- Integrated SNMP
- Data Logging
- PC Configuration
- DSENet[®] (Expansion Support)
- Flexible I/O (Inputs/Outputs)
- Automatic and Front Panel Breaker Control
- Power-Save Mode

CONFIGURABLE OPTIONS

ENGINE SYSTEM

- Critical Grade Silencer
- Hospital Grade Silencer
- CCV (Closed Crankcase Ventilation)
- Oil Heater
- Radiator Duct Flange
- Radiator Stone Guard
- Duplex Fuel Water Separator
- Oil Make Up Kit

ELECTRICAL SYSTEM

- 20A UL Listed Battery Charger (x2)
- Battery Warmer
- Redundant Starting System

ALTERNATOR SYSTEM

- Alternator Upsizing
- Anti-Condensation Heater

CIRCUIT BREAKER OPTIONS

- Main Line Circuit Breaker
- 2nd Main Line Circuit Breaker
- 3rd Main Line Circuit Breaker
- 4th Main Line Circuit Breaker
- Shunt Trip and Auxiliary Contact
- Electronic Trip Breakers

GENERATOR SET

- Spring Isolators (Standard/Seismic)
- 24 Position Load Center
- Extended Factory Testing

CONTROL SYSTEM

- NFPA 110 Level 1 Compliant 21-Light Remote Annunciator
- Remote Output Relays (8 or 16)
- Remote E-Stop (Break Glass-Type, Surface Mount)
- Remote E-Stop (Red Mushroom-Type, Surface Mount)
- Remote E-Stop (Red Mushroom-Type, Flush Mount)
- 100 dB Alarm Horn
- Ground Fault Annunciator
- 10 Amp Engine Run Relay
- 120V GFCI Outlet
- Flush Mount Annunciator Kit
- Damper Alarm Contacts (with Motorized Dampers Only)

WARRANTY (Standby Gensets Only)

- 2 Year Extended Limited Warranty
- 5 Year Extended Limited Warranty
- 7 Year Extended Limited Warranty
- 10 Year Extended Limited Warranty

APPLICATION AND ENGINEERING DATA

ENGINE SPECIFICATIONS

General

Make	Baudouin
EPA Emissions Compliance	Tier 2
EPA Emissions Reference	See Emissions Data Sheet
Cylinder #	20
Type	V
Displacement - in ³ (L)	3,991.0 (65.4)
Bore - in (mm)	5.91 (150)
Stroke - in (mm)	7.28 (185)
Compression Ratio	15:1
Intake Air Method	Turbocharged/Aftercooled
Cylinder Head	4-Valve

Engine Governing

Governor	Electronic
Frequency Regulation (Steady State)	5%

Lubrication System

Oil Pump Type	Gear Driven
Oil Filter Type	Full Flow Spin-On Cartridge
Crankcase Capacity - qt (L)	304 (288)

Cooling System

Cooling System Type	Pressurized Closed
Fan Type	Pusher
Fan Diameter - in (mm)	88 (2,235)

Fuel System

Fuel Type	Ultra Low Sulfur Diesel #2
Fuel Specifications	ASTM
Fuel Filtering (Microns)	4
Fuel Inject Pump	High Pressure Common Rail
Injector Type	Electronic
Fuel Supply Line O.D. Minimum - in (mm)	0.748 (19)
Fuel Return Line O.D. Minimum - in (mm)	0.748 (19)
Governor	ECU
Governor Steady State Speed Stability at Constant Load (ISO 8528-5 Class G3) ²	≤ ±0.5%
Max. restriction at fuel inlet (Bar)	0.1

Engine Electrical System

System Voltage	24 VDC
Battery Charger Alternator	Standard
Battery Size	See Battery Index 0161970SBY
Battery Voltage	24 VDC
Ground Polarity	Negative

ALTERNATOR SPECIFICATIONS

Standard Model	L2050064N24
Poles	4
Field Type	Revolving
Insulation Class - Rotor	H
Insulation Class - Stator	H
Total Harmonic Distortion	<5%
Telephone Interference Factor (TIF)	<50

Standard Excitation	Permanent Magnet
Coupling	Direct Drive
Bearings	Sealed Ball
Prototype Short Circuit Test	Yes
Voltage Regulator Type	Digital
Number of Sensed Phases	3
Regulation Accuracy (Steady State)	±0.25%

POWER RATINGS

Standby			Part Number
Three-Phase 240/416 VAC @0.8pf	2000 kW/2500 kVa	Amps: 3035.9	K3250064N24
Three-Phase 277/480 VAC @0.8pf	2000 kW/2500 kVa	Amps:3,007.0	L2050064N24
Three-Phase 346/600 VAC @0.8pf	2000 kW/2500 kVa	Amps: 2405.6	L2100064N24

MOTOR STARTING CAPABILITIES (SKVA)

skVA vs. Voltage Dip					
240/416 VAC	30%	277/480 VAC	30%	346/600VAC	30%
K3250064N24	Contact Factory	L2050064N24	Contact Factory	L2100064N24	Contact Factory

FUEL CONSUMPTION RATES*

Fuel Pump Lift- ft (m)	Diesel - gph (Lph)	
	Percent Load	Standby
Contact Factory	25%	42.8 (162.0)
	50%	79.1 (299.5)
Total Fuel Pump Flow (Combustion + Return) - gph (Lph)	75%	119.7 (453.0)
Contact Factory	100%	153.1 (579.5)

*Fuel supply installation must accommodate fuel consumption rates at 100% load.

COOLING

Air Flow (Fan Air Flow Across Radiator)	cfm (m ³ /min)	Standby Contact Factory
Coolant Flow (LT)	gpm (Lpm)	213.5 (808.3)
Coolant Flow (HT)	gpm (Lpm)	420 (1590)
Coolant System Capacity	gal (L)	97 (367)
Maximum Operating Ambient Temperature	°F (°C)	122 (50)
Maximum Operating Ambient Temperature (Before Derate)	See Bulletin No. 0199280SSD	
Maximum Additional Radiator Backpressure	in H ₂ O (kPa)	Contact Factory

COMBUSTION AIR REQUIREMENTS

	Standby
Flow at Rated Power cfm — (m ³ /min)	6,339.0 (179.5)

ENGINE

		Standby
Rated Engine Speed	rpm	1,800
Horsepower at Rated kW**	hp	2,950.0
Piston Speed	ft/min (m/min)	2,185 (666)
BMEP	psi (kPa)	329.7 (2,273)

** See "Emissions Data Sheet" for maximum bHP for EPA and SCAQMD permitting purposes.

EXHAUST

Exhaust Flow (Rated Output)	cfm (m³/min)	Standby 20,708.5 (586.4)
Maximum Allowable Back Pressure (Post Turbo)	inHg (kPa)	1.08 (7.5)
Exhaust Temperature (Rated Output - Post Turbo)	°F (°C)	957.2 (514)

Deration – Operational characteristics consider maximum ambient conditions. Derate factors may apply under atypical site conditions. Please contact a Generac Power Systems Industrial Dealer for additional details. All performance ratings in accordance with BS5514 and DIN6271 standards.

Standby - See Bulletin 0187500SSB

Prime - See Bulletin 0187510SSB

***TOTAL
POWER***

3

DSE® G8601 CONTROLLER



Features

The DSE G8601 is a genset controller with integral heater designed for complex paralleling applications. The G8601 can be configured to provide paralleling for up to 4,032 generators on a single site and provides a wide range of high-end features for multiple application environments. The module is configurable for use as a single-set controller, multi-set controller, mains (utility) controller or group controller.

Key Features

- Advanced PLC Functionality
- Multi-Purpose PIDs
- Virtual Inputs
- On-Screen Mimic (SLDs)
- Multiple Application Support
- Integral LCD Display Heater
- Enhanced High-Resolution 240 x 128 Pixel Display
- Single Generator Control
- Latest ECU / ECM Support
- Support for DSE Panel PC
- Zero Sequence Voltage Protection
- Integral Gasket (IP65 protection)

Standard Protections

- Low Coolant Level
- High/Low Coolant Temperature
- Oil Temperature
- Over/Under Speed
- Over/Under Voltage
- Over/Under Frequency
- Over/Under Current
- Over Load
- Battery Voltage
- Battery Charger Current
- Phase to Phase and Phase to Neutral Short Circuits (I²T Algorithm)
- Ground Fault

DSE® G8601 CONTROLLER

Control Panel

- Auto/Off/Manual
 - Indication Through Display Screen
- Audible Alarm and Silence
- Not in Auto Indication

Voltage Protection

- Three Phase Generator Sensing & Protection
- Three Phase Bus Sensing
- Negative Power Limit
- Loss of Sensing Protection
- Fault Protection (I²T Function)
- High Voltage Limit
- Low Voltage Limit
- Maximum Power Limit

Customer Ports

- Ethernet
- 2 RS-485
- 2 USB
- CANBus

Governor Functionality

- Speed Control through ECM Integration
- Soft Start Ramping (Multiple Steps)

Qualification Testing

- Life Test in Environmental Chamber
- Storage Temperature Range -40° C to +85° C
- Operating Temperature w/o Display Heater -30° C to +70° C
- Operating Temperature w/ Display Heater -40° C to +70° C
- Vibration Tested and Protected

Connections[‡]

- 7 Analog Inputs
- 2 Analog Outputs
- 9 Digital Inputs
- 12 Digital Outputs
- Comms Ports
 - 1 CANbus Port
 - 2 USB Ports
 - 2 RS-485 Ports

Codes And Standards

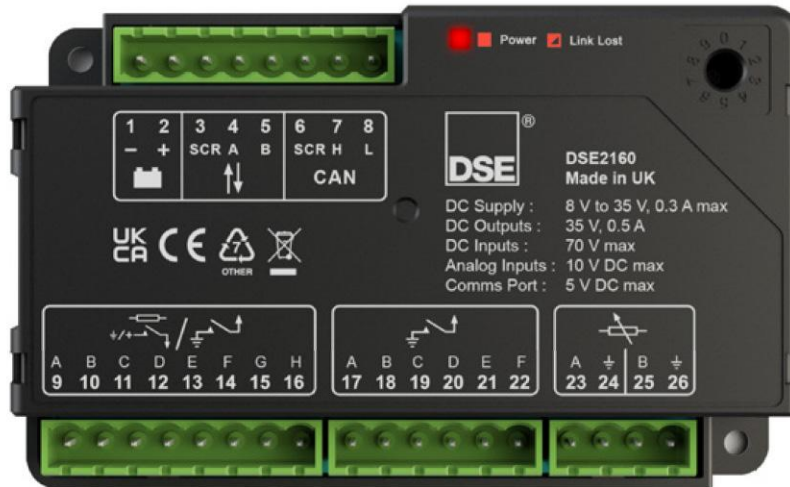
- UL 6200
- CE
- NFPA 110 Capable

More Features

- Built-in Governor and AVR Control
- Digital AVR Support
- Multiple Language Support
- Generator Current, Protection & Power Monitoring
- Configurable Timers
- Integrated SNMP
- Data Logging
- PC Configuration
- DSENet® (Expansion Support)
- Flexible I/O (Inputs/Outputs)
- Automatic and Front Panel Breaker Control
- Power-Save Mode

[‡] Actual I/O May Vary Due to Configuration

DSE® 2160 Expansion Module



Description

The DSE® 2160 Bi-Directional Expansion Module has been developed for use with the DSE® G8601 control module platform, extending the host modules digital I/O capabilities for increased application flexibility. This external communication allows the user to configure or monitor generator parameters, including building management system connections.

Features

- 8 Digital Inputs (2 Analog Configurable)
- 8 Digital Outputs (Configurable As Digital Input, Digital Output, Positive Switching, Or Digital Output Negative Switching)
- RS-485 Communications
- DSE Net® Communications
- Firmware Upgradeable

Specifications

- Voltage: 8 V to 35 V Continuous DC Supply
- Maximum Operating Current: 190 mA at 12 V, 90 mA at 24 V
- Maximum Standby Current: 34 mA at 12 V, 20 mA at 24 V

Environmental Testing Standards

Temperature

- Operating Temperature: -30°C to 70°C
- Storage Temperature: -40°C to 85°C

Shock

- BS EN 60068-2-27
- Three Shocks In Each Of Three Major Axes
- 15 gn in 11 ms

Vibration

- BS EN 60068-2-6
- Ten Sweeps In Each Of Three Major Axes
- 5 Hz to 8 Hz @ +/-7.5 mm,
- 8 Hz to 500 Hz @ 2 gn

Humidity

- BS EN 60068-2-30
Db Damp Heat Cyclic 20/55°C @ 95% RH 48 Hours
- BS EN 60068-2-78
Cab Damp Heat Static 40°C @ 93% RH 48 Hours

Codes and Standards

- UL 6200
- C-ETL-US
- IEC/EN 61010-1

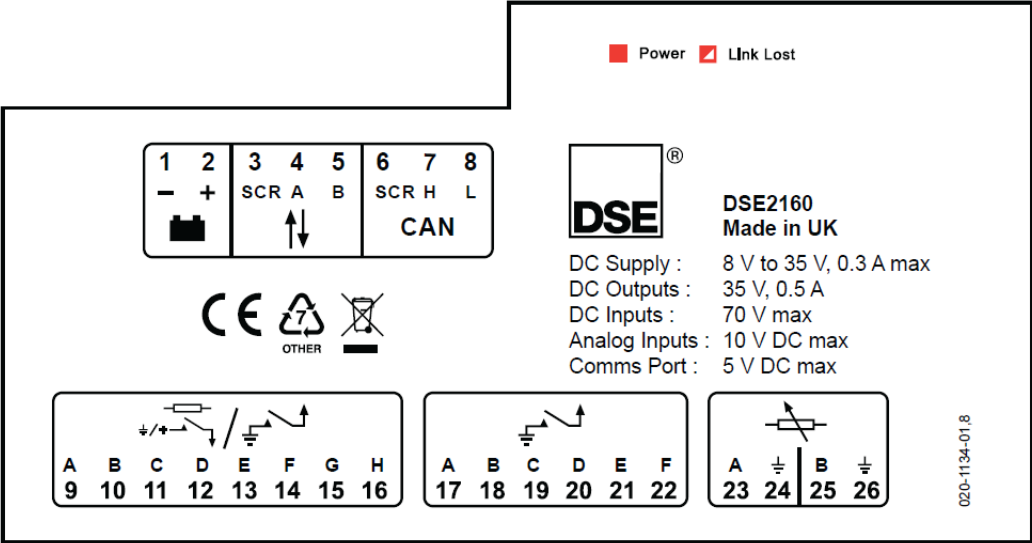
Electro-Magnetic Compatibility

- BS EN 61000-6-2 (EMC Generic Immunity Standard for the Industrial Environment)
- BS EN 61000-6-4 (EMC Generic Emission Standard for the Industrial Environment)

Electrical Safety

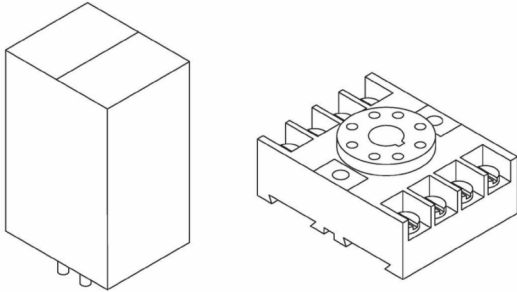
- BS EN 60950 (Safety of Information Technology Equipment, Including Electrical Business Equipment)

DSE® 2160 Expansion Module



PIN Out Description	
PIN	Description
1 to 2	DC Supply
3 to 5	DSENet®
6 to 8	CAN
9 to 16	Digital Input / Output
17 to 22	Digital Input
23 to 26	Digital Output

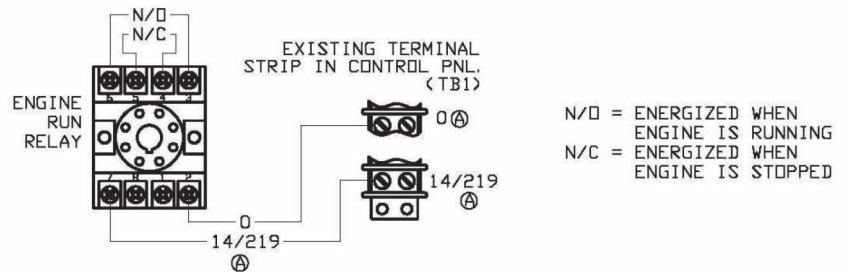
ENGINE RUN RELAY



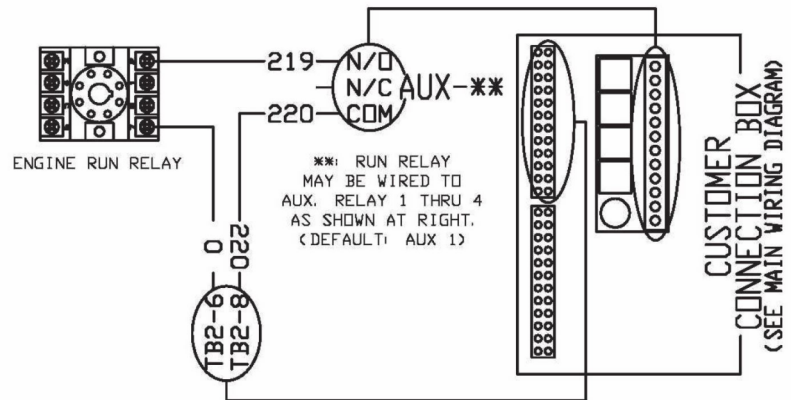
- For use with Generac's Digital Control Platforms
- 10 Amp Contact Rating
- 12 or 24 Volt DC Input
- Contact Open or Closure on Engine Run

Contacts	
Type	DPDT
Material	Silver
Rating	UL 10A @ 240VAC 10A @ 30VDC
Coils	
Input Voltage	24VDC
Resistance	400 Ohms
Nominal Power	1.5W

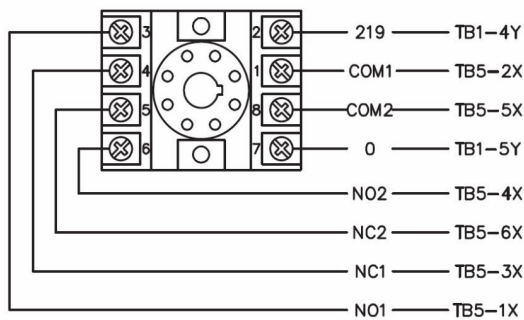
Wiring Diagram with E panel, H-100 Panel



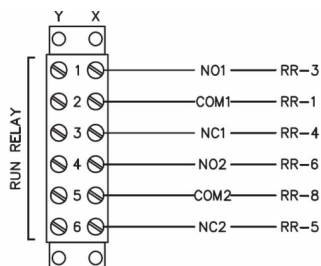
Wiring Diagram with PMDCP



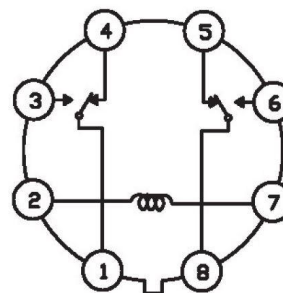
Wiring Diagram with Power Zone Pro Sync



TB5



Pin Detail



***TOTAL
POWER***

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	Model :	Date : 24/03/26
	20M33G6D2/6	Revision : Rev.26.01
	PowerKit Technical Datasheet	Page : 1 / 5

Ratings^{1,2}

RPM	Gross Engine Output				Net Engine Output			
	PRP		ESP		PRP		ESP	
	kWm	BHP	kWm	BHP	kWm	BHP	kWm	BHP
1800	2210 *	2964 *	2460	3299	2208.5 *	2962 *	2458.5	3297

¹ When the engine is used with a cooling system using an electrically driven fan and any optional auxiliary components, net engine output data may change and quoted figures should be used for reference only.

² 1 kWm = 1,34102 BHP

*Notes: This engine is designed for emergency standby power (ESP) applications only, all the values related to PRP is intended for reference only.

Basic data

Engine model	20M33G6D2/6
No. of cylinders / Valves	20/80
Cylinders arrangement	At Vee
Bore x Stroke (mm)	150x185
Displacement (L)	65.4
Thermodynamic cycle	Diesel 4 stroke
Firing order	A1-B7-A2-B5-A4-B3-A6-B1-A8-B2-A10-B4-A9-B6-A7-B8-A5-B10-A3-B9
Number of turbochargers	4
Mean Piston Speed (m/s)	11.1
BMEP @ ESP (Bar)	25.08
Cooling system	Liquid (water + 50% antifreeze)
Injection system	Direct
Fuel system	High Pressure Common Rail
Aspiration	Turbocharged and Aftercooled
Compression ratio	14: 1
Flywheel housing	SAE 00
Flywheel	21"
Rotation viewed from flywheel	Counter Clockwise
Allowed static bending moment of the flywheel housing (Nm)	TBD
No. of teeth on flywheel ring gear	159
Inertia of flywheel (kg•m ²)	8.64
Inertia of crankshaft (kg•m ²)	20.7
Emission standard	EPA Tier2
Overall dimensions without radiator (Length x Width x Height) (mm)	3391×1633×2144
Engine dry weight without radiator and without radiator pipes (kg)	6740
Engine dry weight with radiator and radiator pipes (kg)	N/A
Engine wet weight with radiator (includes oil, coolant) (kg)	N/A

	Model :	20M33G6D2/6	Date : 24/03/26
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Air intake system

Air intake restriction clean filter (mBar)	≤ 30
Air intake restriction dirty filter (mBar)	≤ 75
Combustion air flow @ PRP (m³/min)	188.4
Combustion air flow @ ESP (m³/min)	198.6
Min. diameter of intake pipe (mm)	150

Aftercooling system

Aftercooler system type	Air to Water
Max. intake manifold temperature (°C)	85
Max. difference between intake manifold temperature and ambient temperature (°C)	30
Max. intake pressure drop of aftercooler (mBar)	80

Lubrication system

Oil capacity Low / High (L).....	210/240
Oil pressure in normal condition at idle speed (Bar)	≥ 2
Oil pressure in normal condition at rated speed (Bar)	4 - 6.5
Lowest oil pressure alarm (shutdown) (Bar)	2
High Oil Pressure Warning (Bar).....	10
Max. oil temperature (°C).....	105
Oil flow at 1800 rpm (L/min).....	760
Oil consumption ratio based on engine fuel consumption data (%)	≤ 0.3
Total system capacity (L)	288

Exhaust system

Max. exhaust back pressure (mBar)	75
Max. exhaust gas temperature before turbocharger (°C)	780
Max. exhaust gas temperature after turbocharger (°C)	600
Exhaust flow @ PRP (m³/min).....	607.7
Exhaust flow @ ESP (m³/min).....	667.6
Min. diameter at exhaust pipe (mm)	300
Max. bending moment of exhaust gas exit flange (Nm)	TBD

Noise

Diesel engine noise (Acoustic power level) (dB(A))	122.0
Noise - upper side (dB(A))	104.9
Noise - right side (view from flywheel) (dB(A))	103.8
Noise - left side (view from flywheel) (dB(A))	103.9
Noise - front (radiator) side (dB(A))	103.3
Noise - rear (flywheel) side (dB(A))	103.5

Notes :

- Noise test made at 100% of the ESP power, at 1 mt. distance, on engine without radiator, without cooling fan and without silencer.
- Noise test refers to ISO 6798 norm : "Reciprocating internal combustion engines. Measurement of emitted airborne noise. Engineering method and survey method".

	Model :	Date : 24/03/26
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Cooling system (NonRad)

System designed for ambient temperature up to (°C) ¹	N/A
Radiator type	N/A
Fan type	N/A
Min. inside diameter of coolant outlet pipe (mm)	HT:79;LT:58
Coolant capacity of engine HT (L)	114
Coolant capacity of engine LT (L)	26
Coolant capacity of radiator and pipes HT (L)	N/A
Coolant capacity of radiator and pipes LT (L)	N/A
Coolant alarm (shutdown) temperature (°C)	108
Thermostat opening temperature / full open temperature (°C)	80/92
Max. additional restriction for external cooling circuit HT/LT (Bar)	0.6/0.6
Cooling fan air flow assumes the presence of the standard radiator provided (m³/min)	N/A
Fan absorbed power (kW)	0

Fuel system

Governor	ECU
Steady state speed stability at constant load (%) ²	±0.25%
Max. restriction at fuel inlet (Bar)	0.1
Max. pressure at fuel inlet (Bar)	0
Max. fuel return restriction (Bar)	1
Max. fuel inlet temperature (°C)	70
Fuel supply flow of engine inlet (L/hr)	860.4
Min. internal diameter of inlet pipe (mm)	19
Min. internal diameter of return pipe (mm)	19

Electrical system

Electrical system voltage (negative to ground) (Vdc)	24
Starter motor quantity × power(kW)	2×10
Minimum recommended battery capacity CCA @-18°C(A)	900~1400
Battery charging alternator output (A) / (Vdc)	55/28
Battery charging alternator output power (kW)	1.5
Max. electric resistance of starting circuit (Ω)	0.011
Min. cross-sectional area of wire (mm²)	2×95
Min. cold start temperature without auxiliary starting device (°C) ³	-10
Min. cold start temperature with auxiliary starting device (°C) ³	-25

¹ The indicated value is based on the AOT value of N/A°C for an engine tested at 100% of the ESP Power, reflecting temperature in an open condition, without an enclosure or container, without any airflow obstruction in the front of the radiator, without air recirculation, with free exhaust gas exit and with the engine thermostatic valve in its full open condition, without a closing plate present. The reference air restriction is equal to 50Pa. For the equivalent ATB (Air-to-Boil) performance on a customer or project basis, please consult Baudouin Application Engineering.

² This refers only to the frequency response of the engine.

³ Engines used in emergency standby application or applications that require immediate start, they must be equipped with coolant heaters and pre-lubricated system, details guidance reference the <Operation and Maintenance Manual for Diesel Engine> which documents attached to engine. Baudouin recommend heaters installation to be executed by providing constant coolant circulation across all the related components. For V-type engines, it is necessary to ensure that both sides are heated simultaneously.

	Model :	Date : 24/03/26
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Heat balance test data (with ambient temperature 21.7 °C)

Designation	PRP		ESP	
	HT	LT	HT	LT
Coolant inlet / output pressure (kPa)	N/A	N/A	35.1/86.9	32.8/77.5
Coolant inlet / output temperature (°C)	84.4/90.6	44/54.9	87.7/93.8	43.5/55.3
Coolant flow (m³/h)	110.8	53.8	110.8	53.8
Intercooler inlet / output temperature (°C)	221.5/50.4		239.7/52.1	
Intercooler inlet / output pressure (kPa)	287.7/274.7		312.1/294.5	
Engine total dissipation heat (kJ/s)	3580.7		3989.2	
The heat taken by the HT circuit (kJ/s)	744.7		791.1	
The heat taken by the LT circuit (kJ/s)	647.1		736.3	
The heat taken by the exhaust (kJ/s)	2070.2		2277.2	
Radiation heat of the engine surface (kJ/s)	118.7		184.6	
Exhaust gas temperature after turbo. (°C)	499.3		530.1	

Note: HT: Jacket Water Circuit; LT: Low Temperature Circuit

- 1) Tolerance: Temperature: ± 8%; Flow: ± 5%; Pressure: ± 10%;
- 2) The heat distribution is ± 5% of the total heat. Heat rejection values based on using Liquid (water+50% antifreeze).

DPK-TDS-EN-20M33-9019-24-03-26 Moteurs Baudouin reserve the right to modify these specifications, without notice. Document not contractual.

	Model :	Date : 24/03/26
	20M33G6D2/6	Revision : Rev.26.01
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Fuel consumption gross

Rating	PRP		ESP	
	gr/kWh	L/hr	gr/kWh	L/hr
100%	220.6	580.4	221.3	648.1
75%	224.5	443	223.4	490.7
50%	230.1	302.7	228.9	335.2
25%	245.2	161.3	240.5	176.1

Note: The reference testing diesel density is 0.84 kg/L.

Ratings definitions

Prime Power (PRP)

Prime Power (PRP) is the maximum power that can be delivered while supplying a variable electrical load. A PRP-rated engine may operate for an unlimited number of hours per year, but the permissible average power output over 24 hours of operation shall not exceed 70% of the PRP. A 10% overload capability is permitted for 1 hour within 12 hours of operation.

Emergency Standby Power (ESP)

Emergency Standby Power (ESP) is the maximum power that can be delivered in the event of a utility power outage while supplying a variable electrical load. An ESP-rated engine may operate for up to 200 hours per year. The permissible average power output over 24 hours of operation shall not exceed 70% of the ESP. No overload capability is allowed. The engine is not to be used for sustained utility paralleling applications.

- 1) All ratings are determined in accordance with operating conditions specified in ISO 8528-1, ISO 3046, and DIN 6271 standards.
- 2) This PowerKit Technical Datasheet contains information applicable to standard engine configurations and is intended for reference only. For performance specifications beyond the parameters indicated, please submit technical inquiries to the Applications Engineering Department.

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***TOTAL
POWER***

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GENprotect™

Seamless Protection for Industrial Power Generators

GENprotect Operation

The design choice of an onsite power system using a Generac Industrial Power Generator assures your emergency power source is protected from unexpected power distribution faults. Typically, a generator will include some type of over-current device, such as a circuit breaker, or be protected by inherent design with the controller protecting the alternator through a protection algorithm. Generac's GENprotect generator protection system monitors the system current output and protects the alternator with extended security against fault scenarios that could occur within the site's downstream distribution system.

It is a common misconception that the alternator's main circuit breaker protects the alternator from a short circuit event. The main output breaker protects the cabling and provides a convenient disconnect. The characteristic trip curve for the industry standard thermal magnetic breaker (MCCB, molded case thermal magnetic or solid state) does not coordinate with the thermal damage limitation for an on-site generator. If circuit breakers are used for generator protection, a solid-state circuit breaker with full adjustments (Long Time, Short Time and Instantaneous, LSI) is required to coordinate the breaker protection curve within the generator thermal damage curve. Historically, this limitation was often accepted in system design since failures of the main generator feeder are extremely rare. Most short circuit events happen at a branch circuit, equipment level, where the fault is easily cleared by the smaller down stream breakers.

Given the mission critical nature of today's back-up power applications, it is more desirable to protect the system against even relatively rare failure modes. As generator controllers have become more powerful it is feasible for manufactures to supply coordinated short circuit protection integral to the generator control system, negating the need for a main-line circuit breaker.

Generac's GENprotect alternator protection algorithm monitors the generator output. If this monitoring senses short circuit current in excess of rated amps, GENprotect steps in to provide a controlled and safe approach to breaker coordination and alternator protection. GENprotect first limits the alternator short circuit current level to 300%. By limiting the available fault current, GENprotect extends the time the alternator can maintain fault current resulting in consistent breaker coordination. Without this functionality a

line to neutral fault may be at 800% of rated current and need to be cleared within 1.4 seconds. The second function GENprotect performs is I²T thermal protection for the alternator. Since a short circuit event can heat the alternator so rapidly, it is not possible to protect the alternator by monitoring temperature. Instead GENprotect calculates the heat energy of the fault current. When this energy reaches the limits of NEMA MG1, GENprotect trips the generator off-line. This configuration ensures the alternator is protected and the power system is ensured 10 seconds of 300% fault current for breaker coordination.

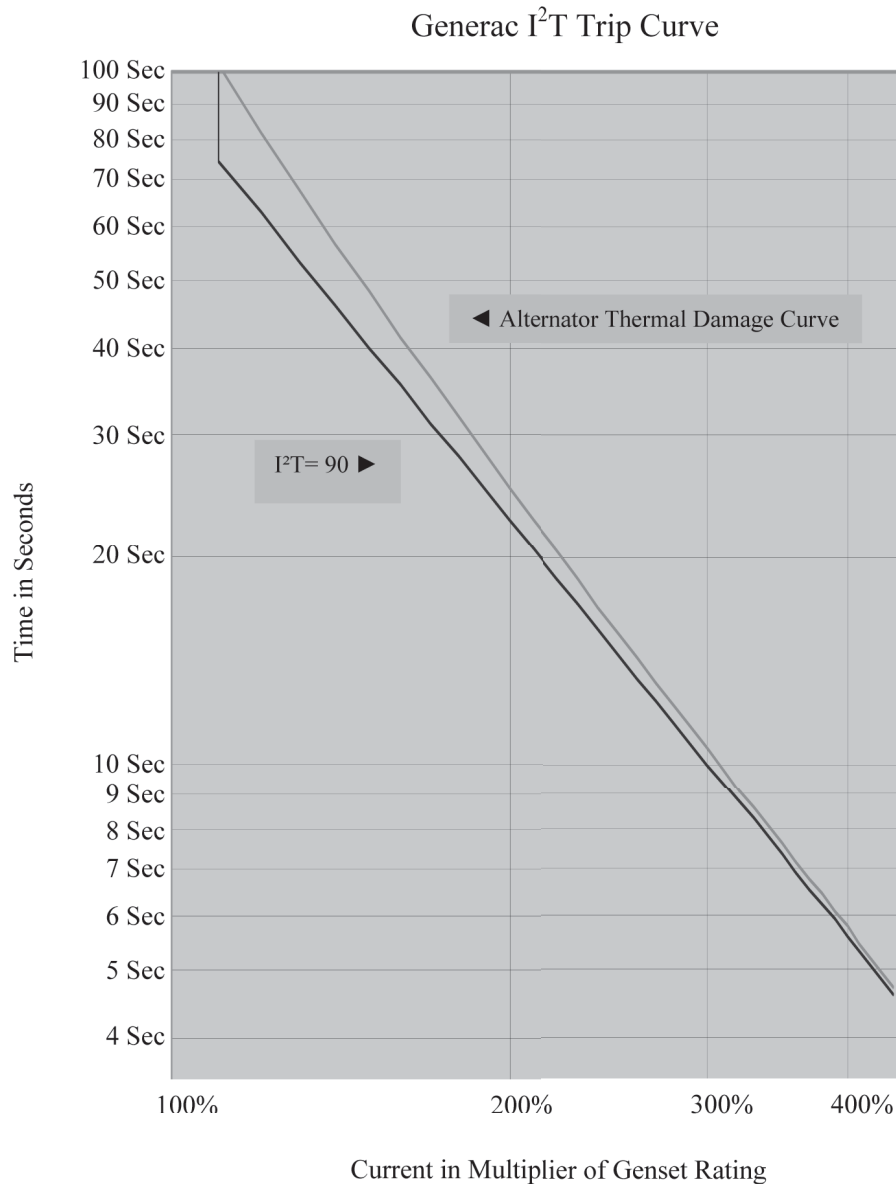
DESCRIPTION

- GENprotect is an alternator protection algorithm approved by UL.
- Protects alternator from damage due to shorts and electrical faults.
- Provides breaker coordination and alternator protection.
- Allows for use of multiple circuit breaker choices, including "no" breaker.



GENprotect™

Seamless Protection for Industrial Power Generators



The above Figure shows the Generac GENprotect thermal protection curve for use in protection and coordination studies. The alternator Thermal Damage Curve is shown just to the right of the GENprotect protection curve. If the alternator load is greater than the thermal damage protection curve for the alternator, the generator set will trip off-line. For example, an overload current of 110% for 75 seconds causes an overload alarm and will trip the generator off-line, shutting down the engine. GENprotect will provide generator protection over a full range of time and current, from instantaneous faults to overloads lasting several minutes. An advantage of GENprotect over a MCCB is that GENprotect allows for downstream breakers to clear faults without tripping the generator off-line, providing selective coordination with the first level of downstream breakers.

ALTERNATOR DATA SHEET

L2300064N24

General Characteristics

Voltages (V)	600	Number of Leads	6
Frequency (Hz)	60	Winding Type	Not Reconnectable
Phases	3	Air Flow (CFM)	4,650
Speed (RPM)	1,800	Total Harmonic Distortion (%)	5%
Excitation System	Ext. Voltage Regulated, Brushless	Largest Single Harmonic Value (%)	3%
Insulation Class	H	Telephone Interference Factor (TIF)	<50
Winding Pitch	2/3	Reference Part Number	A0010428948

Ratings @ 0.8 pf Based on 40 °C Ambient

Voltage (V)	80 °C Rise		105 °C Rise		125 °C Rise	
	kW	kVA	kW	kVA	kW	kVA
600	1,850	2,313	2,100	2,625	2,300	2,875

Reference Base Data at 600V, 2250kW, 2813kVA, 1800RPM, 60Hz, 3Phase

Description	Value
Stator Resistance, Line to Neutral, High Wye Connection (Ω)	0.00173
Rotor Resistance (Ω)	1.245
Exciter Stator Resistance - PMG (Ω)	19.44
Exciter Rotor Resistance - PMG (Ω)	0.071
Excitation Winding Resistance -PMG (Ω)	Consult Factory
Xd, Direct Axis Synchronous Reactance (p.u.)	1.885
X2, Negative Sequence Reactance (p.u.)	1.737
X0, Zero Sequence Reactance (p.u.)	0.160
X'd, Direct Axis Transient Reactance (p.u.)	0.126
X''d, Direct Axis Subtransient Reactance (p.u.)	0.115
Xq, Quadrature Axis Synchronous Reactance (p.u.)	Consult Factory
T'd, Direct Axis Transient Short Circuit Time Constant (s)	0.162

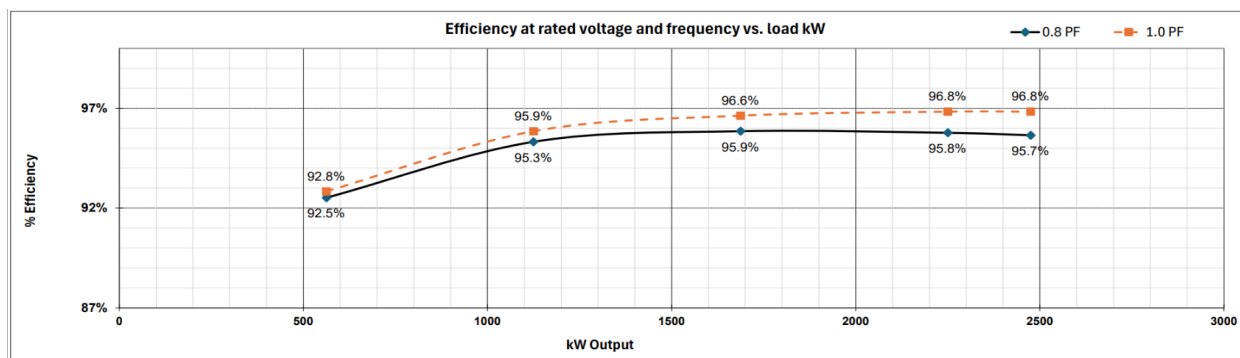
Description	Value
T''d, Direct Axis Subtransient Short Circuit Time Constant (s)	0.026
T'do, Direct Axis Transient Open Circuit Time Constant (s)	2.929
Ta, Short Circuit Time Constant of Armature Winding (s)	0.02
Phase Sequence CCW-ODE	ABC
Voltage Balance, L-L or L-N (%)	0.2%
Deviation Factor (%)	5.0%
High Wye Connection, Sustained 3Ø Short Circuit Current (%) - PMG Only	Consult Factory
X/R	Consult Factory
Short Circuit Ratio	0.841
Heat Rejection (BTU/min)	5,653

Reference: Mil-STD-705B
All Ratings are Nominal

ALTERNATOR DATA SHEET

L2300064N24

600 Volts*, 2250 kW, 2813 kVA, 0.8 P.F., 1800 RPM, 60 Hz, 3 Phase



Model : 764RSS4295

Phase : 3

Hertz : 60

Volts : 600

RPM : 1800

KVA : 2813

KW : 2250

P.F. : 0.8

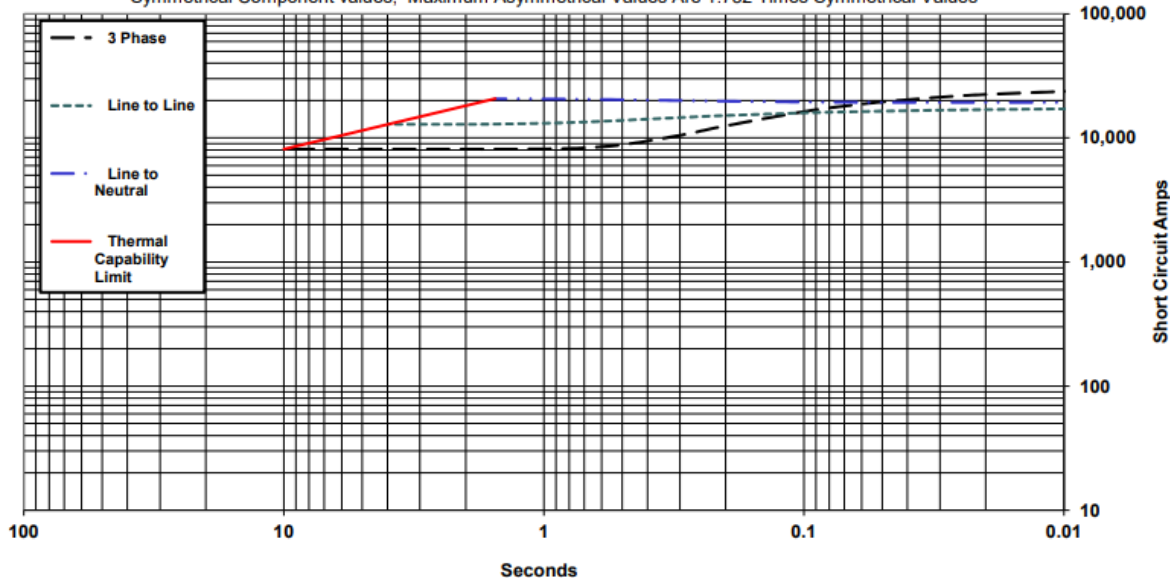
Full Load Current : 2707 amps

Steady State S.C. Current : 8121 amps

Max. 3 ph. Symm. S.C. Current : 23539 amps

INCLUDES EXCITATION SUPPORT (PMG)

Symmetrical Component values, Maximum Asymmetrical Values Are 1.732 Times Symmetrical Values

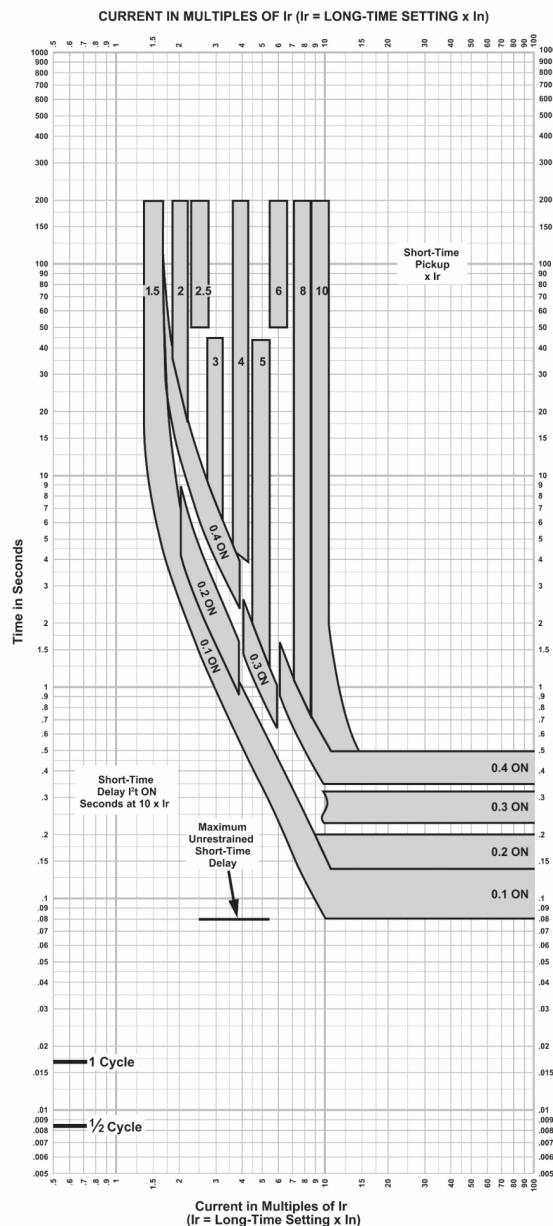


*Rated Power Value is Rated kW at 125°C Winding Temperature Rise and 0.8 PF

***TOTAL
POWER***

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MLCB, 1600-3600A Square D MasterPact MTZ2



MicroLogic 5.0/6.0 X Control Unit Short-time Pickup and I^2t ON Delay

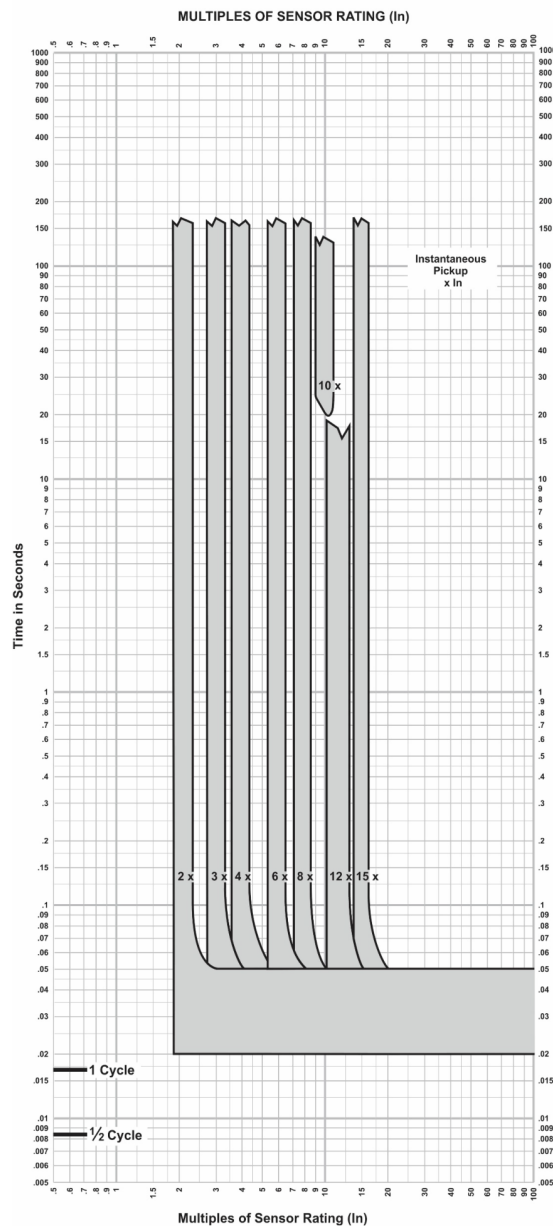
The time-current curve information is to be used for application and coordination purposes only.

Curves apply from -25°C to +70°C
(-13°F to +158°F) ambient temperature.

Notes:

1. There is a thermal-imaging effect that can act to shorten the long-time delay. The thermal-imaging effect comes into play if a current above the long-time delay pickup value exists for a time and then is cleared by the tripping of a downstream device or the circuit breaker itself. A subsequent overload will cause the circuit breaker to trip in a shorter time than normal. The amount of time delay reduction is inverse to the amount of time that has elapsed since the previous overload. Approximately 20 minutes is required between overloads to completely reset thermal-imaging.
2. The end of the curve is determined by the interrupting rating of the circuit breaker.
3. With zone-selective interlocking on, short-time delay utilized and no restraining signal, the maximum unrestrained short-time delay time band applies regardless of the setting.
4. Total clearing times shown include the response times of the trip unit, the circuit breaker opening, and the extinction of the current.
5. For a withstand circuit breaker, instantaneous can be turned OFF.

MLCB, 1600-3600A Square D MasterPact MTZ2



MicroLogic 5.0/6.0 X Control Unit Instantaneous Pickup 2x–15x and OFF

The time-current curve information is to be used for application and coordination purposes only.

Curves apply from -25°C to +70°C
(-13°F to +158°F) ambient temperature.

Notes:

1. The end of the curve is determined by the interrupting rating of the circuit breaker.
2. Total clearing times shown include the response times of the trip unit, the circuit breaker opening, and the extinction of the current.
3. The instantaneous region of the trip curve shows maximum total clearing times. Actual clearing times in this region can vary depending on the circuit breaker mechanism design and other factors. The actual clearing time can be considerably faster than indicated. Contact your local Sales Office for additional information.
4. For a withstand circuit breaker, instantaneous can be turned OFF.

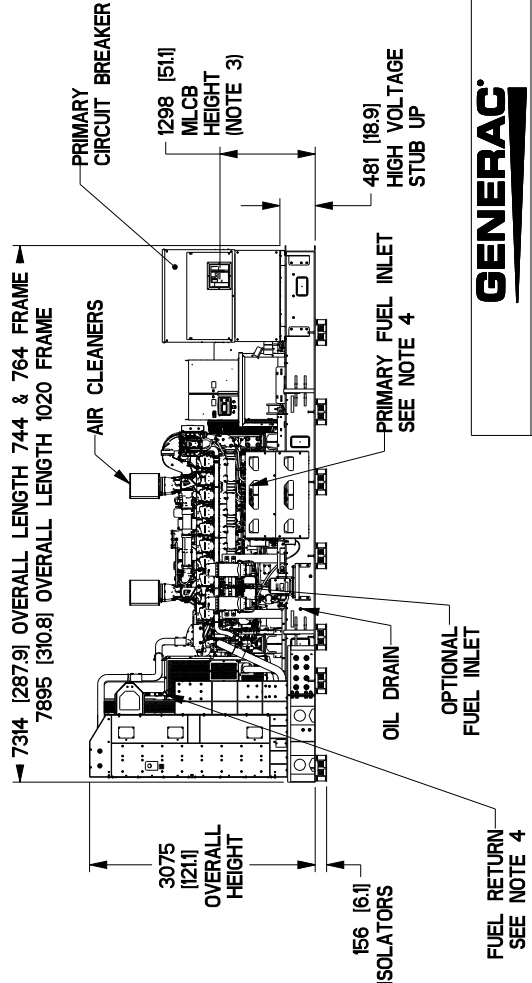
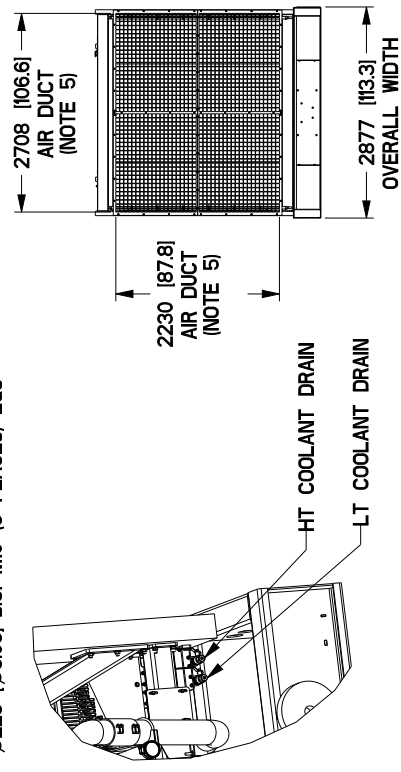
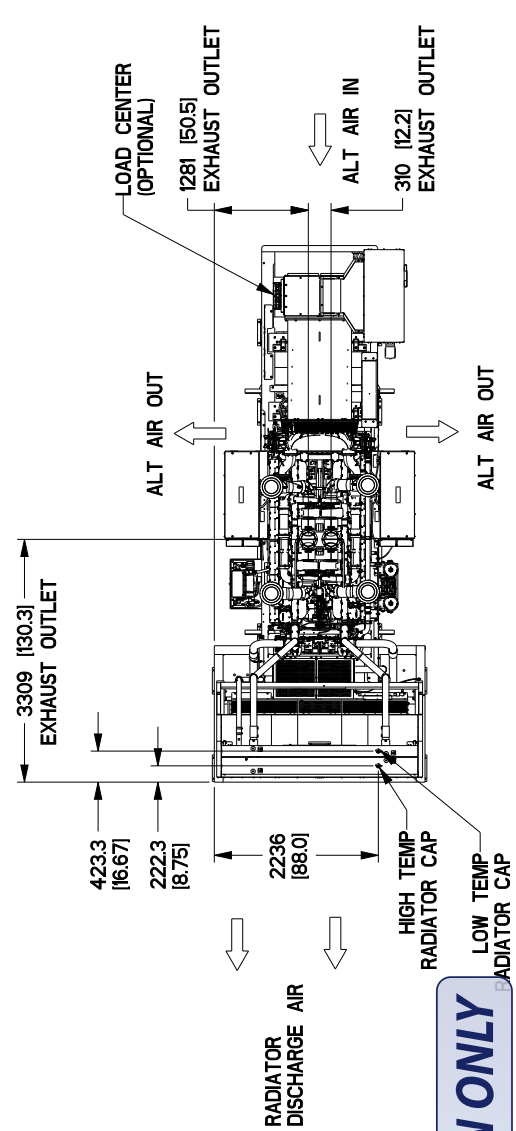
***TOTAL
POWER***

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NOTES:

1. ALLOW SUFFICIENT ROOM ON ALL SIDES OF THE GENERATOR FOR MAINTENANCE & SERVICING. THIS UNIT MUST BE INSTALLED IN ACCORDANCE WITH CURRENT APPLICABLE NFPA 37 AND NFPA 70 STANDARDS AS WELL AS ANY OTHER FEDERAL, STATE, & LOCAL CODES. CONNECT THE OPEN SET EXHAUST PER NFPA 37.
2. BATTERY (24 VOLT GROUND SYSTEM)
3. MAIN LINE CIRCUIT BREAKER (MLCB), AC LOAD LEADS (DIMENSIONS MAY VARY DUE TO UNIT CONFIGURATION)
4. ENGINE SERVICE CONNECTIONS:
 - OPTIONAL INLET DIESEL : 1 1/16-12UN 37°
 - RETURN DIESEL : 1 1/16-12UN 37°
 - OIL DRAIN : 100" NPT COUPLING
5. GENERATOR SET MUST BE INSTALLED SUCH THAT FRESH COOLING AIR IS AVAILABLE AND DISCHARGE AIR FROM THE RADIATOR IS NOT RECIRCULATED.
6. EXHAUST SYSTEM MAXIMUM BACK PRESSURE : 30.1 IN H2O
7. ISOLATORS SPRINGS INCREASES UNIT HEIGHT BY APPROXIMATELY 6.1"
8. EXHAUST FLANGE DETAILS:
 - Ø194 (Ø763) OUTLETS
 - Ø248 (Ø976) FLANGE
 - Ø228 (Ø898) BC. M10 (8 PLACES) EQS

INFORMATION ONLY



GENERAC

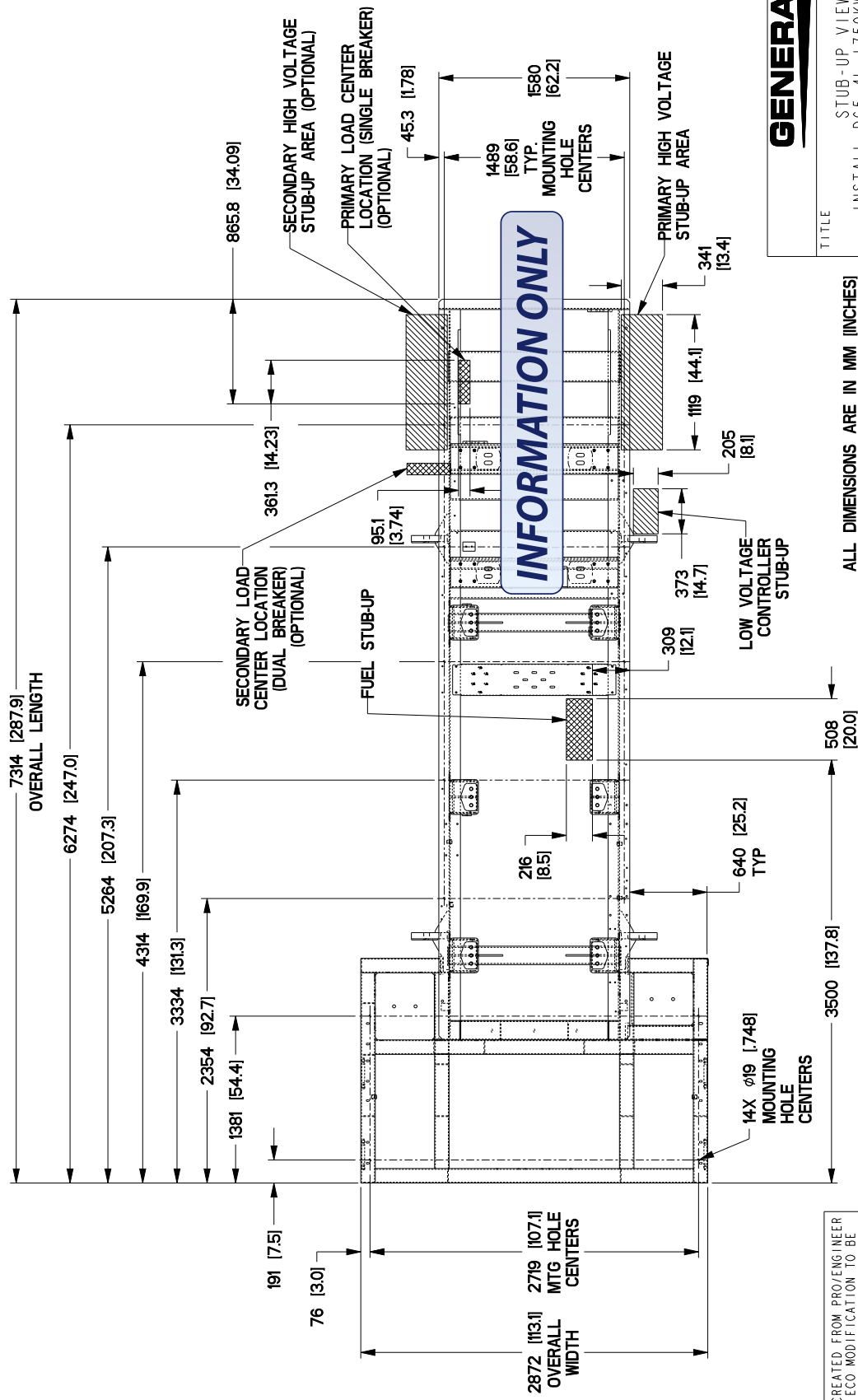
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ISSUE DATE:	4/3/2026	CAGE NO	DWG NO	A0011009667	REV
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SCALE	0.015	WT-KG	-	SHEET	1 of 4

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ELECTRONICALLY APPROVED
INSIDE WINDCHILL

INSTALLATION DRAWING

DRAWING CREATED FROM PRO/ENGINEER 3D FILE. ECO MODIFICATION TO BE APPLIED TO SOLID MODEL ONLY.



INFORMATION ONLY

GENERAC.

TITLE

STUB-UP VIEW
INSTALL D65.4L 1750KW

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ELECTRONICALLY APPROVED
INSIDE WINDCHILL

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INSTALLATION DRAWING

DRAWING CREATED FROM PRO/ENGINEER
3D FILE. ECO MODIFICATION TO BE
APPLIED TO SOLID MODEL ONLY.

***TOTAL
POWER***

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LEGEND:

1. PRIMARY DOUBLE WALLED VERTICAL DISCHARGE PLENUM C/W AIR Baffles, AIR GUIDES AND ACCESS DOOR. VERTICAL DISCHARGE PLENUM TO BE REMOVABLE FOR GENSET REMOVAL.
2. INSULATED DOUBLE WALLED VERTICAL DISCHARGE PLENUM C/W AIR DAMPERS, ORBD, (106 5/8"x87 7/8" HIGH) C/W ON/OFF ACTUATORS BELIMO MODEL FEB120-5 (QTY=2).
3. EXTERIOR STEEL SHEETS OF ENCLOSURE WALLS AND ROOF TO BE 12 GAUGE STAIN GALVANIZED STEEL. EXTERIOR OF ENCLOSURE TO BE PAINTED WITH POLYURETHANE PAINT (SPRAYED) - SEMI GLOSS. INTERIOR STEEL SHEETS TO BE 22 GAUGE GALVANIZED STEEL. INTERIOR WALLS TO BE COVERED WITH 1/2" THICK CLASS INSULATION AT 4" THICK COVERED WITH NYLON REMOVABLE LIFT LUGS.
4. 11, 103 USG LISTED SUB FUEL TANK 5/8" LOW LEVEL SWITCH, 250V, 15 AMP, 120V, 1/2" SWITCH, 250V, 15 AMP, 120V, 1/2" UIC MECHANICAL FUEL GAUGE OVERVIEW, PROTECTIVE VENT, LEAK DETECTOR, MORRISON FIRE VALVE, SECONDARY VENT, NORMAL VENT/WHISTLE, 5 GALLONS SPILL BOU (LOOSE), FLEX GUARDS INCLUDED.
5. FLEXIBLE CONNECTOR FOR GENSET RADIATOR 6" THICK.
6. "GENSET" GENERATOR - MODEL SD3000 SUPPLIED BY TOTAL POWER AND INSTALLED INSIDE ENCLOSURE BY VIBRA-SIL.
7. QTY=2 SINGLE ACCESS DOORS WITH PANIC DOOR HARDWARE (36" Wx84" H) EACH, SAME KEY, C/W DRIP RAIN SHIELD ABOVE EACH DOOR AND DOOR CHAINS.
8. EXHAUST SILENCER (GRADE 4) SUIT TO MEET NOISE CRITERIA, RECTANGULAR SHAPE, EXHAUST SILENCER TO BE INTERNALLY THERMALLY INSULATED (INSULATION NOT EXPOSED) C/W QTY=2, EXHAUST SILENCERS TO BE INSTALLED BY VIBRA-SIL. EXHAUST RAIN SHIELD, 18" X 18" X 1/2" FLANGED EXHAUST STACK AND RAIN CAP, FLEX GUARDS INCLUDED.
9. EXHAUST SILENCER TO BE FABRICATED OUT OF STAINLESS STEEL.
10. INSULATED INTAKE AIR DAMPERS, ORBD, (104Wx120" HIGH) C/W ON/OFF ACTUATORS BELIMO MODEL FEB120-5 (QTY=4).
11. QTY=10 INTAKE HOODS WITH BRD SCREEN INSTALLED AND CAULKED BY OTHERS ON SITE (9"Wx24" HIGHx32" DEEP EACH).
12. SECONDARY DOUBLE WALLED VERTICAL DISCHARGE PLENUM C/W ACOUSTIC AIR Baffles AND REMOVABLE LIFTING LUGS AND REMOVABLE GRILL C/W ON/OFF ACTUATORS BELIMO MODEL FEB120-5 (QTY=2). SHIPPED LOOSE. INSTALLED BY OTHERS. PAINTED PLATES TO BE SHIPPED LOOSE AND SCREWED OVER JOINTS (BETWEEN PRIMARY AND SECONDARY VERTICAL DISCHARGE PLENUMS) ONCE SECONDARY DISCHARGE PLENUM IS INSTALLED IN PLACE, BY OTHERS.
13. EXHAUST FAN FOR HEAT REMOVAL C/W COOLING THERMOSTAT (LOOSE), INSULATED DAMPER (18 3/4"x18 3/4") AND ON/OFF ACTUATOR BELIMO MODEL FEB120-5 (QTY=1).
14. ACOUSTIC AIR INTAKE SILENCERS 120"H X 194"W X 84" L.

NOTE:
AIR VELOCITY THROUGH AIR
INTAKE HOODS TO BE APPROX.
393 FPM (AT FACE OF HOODS)

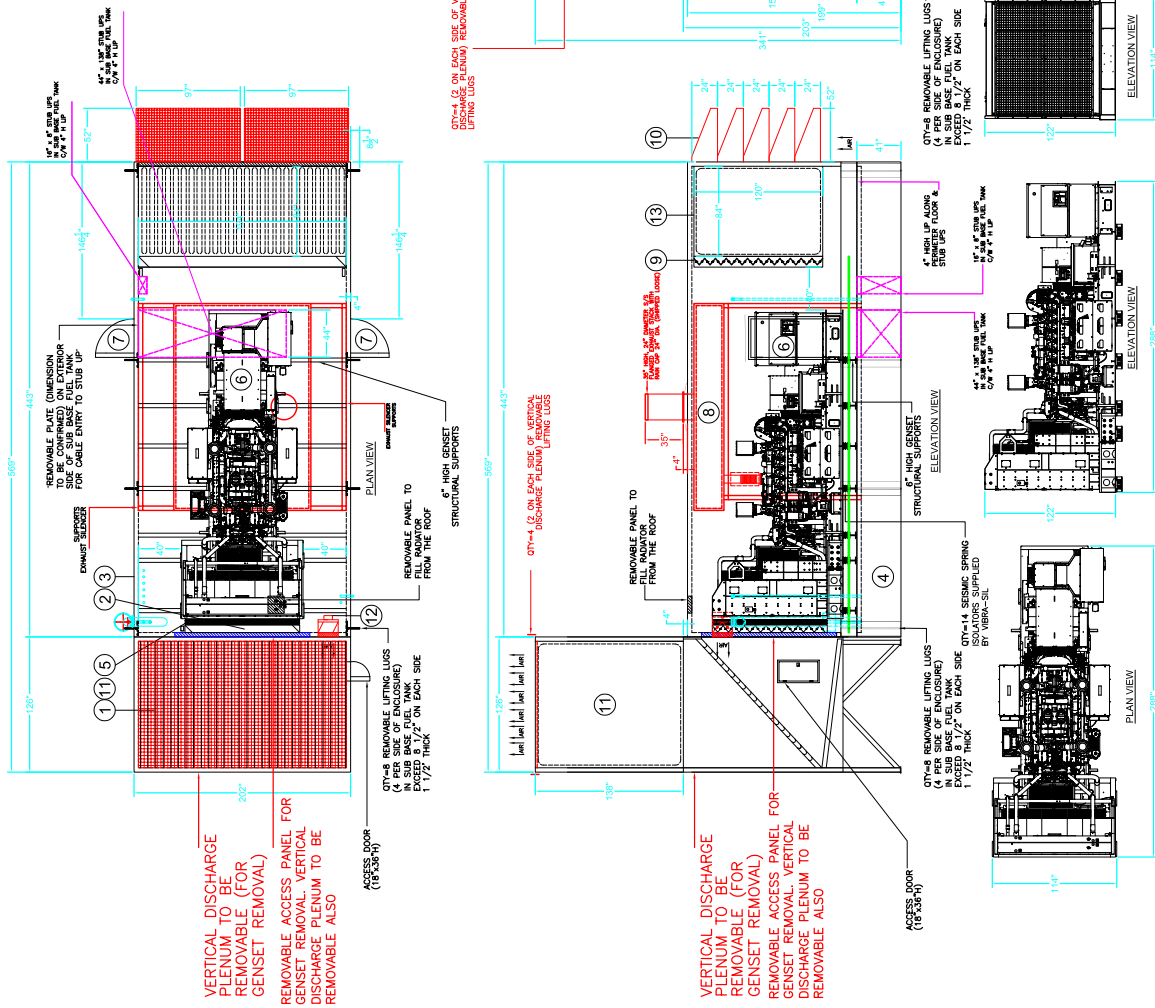
-CONDENSATE PIPING FROM THE EXHAUST SILENCER TO BE EXTENDED AT 6" FROM ENCLOSURE FLOOR W/A VALVE

NOTE:
-EXHAUST SILENCER
AND FLEX CONNECTOR TO
BE PRESSURE TESTED
AT 2 PSI FOR 2 HOURS.

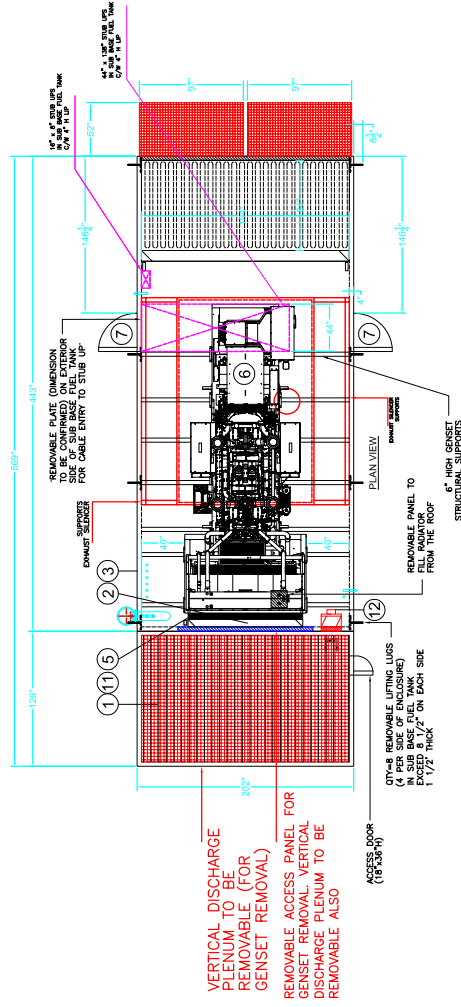
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DO NOT DRILL ANY HOLES, PLACE ANY SCREWS OR BOLTS ON THE FUEL TANK

THE CABLE OPENING MUST BE PROPERLY SEALED FOR WEATHER PROOFING, FIRE RATING AND ACOUSTIC REQUIREMENTS, NOT TO ALLOW SOUND, FIRE AND WATER TO LEAK. THE STUB UPS IN THE SUB BASE FUEL TANK (FLOOR) MUST BE FILLED AND SEALED PROPERLY FOR THE SAME CONSIDERATION. VIBRA-SIL WILL NOT BE RESPONSIBLE FOR ANY WATER, FIRE OR NOISE LEAKS.



APPROX. WEIGHT OF ENCLOSURE INCLUDING GENSET AND FUEL TANK (W/O FUEL) = 131 800 LBS
 NOISE CRITERIA = 60 DBA AT 7 METRES IN A FREE FIELD ENVIRONMENT AND ENCLOSURE TO BE IN
 LEVEL CONCRETE PAD - GROUND LEVEL. NOISE DUE TO REGENERATION WILL NOT BE THE RESPONSE
 STUB UP(S) TO BE PROPERLY SEALED (BY OTHERS) FOR ACOUSTIC ONCE ENCLOSURE IS INSTALLED
 EXHAUST SILENCER TO BE PRESSURE TESTED 2 PSI FOR 2 HOURS.

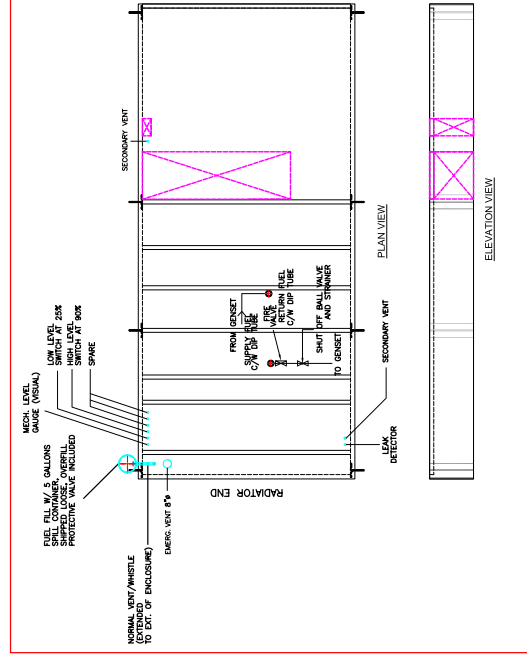


PLUMBING:

- NORMAL VENT/WHISTLE, 2 EMERGENCY VENT, SECONDARY VENT AND FUEL FILL TO BE EXTENDED TO THE EXTERIOR OF THE ENCLOSURE.
- SUPPLY AND RETURN LINE PIPING BETWEEN GENSET AND FUEL TANK BY VIBRA-SIL (FLEXIBLE FUEL LINES SUPPLIED BY GAL POWER OTTAWA).
- INTERNAL FUEL PIPING AND VENT TO BE PAINTED BLACK.
- ACCESSORIES: LOW LEVEL SWITCH (25%), HIGH LEVEL SWITCH (90%), EMERGENCY VENT, OVERFILL PROTECTIVE VALVE, MORRISON FIRE WALL, LEAK DETECTOR, NORMAL VENT/WHISTLE, ULC MECHANICAL FUEL GAUGE, SECONDARY VENT, AND 5 GALLONS SPILL CUP (LOOSE).

NORMAL VENT TO BE GRANBY VENT CAP. 2" DIA.

- PLUMBING NOTES:**
- ALL TANK OPENINGS ARE 2" UNLESS NOTED OTHERWISE
 - USE SCHEDULE 40 BLACK PIPE FOR FUEL LINES
 - ALL VENTS EXTENDED TO THE EXTERIOR OF THE ENCLOSURE
 - FUEL FILL TO BE EXTERIOR OF ENCL. WITH 5 GALLONS SPILL BOX (LOOSE)
 - FUEL LINE SIZES, SUPPLY AND RETURN FUEL PIPING TO BE ADVISED BY CLIENT ON APPROVAL OF THIS DRAWING
 - INSTALL THE SUPPLY AND RETURN FUEL LINES TO THE SPILL BOX (LOOSE)
 - TO INSTALL A SHUT OFF BALL VALVE, A STRAINER AND MORRISON FIRE VALVE AT THE SUPPLY LINE
 - WHEN THE FUEL SUPPLY AND RETURN LINES CLOSE TO THE ENCLOSURE FLOOR
 - EXHAUST SLENDER CONDENSATE TO 6" FROM ENCLOSURE FLOOR



DO NOT DRILL ANY HOLES, PLACE ANY SCREWS OR BOLTS ON THE FUEL TANKS AS IT WILL CAUSE FUEL LEAKAGE.

- GENERAL NOTES**

 1. ALL DIMENSIONS ARE IN IMPERIAL (N) EXCEPT WHERE THERE IS A NOTE
 2. THIS DRAWING DOES NOT HAVE A SCALE TO ASSURE
 3. USE ONLY THE LAST DRAWING NUMBER AS INDICATED IN THE CORNER AS REVISION.
 4. THIS DRAWING SHOULD NOT BE USED FOR FINAL CONSTRUCTION UNTIL IT IS REVIEWED AND APPROVED BY THE ENGINEER OF THE PROJECT.
 5. ALL THE DIMENSIONS ON THE DRAWING SHOULD BE VERIFIED BY THE CONTRACTOR BEFORE CONSTRUCTION AND DIMENSIONS SHOULD BE NOTED ON THE DRAWING.

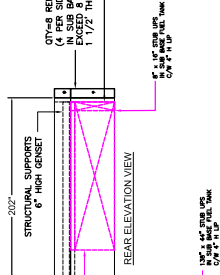
NOTE:
AIR VELOCITY THROUGH AIR
INTAKE HOODS TO BE APPROX.
393 FPM (AT FACE OF HOODS)

-CONDENSATE PIPING FROM THE EXHAUST SILENCER TO BE EXTENDED AT 6" FROM ENCLOSURE FLOOR W/A VALVE

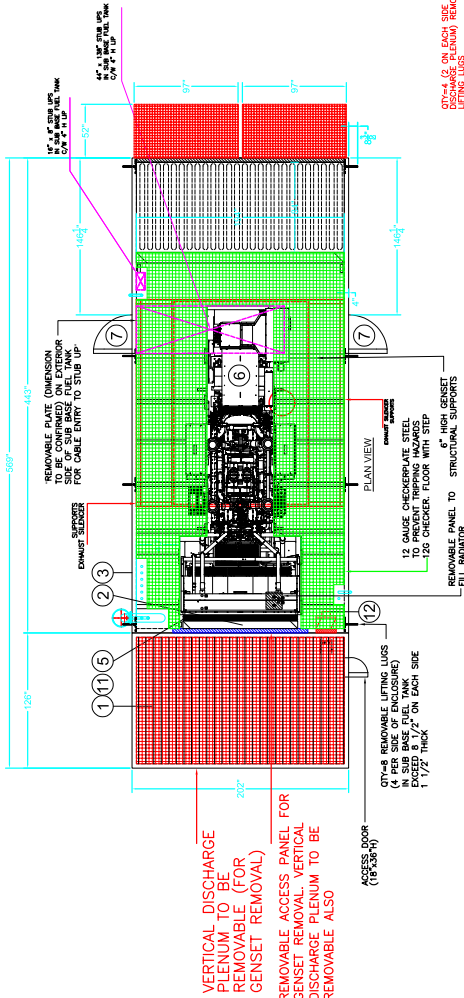
NOTE:
-EXHAUST SILENCER
AND FLEX CONNECTOR TO
BE PRESSURE TESTED
AT 2 PSI FOR 2 HOURS.

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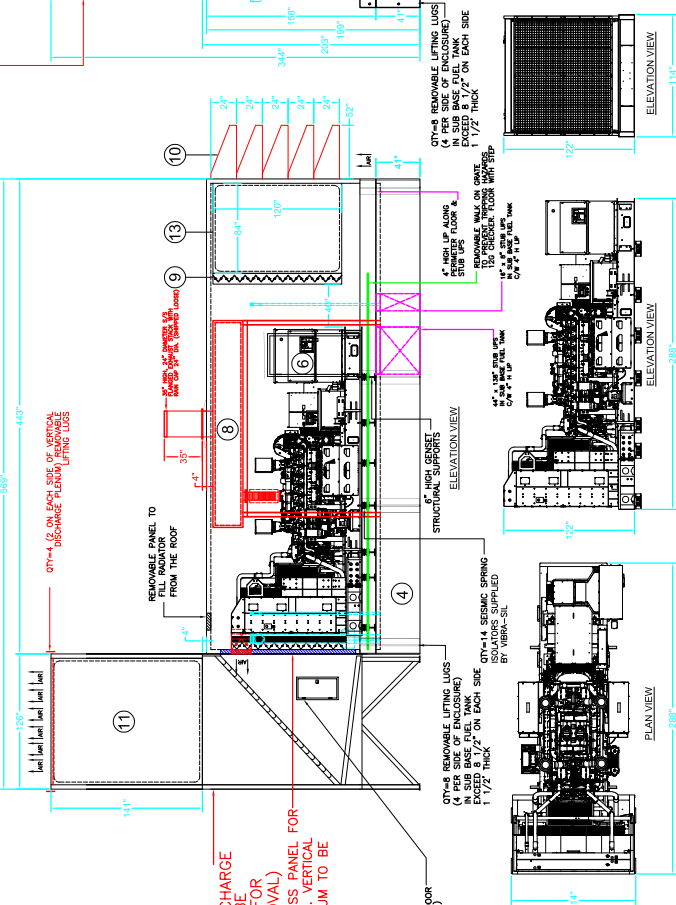
APPROX. WEIGHT OF ENCLOSURE INCLUDING GENSET AND FUEL TANK (W/O FUEL) = 131 800 LBS.
NOISE CRITERIA = 60 DBA AT 7 METRES IN A FREE FIELD ENVIRONMENT AND ENCLOSURE TO BE INSTALLED ON A SOLID, LEVEL CONCRETE PAD - GROUND LEVEL. NOISE DUE TO REVERBERATION WILL NOT BE THE RESPONSIBILITY OF VIBRA-SIL. STUB UP(S) TO BE PROPERLY SEALED (BY OTHERS) FOR ACOUSTIC ONCE ENCLOSURE IS INSTALLED ONTO CONCRETE PAD. EXHAUST SILENCER TO BE PRESSURE TESTED 2 PSI FOR 2 HOURS.



VERTICAL DISCHARGE PLENUM TO BE REMOVABLE (FOR GENSET REMOVAL)

REMOVABLE ACCESS PANEL FOR GENSET REMOVAL. VERTICAL DISCHARGE PLENUM TO BE REMOVABLE ALSO

QTY=4 (2 ON EACH SIDE OF VERTICAL DISCHARGE PLENUM) REMOVABLE LIFT LUGS



VERTICAL DISCHARGE PLENUM TO BE REMOVABLE (FOR GENSET REMOVAL)

REMOVABLE ACCESS PANEL FOR GENSET REMOVAL. VERTICAL DISCHARGE PLENUM TO BE REMOVABLE ALSO

ACCESS DOOR (10.50\"/>

LEGEND:

- DOUBLE WALLED VERTICAL DISCHARGE PLENUM C/W REMOVABLE ACCESS PANEL FOR GENSET REMOVAL. VERTICAL DISCHARGE PLENUM TO BE REMOVABLE (FOR GENSET REMOVAL).
- INSULATED DISCHARGE AIR DAMPERS, ORD. (106 5/8\"/>
- EXTERIOR STEEL SHEETS OF ENCLOSURE WALLS AND ROOF TO BE 12 GAUGE SATIN GALVANIZED STEEL EXTERIOR OF ENCLOSURE TO BE PAINTED WITH POLYURETHANE PAINT (SPRAYED) - SEMI GLOSS. INTERIOR STEEL SHEETS TO BE 22 GAUGE GALVANIZED STEEL - PERFORATED LINER. WALLS/ROOF WITH FIBRE GLASS INSULATION 4\"/>
- 11 103 USC LISTED SUB BASE FUEL TANK C/W LOW LEVEL SWITCH (25SE), HIGH LEVEL SWITCH (80SE), EMERGENCY VENT, LEAK DETECTOR, MORRISON FIRE VALVE, SECONDARY VENT, NORMAL VENT/WHISTLE, 5 GALLONS SPILL BOX (LOOSE).
- FLEXIBLE CONNECTOR FOR GENSET RADIATOR 6\"/>
- *GENSET GENERATOR - MODEL S32000 SUPPLIED BY TOTAL POWER AND INSTALLED INSIDE ENCLOSURE BY VIBRA-SIL.
- QTY=2 SINGLE ACCESS DOORS WITH PANIC DOOR HARDWARE (36\"/>
- EXHAUST SILENCER (GRADE TO SUIT TO MEET NOISE CRITERIA). RECTANGULAR SHAPE, EXHAUST SILENCER TO BE INTERNALLY THERMALLY INSULATED (INSULATION NOT EXPOSED) C/W QTY=2, FLEX GUARDS INCLUDED. FLANGED EXHAUST STACK AND RAIN CAP. FLEX GUARDS INCLUDED.
- INSULATED INTAKE AIR DAMPERS, ORD. (194W120\"/>
- QTY=10 INTAKE HOODS WITH BRD SCREEN INSTALLED AND CAULKED BY OTHERS ON SITE (97\"/>
- SECONDARY DOUBLE WALLED VERTICAL DISCHARGE PLENUM C/W ACOUSTIC AIR Baffles (202\"/>
- PAINTED PLATES TO BE SHIPPED LOOSE AND SCREWED OVER JOINTS AFTER GENSET AND FUEL TANK ARE IN PLACE. ONCE SECONDARY DISCHARGE PLENUM IS INSTALLED IN PLACE, BY OTHERS.
- EXHAUST FAN FOR HEAT REMOVAL C/W COOLING THERMOSTAT (LOOSE). INSULATED DAMPER (18 3/4\"/>
- ACOUSTIC AIR INTAKE SILENCERS 120\"/>

NOTE:
AIR VELOCITY THROUGH AIR INTAKE HOODS TO BE APPROX. 393 FPM (AT FACE OF HOODS)

-CONDENSATE PIPING FROM THE EXHAUST SILENCER TO BE EXTENDED AT 6\"/>

NOTE:
-EXHAUST SILENCER AND FLEX CONNECTOR TO BE PRESSURE TESTED AT 2 PSI FOR 2 HOURS.

DO NOT DRILL ANY HOLES, PLACE ANY SCREWS OR BOLTS ON THE FUEL TANK

THE CABLE OPENING MUST BE PROPERLY SEALED FOR WEATHER PROOFING, FIRE RATING AND ACOUSTIC REQUIREMENTS. IN THE SUB BASE FUEL TANK TO AVOID MUST BE FILLED WITH PUTTY AND SEALED PROPERLY FOR THE SAME CONSIDERATION. VIBRA-SIL WILL NOT BE RESPONSIBLE FOR ANY WATER, FIRE OR NOISE LEAKS

GENERAL NOTES

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- THIS DRAWING SHOULD NOT BE USED FOR CONSTRUCTION OF THE PROJECT. IT IS APPROVED FOR THE PROJECT.
- ALL THE DIMENSIONS ON THE DRAWING ARE TO FACE UNLESS OTHERWISE SPECIFIED. DIMENSIONS TO BE MENTIONED AND DIMENSIONS TO BE MENTIONED

MADE IN CANADA

REVISION		FOR APPROVAL
NO.	DESCRIPTION	DATE
1	ISSUED FOR PERMIT	2024.01.12
2	ISSUED FOR PERMIT	2024.01.12
3	ISSUED FOR PERMIT	2024.01.12
4	ISSUED FOR PERMIT	2024.01.12
5	ISSUED FOR PERMIT	2024.01.12
6	ISSUED FOR PERMIT	2024.01.12
7	ISSUED FOR PERMIT	2024.01.12
8	ISSUED FOR PERMIT	2024.01.12
9	ISSUED FOR PERMIT	2024.01.12
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13	ISSUED FOR PERMIT	2024.01.12
14	ISSUED FOR PERMIT	2024.01.12
15	ISSUED FOR PERMIT	2024.01.12
16	ISSUED FOR PERMIT	2024.01.12
17	ISSUED FOR PERMIT	2024.01.12
18	ISSUED FOR PERMIT	2024.01.12
19	ISSUED FOR PERMIT	2024.01.12
20	ISSUED FOR PERMIT	2024.01.12

VIBRA-SIL

1000 BAYVIEW AVE. UNIT 10

SCARBOROUGH, ONTARIO M1B 2Y4

TEL: (416) 291-1111

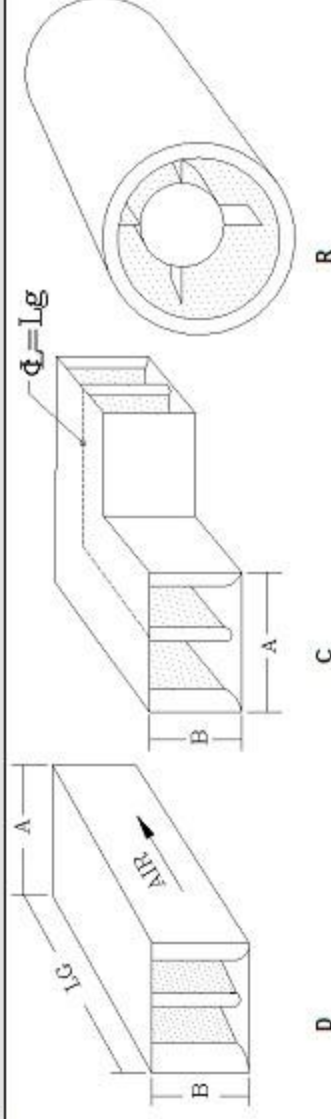
FAX: (416) 291-1112

WWW.VIBRA-SIL.COM

SALES: (416) 291-1111

SUPPORT: (416) 291-1112

PROJECT NO. P0003144-4



System	Type	Quantity	Model	Air Flow		Insertion Loss, DB						Dimension		
				CFM	H2O	63hz	125hz	250hz	500hz	1000hz	2000hz	4000hz	8000hz	
INTAKE	D	1	SR-A	129068	0,26	12	21	42	50	52	53	55	42	194 120 84
DISCH	D	1	SLR-A	122895	0,12	13	21	40	45	51	54	35	24	194 118 138

All dimensions must be checked by the contractor

- ACOUSTIC MEDIA TO BE COVERED IN MYLAR.

Rectangular and circular

Inner core : Acier galvanisé perforé de calibre 22

Rectangular

Inner core : Acier galvanisé de calibre 22

Circular

Outer core : Acier galvanisé de calibre 22

Acoustical media will be made of mineral wool compressed to 3.5 pd/ft³ (56.lkg/m³) density, odourless, fireproof and vermin proof. Packed under not less than 10% compression. Combustion rating tested in accordance with ASTM E-84. Acoustical and airflow performance ASTM E-477-73. These silencers can be manufactured in one piece or in modules.

Silencers models

Rectangular ; SR-A, SMR-A, SLR-A, XLR-A, LLR-A

Circular ; CB, CB-LR, CA, CA-LR, CC

Reference : P0503144 Drawing: PS18043
Order : Page : 1
Date : 2028/06/03

Project : KINGSTON HEALTH SCIENCE CENTER

Engineer: Vincent Tremblay-Powell

Customer : GAL POWER SYSTEM

***TOTAL
POWER***

9

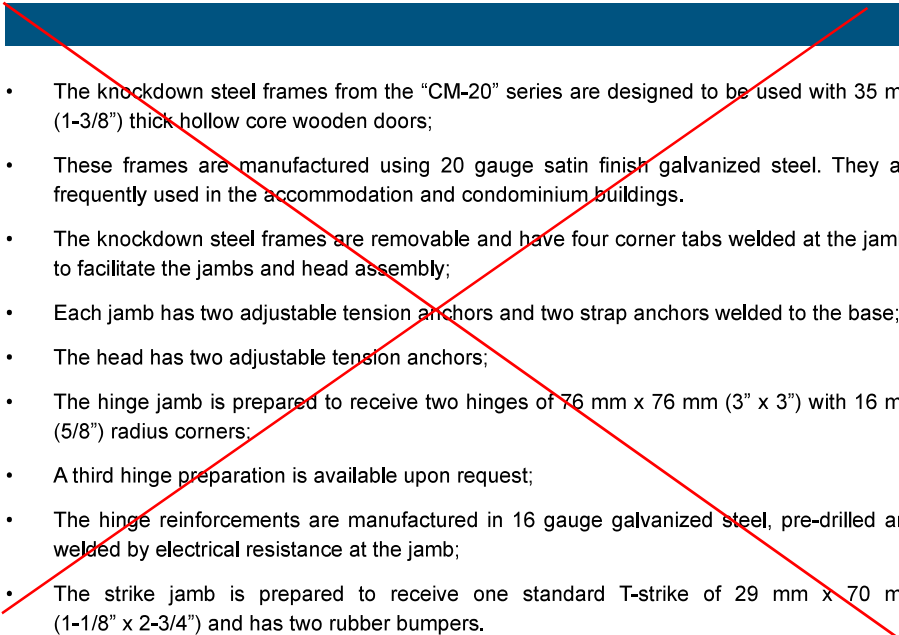
KNOCKDOWN STEEL FRAMES

The knockdown steel frames from the “CM” series, manufactured by Métalec, are designed to be installed once the partition is in place. The double return of the knockdown steel frame enables a close fit without damaging the wall finish. Six tension anchors allows an adjustable installation on each frame ensuring a solid binding and a true alignment. The two strap anchors are welded at the bottom of the jambs. The knockdown frames takes a few minutes to install and can be relocated, if necessary, without damage.

“CM” SERIES

- 
- The knockdown steel frames are manufactured using 18, 16 or 14 gauge galvanized steel;
 - This type of frame is removable and has four corner tabs welded at the jambs to facilitate the jambs and head assembly;
 - Each jamb has two adjustable tension anchors and two strap anchors welded to the base;
 - The head has two adjustable tension anchors. In double openings, the head has two rubber bumpers;
 - The hinge jamb is prepared to receive three standard hinges of 114 mm x 102 mm (4-1/2" x 4");
 - The strike jamb is prepared to receive one ASA type strike of 32 mm x 124 mm (1-1/4" x 4-7/8") or one T-strike of 29 mm x 70 mm (1-1/8" x 2-3/4") and has three rubber bumpers;
 - The knockdown steel frames are available with a 20, 45, 90 or 180 minute fire rating;
 - The hardware preparation and location is in accordance with the standards of the “American National Standard Institute”.

“CM-20” SERIES

- 
- The knockdown steel frames from the “CM-20” series are designed to be used with 35 mm (1-3/8") thick hollow core wooden doors;
 - These frames are manufactured using 20 gauge satin finish galvanized steel. They are frequently used in the accommodation and condominium buildings.
 - The knockdown steel frames are removable and have four corner tabs welded at the jambs to facilitate the jambs and head assembly;
 - Each jamb has two adjustable tension anchors and two strap anchors welded to the base;
 - The head has two adjustable tension anchors;
 - The hinge jamb is prepared to receive two hinges of 76 mm x 76 mm (3" x 3") with 16 mm (5/8") radius corners;
 - A third hinge preparation is available upon request;
 - The hinge reinforcements are manufactured in 16 gauge galvanized steel, pre-drilled and welded by electrical resistance at the jamb;
 - The strike jamb is prepared to receive one standard T-strike of 29 mm x 70 mm (1-1/8" x 2-3/4") and has two rubber bumpers.

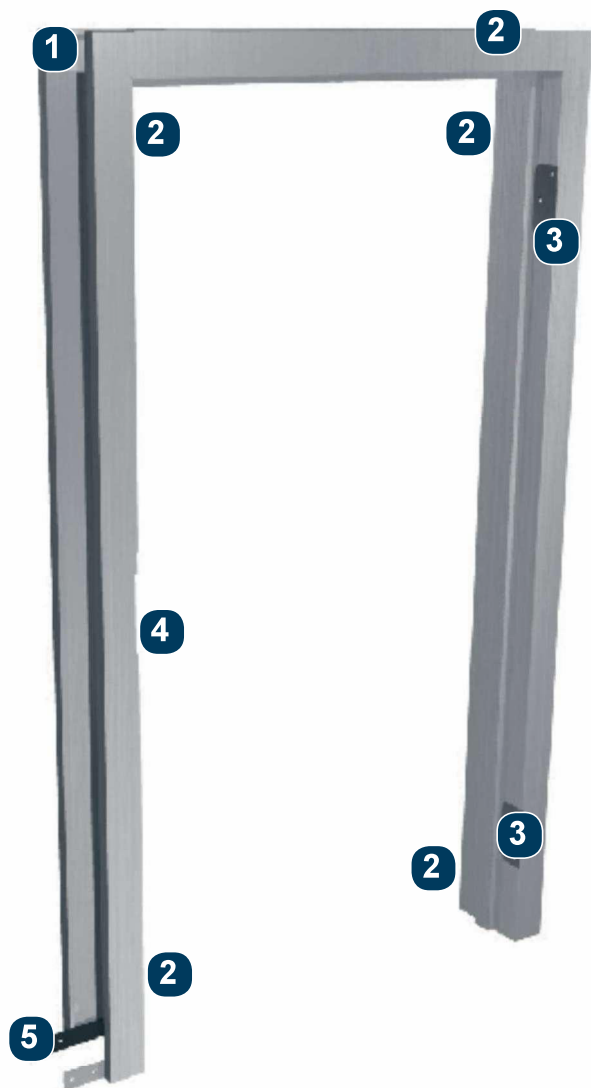
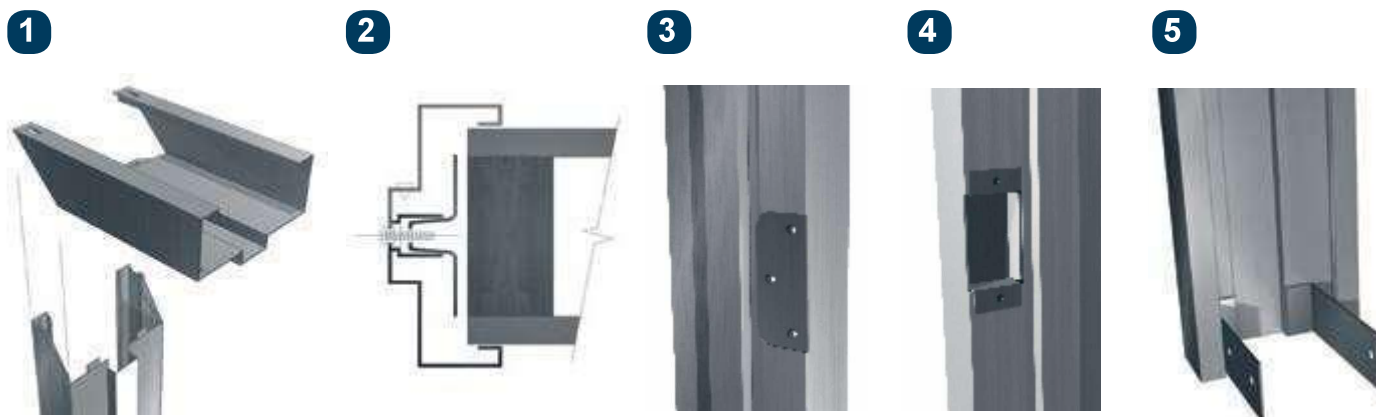


ILLUSTRATION:

- 1- Corner assembly for knockdown frame
- 2- Adjustable tension anchor for knockdown frame only
- 3- 16 gauge hinge reinforcement
- 4- Standard strike preparation
- 5- Strap anchor at the base for knockdown frame

Illustration: "CM-20" Series



N.B.: Other hardware preparations are also available upon request.

STEEL DOORS

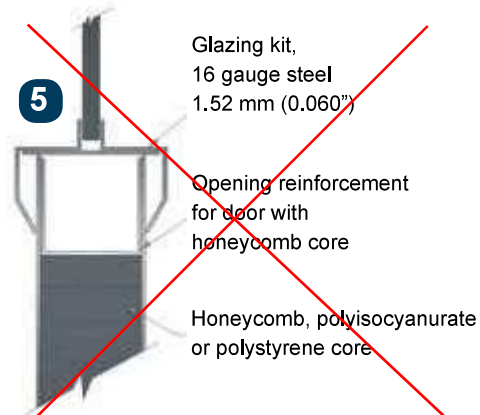
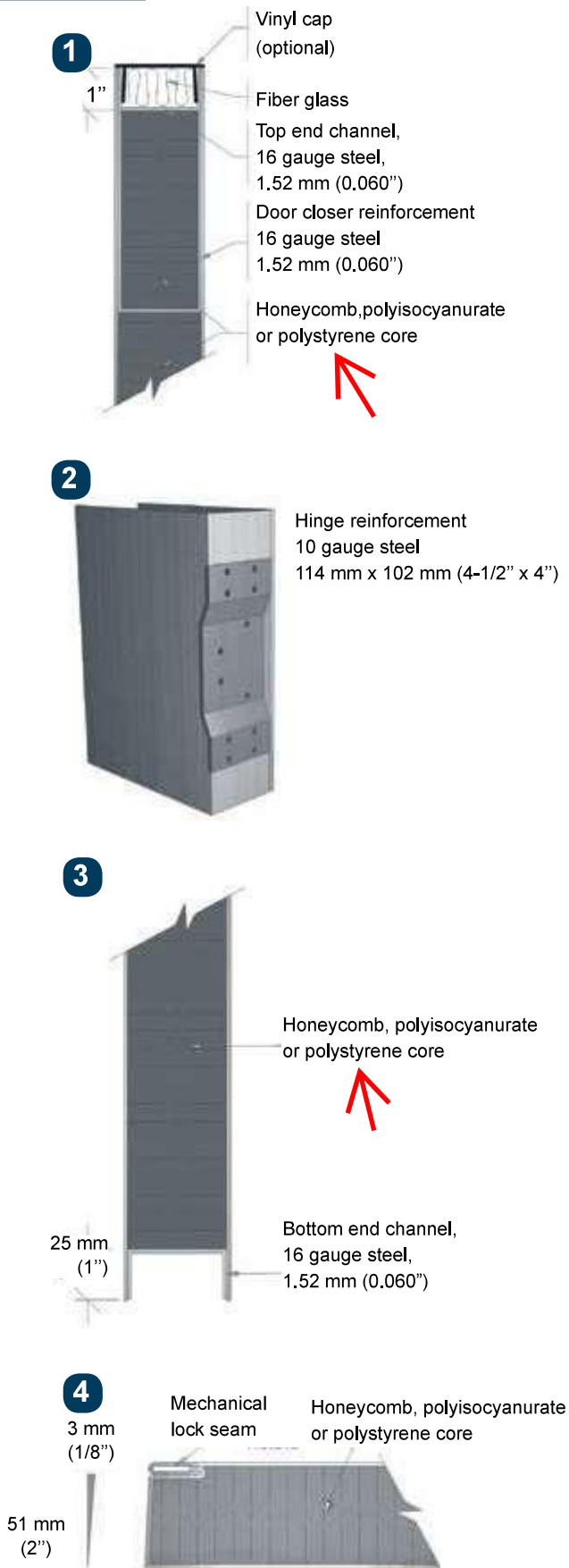
Over the years, Métalec has established a solid reputation in the steel door manufacturing area of expertise for commercial, industrial and institutional purposes.

The Métalec steel doors are offered in several sizes with a variety of designs and cores. They are also available with a 20, 45, 90, or 180 min. fire rating. A label is affixed on the product to certify the fire resistance period.

"PS" SERIES

Technical details

- Métalec steel doors are manufactured using 20, 18, 16 or 14 gauge galvanized steel;
- The door faces are perfectly smooth, without visible joints;
- The door panels are vertically assembled one to each other by a mechanical lock seam with flush welding near the hardware perforations;
- The door edges have a bevel of 3 mm x 51 mm (1/8" x 2");
- 16 gauge steel end channels are welded by electric resistance at the top and the bottom of the door every 152 mm (6") center to center;
- The non-insulated steel doors have a full honeycomb core made of 16 kg/m³ (1.0 lb/cu.ft) density kraft paper with 25 mm (1") cell size, laminated to the door faces by a polyurethane base adhesive;
- The insulated doors have a 54 kg/m³ (3,4 lb/cu.ft) density polyisocyanurate sheet core with a thermal resistance of RSI 2.0 (R-12.9); or a 16 kg/m³ (1,0 lb/cu.ft) density polystyrene sheet core with a thermal resistance of RSI 1.54 (R-8,75), laminated to the door faces by a polyurethane base adhesive;
- The doors are mortised for three standard hinges of 114 mm x 102 mm (4- 1/2" x 4");
- The hinge reinforcements are made with 10 gauge steel, and the top hinge is reinforced to have additional stiffening bend for high frequency strength;
- The doors are prepared for a standard cylindrical lock or reinforced for a surface-mounted panic bar or for a "push/pull" handle;
- Door closer reinforcement made of 16 gauge steel channel are installed at the top of all steel doors. When the door is reversible, a door closer reinforcement is added at the other end of the door. In the insulated steel doors, all the channels used as reinforcements are filled with the same insulating material as the door.



CERTIFICATIONS AND SPECIFICATIONS

Steel specifications

For commercial, institutional and industrial constructions, Métalec uses a wiped finish galvanized steel designed especially to offer the superior durability which is required in steel doors and frames.

Moreover, a wiped finish galvanized steel offers a uniform surface and a very great bond to apply the paint finish. This steel offers better resistance to corrosion than the cold laminated steel, primed and painted. This material is commercially designed under the name of "galvanneal" or "satin coat".



A: STANDARD STEEL

- Cold laminated steel of commercial quality according to the "ASTM A653/A653M" standard
 - Designation finish ZF120 (A40) 120 g/m² (-0.40 oz/sq.ft.)
- Minimum total covering

B: OPTIONAL STEEL

- Cold laminated steel of commercial quality according to the "ASTM A653/A653M" standard
 - Designation finish Z275 (G90) 275 g/m² (-0.90 oz/sq.ft.)
- Minimum total covering.

Finish

The surfaces where the iron-zinc alloy has been damaged or removed during the manufacturing process, are patched with a primer meeting the "CAN/GCSB 1-GP-181" standard.

All the surfaces have to be free of dust, oil or grease to optimize the paint bond.

The top coat (paint) used on our metal products must be of quality and suitable for this type of application.

A

HINGES

B

LOCKSETS

C

EXIT DEVICES

D

DOOR CLOSER

E

ELECTRIFIED
PRODUCT

F

FLATWARE
& DOOR
ACCESSORIES

Full Mortise

Standard Weight

5 Knuckle
2 Ball Bearing

Montreal Hinge Full Mortise Hinges – Standard Weight

- For use on medium weight doors or doors requiring medium to high frequency service
- Suitable for wood and metal doors

STSBB991



Hinge Size		Gauge of Metal	
Inches	mm	Inches	mm
4-1/2 x 4	114 x 102	0.134	3.4

- **Standard:** ANSI/BHMA A156.1 and A156.7
- **Description:** 5 Knuckle, 2 Ball Bearing Butt Hinge - for standard weight door applications
- **Finish:** US32D
- **Base Material:** Stainless Steel
- **Options:** NRP/ETW/PIC/RC

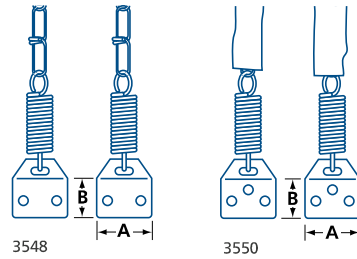
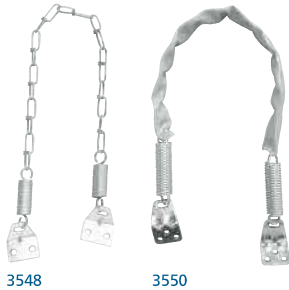


CHECK CHAINS

GENERAL HARDWARE

CHECK CHAINS

3548, 3550



- Steel chain
- Two tension coil springs
- Stamped steel mounting brackets, zinc plated
- Mounting hardware included: self-tapping screws

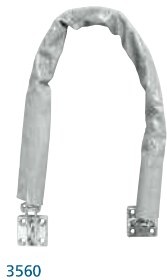
#3550 - Includes grey vinyl cover, with two expansion rings

MODEL	FREE LENGTH	A	B	PER BOX
3548	24½ (622.3)	1½ (33.3)	7⁄8 (22.2)	25
3550	27½ (698.5)	1¼ (31.8)	1½ (28.5)	10

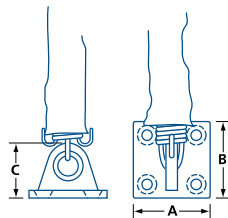
IN (MM)

COMMERCIAL CHECK CHAINS

3560, 3561



3560



- Heavy-duty welded chain
- Two compression coil springs
- Zinc die-cast mounting brackets, zinc plated
- Grey vinyl cover
- Mounting hardware included: self-tapping screws

MODEL	FREE LENGTH	A	B	C	PER BOX
3560	27 (685.8)	1½ (39.7)	1½ (39.7)	1½ (28.6)	6
3561	31 (787.4)	1½ (39.7)	1½ (39.7)	1½ (28.6)	6

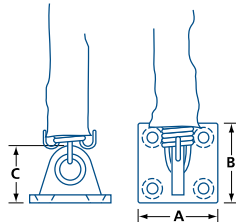
IN (MM)

HEAVY DUTY COMMERCIAL CHECK CHAIN

3562



3562



- Extra heavy-duty welded chain
- Two heavy-duty coil springs with stainless steel linkage
- Brass die-cast mounting brackets, satin chrome finish
- Grey textured vinyl cover
- Mounting hardware included: self-tapping screws

MODEL	FREE LENGTH	A	B	C	PER BOX
3562	32½ (825.5)	1½ (39.7)	1½ (39.7)	1¾ (30.2)	6

IN (MM)

Exit Device Trim, Model: SF-LHED

Escutcheon lever design

Construction

Grade 1, thru-bolted design, clutch freewheeling. Non handed design. Easily field reversible. Hardened steel heavy duty tailpiece. Available for fire and non fire rated rim and vertical rod exit devices.

Finished

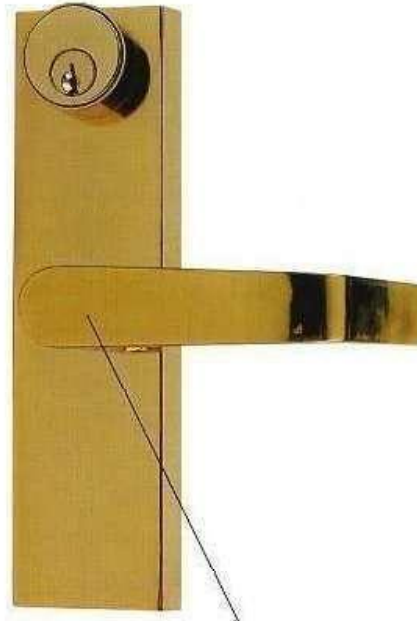
Power coated aluminum (alum)
Power coated dark bronze duranodic (duro)
Power coated glod

Door Thickness

Standard 1-3/4" (45MM)

Escutcheon Dimensions

2 5/8" width x 8 1/2" length. Lever length: 4 3/4". Fits and covers 2 1/8" 161 cutout..



CLUTCH FREEWHEELING

SF-LHED-E Entrance

Key locks or unlocks thumbpiece.
ANSI Fuction - 13 / 63

SF-LHED-S Storeroom

Key retracts latchbolt, otherwise always locked.
ANSI Fuction - 04

SF-LHED-P Passage (Without Trim Cylinders)

Trim always operable and free.
ANSI Fuction - 15 / 62

SF-LHED-D Dummy

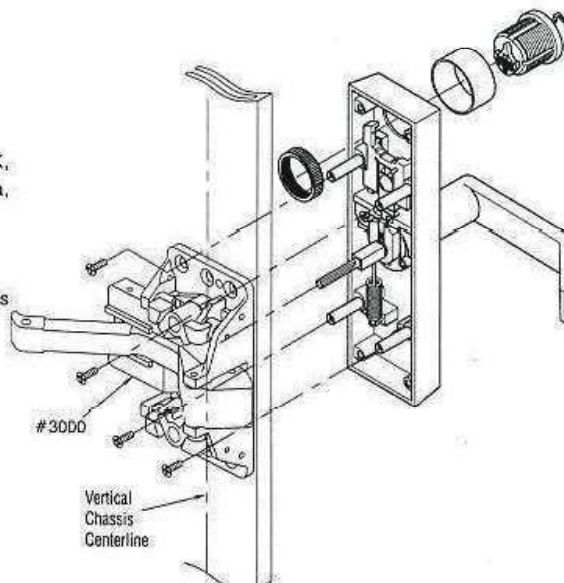
Tummy trim. One sided.
ANSI Fuction - 10

Keyway:

Standard 6-pin "C" keyway. Also available in Schlage C-K, Russwin D1, Corbin 60, Sargent LA, Falcon/Weiser E, Assa, and Kaba high security cylinders.

Interchangeable Core

Interchangeable core locks will accept compatible 6 or 7 pin cores with BEST, FALCON and ARROW.



Unique

ALUMINUM THRESHOLDS

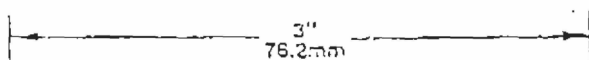
AC 3



1/2"
12.7mm



AC 4



3"
76.2mm



1/2"
12.7mm

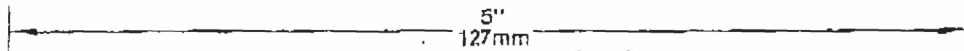
AC 5



1/2"
12.7mm



AC 6 & AA 1



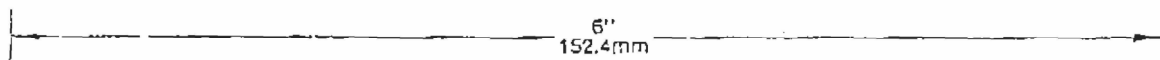
5"
127mm

5/16"
7.93mm

1/2"
12.7mm



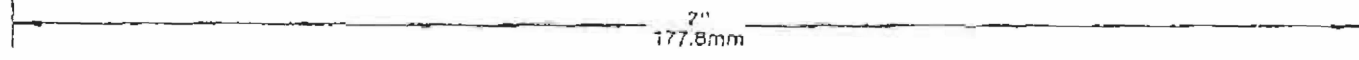
AC 7



6"
152.4mm



AC 8

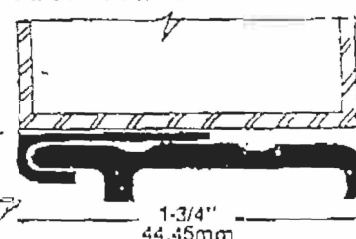


7"
177.8mm



8"
203.2mm

AA1 & HA2



19/32"
15.09mm

HA2

1-3/4"
44.45mm



5/16"
7.93mm

Stopper for AC series

Extruded Aluminum Alloy 6053T5

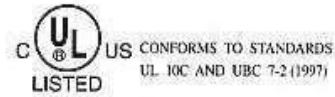
Echelle/Scale 1" 25.4mm = 1" 25.4mm

SOCIÉTÉ INDUSTRIELLE UNIQUE LTÉE

UNIQUE SASH BALANCE COMPANY LTD.

8301, Marconi, Anjou, Qué. H1J 2W4 Tél.: (514) 493-1353

SF-EDT / SF-EDTSS Panic Rim Exit Device SF-EDTFR / SF-EDTSSFR Fire Rim Exit Device



An universal Non-Handed Exit Device with Security Guarded bolt, for all applications where labeled doors used as exits, listed

- Panic Hardware in the accident Equipment
- Fire Exit Hardware and UL10C, UBC 7-2-1997 codes



Specifications:

Conforms to Ansi STD

A156.3 Grade 2

For Doors.....1 3/4" thick standard. Also usable on 1 3/8 to 2" thick doors.
(specify when other than 1 3/4" thick).
Door widths from 30" ~ 48".

Stile.....4 1/2" minimum stile.

Mounting.....Furnished standard with wood & machine screws and SNB's.

Covers.....Zinc or stainless steel.

Chassis.....Steel or stainless steel.

Rail Assembly.....Steel or stainless steel.

End Cap.....Steel or stainless steel.

Hand.....Non Handed. Trim reversible.

Latch Bolt.....Stainless steel 3/4" throw.

Dead Latch Bolt.....Stainless steel 5/8".

Cylinder.....Brass, rim-type, 5-pin, 2 keys.

Strike.....5/8" stop plus shim for 1/2" stop.

Dogging Feature...Allen-Key. (Not permitted on Fire Rated model).

Mullion.....Removable Mullion & Fire Exit Mullion.

U.L. Listed.....For "Panic Hardware" and Fire Rated model 3 hour for use on doors up to 36" x 86".

ANSI Standard.....ANSI 156.3 - the 5000 series is built to conform to this standard.

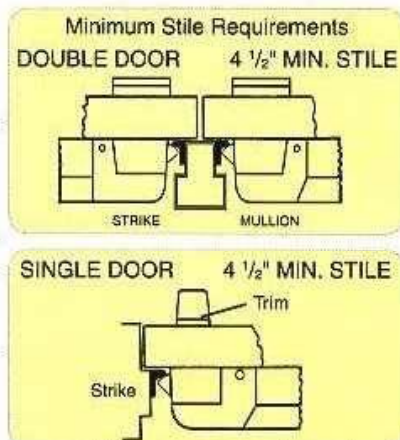
Finishes.....Painted: Aluminum, Bronze, Durododic.

Plated: Highly polished brass or chrome.

Solid stainless steel: Highly polished or satin.

Dimensions

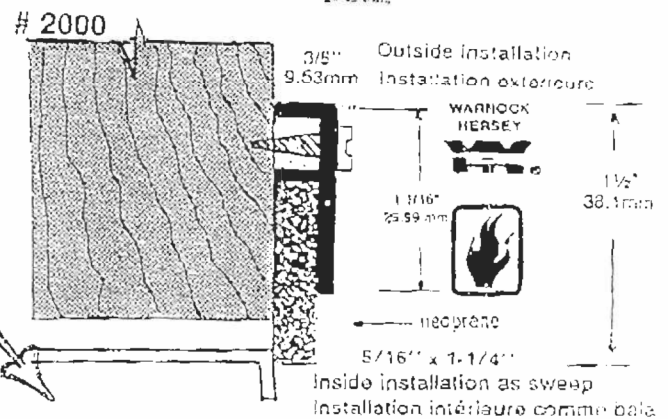
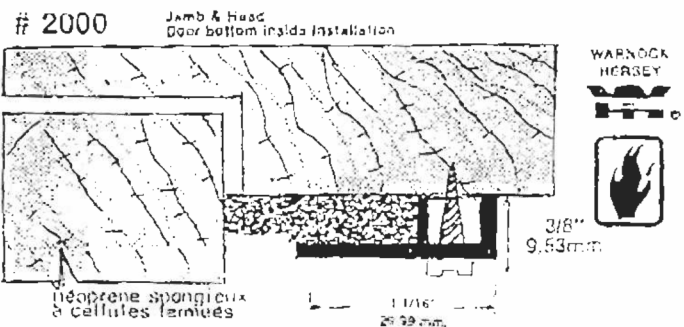
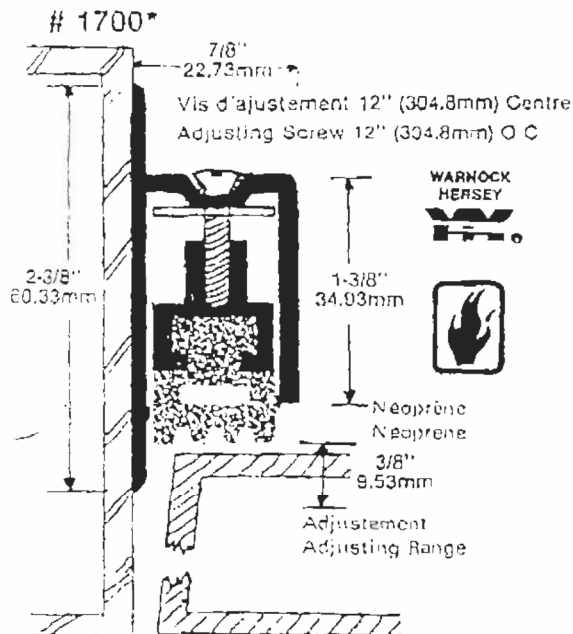
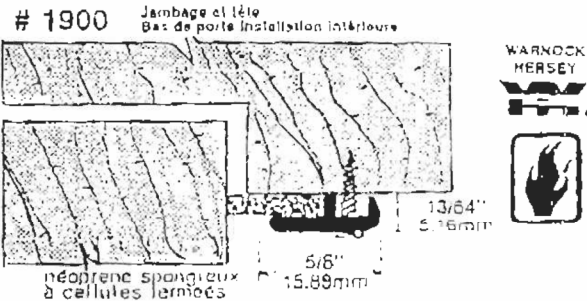
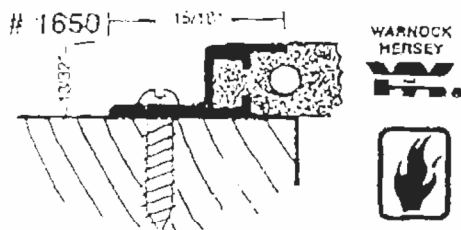
Touchbar height to finished floor	41" (1043mm) at center
Touchbar projection	
neutral	2 1/2" (64mm)
depressed	1 3/4" (45mm)
Center case	6" x 3-3/4" x 2-1/2" (153mm x 94mm x 64mm)
Device length - Short 3' (914mm)	2'9" to 3' (840mm to 914mm) door size
Long 4' (1219mm)	2'9" to 4' (1145mm to 1219mm) door size



Unique

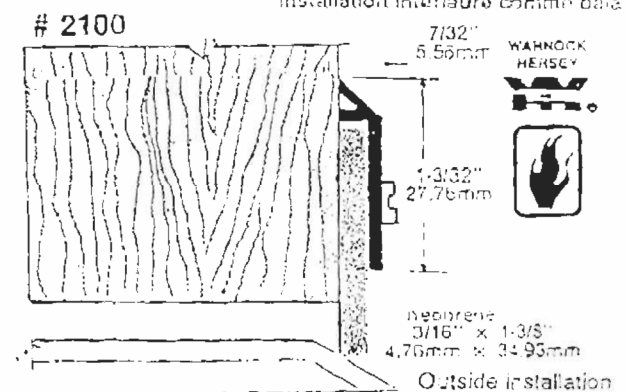
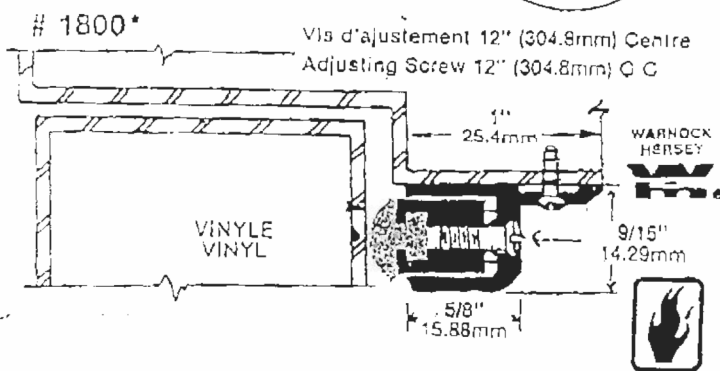
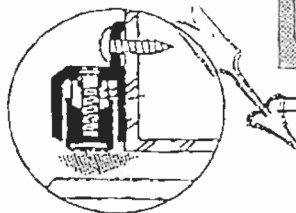
TETE & JAMBAGE HEAD & JAMB

**SOUNDPROOF & WEATHERSTRIP
DOOR STOPS & DOOR BOTTOMS**
Extruded anodized Aluminum & Neoprene
(Slotted holes and screws supplied)



* Utiliser avec poignée à retrait
* Use with Backset Lock
Echelle/Scale 1" (25.4mm) = 1" (25.4mm)

Emploie comme bas de porte
Used as door bottom



SOCIÉTÉ INDUSTRIELLE UNIQUE LTÉE

UNIQUE SASH BALANCE COMPANY LTD.

8301, Marconi, Anjou, Qué. H1J 2W4 Tél.: (514) 493-1353 Fax: (514) 493-0571

Stainless steel "T" handle lock

Prod. #: **699-9004**

Blind mount. Welded studs.

4.75" x 4.89"

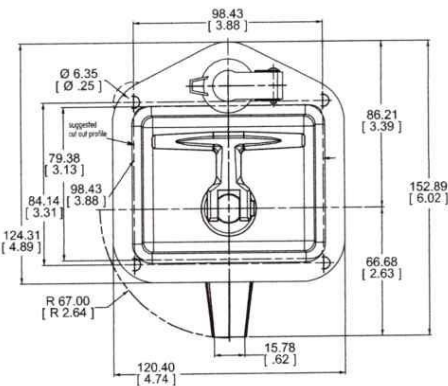
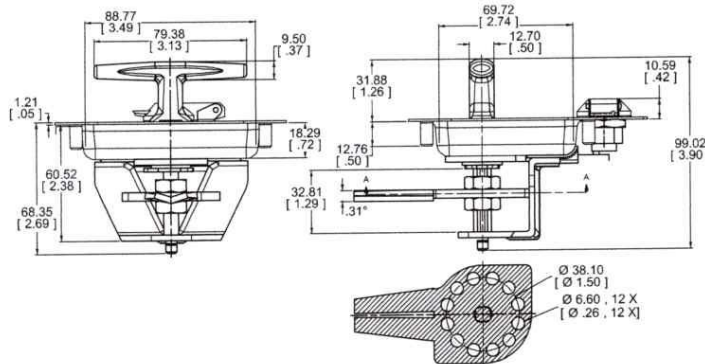
Locking with dust cover

Stainless steel

Waterproof lock

Dust cover (695-5857) and gasket (623-9980) only.

Replacement cylinder: 697-5282 (CH 501)



Stainless steel "T" handle lock

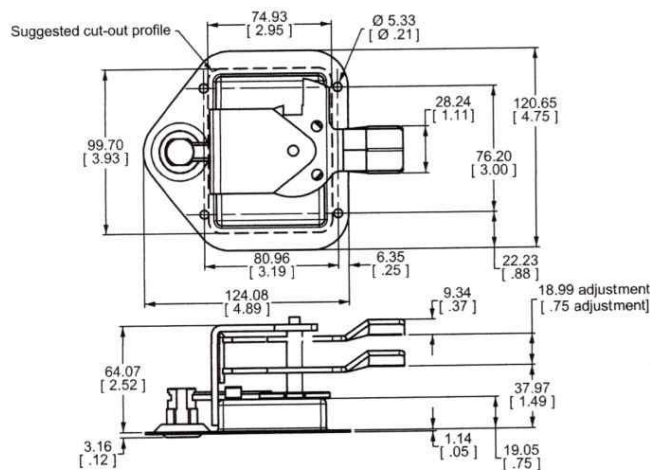
Prod. #: **697-2002**

Four mounting holes

4.75" x 4.89"

Stainless steel

Locking



EFB120, EFB120-S, EFX120, EFX120-S

On/Off, Spring Return, 100 to 240 VAC



Technical Data		EFB120, EFB120-S, EFX120, EFX120-S
Power supply		100...240 VAC +10% / -20%, 50/60 Hz 100...125 VDC ±10%
Power consumption	running	9.5 W
	holding	4.5 W
VA rating		21 VA @ 100 VAC
		29 VA @ 240 VAC
Electrical connection		
EFB120...		3 ft, 18 GA appliance cable, 1/2" conduit connector -S models: Two 3 ft, 18 gauge appliance cables with 1/2" conduit connectors
EFX120...		3 ft [1m], 10 ft [3m] or 16 ft [5m] 18 GA appliance cable, with or without 1/2" conduit connector -S models: Two 3 ft [1m], 10 ft [3m] or 16 ft [5m] appliance cables with or without 1/2" conduit connectors
Overload protection		electronic throughout 0 to 95° rotation
Control		on/off
Torque		270 in-lb [30 Nm] minimum
Direction of rotation	spring	reversible with CW/CCW mounting
Mechanical angle of rotation		max. 95° (adjustable with mechanical end stop, 35° to 95°)
Running time	motor	75 sec
	spring	< 20 seconds @ -4°F to 122°F [-20°C to 50°C]; < 60 seconds @ -22°F [-30°C]
Position indication		visual indicator, 0° to 95° (0° is full spring return position)
Manual override		5 mm hex crank (3/16" Allen), supplied
Humidity		max. 95% RH non-condensing
Ambient temperature		-22°F to 122°F [-30°C to 50°C]
Storage temperature		-40°F to 176°F [-40°C to 80°C]
Housing		Nema 2, IP54, Enclosure Type2
Housing material		aluminum diecast and plastic casing
Agency listings †		cULus acc. to UL60730-1A/-2-14, CAN/CSA E60730-1:02, CE acc. to 2004/108/EC & 2006/95/EC
Noise level		≤56.5dB(A) motor @ 75 seconds ≤71.4dB(A) spring return
Servicing		maintenance free
Quality standard		ISO 9001
Weight		9.82 lbs [4.45 kg], 10.14 lbs [4.6 kg] with switches

† Rated Impulse Voltage 2.5kV, Type of action 1.AA (1.AA.B for -S version), Control Pollution Degree 3.

EFB120-S, EFX120-S

Auxiliary switches	2 x SPDT 3A (0.5A) @ 250 VAC, UL Approved one set at +10°, one adjustable 10° to 85°
--------------------	---

Torque min. 270 in-lb, for control of air dampers

Application

For On/Off, fail-safe control of dampers in HVAC systems. Actuator sizing should be done in accordance with the damper manufacturer's specifications. Control is On/Off from an auxiliary contact, or a manual switch.

The actuator is mounted directly to a damper shaft up to 1.05" in diameter by means of its universal clamp. A crank arm and several mounting brackets are available for applications where the actuator cannot be direct coupled to the damper shaft.

Operation

The EFB and EFX series actuators provide true spring return operation for reliable fail-safe application and positive close off on air tight dampers. The spring return system provides constant torque to the damper with, and without, power applied to the actuator.

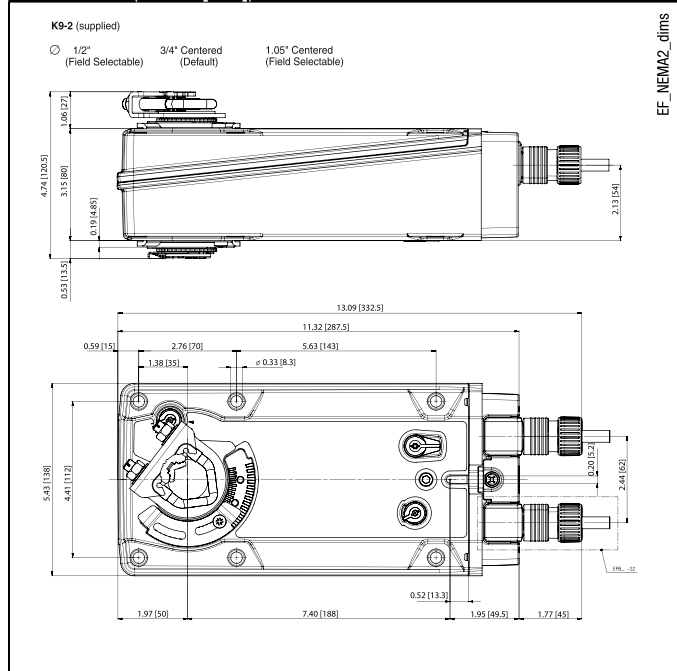
The EFB and EFX series provides 95° of rotation and is provided with a graduated position indicator showing 0° to 95°.

The actuator may be stalled anywhere in its normal rotation without the need of mechanical end switches.

The EFB120-S and EFX120-S versions are provided with two built-in auxiliary switches. These SPDT switches provide safety interfacing or signaling, for example, for fan start-up. The switching function at the fail-safe position is fixed at +10°, the other switch function is adjustable between +10° to +85°. The EFB120, EFB120-S, EFX120 and EFX120-S actuator is shipped at +5° (5° from full fail-safe) to provide automatic compression against damper gaskets for tight shut-off.

Installation Note: Use flexible metal conduit. Push the UL listed conduit fitting device over the actuator's cable to butt against the enclosure. Screw in conduit connector. Jacket the actuators input wiring with UL listed flexible conduit. Properly terminate the conduit in a suitable junction box.

Dimensions (Inches [mm])



N40103 - 09/11 - Subject to change. © Belimo Aircontrols (USA), Inc.

Accessories

IND-EFB	Damper position indicator
KH-EFB	Crank arm
K9-2	Universal clamp for up to 1.05" diameter jackshafts
TF-CC US	Conduit fitting
Tool-07	13 mm wrench
ZG-EFB	Crank arm adaptor kit

Note: When using EFB120, EFB120-S, EFX120, EFX120-S actuators, only use accessories listed on this page.

For actuator wiring information and diagrams, refer to Belimo Wiring Guide.

Typical Specification

On/Off spring return damper actuators shall be direct coupled type which require no crank arm and linkage and be capable of direct mounting to a jackshaft up to a 1.05" diameter. The actuators must be designed so that they may be used for either clockwise or counterclockwise fail-safe operation. Actuators shall be protected from overload at all angles of rotation. If required, two SPDT auxiliary switch shall be provided having the capability of one being adjustable. Actuators with auxiliary switches must be constructed to meet the requirements for Double Insulation so an electrical ground is not required to meet agency listings. Actuators shall be cULus approved and have a 5 year warranty, and be manufactured under ISO 9001 International Quality Control Standards. Actuators shall be as manufactured by Belimo.

Wiring Diagrams

INSTALLATION NOTES

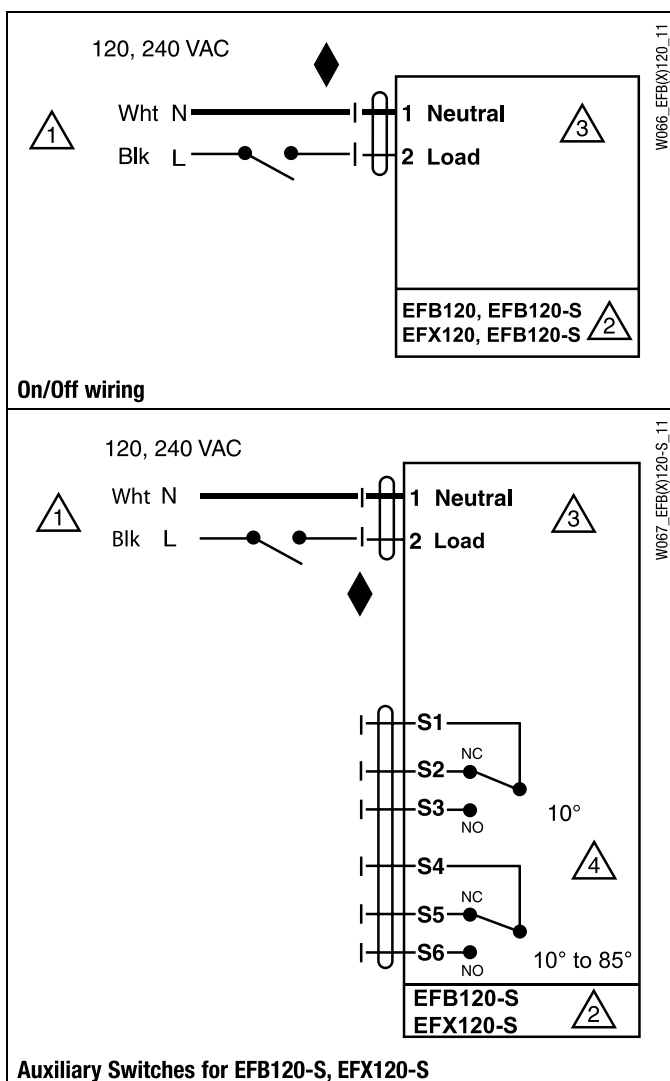
- 1 Provide overload protection and disconnect as required.
- 2 **CAUTION Equipment Damage!**
Actuators may be connected in parallel.
Power consumption and input impedance must be observed.
- 3 No ground connection is required.
- 4 For end position indication, interlock control, fan startup, etc., EFB120-S and EFX120-S incorporates two built-in auxiliary switches: 2 x SPDT, 3A (0.5A) @250 VAC, UL Approved, one switch is fixed at +10°, one is adjustable 10° to 85°.

APPLICATION NOTES

- Meets cULus requirements without the need of an electrical ground connection.

WARNING Live Electrical Components!

During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.



TFB120-S - Damper Actuator

On/Off, Spring Return, 100 to 240 VAC



Technical Data	
Power Supply	100...240 VAC +10% / -15%, 50/60 Hz
Power Consumption Running	2.5 W
Power Consumption Holding	1.3 W
Transformer Sizing	5 VA
Shaft Diameter	1/4" to 1/2" round, centers on 1/2"
Electrical Connection	(2) 3 ft, 18 GA appliance cables with 1/2" conduit connectors
Overload Protection	electronic throughout 0° to 95° rotation
Electrical Protection	actuators are double insulated
Angle of Rotation	max. 95°, adjustable with mechanical stop
Torque (US unit)	22 in-lbs [2.5 Nm] minimum
Direction of Rotation (Motor)	reversible with CW/CCW mounting
Direction of Rotation (Fail-Safe)	reversible with CW/CCW mounting
Position Indication	visual indicator, 0° to 95° (0° is full spring return position)
Running Time (Motor)	<75 sec
Running Time (Fail-Safe)	<25 sec @ -4°F to 122°F [-20°C to 50°C], < 60 sec @ -22°F [-30°C]
Humidity	max. 95% RH non-condensing
Ambient Temperature Range	-22°F to 122°F [-30°C to 50°C]
Storage Temperature Range	-40°F to 176°F [-40°C to 80°C]
Housing	NEMA 2, IP42, UL enclosure type 2
Housing Material	UL94-5VA
Agency Listings†	cULus acc. to UL60730-1A/-2-14, CAN/CSA E60730-1:02, CE acc. to 2004/108/EC and 2006/95/EC
Noise Level (Motor)	<50 dB (A)
Noise Level (Fail-Safe)	<62 dB (A)
Servicing	maintenance free
Quality Standard	ISO 9001
Weight	1.5 lbs [0.7 kg]
Auxiliary Switch	1 x SPDT, 3A resistive (0.5A inductive) @ 250 VAC, adjustable 0° to 95°

†Rated Impulse Voltage 4kV, Type of Action 1.AA.B, Control Pollution Degree 3.

Torque min. 22 in-lb, for control of air dampers.

Application

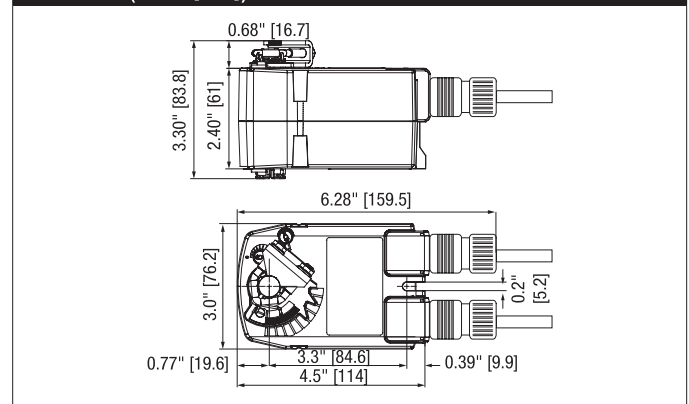
For On/Off, fail-safe control of dampers in HVAC systems. Actuator sizing should be done in accordance with the damper manufacturer's specifications. Control is On/Off from an auxiliary contact, or a manual switch. The actuator is mounted directly to a damper shaft from 1/4" up to 1/2" in diameter by means of its universal clamp, 1/2" shaft centered at delivery. A crank arm and several mounting brackets are available for applications where the actuator cannot be direct coupled to the damper shaft.

Operation

The TF series actuators provide true spring return operation for reliable fail-safe application and positive close off on air tight dampers. The spring return system provides consistent torque to the damper with, and without, power applied to the actuator. The TF series provides 95° of rotation and is provided with a graduated position indicator showing 0° to 90°. The actuator may be stalled anywhere in its normal rotation without the need of mechanical end switches. Power consumption is reduced in holding mode. The actuator is double insulated so an electrical ground connection is not necessary. The TF-S versions are provided with one built-in auxiliary switch. This SPDT switch is provided for safety interfacing or signaling, for example, for fan start-up. The switching function is adjustable between 0° and 95°.

Safety Note: Screw a conduit fitting into the actuator's bushing. Jacket the actuator's input and output wiring with suitable flexible conduit. Properly terminate the conduit in a suitable junction box.

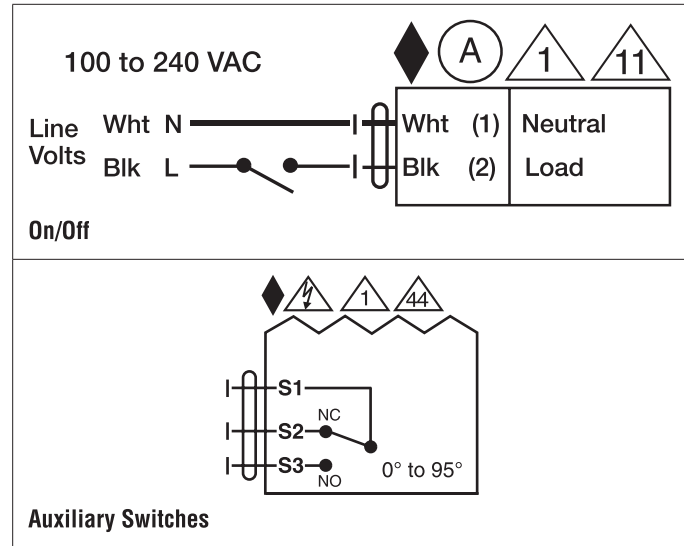
Dimensions (Inches[mm])



Accessories	
AV6-20	6.7" shaft extension for 1/4" to 3/4" diameter shafts.
IND-TF	TF position indicator.
K8 US	Standard TFB(X) clamp (1/4" to 1/2").
KG10A	Ball joint for 3/8" diameter rod, zinc plated.
KG6	Ball joint for 5/16" diameter rod, zinc plated.
KG8	Ball joint for 5/16" diameter rod, 90°, galvanized steel.
KH12	Univ. crankarm, slot 21/64" w, for 3/4" to 1" dia. shafts.
KH6	Univ. crankarm, slot 1/4" w, for 3/8" to 11/16" dia. shafts.
KH8	Univ. crankarm, slot 21/64" w, for 3/8" to 11/16" dia. shafts.
KH-TF US	TFB(X) crankarm with 5/16" slot.
KH-TF-1 US	TFB(X) crankarm with 1/4" slot.
KH-TF-1.1 US	TFB(X) crankarm for Shafts with 1/4" slot.
SB-TF	TFB(X) mounting kit (T-bracket, bolts).
SH10	Push rod for KG10A ball joint (36" L, 3/8" diameter).
SH8	Push rod for KG6 & KG8 ball joints (36" L, 5/16" diameter).
TF-P	Anti-rotation bracket TF/NKQ/AM/NM/LM.
TOOL-06	8 mm and 10 mm wrench.
ZDB-TF	Angle of rotation limiter for TFB(X).
ZG-113	TFB(X) right angle bracket (4-1/2" H x 5-1/2" W x 2-1/2" D).
ZG-DC1	Damper clip for damper blade, 3.5" width.
ZG-DC2	Damper clip for damper blade, 6" width.
ZG-LMSA-1	Shaft extension for 3/8" diameter shafts (4" L).
ZG-LMSA-1/2-5	Shaft extension for 1/2" diameter shafts (5" L).
ZG-TF112	TFB(X) crankarm adaptor kit (includes ZG-113).
ZG-TF2	TFB(X) crankarm adaptor kit (T bracket included).
ZG-TF3	TFB(X) Mounting Hardware without bracket.
ZS-100	Weather shield - galvanneal (13" L x 8" W x 6" D).
ZS-101	Base plate for ZS-100.
ZS-150	Weather shield - PC w/ foam seal (16" L x 8-3/8" W x 4" D).
PS-100	Actuator power supply and control simulator.
TF-CC US	Cable conduit connector, 1/2".

Typical Specification

On/Off spring return damper actuators shall be direct coupled type which require no crank arm and linkage and be capable of direct mounting to a shaft up to a 1/2" diameter and center a 1/2" shaft. The actuators must be designed so that they may be used for either clockwise or counter clockwise fail-safe operation. Actuators shall be protected from overload at all angles of rotation. If required, one SPDT auxiliary switch shall be provided having the capability of being adjustable. Actuators with auxiliary switch must be constructed to meet the requirements for Double Insulation so an electrical ground is not required to meet agency listings. Actuators shall be cULus listed, have a 5 year warranty, and be manufactured under ISO 9001 International Quality Control Standards. Actuators shall be as manufactured by Belimo.



TFB120-S - Damper Actuator

On/Off, Spring Return, 100 to 240 VAC



Wiring Diagrams



WARNING! LIVE ELECTRICAL COMPONENTS!

During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.



Meets cULus requirements without the need of an electrical ground connection.



Apply only AC line voltage or only UL-Class 2 voltage to the terminals of auxiliary switches. Mixed or combined operation of line voltage/safety extra low voltage is not allowed.



Actuators with appliance cables are numbered.



Provide overload protection and disconnect as required.



Actuators may be connected in parallel if not mechanically linked. Power consumption and input impedance must be observed.



One built-in auxiliary switch (1x SPDT), for end position indication, interlock control, fan startup, etc.



P SERIES FAN



FEATURES

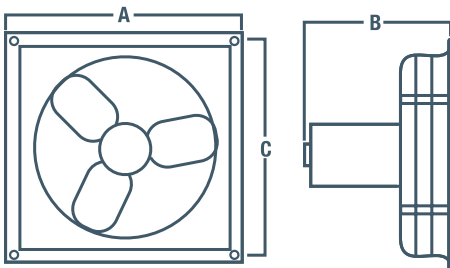
- Sturdily constructed direct drive, horizontal discharge fan.
- Durable powder coated finish.
- 8" - 24" models have heavy wire chrome plated OSHA guards on intake side of fan.
- 30" & 36" models have grey powder coated guards.
- Totally enclosed air over motor with overload protection.
- Ships fully assembled.



DIMENSIONS

MODEL	A X A SQUARE	B		C c/c
		P	P-4~	
P08	13 1/4"	6 1/2"	-	12"
P10	15 1/4"	6 1/2"	-	14"
P12	17 1/4"	11"	13 3/4"	16"
P14	19 1/4"	11"	13 3/4"	18"
P16	21 1/4"	11"	13 3/4"	20"
P18	23 1/4"	11 1/4"	14"	22"
P20	25 1/4"	11 1/4"	14"	24"
P24	29 1/4"	11"	13 3/4"	28"
P30	35 1/4"	13 1/4"	-	34"
P36	41 1/4"	13 1/2"	-	40"

~ Explosion Proof Motor, 50 Hz or 3 phase



P - PANEL MOUNTED FANS

Designed for Industrial, Commercial & Farming applications.


P4 SERIES
EXPLOSION PROOF MOTOR

SPECIFICATIONS

SINGLE PHASE	THREE PHASE	BLADE DIAMETER	RPM	HP (SINGLE PHASE)	VOLTAGE (SINGLE PHASE)	AMPS (FLA) (SINGLE PHASE)	WEIGHT (LBS)	dB(A) @ 5 ft	CFM @ STATIC PRESSURE			
									0.00"	0.10"	0.125"	0.25"
SINGLE SPEED - VARIABLE SPEED FANS												
P12-1V	P12-1*	12"	1700	1/3	115/230	5.0/2.5	26	63	1650	1560	1525	1400
P12-1VHE	--	12"	1450	1/15	115	1.0	22	60	1350	1290	1275	1150
P14-1V	P14-1*	14"	1700	1/3	115/230	5.0/2.5	29	67	2170	2030	1950	1900
P14-1VHE	--	14"	1450	1/15	115	1.0	25	64	1600	1525	1500	1300
P16-1V	P16-1*	16"	1700	1/3	115/230	5.0/2.5	30	68	2570	2470	2410	2260
P16-1VHE	--	16"	1450	1/15	115	1.0	26	63	1850	1750	1700	1550
P18-1V	P18-1*	18"	1700	1/3	115/230	3.8/1.9	36	71	3150	3000	2900	2575
P20-1V	P20-1*	20"	1700	1/3	115/230	3.8/1.9	39	77	3620	3420	3340	3120
P24-1V	--	24"	1100	1/3	115/230	4.4/2.2	43	72	5500	5400	5310	5100
--	P24-1*	24"	1700	1/3	--	--	57	77	5520	5410	5330	5130
SINGLE SPEED FANS												
P12-2	--	12"	1625	1/4	115	2.7	27	63	1640	1540	1510	1390
P14-2	--	14"	1625	1/4	115	2.7	30	67	2170	2070	2030	1860
P16-2	--	16"	1625	1/4	115	2.7	31	68	2370	2270	2210	2060
P18-2	--	18"	1625	1/3	115	4.1	37	73	3200	3090	3040	2920
P20-2	--	20"	1625	1/3	115	4.1	39	77	3420	3220	3170	2920
P24-2	--	24"	1100	1/3	115	5.4	45	70	5000	4500	4300	3600
P30-2	--	30"	1100	1/3	115/230	4.4/2.2	72	82	8000	7000	6000	5000
P36-7	P36-7M**	36"	850	1/2	115/230	6.6/3.3	88	72	12000	11000	10500	9500
TWO SPEED FANS												
P08-3	--	8"	1600/1300	1/4	115	0.5	14	48	360/300	270/150	230/110	--
P10-3	--	10"	1600/1300	1/4	115	0.5	14	56	690/580	590/460	570/390	--
P12-3	--	12"	1725/1140	1/4	115	3.4	27	64	1670/1100	1600/950	1575/900	1450/625
P14-3	--	14"	1725/1140	1/4	115	3.4	31	67	2190/1440	2080/1325	2000/1300	1950/850
P16-3	--	16"	1725/1140	1/4	115	3.4	34	69	2580/1770	2480/1620	2430/1560	2270/1020
P18-3	--	18"	1725/1140	1/3	115	5.5/2.9	38	74	3200/2310	3050/2030	2950/1960	2625/1750
P20-3	--	20"	1725/1140	1/3	115	5.5/2.9	41	77	3640/2420	3440/2270	3360/2210	3140/1890
SINGLE SPEED EXPLOSION PROOF FANS (Explosion Proof Motors are DIVISION 1 - CLASS 1 - GROUP C & D and CLASS 2 - GROUP F & G)												
Class I, Group C - Atmospheres containing ethyl ether, ethylene, gases or vapors of equivalent hazard. Class I, Group D - Atmospheres such as acetone, ammonia, benzene, butane, cyclopropane, ethanol, gasoline, hexane, methane, natural gas, naphtha, propane, or gases or vapors of equivalent hazard. Class II Group F - Atmospheres containing carbonaceous dust, including carbon black, charcoal, coal, or coke dusts that have more than 8% total entrapped volatiles, or dusts that have been sensitized by other materials so that they present an explosion hazard. Class II Group G - Atmospheres containing combustible dusts not included in group E or F, including flour, grain, wood, plastic and chemicals.												
P12-4	P12-4*	12"	1725	1/3	115/230	6.6/3.1-3.3	49	63	1670	1600	1575	1450
P14-4	P14-4*	14"	1725	1/3	115/230	6.6/3.1-3.3	49	67	2190	2080	2000	1950
P16-4	P16-4*	16"	1725	1/3	115/230	6.6/3.1-3.3	51	68	2580	2480	2430	2270
P18-4	P18-4*	18"	1725	1/3	115/230	6.6/3.1-3.3	56	73	3200	3050	2950	2625
P20-4	P20-4*	20"	1725	1/3	115/230	6.6/3.1-3.3	57	77	3640	3440	3360	3140
P24-4	P24-4*	24"	1725	1/3	115/230	6.6/3.1-3.3	57	77	5520	5410	5330	5130

For three phase motors, substitute "M" with "M" for 230/460 volt or "P" for 575 volt

**NOTE: P36-7M is only available in 208-230/460 volt for three phase applications

Other voltages in single or three phase are available. 50HZ voltages are available. Consult factory.

ACCESSORIES

- Front guards
- Wall sleeve
- Thermostats
- Backdraft dampers
- Weather hoods
- Controls

For a complete listing on all available accessories, see page D16.

For a complete listing of all available hoods, see page D11.

For all available control options, see Controls & Thermostats tab.

Consult factory to have accessories installed.

SPECIFICATIONS

S E R I E S 9 0 0 0 THERMALLY INSULATED DAMPER

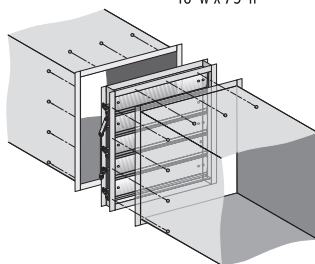
- Extruded aluminum (6063T5) damper frame is not less than .080" (2.03mm) in thickness. Damper frame is 4" (101.6mm) deep.
- Blades are extruded aluminum (6063T5) profiles, internally insulated with expanded polyurethane foam and thermally broken. Complete blade has an insulating factor of R-2.29 and a temperature index of 55.
- Blade seals are extruded EPDM. Frame seals are extruded silicone. Seals are secured in an integral slot within the aluminum extrusions.
- Bearings are composed of a Celcon inner bearing fixed to a $\frac{7}{16}$ " (11.11mm) aluminum hexagon blade pin, rotating within a polycarbonate outer bearing inserted in the frame, resulting in no metal-to-metal or metal-to-plastic contact.
- Linkage hardware is installed in frame side and constructed of aluminum and corrosion-resistant, zinc-plated steel, complete with cup-point trunnion screws for a slip-proof grip.
- Dampers are designed for operation in temperatures ranging between -72°F (-58°C) and 185°F (85°C).
- Dampers are available with either opposed blade action or parallel blade action.
- Leakage does not exceed 3 cfm/ft.² (15.2 l/s/m²) against 1" (.25 kPa) w.g. differential static pressure.
- Pressure drop of a fully open 48" x 48" (1219mm x 1219mm) damper does not exceed .03" (.007kPa) w.g. at 1000 fpm (5.08 l/s).
- Dampers are made to size required without blanking off free area.
- Dampers are available in two mounting types: i.e., "Installed in Duct" or "Flanged to Duct".
- Installation of dampers must be in accordance with current manufacturer's installation guidelines provided with each shipment of TAMCO dampers. (Note that all technical information available on TAMCO's web site at www.tamco.ca supersedes and takes precedence over all information contained within the printed catalog.)
- Intermediate or tubular steel structural support is required to resist applied pressure loads for dampers that consist of two or more sections in both height and width. (See TAMCO Aluminum Damper Installation Guidelines.)

NOTE: Reduced air leakage at colder temperatures obtainable by upgrading to Series 9000 SC Severe Cold Option. Silicone gaskets & seals are supplied only if Series 9000 SC Severe Cold Option is specified. See Series 9000 SC Specification Sheet.

"FLANGED TO DUCT" TYPE

2" added to duct width & height dimensions

Minimum section size: $4\frac{1}{2}$ " w x $4\frac{1}{4}$ " h
Maximum section size: 25 ft.²
60" w x 60" h or
48" w x 75" h



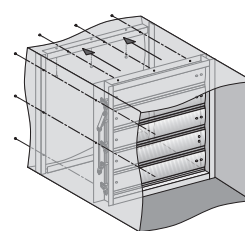
Note:

- To reduce pressure drop, use "Flanged to Duct" type for sizes under 9 ft.² (.83m²).
- Suitable for operation in breathable air environments within stated temperature range.
- Dampers sized for duct openings exceeding 37½" (953mm) in height are equipped with a stiffener bar at mid-height to strengthen and maintain air leakage tolerances.
- Not available as 4" only blade type.

"INSTALLED IN DUCT" TYPE

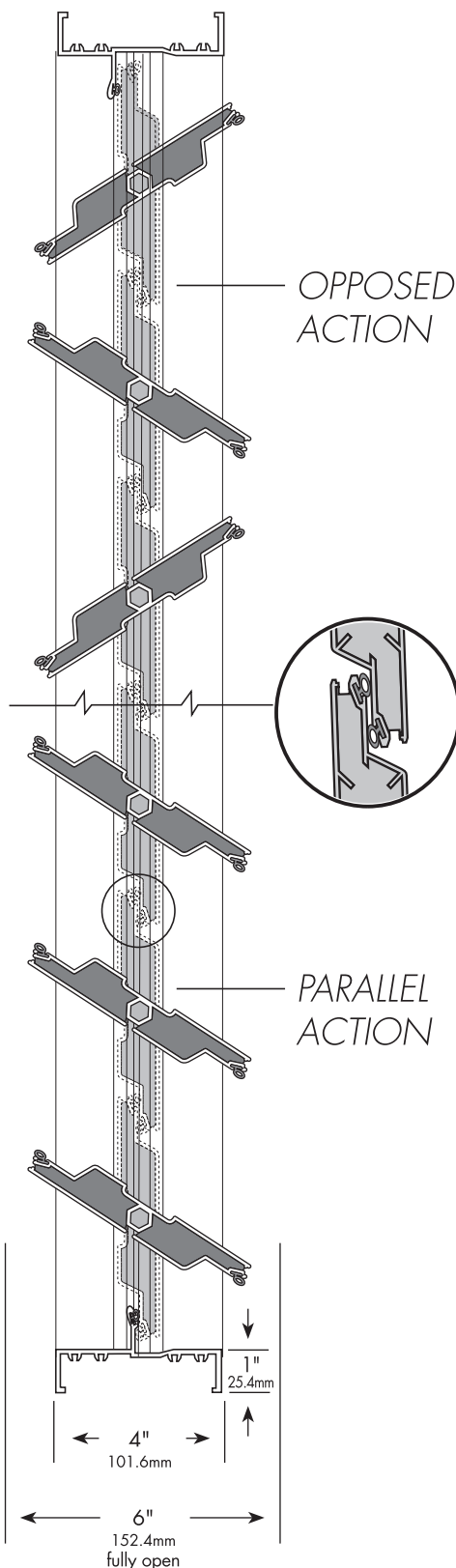
½" deducted for clearance from width & height dimensions unless otherwise specified

Minimum section size: $6\frac{1}{2}$ " w x $6\frac{3}{4}$ " h
Maximum section size: 25 ft.²
60" w x 60" h or
48" w x 75" h



For additional information, refer to:

- Series 9000 SC Specification Sheet
- Series 9000 SW Specification Sheet
- Series 9000 BF, 9000 ECT, 9000, 9000 SC & 9000 SW Pressure Drop
- Series 9000 BF, 9000 ECT, 9000, 9000 SC & 9000 SW Free Area Charts
- Aluminum Standard Configurations
- TAMCO Aluminum Damper Torque Requirements
- Multiple-Section Horizontal Jack Shafts
- Configurations Using Vertical Jack Shafts
- Multiple-Section Damper Jumpers
- Square-to-Round Transition Option
- TAMCO Aluminum Damper Installation Guidelines



PERFORMANCE DATA

S E R I E S 9 0 0 0 THERMALLY INSULATED DAMPER

LEAKAGE RATING

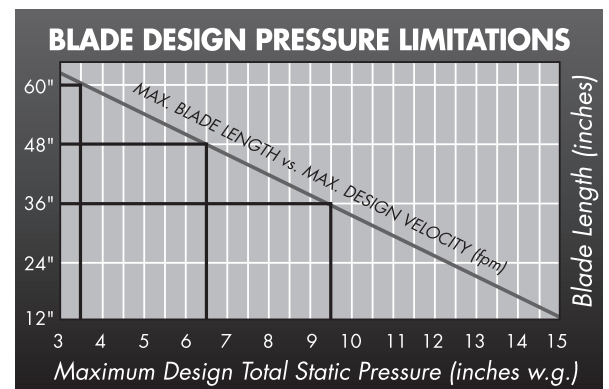
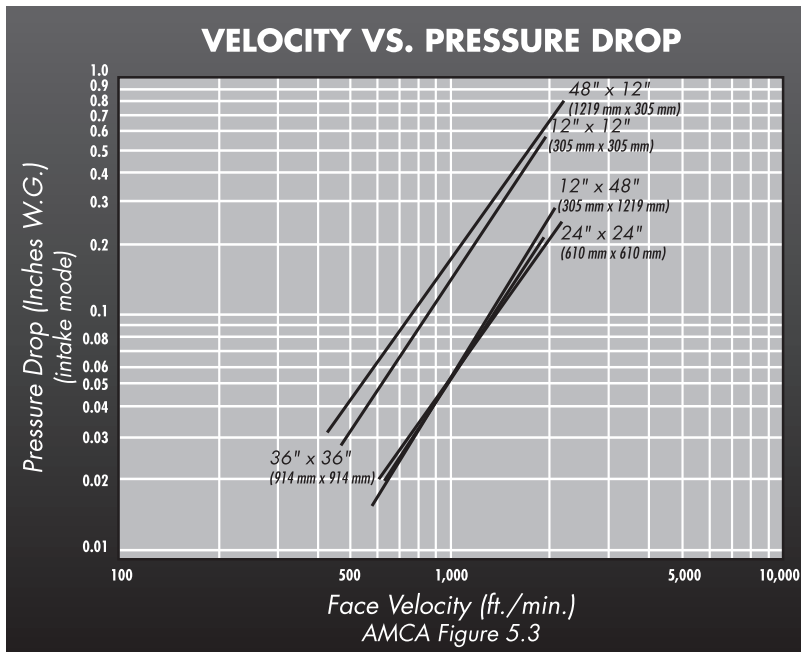
Damper Width	1 in. w.g.	4 in. w.g.	8 in. w.g.
12" (305mm)	1A	1	11
24" (610mm)	1A	1	11
36" (914mm)	1A	1	n/a
48" (1219mm)	1A	1	n/a
60" (1524mm)	1A	1	n/a

Leakage testing was conducted in accordance with AMCA Standard 500-D-98. Holding torque applied was 5.2 in.-lbs./sq. ft. on opposed blade dampers and 7 in.-lbs./sq. ft. on parallel blade dampers. AMCA Standard 500-D-98 states that air leakage is based on operation between 50°F (10°C) and 104°F (40°C). All tests were performed with 120 lb-in resulting in a maximum of 120 lb-in/ft² with the 12" x 12" damper.

The following sizes of TAMCO Series 9000 dampers were tested:

12" x 12" (305 mm x 305 mm), 24" x 24" (610 mm x 610 mm), 48" x 12" (1219 mm x 305 mm)
12" x 48" (305 mm x 1219 mm), 36" x 36" (914 mm x 914 mm), 60" x 36" (1524 mm x 914 mm).

Pressure Class	LEAKAGE, ft ³ /min/ft ² (l/s/m ²)			
	Required Rating	Extended Ranges (Opt.)		
	1" / 0.25 kPa	4" / 1.0 kPa	8" / 2.0 kPa	12" / 3.0 kPa
1A	3 / 15.2	n/a	n/a	n/a
1	4 / 20.3	8 / 40.6	11 / 55.9	14 / 71.1
2	10 / 50.8	20 / 102	28 / 142	35 / 178
3	40 / 203	80 / 406	112 / 569	140 / 711



All Series 9000 dampers exceeding the maximum design pressure due to blade length may be used by reducing the width of the damper sections and/or by increasing the number of sections per damper to maintain a blade width compatible with the required system pressure.

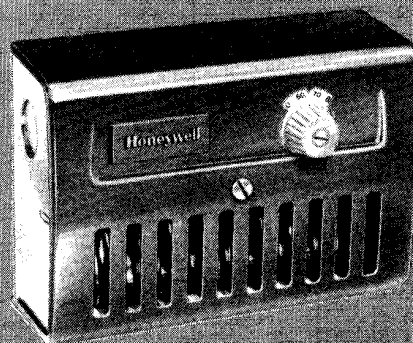
Example: 1 section damper of 60" w x 36" h (1525mm x 915mm) at 5" (1.24kPa) w.g. would need to be built in two sections of 30" w x 36" h (762mm x 914mm).

Honeywell

T631 CONTROLLERS PROVIDE LINE VOLTAGE CONTROL OF HEATING, COOLING, AND VENTILATION SYSTEMS IN FARM BUILDINGS OR STORAGE AREAS.

- ☐ Typical applications include barns, brooder houses, poultry houses, hog houses, pump houses, milk houses, and crop storage houses.
- ☐ Slots in front and bottom of case provide maximum air circulation over the coiled sensing element.
- ☐ Rugged steel case treated to resist corrosion.
- ☐ Dependable switching provided by spdt snap switch(es) permanently sealed against contamination.
- ☐ Temperature setting knob and scale on front of controller.

FARM-O-STAT AIRSWITCH CONTROLLERS



T631A-C

TABLE 1—MODEL NUMBERS

MODEL NUMBER	TEMPERATURE RANGE		DIFFERENTIAL SWITCH		ADDITIONAL FEATURES
	F	C	F	C	
T631A	35 to 100	2 to 38	2	1.1	—
	70 to 140	21 to 60	2	1.1	—
	0 to 70	-18 to 21	3	1.7	—
	-10 to 100	-23 to 38	3	1.7	—
	0 to 40	32 to 104	1.1	2	—
	70 to 140	21 to 60	8	4.4	—
	70 to 160	21 to 71	3	1.7	—
	35 to 100	2 to 38	3-1/2	1.9	with 1 hp [0.7 kW] rated switch
T631B	35 to 100	2 to 38	2	1.1	3-1/2 F [1.9 C] between switches
	35 to 100	2 to 38	2	1.1	9 F [5 C] between switches
	35 to 100	2 to 38	2	1.1	adjustable interstage differential ^a
	35 to 100	2 to 38	3-1/2	1.9	adjustable interstage differential ^a ; with 1 hp [0.7 kW] rated switches
T631C	-10 to 60	-23 to 16	3	1.7	with 1 hp [0.7 kW] rated switch
	20 to 90	-7 to 32	3	1.7	with 1 hp [0.7 kW] rated switch
	70 to 140	21 to 60	2	1.1	—
	14 to 86	-10 to 30	3	1.7	—
	68 to 140	20 to 60	3	1.1	—
	35 to 100	2 to 38	2	1.1	—
	14 to 86	-10 to 30	3	1.7	with ground screw

^aInterstage differential is adjustable from 0 F to 7 F [0 C to 4 C]. At 0 differential, both switches make at set point. With differential set above 0, speed change switch closes after fan switch, on temperature rise.

ELECTRICAL RATINGS (Amperes):

T631A,B

VOLTAGE (Vac)	24 ^a	120	240	WITH 1 hp SWITCH	
				120	240
Full Load	2.0	7.4	3.7	16.0	8.0
Locked Rotor	—	44.4	22.2	96.0	48.0

^a24 Vac rating for T631B.

T631C

VOLTAGE (Vac)	24	120	240	277	WITH 1 hp SWITCH			
					R-B		R-W	
					120	240	120	240
Full Load	2.0	7.4	3.7	3.0	8	5.1	16	8
Locked Rotor	—	44.4	22.2	18.0	48	30.6	80	40
Resistive Load	—	10.0	5.0	—	—	—	—	—

INSTALLATION

WHEN INSTALLING THIS PRODUCT...

1. Read these instructions carefully. Failure to follow them could damage the product or cause a hazardous condition.
2. Check the ratings given in the instructions and on the product to make sure the product is suitable for your application.
3. Installer must be a trained, experienced service technician.
4. After installation is complete, check out product operation as provided in these instructions.

CAUTION

Disconnect power supply before beginning installation to prevent electrical shock and equipment damage.

LOCATION

Locate the T631 controller about 5 ft [1.5 m] above the floor in an area with good air circulation and average temperature. The controller mounts on any flat surface or on switch box with screws through back of case. Do not locate T631 on an outside wall, or where the controller will be affected by drafts or radiant heat from the sun.

MOUNTING ON FLAT SURFACE OR SWITCH BOX

1. Remove cover by unscrewing single screw in cover.
2. Remove appropriate knockout for wiring.
3. Attach controller to mounting surface or switch box.

NOTE: A wooden panel should be placed between the controller and the mounting surface if the surface is brick, metal, or concrete.

4. Run wires through the knockout and into the controller case.

WIRING

Disconnect power supply before making wiring connections to avoid possible electrical shock or equipment damage. All wiring must agree with local codes and ordinances.

Refer to the wiring diagrams (Figs. 2-8) and to installation information furnished with the system equipment when wiring the T631.

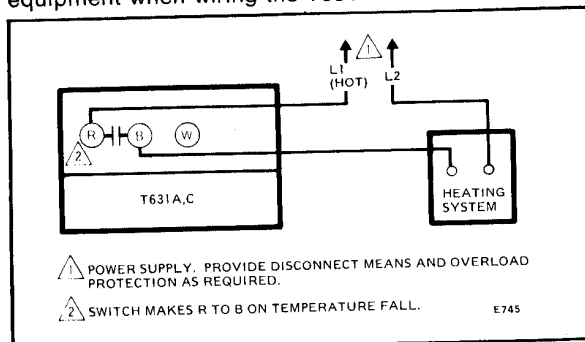


FIG. 2—T631A OR C HOOKUP FOR CONTROL OF HEATING SYSTEM.

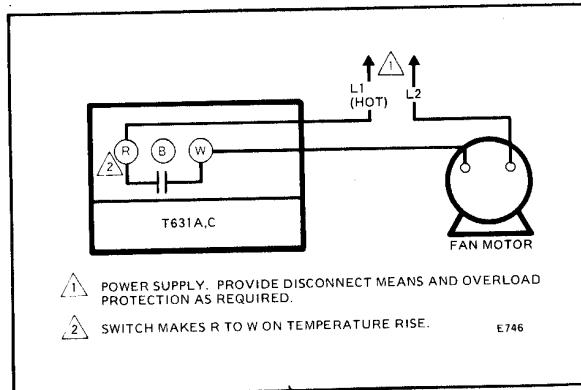


FIG. 3—T631A OR C HOOKUP FOR CONTROLLING FAN.

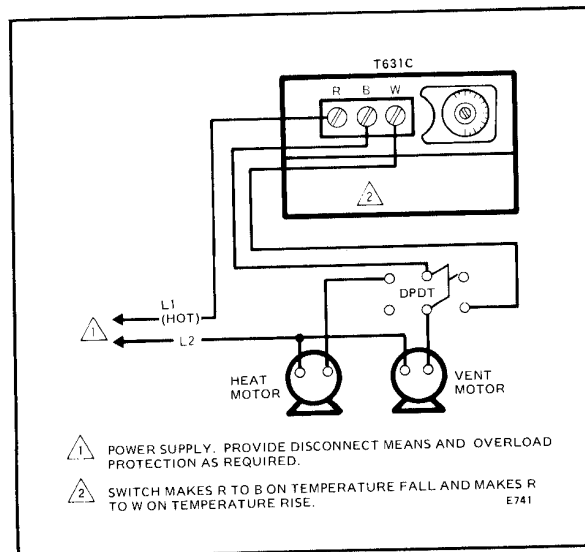


FIG. 4—T631C CONTROLLING HEATING AND VENTILATION.

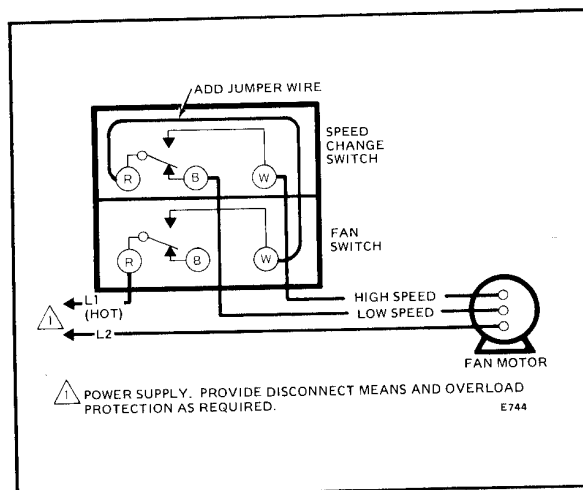


FIG. 5—TYPICAL HOOKUP OF T631B FOR CONTROLLING A 2-SPEED FAN.

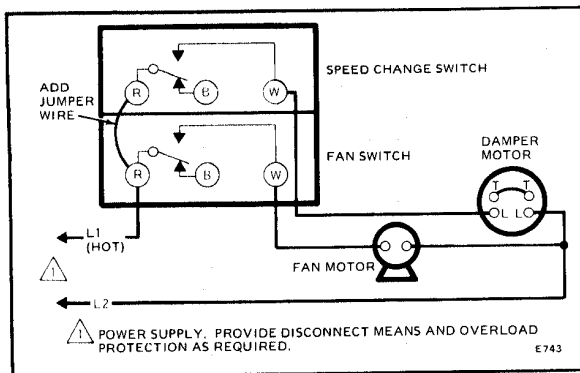


FIG. 6—T631B CONTROLLING SINGLE-SPEED FAN AND DAMPER MOTOR.

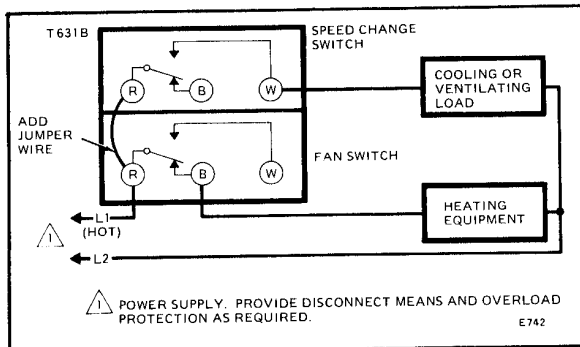


FIG. 7—TYPICAL T631B CONNECTIONS FOR HEATING AND COOLING (or ventilating) CONTROL.

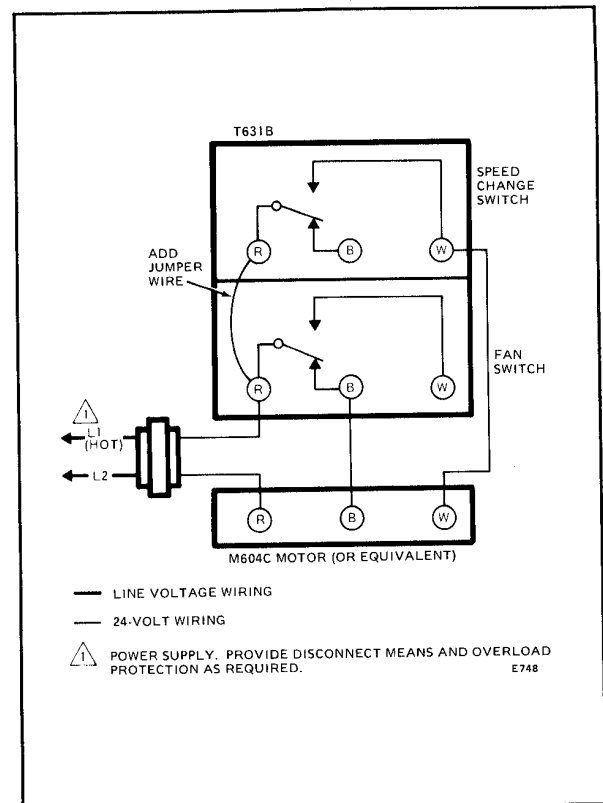


FIG. 8—TYPICAL T631B CONNECTIONS FOR FLOATING CONTROL OF DAMPER MOTOR.

CHECKOUT

1. Turn on the power.
2. Turn the temperature adjusting knob and scale across the indicator and back again. See Fig. 9. The controlled equipment should switch on and off.

When wired for heating (R to B), turning the dial counterclockwise to a higher setting simulates a space temperature drop and the heating equipment should come on. When the controller is wired for a cooling or ventilating application (R to W), turning the dial clockwise to a lower setting simulates a rise in temperature and the cooling or ventilating equipment should come on.
3. If the controlled equipment does not start and stop as indicated in step 2, disconnect the power supply and check the wiring and terminal connections.
4. If the controlled equipment operates opposite to the sequence desired, shut off the power and check for reversed leads on the switch.

IMPORTANT

If the T631 is mounted in an area where it is subjected to dust or other substances, clean periodically. Wipe the temperature sensing coil to maintain maximum air contact if the surrounding air contains oil or other adhesive substances.

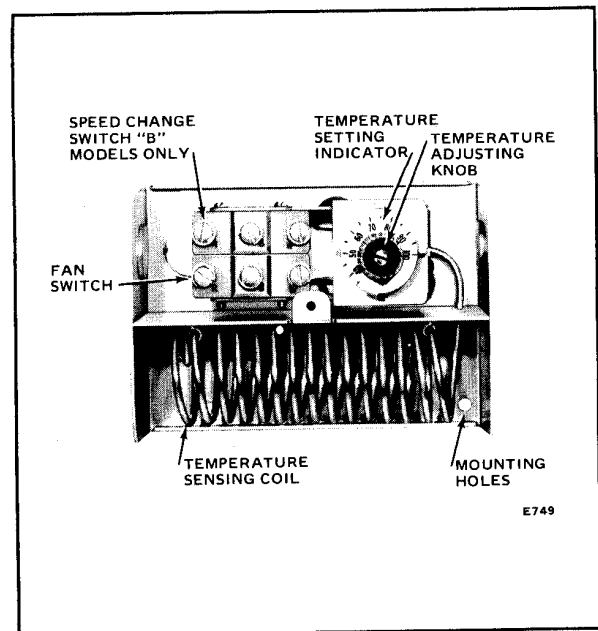


FIG. 9—T631B WITH COVER REMOVED. T631A AND C HAVE 3 WIRING TERMINALS ONLY.

If questions arise regarding this product, contact your distributor or local Honeywell representative.



Model 244 Emergency Vents | 8-inch

SPECIFICATION SHEET

Application

UL Listed emergency vent (pressure relief only) used on aboveground storage tanks, as a code requirement, to help prevent the tank from becoming over-pressurized and possibly rupturing if ever exposed to fire. The vent must be used in conjunction with a “normal vent.” Correct application of this vent requires proper vent size and selection for the tank system in order to meet the specific venting capacity.

Code Compliance

When properly sized for the tank, this vent will conform to the requirements of the International Fire Code; National Fire Code of Canada; National Fire Protection Agency—NFPA 20, 30, 30A, 31, 37, 110; Petroleum Equipment Institute—PEI RP200, PEI RP800; Underwriters Laboratories Inc.—UL-142, UL-2085, UL-2244; Underwriters Laboratories of Canada—CAN/ULC S601, CAN/ULC S602, CAN/ULC S652

Approvals

California Air Resource Board (CARB) Phase 1 Enhanced Vapor Recovery (EVR) AST Certified Products (VR-402-B) 
Underwriters Laboratories Inc. UL-2583



WARNING: DO NOT FILL OR UNLOAD FUEL FROM A STORAGE TANK UNLESS IT IS CERTAIN THAT THE TANK VENTS WILL OPERATE PROPERLY. Morrison tank vents are designed only for use on shop fabricated atmospheric tanks which have been built and tested in accordance with UL 142, NFPA 30 & 30A, and API 650 and in accordance with all applicable local, state, and federal laws. In normal operation, dust and debris can accumulate in vent openings and block air passages. Certain atmospheric conditions such as a sudden drop in temperature, below freezing temperatures, and freezing rain can cause moisture to enter the vent and freeze which can restrict internal movement of vent mechanisms and block air passages. All storage tank vent air passages must be completely free of restriction and all vent mechanisms must have free movement in order to insure proper operation. Any restriction of airflow can cause excessive pressure or vacuum to build up in the storage tank, which can result in structural damage to the tank, fuel spillage, property damage, fire, injury, and death. Monthly inspection, and immediate inspection during freezing conditions, by someone familiar with the proper operation of storage tank vents, is required to insure venting devices are functioning properly before filling or unloading a tank.

Item numbers on next page...



MORRISON BROS. CO.



Model 244 Emergency Vents | 8-inch (continued)

SPECIFICATION SHEET

	Item Number	A	B	C	D	E	F	G	Overall Diameter	Height	Weight
	244O--0600 AV	8"	503,517		8	I	A	AL	11"	4.6"	43.0
EVR	244O--0600 AVEVR	8"	503,517		8	I	B	AL	11"	4.6"	43.0
	244O--0700 AV	8"	503,517		16	I	A	AL	11"	5.8"	62.0
EVR	244O--0700 AVEVR	8"	503,517		16	I	B	AL	11"	5.8"	62.0
	244OF-0100 AV †	8"	503,517	F	8	I	A	AL	13.5"	3.3"	43.0
EVR	244OF-0100 AVEVR	8"	503,517	F	8	I	B	AL	13.5"	3.3"	43.0
	244OF-0200 AV †	8"	503,517	F	16	I	A	AL	13.5"	4.5"	67.0
EVR	244OF-0200 AVEVR	8"	503,517	F	16	I	B	AL	13.5"	4.5"	67.0
	244OM-0600 AV	8"	503,517	M	8	I	A	AL	11"	5.8"	44.0
EVR	244OM-0600 AVEVR	8"	503,517	M	8	I	B	AL	11"	5.8"	44.0
	244OM-0700 AV	8"	503,517	M	16	I	A	AL	11"	6.9"	63.0
EVR	244OM-0700 AVEVR	8"	503,517	M	16	I	B	AL	11"	6.9"	63.0
	244OMB0700 AV	8"	503,517	M	16	I	A	AL	11"	6.9"	63.0
	244OMBSP0600 AV	8"	503,517	M	8	I	B	AL	11"	5.8"	44.0

SPECIFICATION OPTIONS:

- A**—Size (inches)
B—Venting capacity / SCFH at 2.5 P.S.I.
C—Mounting connection: Female N.P.T. (BLANK); Male N.P.T.(M); Flanged (F)
D—Pressure settings: 8, 16 oz/in². Pressure required to open vent.
E—Cover: Cast iron powder coated (I)
F—Seat material: O-Ring Viton A (A) or Viton B (B)
G—Body material: Aluminum (AL)
Diameter—Dimension across vent (inches)
Height—Dimension from base to top when closed (inches)
Weight—Shipping weight (lbs)
Bolt—Zinc plated steel

Flange = 13.5" OD ; eight (8) .88" Diameter holes on 11.75" diameter B.C.

† Indicates model is available in a kit.

Size	Item Number	Flanged Kits	Weight (lbs)
8"	244OF-08080 AK	Includes 244OF-0100 AV vent, flange adaptor, gasket, and nuts/bolts	N/A
	244OF-08160 AK	Includes 244OF-0200 AV vent, flange adaptor, gasket, and nuts/bolts	N/A



MORRISON BROS. CO.

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www.morbro.com

January 2024

Model 244 Emergency Vents | 2-inch

Application

UL Listed emergency vent (pressure relief only) used on aboveground storage tanks, as a code requirement, to help prevent the tank from becoming over-pressurized and possibly rupturing if ever exposed to fire. The vent must be used in conjunction with a “normal vent.” Correct application of this vent requires proper vent size and selection for the tank system in order to meet the specific venting capacity requirements. The new design increases protection against weather, improves manufacturability and helps limit and control dust accumulation.

Code Compliance

When properly sized for the tank, this vent will conform to the requirements of the International Fire Code; National Fire Code of Canada; National Fire Protection Agency—NFPA 20, 30, 30A, 31, 37, 110; Petroleum Equipment Institute—PEI RP200, PEI RP800; Underwriters Laboratories Inc.—UL-142, UL-2085, UL-2244; Underwriters Laboratories of Canada—CAN/ULC S601, CAN/ULC S602, CAN/ULC S652

Approvals

California Air Resource Board (CARB) Phase 1 Enhanced Vapor Recovery (EVR) AST Certified Products (VR-402-B) 
Underwriters Laboratories Inc. UL-2583

Item Number	A	B	C	D	E	F	G	Overall Diameter	Height	Weight	Screen
244OM-0020 AV	2"	31,917	M	8	B	A	BR	3"	2.96"	1.0	
244OMA0020 AV	This model is no longer available. Refer to 245M--0200 AV for equivalent.										
 244OMA0030AVEVR	2"	31,917	M	16	A	B	AL	3"	2.96"	0.40	
244OMAB0020 AV	This model is no longer available. Refer to 245MB-0200 AV for equivalent.										
244OMABS0020 AV	This model is no longer available. Refer to 245MSB0200 AV for equivalent.										
 244OMAS0020 AV	This model is no longer available. Refer to 245MS-0200 AV for equivalent.										
244OMAS030AVEVR	2"	24,069	M	16	A	B	AL	3"	2.96"	0.40	S
244OMB0020 AV	2"	31,917	MB	8	B	A	BR	3"	2.96"	1.0	
244OMBS0020 AV	2"	24,069	MB	8	B	A	BR	3"	2.96"	1.0	S
244OMS0020 AV	2"	24,069	M	8	B	A	BR	3"	2.96"	1.0	S

SPECIFICATION OPTIONS:

A—Size (inches)
B—Venting capacity / SCFH at 2.5 P.S.I.
C—Mounting connection: Male N.P.T. (M), Male BSP (MB)
D—Pressure settings: 8 or 16 oz/in². Pressure required to open vent.
E—Cover: Hard coated aluminum (A), brass (B)
F—Seat material: Viton A (A), Viton B (B)
G—Body material: Brass (BR), anodized aluminum (AL)
Diameter—Dimension across vent (inches)
Height—Dimension from base to top when closed (inches)
Weight—Shipping weight (lbs)
Screen (4 mesh stainless steel)—Yes (S), No (blank)
Bolt—Zinc plated steel

SPECIFICATION SHEET



Emergency Vents

Top Photo: Aluminum
Bottom Photo: Brass



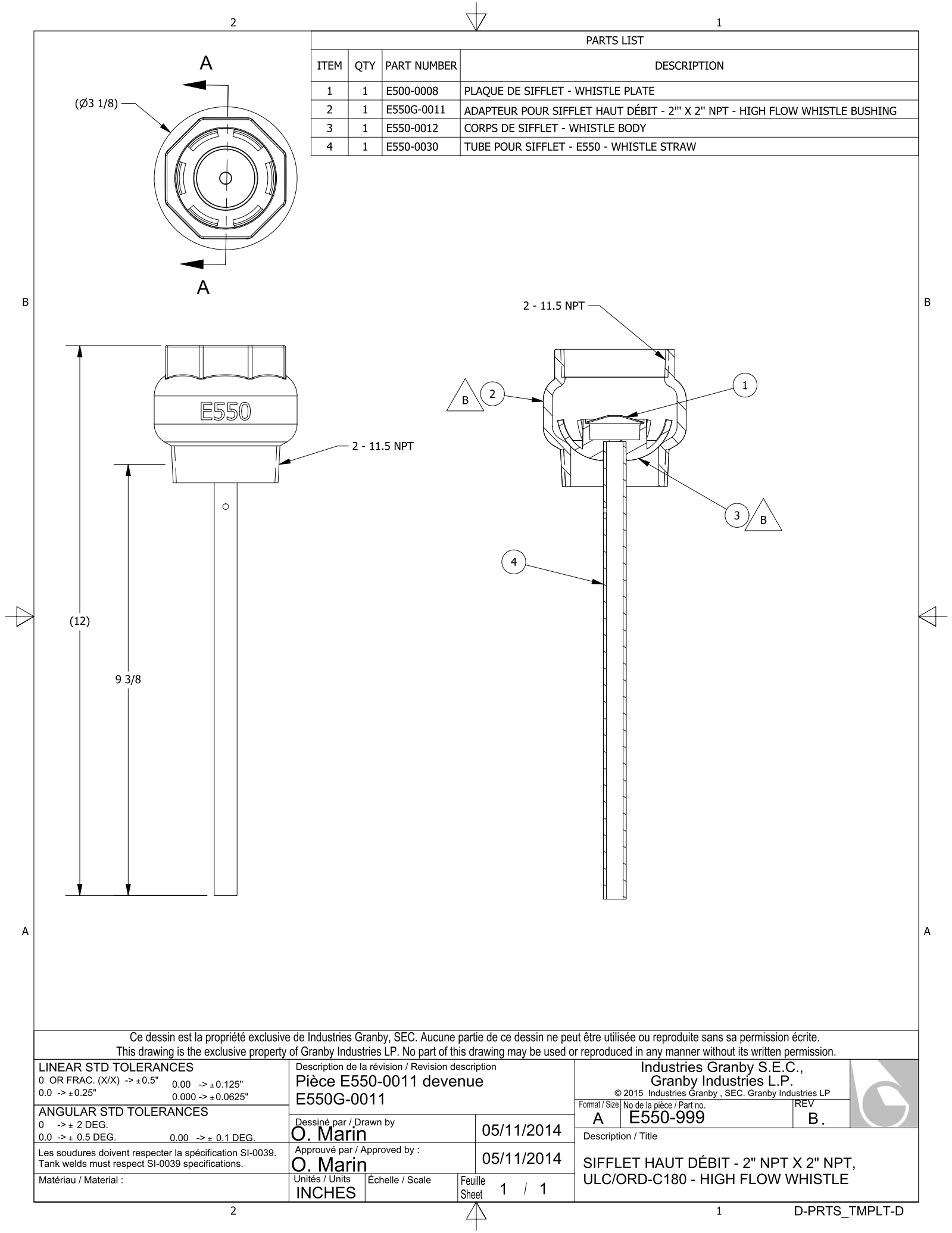
UL
2583

WARNING: DO NOT FILL OR UNLOAD FUEL FROM A STORAGE TANK UNLESS IT IS CERTAIN THAT THE TANK VENTS WILL OPERATE PROPERLY. Morrison tank vents are designed only for use on shop fabricated atmospheric tanks which have been built and tested in accordance with UL 142, NFPA 30 & 30A, and API 650 and in accordance with all applicable local, state, and federal laws. In normal operation, dust and debris can accumulate in vent openings and block air passages. Certain atmospheric conditions such as a sudden drop in temperature, below freezing temperatures, and freezing rain can cause moisture to enter the vent and freeze which can restrict internal movement of vent mechanisms and block air passages. All storage tank vent air passages must be completely free of restriction and all vent mechanisms must have free movement in order to insure proper operation. Any restriction of airflow can cause excessive pressure or vacuum to build up in the storage tank, which can result in structural damage to the tank, fuel spillage, property damage, fire, injury, and death. Monthly inspection, and immediate inspection during freezing conditions, by someone familiar with the proper operation of storage tank vents, is required to insure venting devices are functioning properly before filling or unloading a tank.

570 E. 7th Street, P.O. Box 238 | Dubuque, IA 52004-0238

t. 563.583.5701 | 800.553.4840 | f. 563.583.5028

www.morbros.com



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LINEAR STD TOLERANCES
0 OR FRAC. (X/X) -> $\pm 0.5"$ 0.00 -> $\pm 0.125"$
0.0 -> $\pm 0.25"$ 0.000 -> $\pm 0.0625"$

ANGULAR STD TOLERANCES
0 -> ± 2 DEG.
0.0 -> ± 0.5 DEG. 0.00 -> ± 0.1 DEG.

Les soudures doivent respecter la spécification SI-0039.
Tank welds must respect SI-0039 specifications.

Matériau / Material :

Description de la révision / Revision description

**Pièce E550-0011 devenue
E550G-0011**

Dessiné par / Drawn by
O. Marin

05/11/2014

Approuvé par / Approved by :
O. Marin

05/11/2014

Unités / Units
INCHES

Échelle / Scale

Feuille
Sheet **1 / 1**

**Industries Granby S.E.C.,
Granby Industries L.P.**

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Format / Size No de la pièce / Part no.

A E550-999

REV

B.

Description / Title

**SIFFLET HAUT DÉBIT - 2" NPT X 2" NPT,
ULC/ORD-C180 - HIGH FLOW WHISTLE**



Model 9095S Fill Overfill Prevention Valve

SPECIFICATION SHEET

The 9095S Overfill Prevention Valve is installed at the fill port of a storage tank. Used in a pressurized tight fill application, the valve helps prevent tank overfills by closing when the liquid level reaches a pre-set warning level (90-95% full). The valve is installed on a standard 2" NPT male connection and has a built-in bleed hole that allows the fill hose pressure to be relieved after the valve closes. This bleed hole also provides anti-siphon protection for the valve. When installed to manufacturer requirements, the Morrison Fig. 9095S Overfill Prevention Valve can eliminate hazardous liquid spills.

Features

- The valve design allows for a full flow fill until it closes.
- Designed for fuel not requiring a drop tube.
- A field adjustable float allows the installer to set the desired shut-off point. The vertical float allows for installation in openings in proximity to the tank walls.
- The valve shut-off length is field adjustable from 2 to 12 inches.
- 2" 305C--0000 AC Locking Cap sold separately.
- The valve can be installed in various configurations on the tank:
 - Directly onto the top of the tank without a spill container.
 - Between a Morrison 517 Spill Container and the tank top.
 - Inside a Morrison 2" 518 Spill Container.
 - Inside 2" 516 spill container when used with 305C--0000 AC cap.
 - Directly into the tank top with 2" NPT piping going to a remote fill.
- A pressurized tight fill connection is required for operation



NOTE
For use on clean product only.
Not suitable for motor oil.

Product Warnings and Cautions

- The valve flow rate is 110 GPM at 10PSI pressure drop. (See flow curve.)
- 5 PSI & 5 GPM is the minimum flow requirement for valve operation. Valve will NOT function in gravity fill applications.
- Maximum viscosity of 150 centistokes. The maximum operating pressure is 100PSI.
- Consult Morrison Bros. Co. for product compatibility with the valve.

Code Compliance

Florida DEP EQ696, NFPA 30, 30A, UFC, IFC and PEI /RP2000

Size	Maximum Pressure	Maximum Viscosity
2"	100 PSI	300 Centistokes

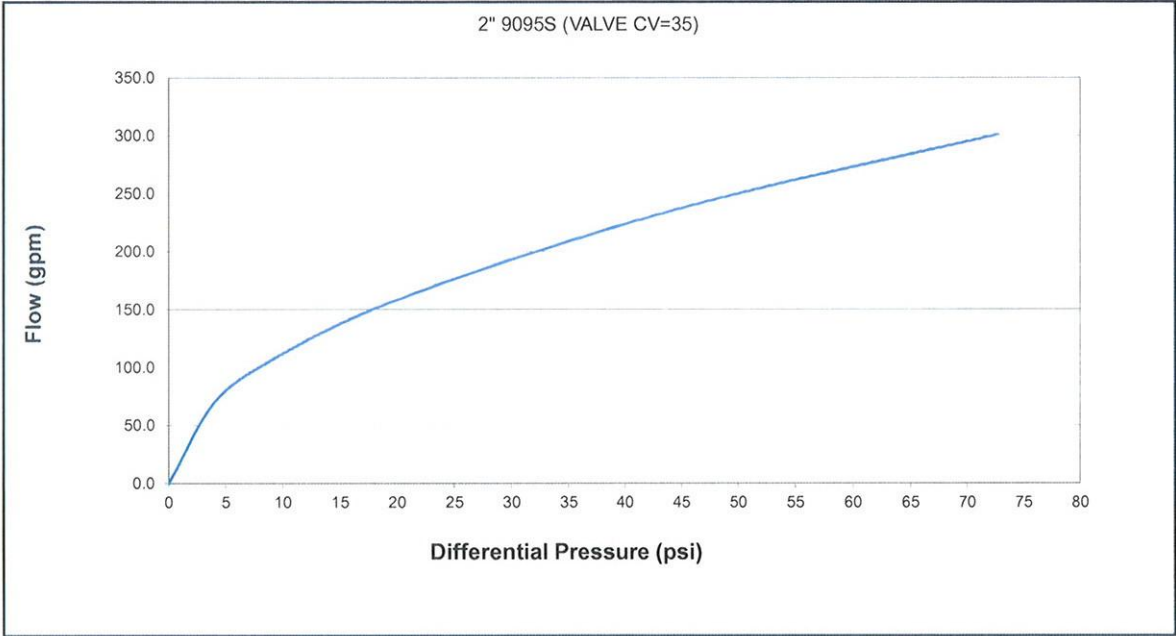
570 E. 7th Street, P.O. Box 238 | Dubuque, IA 52004-0238
t. 563.583.5701 | 800.553.4840 | f. 563.583.5028

www.morbros.com

Model 9095S Overfill Prevention Valve (continued)

I.D. Number	Size	Adaptor Number*	Description	Weight
9095S-0200 AV	2"	800FSA1000 AA	2" Part F Male Threaded	6.1 lbs
9095S-0500 AV	2"	9095A-0224 MA	2" Part A Female Threaded	6.1 lbs

*Included with purchase of a 9095S.





Direct Reading Gauge—Type D



Part Number—
D-(size opening)-(tank depth)+(ext)-(list options)
Sample—D-2-48+12

What it is:

Top mounted liquid level gauge that can measure from 6 inches to 144 inches in depth. Bushing size can be 2", 1.5", or .75". Gauges are custom made in house to fit your tank. Can also accommodate for double walls and pipe risers.

ULC Listed 75EO for Flammable Liquids

Rated for up to 70 PSI

Additional Options - Not included:

Audible Alarm Accessory: This add on feature can turn your mechanical gauge into an audible Hi or Lo level alarm.

LED At-A-Glance Accessory: Another add on feature. This can give your mechanical gauge remote reading capability.

Gauge Guard: A cover that protects the exposed plastic components on top of the gauge.

Replacement Parts -

D-Kit - Replaces all of the gauge components from the red lock nut and up. Includes: Red HDPE Plastic Nut, Duro Nitrile Gasket, Plastic Cellulose acetate inner and outer calibration.

DG-Kit-ALN - Replaces all of the gauge components from the red lock nut and up with upgraded parts. Includes: Aluminum Lock Nut, Duro Nitrile Gasket, Plastic Cellulose acetate outer calibration, Glass inner calibration.

Instructions for Operation:

This gauge is a simple volume reading tool. The top of the red indicator is an indication of your approximate fuel level in your tank. Once installed, you simply view the calibration to monitor your tank level. Indicator is calibrated in eighths of a tank on one side, and quarters of a tank on the other.

Krueger Sentry Gauge
1873 Siesta Lane
Green Bay, WI 54313

www.ksentry.com



Contact us for more info:
Ph: 920-434-8860
Fax: 920-434-8897

Email: info@ksentry.com

FIGURE 559B

Y-STRAINER



400 WOG CAST IRON Y-STRAINER

FEATURES

- 400 PSI CWP non-shock (400 PSI @ 100°F)
- 250 PSI WSP (250 PSI @ 450°F)
- Threaded NPT ends
- Stainless steel screen:
 - 1/4" to 2" - 20 mesh
 - 2-1/2" - 1/8" holes perforated
- Blow-off plug included

**2-1/2" strainer has bolted end bonnet*



PRODUCT SPECIFICATIONS

Standards

- NPT ends: ANSI/ASME B1.20.1
- Shell (Hydro) test pressure: 600 PSI
- Markings per MSS SP-25

CV & WEIGHT

Size	Cv	Wt. (lbs.)
1/2	9.5	1.6
3/4	18.7	2.4
1	30.0	4.0
1-1/4	44.9	6.6
1-1/2	61.0	8.1
2	98.0	13.0
2-1/2	129.7	24.0

FIGURE NUMBER MATRIX

FNW	559B	Size Code		Replacement Screens
		1/2 = D	1-1/2 = J	1/2 = FNW559SD
		3/4 = F	2 = K	3/4 = FNW559SF
		1 = G	2-1/2 = L	1 = FNW559SG
		1-1/4 = H		1-1/4 = FNW559SH
				1-1/2 = FNW559SJ
				2 = FNW559SK
				2-1/2 = FNW559SL

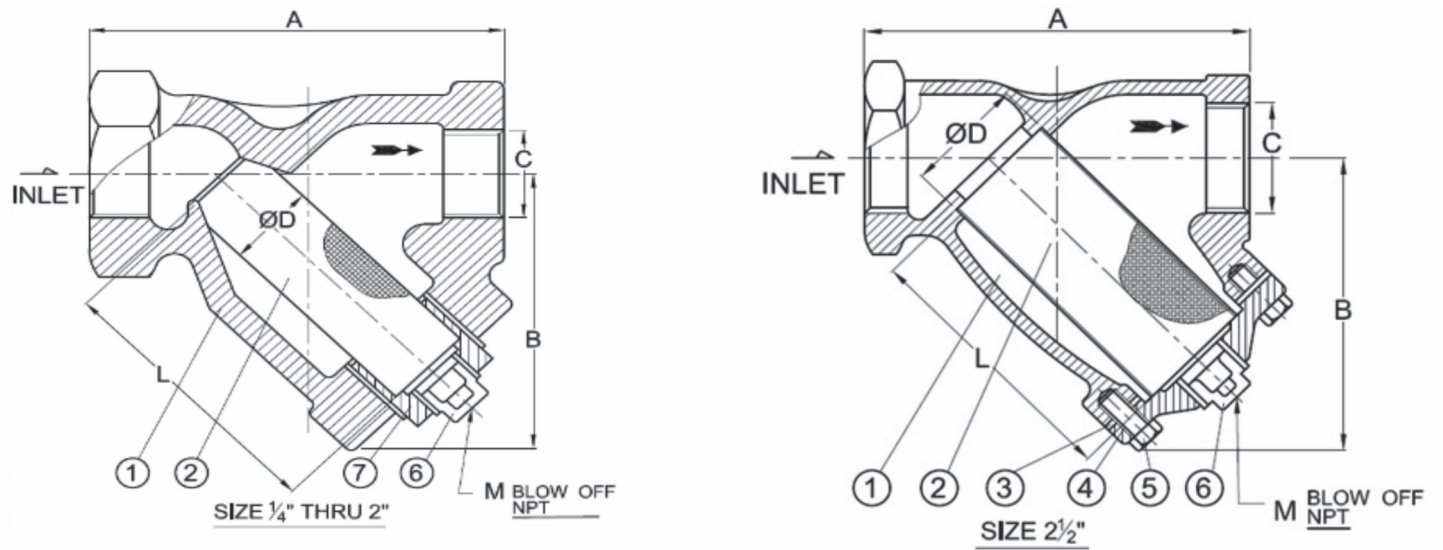
FIGURE 559B

Y-STRAINER

FNW

400 WOG CAST IRON Y-STRAINER

PARTS BREAKDOWN



STANDARD MATERIALS

Ref #	Description	Material	Specification	Qty	Notes
1	Body	Cast Iron	ASTM A126-B	1	
2	Screen	Stainless Steel, SUS-304	SUS 304	1	
3	Gasket	Non-Asbestos		1	2-1/2 only
4	Cover	Cast Iron, ASTM A126-B	ASTM A126-B	1	2-1/2 only
5	Hex. Head Bolt	Steel, ASTM A307-A	ASTM A307-A	1 Set	2-1/2 only
6	Plug	Malleable Iron, ASTM A197-B	ASTM A197-B	1	
7	Cap	Ductile Iron, ASTM A536	ASTM A536	1	

DIMENSIONS (INCHES)

Size	A	B	C (NPT)	øD	L	M (NPT)
1/2	3.4	2.4	1/2	0.70	2.41	3/8
3/4	4.0	2.8	3/4	0.91	2.59	1/2
1	4.6	3.3	1	1.19	3.34	1/2
1-1/4	5.4	3.9	1-1/4	1.45	3.94	3/4
1-1/2	6.1	4.6	1-1/2	1.78	4.53	3/4
2	7.5	5.3	2	2.36	5.28	1
2-1/2	9.0	7.19	2-1/2	2.70	6.50	1-1/4



Model 446 Emergency Shut-Off Valve

NEW PRODUCT ANNOUNCEMENT

Application

The 446 normally open valve is designed to shut off liquid flow in the event of a fire or excessive temperatures. This emergency shut-off valve is installed in the fuel line from a storage tank to fuel burning equipment; such as back-up generators, boilers and other flammable liquid burning appliances.

Features and Details

- cULus listed to ULC/ORD-C842 – Valves for Flammable and Combustible Liquids
- 165° F fusible link activates spring closure
- ¾" or 1" female NPT threaded connects
- Compact size reduces operational footprint requirement
- Easy to install and maintain

Operational Criteria

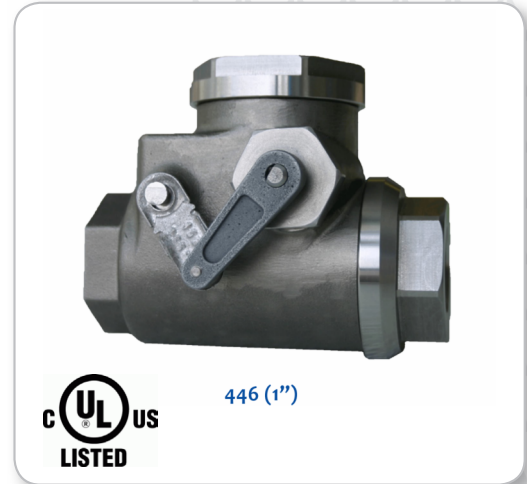
- Operating pressure rated at 50 psi
- Operating temperature range rated at -20° F to 125° F

Materials of Construction

- Body... 316 stainless steel
- Cap, shaft, tail fitting, poppet, and nut... 303 stainless steel
- Lever arm... 304 stainless steel
- Handle... 356-T6 aluminum
- Spring... 17-7 stainless
- Fuse link... 165° F
- O-ring and disc... Viton®

Code Compliance

- cULus listed



Item Number	Size	Weight (lbs)	
446---0075 AV	¾"	3.20	
446---0100 AV	1"	3.40	



MORRISON BROS. CO.



Model 691 & 691B Full Port Brass Ball Valve

SPECIFICATION SHEET

Ball valves are used throughout fuel piping systems where a shut-off is required or desired.

Features

- Quarter turn operation
- Full port for maximum flow and minimum pressure drop
- Can be operated in partial open position for flow control
- Double seal allows the valve to be operated in both directions
- Blowout proof stem
- 600 PSIG non-shock cold working pressure rating for 1/4" to 2" size
- 450 PSIG non-shock cold working pressure rating for 2 1/2" to 4" size
- Can be used for air service
- **691B** is lockable with a padlock

Construction Details

- Forged brass body
- Hard chrome plated ball
- Teflon® seal

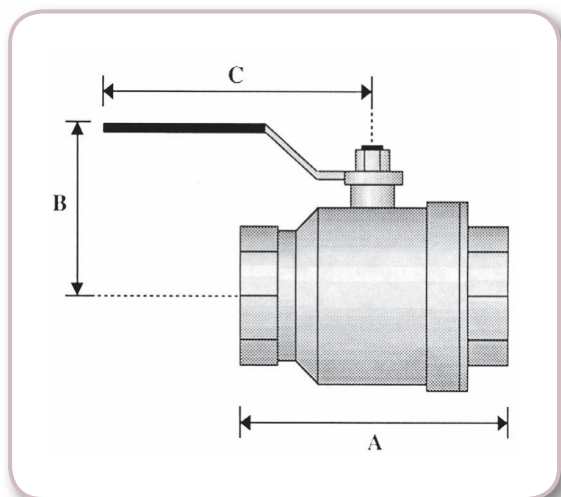
Certifications & Listings

UL 842 listed for flammable liquids,
UL 125 listed for LP gas shut-off,
CSA approved,
ULC listed (ULC/ORD-C125-1992,
ULC/ORD-C842-M1984 and
ULC/ORD-C258-03)



I.D. Number	Size	A	B	C	Port Size	Weight (lbs)
691---0100 1V	1/4"	1.771	1.496	3.228	0.314	0.30
691---0200 1V	3/8"	1.771	1.496	3.228	0.393	0.30
691---0300 1V	1/2"	2.32	1.69	3.94	0.59	0.50
691---0400 1V	3/4"	2.519	1.968	4.724	0.787	0.80
691---0500 1V	1"	3.188	2.125	4.724	0.984	1.17
691---0600 1V	1 1/4"	3.661	2.874	6.22	1.259	1.93
691---0700 1V	1 1/2"	4.015	3.11	6.22	1.574	2.40
691---0800 1V	2"	4.763	3.385	6.22	1.968	4.02
691---0900 1V	2 1/2"	6.141	5.196	10.04	2.559	10.0
691---1000 1V	3"	6.968	5.551	10.04	3.149	13.65
691---1100 1V	4"	8.504	6.062	10.04	3.937	22.0
691B--0100 1V	1/4"	1.771	1.496	3.228	0.314	0.30
691B--0200 1V	3/8"	1.771	1.496	3.228	0.393	0.30
691B--0300 1V	1/2"	2.32	1.69	3.94	0.59	0.50
691B--0400 1V	3/4"	2.519	1.968	4.724	0.787	0.80
691B--0500 1V	1"	3.188	2.125	4.724	0.984	1.17
691B--0600 1V	1 1/4"	3.661	2.874	6.22	1.259	1.93
691B--0700 1V	1 1/2"	4.015	3.11	6.22	1.574	2.40
691B--0800 1V	2"	4.763	3.385	6.22	1.968	4.02
691B--0900 1V	2 1/2"	6.141	5.196	10.04	2.559	10.0
691B--1000 1V	3"	6.968	5.551	10.04	3.149	13.65
691B--1100 1V	4"	8.504	6.062	10.04	3.937	22.0

NOTE: All dimensions are in inches.



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MORRISON BROS. CO.

Morrison Bros. Co.

www.morbro.com

516 5-Gallon Spill Container

Specification Sheet



DESCRIPTION

The Fig. 516 contains any spills that occur at the fill point on Aboveground Storage Tanks. It is designed to be mounted on top of the AST. The 5 gallon Fig. 516 has a lockable hinged cover. It is of steel construction and powdercoated white inside and out. It has an optional push type drain with a fluoroelastomer o-ring.

EVR approved models available.

SPECIFICATION OPTIONS:

B—Mounting Connection: Male (M), Female (F)

C—Size: NPT Threads

D—Drain: Yes/No

E—Mount

F—Height (Inches)

G—Width (Inches)

H—Body Diameter

I—Shipping Weight (lbs.)

J—ULC Listing

Body: Powdercoated White

Lid: Powdercoated White

Other Hardware: Zinc Plated Steel

Optional With Drain:

Drain Push Rod: Brass

Drain Nut: Brass

Spring: Bronze

O-Ring: Fluoroelastomer

Black Powdercoat Optional

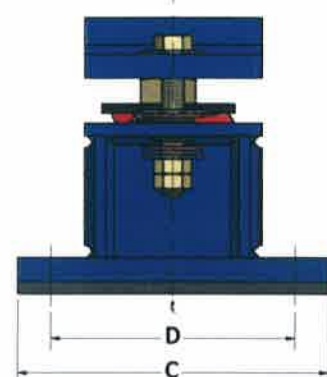
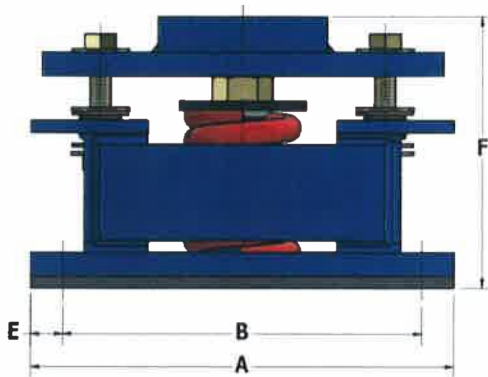
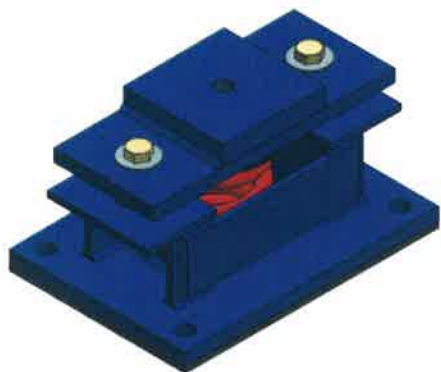
ID Number	B	C	D	E	F	G	H	I	J
516---0200 ACPW	F	2	No	Centered	12.03	17.2	13.2	17	Yes
516---0400 ACPW	F	4	No	Centered	13.41	17.2	13.2	21	Yes
516D--0200 ACPW	F	2	Yes	Centered	13.16	17.2	13.2	17	Yes
516D--0400 ACPW	F	4	Yes	Centered	13.41	17.2	13.2	21	Yes
516O--0200 ACPW	F	2	No	Offset	12.03	17.2	13.2	17	Yes
516O--0400 ACPW	F	4	No	Offset	13.41	17.2	13.2	21	Yes
516O--0400ACEVR	F	4	No	Offset	13.41	17.2	13.2	21	Yes
516OD-0200 ACPW	F	2	Yes	Offset	13.16	17.2	13.2	17	Yes
516OD-0400 ACPW	F	4	Yes	Offset	13.41	17.2	13.2	21	Yes
516M--0200 ACPW	M	2	No	Centered	12.28	17.2	13.2	16.5	Yes
516M--0400 ACPW	M	4	No	Centered	13.78	17.2	13.2	19	Yes
516MD-0200 ACPW	M	2	Yes	Centered	13.28	17.2	13.2	17.5	Yes
516MD-0400 ACPW	M	4	Yes	Centered	13.78	17.2	13.2	20.5	Yes
516MO-0200 ACPW	M	2	No	Offset	12.28	17.2	13.2	17	Yes
516MO-0400 ACPW	M	4	No	Offset	13.78	17.2	13.2	19	Yes
516MO-0400ACEVR	M	4	No	Offset	13.78	17.2	13.2	19	Yes
516MOD0200 ACPW	M	2	Yes	Offset	13.28	17.2	13.2	17.5	Yes
516MOD0400 ACPW	M	4	Yes	Offset	13.78	17.2	13.2	20.5	Yes

Morrison Bros. Co.
Established 1855

P.O. Box 238 • Dubuque, Iowa 52004-0238
563.583.5701 (tel) • 563.583.5028 (fax)
www.morbro.com

SEISMICALLY RESTRAINED ISOLATOR

MODEL "SRPR"



PERFORMANCE DATA

MODEL	COLOR CODE	SERVICE WEIGHT (lbs)	DEFLECTION (in)	HORIZONTAL RATING	DIMENSIONS					
					A	B	C	D	E	F
20	GRAY	150	2.00	45.00	10"	8 ½"	7"	5 ½"	3/4"	6"
21	YELLOW	200	2.00	33.72						
22	RED	300	2.00	22.48						
23	WHITE	400	2.00	16.86						
24	GREEN	500	2.00	13.48						
25	BLUE	700	2.00	9.63						
26	ORANGE	900	2.00	7.49						
27	GOLD	1000	2.00	6.74						
28	BROWN	1250	2.00	5.40						
29	BLACK	1600	2.00	4.21						
30	PURPLE	2000	2.00	3.37						
31	MARINE BLUE	3000	2.00	2.30						
32	BEIGE	2500	2.00	2.69						

OVERVIEW

"SRPR model Encased Spring Isolator, Including a vertical and horizontal movement stabilizer, is equipped with a levelling mechanism and a 1/4 in. thick neoprene anti-slip damping pad, grooved at the base.

The isolator casing is made of soft steel, a 3/4 in. diameter bolt and an internal compression plate ½ in. which serves as a levelling device. Retaining stops on each side of the isolator limits any vertical uplifting movement of large mass equipment. This isolator can be made of a single or several springs.

Levelling and anchoring bolts are cadmium plated. The royal blue casing and color coded springs are protected with a polyurethane anti-rust paint.

The isolator is used on large mass floor-mounted equipment stability with superior vibration absorption efficiency. It Provides 95% efficiency at a minimum frequency of 600 CPM and a 2 in. deflection.

Recommended for installation on cooling towers, chillers, inertia bases, etc.

Tested: ASHRAE-171-2008 Seismic Isolator Tests

QOB Bolt-On Circuit Breakers

With VISI-TRIP® Indicator for NQ Panelboards

QOB Circuit Breaker
(Bolt-on)



1-pole

QOB-VH 110-150 A
Three-pole



6 Spaces Required

Ampere Rating▲	One-pole Catalogue No.	Two-pole—Common Trip Catalogue No.
----------------	---------------------------	---------------------------------------

QOB-GFI—QOB QWIK-GARD® Circuit Breaker With Ground Fault Circuit Interrupter—Class A 4-6 mA People Protection. ■

	120 Vac—10,000 AIR	120/240 Vac—10,000 AIR
15	QOB115GFI	QOB215GFI
20	QOB120GFI	QOB220GFI
25	QOB125GFI	QOB225GFI
30	QOB130GFI	QOB230GFI
40	.....	QOB240GFI
50	.....	QOB250GFI
60	.....	QOB260GFI◆

QOB-VHGF1

	120 Vac—22,000 AIR	
15	QOB115VHGF1	.....
20	QOB120VHGF1	.....
25	QOB125VHGF1	.....
30	QOB130VHGF1	.....

QOB-EPD—QOB Equipment protection circuit breakers with 30 mA equipment protection.

	120 Vac—10,000 AIR	
15	QOB115EPD	QOB215EPD
20	QOB120EPD	QOB220EPD
25	QOB125EPD	QOB225EPD
30	QOB130EPD	QOB230EPD
40	.....	QOB240EPD
50	.....	QOB250EPD
60	.....	QOB260EPD

QOB-HM—High magnetic trip circuit breakers are recommended for applications where high initial inrush may occur and for individual dimmer applications.

15	QOB115HM□	.....
20	QOB120HM□	.....

QOB-AFI—QOB Arc Fault Circuit Interrupters

15	QOB115AFI	.....
20	QOB120AFI	.....
15	QOB115CAFI	.....
20	QOB120CAFI	.....

QOBVH-AFI—QOB Arc Fault Circuit Interrupters

	120 Vac—22,000 AIR	
15	QOB115VHAFI	.....
20	QOB120VHAFI	.....

QOB-K—Key operated QOB circuit breakers can be turned ON or OFF or to RESET with a special key (Catalogue No. QOK10) included with the circuit breaker.

	120 Vac—10,000 AIR	
10	QOB110K	.....
15	QOB115K	.....
20	QOB120K	.....
25	QOB125K	.....
30	QOB130K	.....

QO/QOB Circuit Breaker Wire Sizes

Breaker Type	Ampere Rating	Wire Size (AWG)	
		Al	Cu
QOB 1-pole	10-30	#14-8	#14-8
	10-30	.....	(2) #14-10
	35-70	#8-2	#8-2
QOB 2-pole	10-30	#14-8	#14-8
	10-30	.....	(2) #14-10
	35-70	#8-2	#8-2
	80-125	#4-2/0	#4-2/0
	150-200	#4-300 kcmil	#4-300 kcmil
QOB 3-pole	10-30	#14-8	#14-8
	35-70	#8-2	#8-2
	80-125	#4-2/0	#4-2/0
QOB-VH	110-150	#4-300 kcmil	#4-300 kcmil
QOT	15-20	#12-8	#14-8
QOB-GFI & QOB-EPD	15-30	#12-8	#14-8
	40, 50, 60	#12-4	#14-6

Ampere Rating	One-pole	Two-pole—Common Trip	Two-pole—Common Trip★	Three-pole—Common Trip
	Catalogue No.	Catalogue No.	Catalogue No.	Catalogue No.

QOB Bolt-On

	120 Vac—10,000 AIR 48 Vdc—5,000 AIR	120/240 Vac—10,000 AIR 48 Vdc—5,000 AIR▼	240 Vac—10,000 AIR	240 Vac—10,000 AIR 48 Vdc—5,000 AIR▼
10	QOB110	QOB210	.....	QOB310
15	QOB115△□	QOB215△	QOB215H	QOB315△
20	QOB120△□	QOB220△	QOB220H	QOB320△
25	QOB125△	QOB225△	QOB225H	QOB325△
30	QOB130△	QOB230△	QOB230H	QOB330△
35	QOB135△	QOB235△	.....	QOB335△
40	QOB140△	QOB240△	QOB240H	QOB340△
45	QOB145△	QOB245△	.....	QOB345△
50	QOB150△	QOB250△	QOB250H	QOB350△
60	QOB160△	QOB260△	QOB260H	QOB360△
70	QOB170△	QOB270△	QOB270H	QOB370△▼
80	.....	QOB280△▼	QOB280H	QOB380△▼
90	.....	QOB290△▼	QOB290H	QOB390△▼
100	.....	QOB2100△▼	QOB2100H	QOB3100△▼
110	.....	QOB2110△▼	.....	.....
125	.....	QOB2125△▼	.....	.....

Molded Case Switch 60 A max - 240 Vac
Molded Case Switch 100 A max - 240 Vac

QOB200 QOB2000

QOB200 QOB2000

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NQ Panelboards – Ready to Install (RTI)

20" Wide Enclosures—240 Vac, 48 Vdc

NQ Ready to Install Main Lug Interiors

Main Circuit Breaker Interior, Order MLO Interior + MCB Mounting Kit + MCB

Mains Rating	Max no. of Single Pole QO/QOB Circuit Breakers	Interior Only (order branch circuit breakers separately)	Type 1 Enclosure		Type 3R, 5, 12 Enclosure*		TVSS Surge Rating
			Box 20"W x 5.75"D■	Front◆	Box 20"W x 6.5"D		
		Catalogue No.▲	Catalogue No.	Catalogue No.	Catalogue No.	Height (in.)	
NQ RTI 20" wide Single Phase 3-Wire							
100	18	NQ18L1	MH26	NC26(S) or (F)	MH26WP	26	-
	18	NQ18L1C	MH26	NC26(S) or (F)	MH26WP	26	-
	30	NQ30L1	MH32	NC32(S) or (F)	MH32WP	32	-
	30	NQ30LIC	MH32	NC32(S) or (F)	MH32WP	32	-
225	30	NQ30L2	MH32	NC32(S) or (F)	MH32WP	32	-
	30	NQ30L2C	MH32	NC32(S) or (F)	MH32WP	32	-
	42	NQ42L2	MH38	NC38(S) or (F)	MH38WP	38	-
	42	NQ42L2C	MH38	NC38(S) or (F)	MH38WP	38	-
	72	NQ72L2	MH44	NC44(S) or (F)	MH44WP	44	-
	72	NQ72L2C	MH44	NC44(S) or (F)	MH44WP	44	-
	84	NQ84L2	MH50	NC50(S) or (F)	MH50WP	50	-
	84	NQ84L2C	MH50	NC50(S) or (F)	MH50WP	50	-
400	30	NQ30L4	MH50	NC50V(S) or (F)	MH50WP	50	-
	30	NQ30L4C	MH50	NC50V(S) or (F)	MH50WP	50	-
	42	NQ42L4	MH50	NC50V(S) or (F)	MH50WP	50	-
	42	NQ42L4C	MH50	NC50V(S) or (F)	MH50WP	50	-
84	30	NQ30L4C	MH68	NC68V(S) or (F)	MH68WP	68	-
	30	NQ30L6C	MH50	NC50V(S) or (F)	MH62WP**	62	-
	42	NQ42L6C	MH50	NC50V(S) or (F)	MH62WP**	62	-
	84	NQ84L6C	MH68	NC68V(S) or (F)	MH80WP**	80	-
NQ RTI 20" wide Three Phase 4-Wire							
100	18	NQ418L1	MH26	NC26(S) or (F)	MH26WP	26	-
	18	NQ418L1C	MH26	NC26(S) or (F)	MH26WP	26	-
	30	NQ430L1	MH32	NC32(S) or (F)	MH32WP	32	-
	30	NQ430LIC	MH32	NC32(S) or (F)	MH32WP	32	-
225	30	NQ430L2	MH32	NC32(S) or (F)	MH32WP	32	-
	30	NQ430L2C	MH32	NC32(S) or (F)	MH32WP	32	-
	30	NQ430L2TVS212	MH50	NC50(S) or (F)	MH50WP	50	120
	30	NQ430L2TVS216	MH50	NC50(S) or (F)	MH50WP	50	160
	30	NQ430L2TVS212C	MH50	NC50(S) or (F)	MH50WP	50	120
	30	NQ430L2TVS216C	MH50	NC50(S) or (F)	MH50WP	50	160
	42	NQ442L2	MH38	NC38(S) or (F)	MH38WP	38	-
	42	NQ442L2C	MH38	NC38(S) or (F)	MH38WP	38	-
	42	NQ442L2TVS212	MH56	NC56(S) or (F)	MH56WP	56	120
	42	NQ442L2TVS216	MH56	NC56(S) or (F)	MH56WP	56	160
	42	NQ442L2TVS212C	MH56	NC56(S) or (F)	MH56WP	56	120
	42	NQ442L2TVS216C	MH56	NC56(S) or (F)	MH56WP	56	160
	54	NQ454L2	MH38	NC38(S) or (F)	MH38WP	38	-
	54	NQ454L2C	MH38	NC38(S) or (F)	MH38WP	38	-
	72	NQ472L2	MH44	NC44(S) or (F)	MH44WP	44	-
	72	NQ472L2C	MH44	NC44(S) or (F)	MH44WP	44	-
	72	NQ472L2TVS212	MH62	NC62(S) or (F)	N/A	62	120
	72	NQ472L2TVS212C	MH62	NC62(S) or (F)	N/A	62	120
	84	NQ484L2	MH50	NC50(S) or (F)	MH50WP	50	-
	84	NQ484L2C	MH50	NC50(S) or (F)	MH50WP	50	-
400	30	NQ430L4	MH50	NC50V(S) or (F)	MH50WP	50	-
	30	NQ430L4C	MH50	NC50V(S) or (F)	MH50WP	50	-
	42	NQ442L4	MH50	NC50V(S) or (F)	MH50WP	50	-
	42	NQ442L4C	MH50	NC50V(S) or (F)	MH50WP	50	-
	42	NQ442L4TVS212	MH68	NC68V(S) or (F)	MH68WP	68	120
	42	NQ442L4TVS216	MH68	NC68V(S) or (F)	MH68WP	68	160
	42	NQ442L4TVS212C	MH68	NC68V(S) or (F)	MH68WP	68	120
	42	NQ442L4TVS216C	MH68	NC68V(S) or (F)	MH68WP	68	160
	72	NQ472L4	MH62	NC62V(S) or (F)	MH62WP	62	-
	72	NQ472L4C	MH62	NC62V(S) or (F)	MH62WP	62	-
	72	NQ472L4TVS212	MH80	NC80V(S) or (F)	N/A	80	120
	72	NQ472L4TVS212C	MH80	NC80V(S) or (F)	N/A	80	120
84	NQ484L4C	MH68	NC68V(S) or (F)	MH68WP	68	-	
600◆	30	NQ430L6C	MH50	NC50V(S) or (F)	MH62WP**	62	-
	42	NQ442L6C	MH50	NC50V(S) or (F)	MH62WP**	62	-
	84	NQ484L6C	MH68	NC68V(S) or (F)	MH80WP**	80	-

- ▲ "C" suffix indicates copper bussing.
 ■ Embossed mounting holes add a .25 inch standoff to back of MH box.
 ◆ Copper bus standard on 600 A interiors.
 ★ Enclosure includes trim kit.
 * Equipment ground bars must be ordered separately.
 * Box height may change with subfeed lugs, feed-thru lugs and subfeed breakers.

- * NCxxV(S) or (F) is a vented trim used on 400 & 600 amp NQ.
 * NCxx(S) or (F) is a non vented trim used on 100A & 225A NQ.
 ** Requires the 12 in. rail extension and deadfront NQ12RDE.



NQ 225A 42CCT MLO

Product data sheet

Specifications

SQUARE D



Surge protection device,
SurgeLogic, 40kA, 208Y/120 VAC,
3 phase, 4 wire, NEMA 4X

SDSA2040

Main

Product	Surge protection device
Range	SurgeLogic

Complementary

Voltage Rating	208Y/120 V AC
MCOV	180 V
SCCR	200 kA
Surge Current	40 kA
Nominal Discharge Current	10 kA
Number of Phases	3 phase
Wiring Configuration	4-wire
Connection	Wire AWG 12 copper
Local Signalling	Status LED normal operation
Cable length	24 in (609.6 mm)
Mounting Support	Panel mounting
Height	3.07 in (78 mm)
Width	3.6 in (92 mm)
Depth	2.6 in (67 mm)

Environment

Ambient Operating	149 °F (65 °C)
Enclosure Rating	NEMA 4X
Enclosure Material	Black Plastic
Standards	UL 1449:ed. 4 CSA C22.2 No 8:1986

Ordering and shipping details

Category	US1DE1B08462
Discount Schedule	DE1B
GTIN	785901602569
Returnability	Yes

Price is "List Price" and may be subject to a trade discount – check with your local distributor or retailer for actual price.

Disclaimer: This documentation is not intended as a substitute for and is not to be used for determining suitability or reliability of these products for specific user applications

Country of origin	MX
-------------------	----

Packing Units

Unit Type of Package 1	PCE
Number of Units in Package 1	1
Package 1 Height	3.50 in (8.89 cm)
Package 1 Width	4.00 in (10.16 cm)
Package 1 Length	5.00 in (12.7 cm)
Package 1 Weight	15.680 oz (444.521 g)
Unit Type of Package 2	CAR
Number of Units in Package 2	20
Package 2 Height	6.00 in (15.24 cm)
Package 2 Width	16.50 in (41.91 cm)
Package 2 Length	17.00 in (43.18 cm)
Package 2 Weight	20.739 lb(US) (9.407 kg)

Straight Blade Devices

20A, 125V, 2 Pole, 3 Wire Grounding

Heavy Duty, Specification Grade

Tamper-Resistant Duplex Receptacles



Features

- Patented TR design eliminates plug-in difficulty and TR complaints
- Fed-Spec UL listing insures proven performance in demanding applications
- Brass mounting strap and Triple Wipe contacts
- High impact resistant face with circuit I.D. marking area
- Complies with National Electrical Code (NEC®) requirements for Tamper Resistant receptacles

Ordering Information

Description	Device Color	UPC Number	Catalog Number
Fed-Spec listed, Smooth nylon face, back and side wired, duplex	White	783585542546	HBL5362WTR

Listings

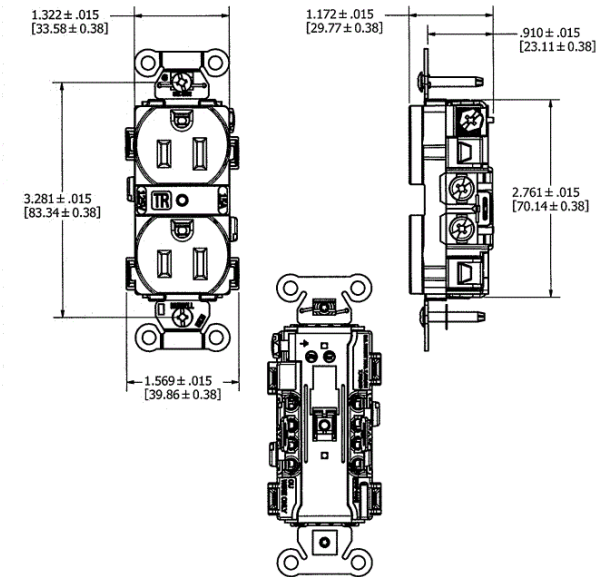
UL Listed to UL498 File No. E2186
Certified to CSA, C22.2, No. 42 File 285
Fed. Spec. W-C-596
NEMA® WD-6 Compliant

Specifications

Face	Nylon
Base	PBT
Power Contacts	Brass
Ground Contact	Brass
Clamping Plate	Plated steel
Mounting Strap	Brass
Automatic Self-grounding Staple	Stainless steel
Mounting Screws	Zinc plated steel

Performance

Electrical	
Current Interrupting	Certified for current interrupting at full rated current
Dielectric Voltage	Withstands 2,000V minimum
Mechanical	
Product Identification	Ratings are a permanent part of the device
Terminal Accommodation	#12-10 AWG stranded or solid copper wire only.
Terminal Identification	Terminals identified in accordance with UL 498 and CSA
Environmental	
Flammability	UL 94V-2
Operating Temperature	Maximum continuous 75°C; minimum -40°C (w/o impact)



Complementary Products

Wallplate or Weatherproof Cover Duplex Opening

Online Resources

Customer Sales Drawings
eCatalog
Installation Instructions





Color :  Red

UPC Code : 078477781296

Country Of Origin : Please Contact Customer Service

Available Colors :



Clear



Green

1203-PLR

15 Amp Toggle Switch, Pilot Light, 3-Way, Quiet Switch, Extra Heavy Duty Spec Grade

15 Amp, 120 Volt, Toggle Pilot Light - Illuminated ON - Req. Neutral 3-Way AC Quiet Switch, Extra Heavy Duty Spec Grade, Self Grounding, Back & Side Wired, - Red

Leviton's Industrial Grade AC toggle switches for extra heavy-duty applications represent top-of-the-line quality and peak performance. Leviton uses the finest materials available and the highest production standards to produce industrial switches of unmatched versatility and reliability.

Technical Information

AC Horsepower Ratings

HP Rating : 1/2HP-120V

Max. Amperage : 12 Amp

Electrical Specifications

Amperage : 15 A

Dielectric Voltage :
Withstands 1500V for 1 minute

Endurance : 50,000 cycles minimum

Grounding : Self-Grounding

Overload UL20 Test : 100 cycles of OL at 4.8 times rated current

Temperature Rise : Maximum 30 degrees C rise

Voltage : 120 VAC

Environmental Specifications

Flammability : Rated V-2 per UL 94

Operating Temperature : -40° C to 65°C

Material Specifications

Base Material : Thermoplastic

Color : Red

Contact Material : Silver Alloy

Cover Material : Thermoplastic

Ground Clips : Brass

Grounding Screw : Brass 8-32

Strap Material : Steel

Terminal Screws : Brass 8-32

Toggle : Polycarbonate

Mechanical Specifications

Product ID : Ratings are permanently marked on device

Screw Terminal Torque : 14-18 in-lbs

Product Features

Actuator Material :
Polycarbonate

Body Material : Thermoplastic

Color : Red

Device Type : Toggle Switch

Terminal Accom. : 14-#10
AWG back wired; #14-#12
AWG side wired

Terminal ID : Brass-Hot Black-
Hot White-Neutral Green-Gnd

Termination : Back or Side
Wire

Feature : Pilot Light -
Illuminated ON - Req.
Neutral|Illuminated - Load ON
(Pilot Light)

Function : 3-Way

Grade : Extra Heavy-Duty
Industrial Specification Grade

Grounding : Self-Grounding

Strap Material : Steel

Standards and Certifications

ANSI : C-73

CSA C22.2 No. 111 : File
#152105

NEMA : WD-1 & WD-6

NOM : 057

RoHS : Compliant

UL Fed Spec WS896E : File
#E7458

UL Standard : UL 20

Warranty : 10-Year Limited

Leviton Manufacturing Co., Inc

201 North Service Road, Melville, NY 11747

Telephone: +1-800-323-8920 · FAX: +1-800-832-9538 · Tech Line (8:30AM-7:30PM E.S.
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5386- 1797 ·

Visit our Website at: www.leviton.com

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Leviton has a global presence.

If you would like to know where your local Leviton office is located please go to:

www.leviton.com/company/about-leviton/locations

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FW4-LED41

4' LED Linear Vapourproof fixture

SPECIFICATIONS*

Watts	42.54
Lumens	5682.9
Efficacy	133.59 lm/W
Replaces Up To	2 Lamp T8
Colour Temp	Universal Fixture: 3K, 4K, 5K Basic Fixture: 4K only
Operating Temp	-40°C to +40°C
Voltage	Universal Fixture: 120-347 Basic Fixture: 120-277*
LED Life	50,000 hours
Certification	cULus, IP65, DLC
Housing Material	Polycarbonate
Lens	Polycarbonate
Power Factor	0.9954
Total Harmonic Distortion	5.1
CRI	>83.2
Mounting	Surface or Pendant mounting



2 DIFFERENT VERSIONS:



Universal Fixture

120-347V RANGE
3K, 4K, 5K COLOUR SELECTABLE



Basic Fixture

120-277V
4K ONLY



DESCRIPTION

The FW4-LED41 is a new improved product in the same design as the original FW4 product family. There are two different fixture types - the universal fixture (120 - 347V and 3K/4K/5K colour selectable) and the basic fixture (120-277V, 4K)

APPLICATIONS



Underground
Parking
Garages



Industrial
Facilities



Poultry
Barns



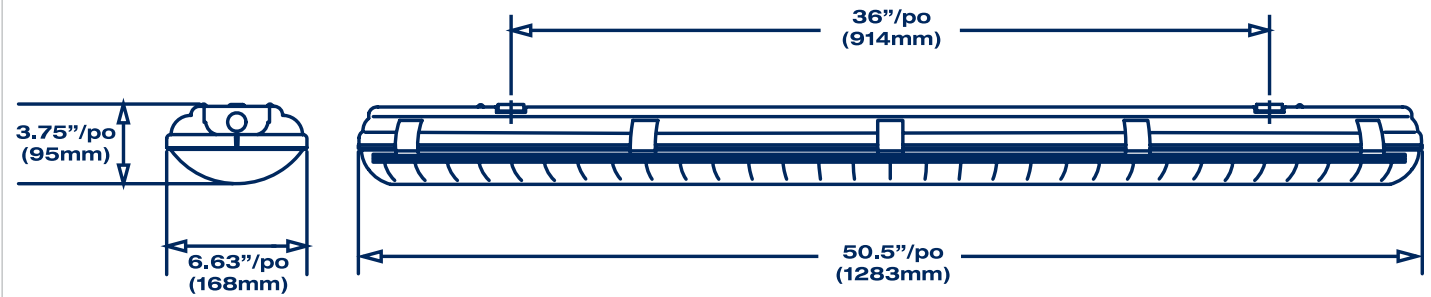
Commercial
Freezers

FEATURES

- 4' Linear vapourproof LED fixture that replaces 2 lamp T8 fluorescent fixtures
- Polycarbonate housing with frosted lens for harsh environments
- 5 polycarbonate clips on either side
- Surface or pendant mount option

*The above specs apply to the standard product configuration - FW4-LED41-B-4K. For spec information on other product configurations please see page 3.

DIMENSIONS



OTHER MODEL SPECIFICATIONS

MODEL DESCRIPTION	VOLTAGE (V)	INPUT POWER (W)	LIGHT OUTPUT	EFFICACY (Lm/W)	THD	PF	CCT	CRI
FW4-LED41-B-4K-DIM	120-277	42.54	5682.9	133.59	5.1	0.9954	4005	83.2
FW4-LED41-H-VK-DIM (3000K)	120-347	42.63	5044.9	118.34	2.9	0.9983	3170	83.4
FW4-LED41-H-VK-DIM (4000K)	120-347	40.46	5441	134.48	2.3	0.9992	3933	85.5
FW4-LED41-H-VK-DIM (5000K)	120-347	42.61	5254	123.3	2.68	0.9988	5122	84

LEGEND

B - 120V-277V , H - 120-347V

4K - 4000K, 5K - 5000K, VK - Variable colour temperature

DIM - 0-10V DIMMING

2 DIFFERENT VERSIONS:



Universal Fixture
120-347V RANGE
3K, 4K, 5K COLOUR SELECTABLE
ORDER CODE: FW4-LED41-H-VK-DIM

1



Basic Fixture
120-277V
4K ONLY
ORDER CODE: FW4-LED41-B-4K-DIM

2

ORDERING GUIDE

FW4	LED41			DIM
WATTS	VOLTAGE	COLOUR TEMP.	DIMMING	
	H - 120-347V (Variable colour temperature version only)	VK - COLOUR TUNABLE (can be changed to 3K, 4K, or 5K)	DIM- 0-10V DIMMING	
	B - 120 - 277V*	4K - 4000K*		

*Standard Configuration.



LSC Series

Steel Combination Unit

Type: _____

Project/Location: _____

Contractor: _____

Prepared By: _____

Date: _____

Model No.: _____

FEATURES

- Universal mounting: end, wall or ceiling
- Long-life white LED light sources is warrantied for ten (10) years
- Sealed, maintenance-free, 6V or 12V Lead-Calcium battery
- Remote load capacity: 80W up to 560 feet of egress illumination when using LED remote heads
- Meets or exceeds CSA 22.2 No.141-15

See warranty details at: www.tnb.ca/en/brands/lumacell

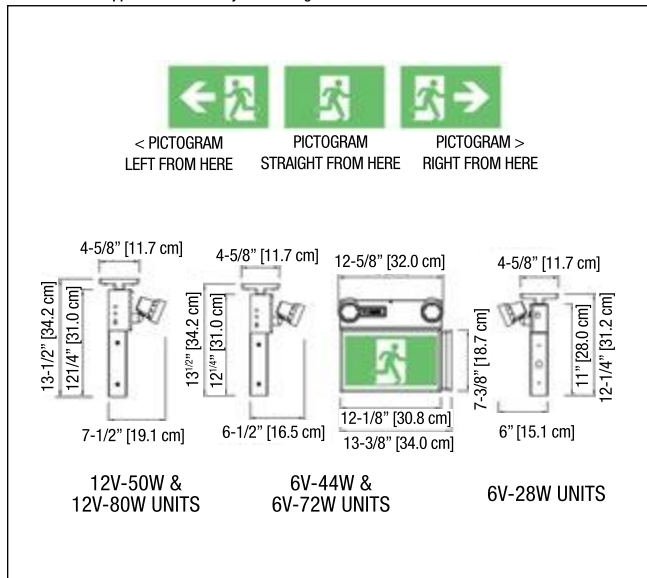
LSC1250W2LD9



nexus®

DIMENSIONS

Dimensions are approximate and subject to change.



TYPICAL SPECIFICATIONS

Supply and install **Lumacell® LSC Series** combination of unit equipment and pictogram Exit Sign. The unit shall be made of solid steel sheet metal and be suitable for universal mounting: wall, end, or ceiling. The legend housing shall have a maximum depth of 2-1/8". The legend face plate(s) shall be constructed of robust clear polycarbonate panel(s) with an opaque border coloured factory-white. The light source shall be white light-emitting diodes (LED) and shall provide even illumination in normal and emergency operation. The power pack shall include one circuit board with test switch and pilot light for battery charger and legend LED driver. The unit shall include one 6V, maintenance-free, sealed Lead-Calcium battery and shall provide minimum 30 minutes of emergency lighting upon AC power failure. The electrical power available for emergency lights shall be 28W or up to 72W, for 6V and 50W or up to 80W for 12V, as specified. The emergency heads shall require no tools to adjust and aim.

The equipment shall be CSA 22.2 No.141-15 certified.

The equipment shall be **Lumacell®** Model: _____.

WIRE GUARDS

460.0081-L	Wall mount
460.0060-L	Ceiling mount

POWER CONSUMPTION

MODEL	AC SPECS	EMERGENCY POWER AVAILABLE FOR LAMPS				
		30MIN	1H00	1H30	2H00	4H00
Pictogram module	120/347VAC	Less than 1.5W	-	-	-	-
LSC28		0.13 / 0.05 A	28	16	12	9
LSC44		0.13 / 0.05 A	44	26	18	15
LSC72		0.13 / 0.05 A	72	42	30	24
LSC-1250		0.25 / 0.09 A	50	29	21	16
LSC-1280			80	46	32	27

ORDERING INFORMATION

SERIES	POWER EM. LIGHTS	HOUSING COLOURS	HEADS	HEAD STYLE AND POWER	VOLTAGE	OPTIONS
LSC= pictogram steel combo exit sign	28= 6V-28W 44= 6V-44W 72= 6V-72W 1250= 12V-50W 1280= 12V-80W	B= black W= factory white	Blank= no heads 1= one head 2= two heads	Blank= no heads LD1= MR16 LED, 6V-4W LD7= MR16 LED, 12V-4W LD9= MR16 LED, 12V-5W LD10= MR16 LED, 12V-6W MI= MR16 halogen, 6V-6W MJ= MR16 halogen, 6V-10W MK= MR16 halogen, 12V-12W MA= MR16 halogen, 12V-20W 130MB= MR16 halogen, 12V-35W* 130MR= MR16-IR, 12V-35W, high-output* MT9= micro-tungsten, 9W MT18= micro-tungsten, 12V-18W, wedge base MQ8= micro-halogen, 8W MQ12= micro-halogen, 12W	Blank= 120/347VAC ZC= 120/277VAC input	AT= auto-test* ATN= auto-test, non-audible* NEX= NEXUS® system interface** NEXRF= wireless NEXUS® system interface** DF= double-face sign TP= tamper-proof screws** T3= time delay (15 minutes)
				* MB & MR are using DR1130 type heads		* Not available with 6V models ** Not available with 6V-72W *** 990.0119-L= tamper-proof bit (sold separately)

EXAMPLE: LSC28W2LD1

Unlike Exit Signs this pictogram sign is not available in double arrow configuration.



Product Information Sheet

SCA Standby Chargers

MODEL	CELLS	VDC	ADC	VAC	AAC	DESCRIPTIONS	Ship Wt LBS / KG	Ship Dimensions LXWXH
SCA 12/6	6	12	6	120	2	STD. CAB.; COMPACT CAB. (CC) AVAIL.	34 / 16	20X16X10"
SCA 12/10	6	12	10	120	3	STD. CAB.; COMPACT CAB. (CC) AVAIL.	35 / 16	20X16X10"
SCA 12/20	6	12	20	120	4	STANDARD CABINET	38 / 18	20X16X10"
SCA 12/30	6	12	30	120	8	STANDARD CABINET	42 / 20	20X16X10"
SCA 12/50	6	12	50	120	9	LARGE BASE MOUNT CABINET	48 / 22	28X17X28"
SCA 12/75	6	12	75	240	7	LARGE BASE MOUNT CABINET	98 / 45	28X17X28"
SCA 24/6	12	24	6	120	3	STD. CAB.; COMPACT CAB. (CC) AVAIL.	38 / 18	20X16X10"
SCA 24/10	12	24	10	120	4	STD. CAB.; COMPACT CAB. (CC) AVAIL.	40 / 19	20X16X10"
SCA 24/15	12	24	15	120	8	STANDARD CABINET	42 / 20	20X16X10"
SCA 24/20	12	24	20	120	10	STANDARD CABINET	46 / 21	20X16X10"
SCA 24/30	12	24	30	120	13	STANDARD CABINET	47 / 22	20X16X10"
SCA 24/50	12	24	50	240	9	LARGE BASE MOUNT CABINET	110 / 50	28X17X28"
SCA 24/75	12	24	75	240	15	LARGE BASE MOUNT CABINET	125 / 57	28X17X28"
SCA 24/100	12	24	100	240	20	LARGE BASE MOUNT CABINET	150 / 69	28X17X28"
SCA 36/6	18	36	6	120	5	STANDARD CABINET	58 / 27	20X16X10"
SCA 36/10	18	36	10	120	6	STANDARD CABINET	62 / 29	20X16X10"
SCA 36/20	18	36	20	120	11	STANDARD CABINET	72 / 33	20X16X10"
SCA 36/50	18	36	50	240	14	LARGE BASE MOUNT CABINET	106 / 49	28X17X28"
SCA 48/10	24	48	10	120	8	STANDARD CABINET	62 / 29	20X16X10"
SCA 48/20	24	48	20	240	8.5	STANDARD CABINET	64 / 30	20X16X10"
SCA 120/6	60	120	6	120	12.5	STANDARD CABINET	64 / 30	20X16X10"
SCA 120/10	60	120	10	240	8	STANDARD CABINET	96 / 44	20X16X10"
SCA 120/20	60	120	20	240	18	LARGE BASE MOUNT CABINET	112 / 51	28X17X28"
SCA 120/30	60	120	30	240	27	LARGE BASE MOUNT CABINET	160 / 73	28X17X28"
PACKAGE #1	ANY ONE ALARM					(LOW VOLTAGE, HIGH VOLTAGE, AC FAIL, NO CHARGE) LED AND FORM "C" CONTACT		
PACKAGE #2	ANY TWO ALARMS					(LOW VOLTAGE, HIGH VOLTAGE, AC FAIL, NO CHARGE) LED AND FORM "C" CONTACT		
PACKAGE #3	ANY THREE ALARMS					(LOW VOLTAGE, HIGH VOLTAGE, AC FAIL, NO CHARGE) LED AND FORM "C" CONTACT		
PACKAGE #4	ALL FOUR ALARMS					(LOW VOLTAGE, HIGH VOLTAGE, AC FAIL, NO CHARGE) LED AND FORM "C" CONTACT		
FEATURE #1						30 DAY 6 HOUR AUTOMATIC EQUALIZE TIMER		
FEATURE #2						4 ALARM TEST FUNCTION		
FEATURE #3						GROUND FAULT ALARM – NEGATIVE OR POSITIVE		
FEATURE #4						UPGRADE TO DIGITAL AMMETER AND VOLTMETER		
FEATURE #5						TOP MOUNTED DRIP SHIELD		
FEATURE #6						Custom Color, International Orange		
FEATURE #7						KIT FORM CHARGERS (SUFFIX BCT1)		
FEATURE #8						50 CYCLE MODELS		
FEATURE #9						240 V INPUT (WHERE NOT STANDARD)		

OAC Commercial Wall Fan Heater



With surface
mounting box

Recessed



VERSION AVAILABLE



1



2



3



4



5

Features

Color

- Standard: white, almond.
- Optional (upcharge applicable): metallic silver, bronze, metallic charcoal, aluminum, semi-gloss black, sand.
- Custom colors available upon request.

Finish

- Standard: epoxy/polyester powder paint.

Voltage

- 120V, 208V, 240/208V, 277V, 347V, 480V, 600V, 1 or 3-phase.

Construction

- 18-gauge steel front cover. **1**
- Bottom air outlet.
- High-limit temperature control with automatic reset.

Fan

- Closed, factory-lubricated motor. **2**
- 160 cfm fan (single unit: 55 dBA); 2 X 160 cfm fan (double unit: 58 dBA); 3 X 160 cfm fan (triple unit: 61 dBA).
- Fan delay purges heater of residual heat.

Heating element

- Durable tubular heating element with fins. **3**

Control

- Built-in thermostat included with control knob or tamperproof. **4**
- 24V relay, with or without transformer available.

Note: Thermostat is not included in heater with factory installed relay. Any remote thermostat or relay must be connected to the heater control terminal block.

Installation

- Minimum clearance from the floor and adjacent walls: 10 in. (25.4 cm).
- Adaptor for surface mounting available. **5**

Warranty

- 3-year warranty against defects.

Application

- Apartment building, commercial building, entrance way, stairwell, garage.

OAC

Models

Watts	Volts (ph)	Product # ¹	Price	BTU/hr	Unit	Weight	
						lb	kg
1500	120 (1)	OAC01502-T	625.00	5123	simple	24.0	10.9
2000	208 (1)	OAC02008-T	720.00	6830	simple	24.0	10.9
4000	208 (1)	OAC04008-T	720.00	13661	simple	24.0	10.9
4000	208 (3)	OAC04038-T	862.00	13661	simple	26.0	12.0
4800	208 (1)	OAC04808-T	759.00	16393	simple	24.0	10.9
5000	208 (3)	OAC05038-T	1014.00	17076	simple	26.0	12.0
6000	208 (3)	OAC06038-T	1668.00	20491	double	54.0	24.5
8000	208 (1)	OAC08008-T	1717.00	27321	double	50.0	22.7
9000	208 (3)	OAC09038-T	2148.00	30737	triple	90.0	40.9
12000	208 (1)	OAC12008-T	2602.00	40982	triple	90.0	40.9
12000	208 (3)	OAC12038-T	2602.00	40982	triple	90.0	40.9
1500/1125 ²	240/208 (1)	OAC01500-T	625.00	5123/3842	simple	24.0	10.9
2000/1500 ²	240/208 (1)	OAC02000-T	625.00	6830/5123	simple	24.0	10.9
3000/2250 ²	240/208 (1)	OAC03000-T	643.00	10246/7684	simple	24.0	10.9
3000/2250 ²	240/208 (3)	OAC03030-T	740.00	10246/7684	simple	26.0	12.0
4000/3000 ²	240/208 (1)	OAC04000-T	682.00	13661/10246	simple	24.0	10.9
4000/3000 ²	240/208 (3)	OAC04030-T	786.00	13661/10246	simple	26.0	12.0
4800/3600 ²	240/208 (1)	OAC04800-T	722.00	16393/12295	simple	24.0	10.9
5000/3750 ²	240/208 (3)	OAC05030-T	976.00	17076/12807	simple	26.0	12.0
6000/4500 ²	240/208 (1)	OAC06000-T	1517.00	20491/15368	double	50.0	22.7
8000/6000 ²	240/208 (1)	OAC08000-T	1625.00	27321/20491	double	50.0	22.7
12000/9000 ²	240/208 (1)	OAC12000-T	2520.00	40982/30737	triple	90.0	40.9
1500	347 (1)	OAC01507-T	899.00	5123	simple	28.0	12.7
2000	347 (1)	OAC02007-T	899.00	6830	simple	28.0	12.7
3000	347 (1)	OAC03007-T	930.00	10246	simple	28.0	12.7
4000	347 (1)	OAC04007-T	960.00	13661	simple	28.0	12.7
4800	347 (1)	OAC04807-T	1013.00	16393	simple	28.0	12.7
6000	347 (1)	OAC06007-T	1982.00	20491	double	55.0	25.0
8000	347 (1)	OAC08007-T	2279.00	27321	double	55.0	25.0
12000	347 (1)	OAC12007-T	3278.00	40982	triple	90.0	40.9
1500	480 (1)	OAC01504-T	943.00	5123	simple	28.0	12.7
2000	480 (1)	OAC02004-T	943.00	6830	simple	28.0	12.7
3000	480 (1)	OAC03004-T	971.00	10246	simple	28.0	12.7
3000	480 (3)	OAC03034-T	1117.00	10246	simple	30.0	14.0
4000	480 (1)	OAC04004-T	1004.00	13661	simple	28.0	12.7
4000	480 (3)	OAC04034-T	1155.00	13661	simple	30.0	14.0
4800	480 (1)	OAC04804-T	1058.00	16393	simple	28.0	12.7
5000	480 (3)	OAC05034-T	1431.00	17076	simple	30.0	14.0
6000	480 (1)	OAC06004-T	1984.00	20491	double	55.0	25.0
8000	480 (1)	OAC08004-T	2279.00	27321	double	55.0	25.0
12000	480 (1)	OAC12004-T	3278.00	40982	triple	90.0	40.9
12000	480 (3)	OAC12034-T	3278.00	40982	triple	90.0	40.9
1500	600 (1)	OAC01506-T	943.00	5123	simple	28.0	12.7
2000	600 (1)	OAC02006-T	943.00	6830	simple	28.0	12.7
3000	600 (1)	OAC03006-T	971.00	10246	simple	28.0	12.7
3000	600 (3)	OAC03036-T	1117.00	10246	simple	30.0	14.0
4000	600 (1)	OAC04006-T	1004.00	13661	simple	28.0	12.7
4000	600 (3)	OAC04036-T	1155.00	13661	simple	30.0	14.0
4800	600 (1)	OAC04806-T	1058.00	16393	simple	28.0	12.7
5000	600 (3)	OAC05036-T	1431.00	17076	simple	30.0	14.0
6000	600 (1)	OAC06006-T	1984.00	20491	double	55.0	25.0
6000	600 (3)	OAC06036-T	2098.00	20491	double	58.0	26.3
8000	600 (1)	OAC08006-T	2279.00	27321	double	55.0	25.0
9000	600 (3)	OAC09036-T	2705.00	30737	triple	90.0	40.9
12000	600 (1)	OAC12006-T	3278.00	40982	triple	90.0	40.9
12000	600 (3)	OAC12036-T	3278.00	40982	triple	90.0	40.9

¹ Built-in thermostat included with control knob or tamperproof.

² 208V = 75% of wattage at 240V.

Add "BL" for white, "AM" for almond. Upcharge available for optional colors shown in the color chart section.
277V available upon request.

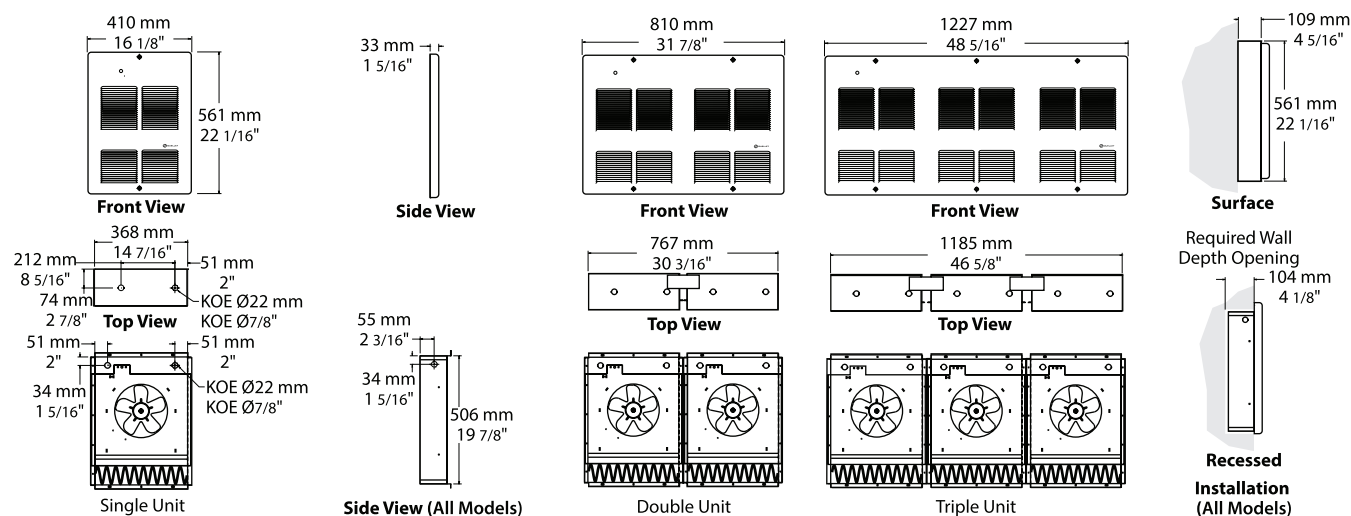
OAC Options

Product # Kit	Product # Factory installed*	Price	Description
KIT-OAC-BS1	-	72.00	Surface mounting box, single unit
KIT-OAC-BS2	-	144.00	Surface mounting box, double unit
KIT-OAC-BS3	-	210.00	Surface mounting box, triple unit
KIT-OAC-DIS20 ³	DIS20 ³	138.00	Disconnect switch, double-pole, 20A at 277V and less
KIT-OAC-DIS40 ³	DIS40 ³	161.00	Disconnect switch, triple-pole, 40A at 600V max.
KIT-OAC-DIS80 ³	DIS80 ³	195.00	Disconnect switch, triple-pole, 80A at 600V max.
-	IV	138.00	Fan switch
-	OO	143.00	On/Standby heating switch
-	R ⁴	146.00	24V control relay, without transformer
-	RT ⁴	154.00	24V control relay with transformer

* For factory installed options, add the option number to the product number. See the **Product Code** section inside the front cover.

³ For the U.S. only: The nominal current of the unit must not exceed 80% of the capacity of the disconnect.

⁴ If the built-in thermostat is not required with the 24V control relay, remove the "-T" from the product number (E.g.: OAC04006-RT).



Non-Metallic Extra Duty Weatherproof While-In-Use Covers

The new Leviton Extra Duty While-in-Use Covers are ruggedly constructed to protect from moisture, debris and insects, while providing easy access to receptacles. These non-metallic covers are available in both vertical and horizontal configurations for a secure fit and neat appearance when mounted. The UV resistant polycarbonate cover and base protect wiring devices from the elements without breaking, cracking or discoloration.

The Extra Duty While-in-Use Covers are available in solid Gray or Clear with a gray base. They are ideal for use with lawn equipment, pools, hot tubs, holiday and landscape lighting, outdoor entertainment systems, barbecues, fountains, vending machines and other outdoor electrical applications.

Our Extra Duty While-in-Use Covers are built to withstand the elements and feature:

- Compliance with NEC® 2017 Section 406.9(B)(1) for "Extra Duty" applications hoods*
- Standard opening accommodates Decora® GFCI devices and additional adapter plates included
- Pre-mounted heavy-duty gasket provides a weather-resistant seal which protects from moisture and adds to ease of installation
- The 1-gang covers include two inserts that can be placed in the circular cord openings to prevent insects and debris from entering the cover while not in use
- 1-gang covers feature a stainless steel hinge pin for added strength
- 1 and 2-gang available
- Gray and clear
- Safety lock feature
- cULus listed



Ordering Information

Item	Item Description	Gang	Configuration	Color
001-05980-UCL	While in Use Cover for GFCI/Decora, Duplex & Single Receptacle	1-Gang	Vertical	Clear
002-05980-UGY	While in Use Cover for GFCI/Decora, Duplex & Single Receptacle	1-Gang	Vertical	Gray
001-05981-UCL	While in Use Cover for GFCI/Decora, Duplex & Single Receptacle	1-Gang	Horizontal	Clear
002-05981-UGY	While in Use Cover for GFCI/Decora, Duplex & Single Receptacle	1-Gang	Horizontal	Gray
001-05982-UCL	While in Use Cover for GFCI/Decora, Duplex Receptacle	2-Gang	Vertical	Clear
002-05982-UGY	While in Use Cover for GFCI/Decora, Duplex Receptacle	2-Gang	Vertical	Gray

* 406.9 Receptacles in Damp or Wet Locations

(B) Wet Locations

(1) Receptacles of 15 and 20 Amperes in Wet Location. Receptacles of 15 and 20 amperes installed in a wet location shall have an enclosure that is weatherproof whether or not the attachment plug cap is inserted. An outlet box hood installed for this purpose shall be listed and shall be identified as "extra duty." All 15- and 20-ampere, 125- and 250-volt nonlocking-type receptacles shall be listed weather-resistant type.



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New SmartlockPro® Self-Test GFCIs For Smarter Protection.

Industry-leading quality, professional grade lockout action, and the slimmest profile on the market make SmartlockPro Self-Test GFCIs a smart choice in ground fault circuit interrupter protection. Engineered to meet the latest UL standard for auto-monitoring (self-test), our complete line of self-test GFCIs periodically conduct an automatic internal test to confirm that protected power is available. If the GFCI detects a problem, one or more of the following will occur:

- Power will be denied (trip with the inability to reset)
- Trip with the ability to reset, subject to the next auto-monitoring test cycle or repeatedly trip
- Visual and/or audible indication

Faster and easier to install in any wallbox because the depth is reduced, our slim Self-Test GFCIs flush mount to the wall with minimal protrusion for a sleek, finished look.

Applications

Residential - Kitchens, bathrooms, garages, basements, laundry rooms, wet sink and other wet locations around the home

Educational Facilities - Classrooms, restrooms, laboratories, dormitories and kitchens

Airports - Public bathrooms, general use and maintenance areas

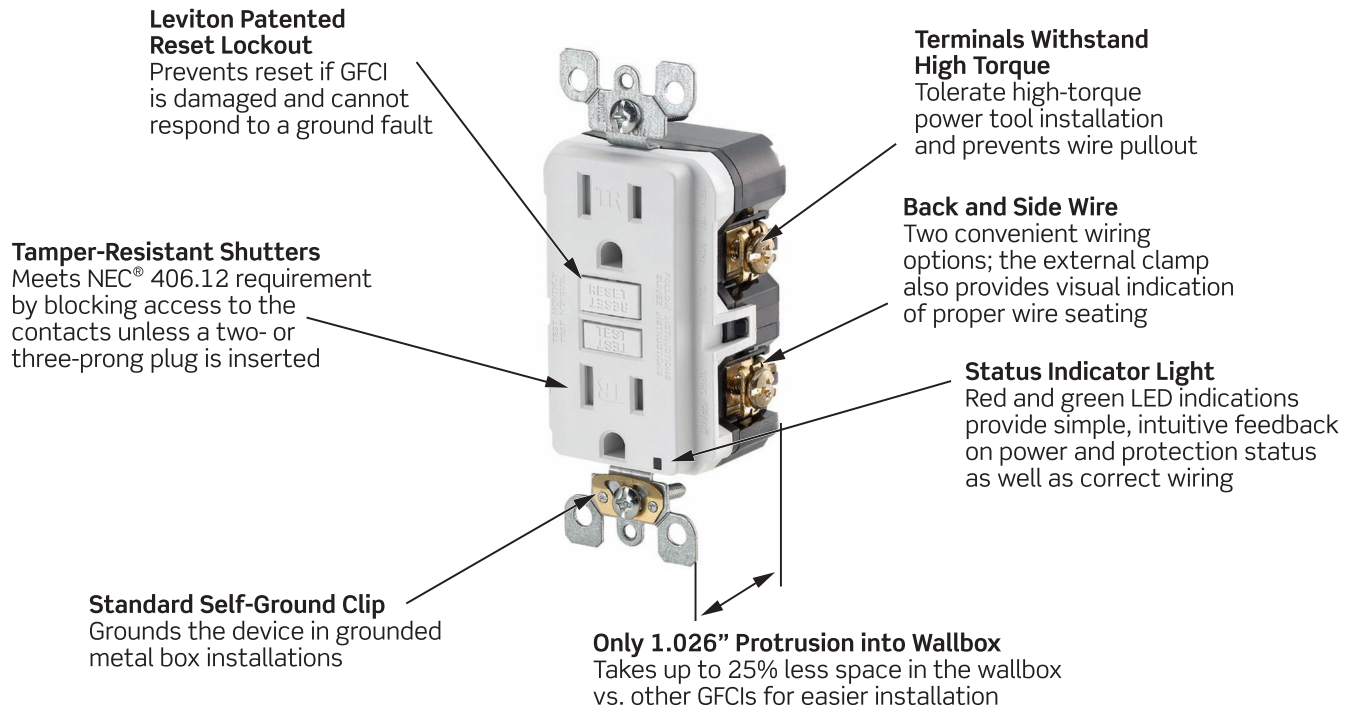
Restaurants, Lodging and Retail Malls - Public bathrooms, general use and maintenance areas

Commercial Offices - Bathrooms, basement areas, hallways and kitchen facilities

Public Areas - Wherever receptacles are located near wet or damp locations



Features and Benefits



Self-Test

- Provides continuous ground fault protection - detects and trips on actual ground fault even when self-test is being conducted
- On initial power up, tests the GFCI within 3 seconds
- Auto-monitoring exceeds the UL requirement
- Auto adapts and shifts to more frequent testing if potential problem is detected
- Testing frequency regularly updates protection status
- Electronics are designed to minimize any false triggers

General Features

- Patented bridge contact provides individual sets of contacts for GFCI receptacle face and downstream receptacles; no power will be delivered to receptacle face if improperly wired (line-load reversed)
- Trip threshold meets or exceeds UL requirements for tripping time
- Improved immunity to high frequency noise reduces nuisance tripping
- Advanced electronics provides superior resistance to electrical surges and over-voltages
- Patented Lockout Action prevents reset if GFCI is damaged and cannot respond to a ground fault
- Status Indicator Light provides simple, intuitive feedback on power and protection status as well as indication of line/load reversal
- Silver alloy contacts
- Impact-resistant thermoplastic cover and body
- One-piece T-design trip latch mechanism provides efficient operation
- Available in 15A and 20A versions, all with Fed Spec rating
- TEST and RESET button colors match device face
- Compatible with all Decora® devices and wallplates; available in select Decora colors
- Limited Two-Year Product Warranty

Tamper-Resistant (TR) Models

- Complies with NEC® requirement mandating that all 15A and 20A receptacles installed in dwelling units be listed as tamper-resistant
- Shutter mechanism inside the receptacle blocks access to the contacts unless a two- or three-prong plug is inserted

Duplex Guide Light Models

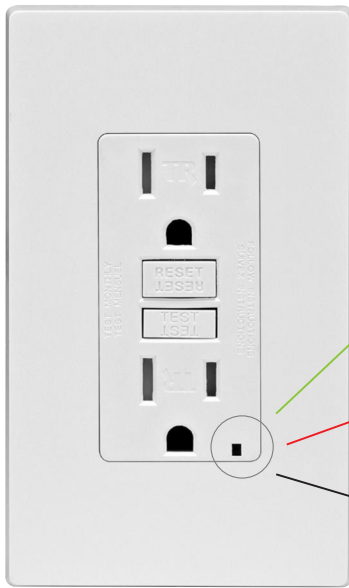
- Sensor provides automatic ON/OFF based on ambient lighting
- Dual lens provides visible light with a variety of plugs or transformers
- Custom designed lenses with edge-mounted LEDs improve light dispersion
- Energy-efficient (~1W of electricity). No bulbs to replace
- Saves space by eliminating the need to use an outlet for a plug-in night light

Weather-Resistant Models

- Designed for wet and damp locations to meet the requirements of NEC Section 406.8
- Stainless steel strap and screws
- Conformal coated PC board to protect critical components from moisture
- Cold impact resistant face and buttons
- UV stabilized plastics

Audible Models

- Audible alarm sounds when the GFCI trips, providing an alert that power has been disconnected from load(s) plugged into or fed from the GFCI
- Indicator light provides visual status



Status Indicator Light

Leviton GFCI devices feature an LED Status Indicator Light which provides a visual indication to the user of the status of GFCI protection. This is a convenient way to check the level of protection at-a-glance.

GREEN LED - NORMAL OPERATION

- GFCI has passed self-test and is providing power

RED LED - ALERT!

- Blinking - Initial self-test upon first power up
- Solid or blinking - Press TEST and RESET buttons to reset GFCI
- If GFCI will not reset OR solid or blinking red continues, replace device

NO LED - NO POWER

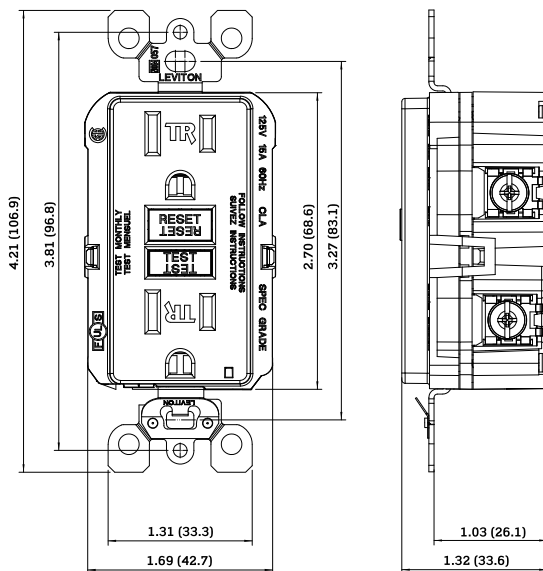
- GFCI in tripped state
- Press RESET button
- If GFCI will not reset, no power on the circuit

Agency Standards and Compliance

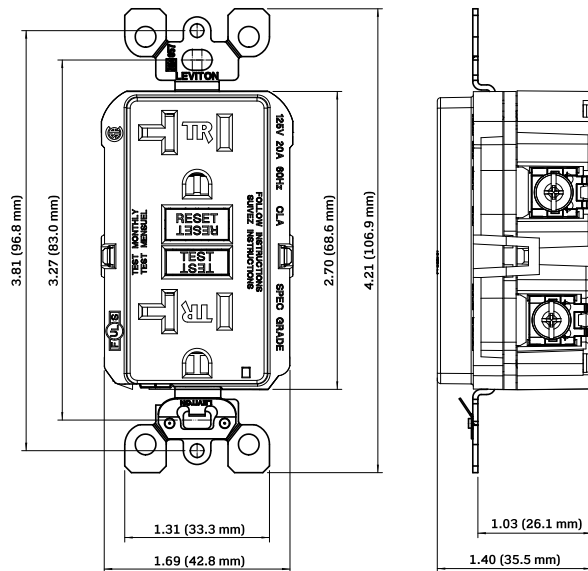
- Meets the latest UL and CSA requirements
- UL Standard 943 Class A (GFCI) and 498 (Receptacles)
- UL Listed (File #E-48380)
- CSA Standard C22.2 - 144.1 (GFCI) and 42 (Receptacles)
- CSA Certified (File #LR-57811)
- NOM Certified
- Meets Federal Specification W-C-596G (blank face - exception)

Material Characteristics

- Environmental: Flammability UL-94 V2 Rating
- Operating Temperature: -35°C to 66°C
- Material: Face, Thermoplastic; Body, Polycarbonate



15A SmartlockPro® Self-Test GFCI



20A SmartlockPro® Self-Test GFCI

Ordering Information

Commercial Spec Grade - Back and Side Wired

Description	Color	Cat. No.		Cat. No.	
NEMA		NEMA 5-15R		NEMA 5-20R	
Rating		15A-125V @ Receptacle 20A-125V Feed-Through		20A-125V @ Receptacle 20A-125V Feed-Through	
		TR	Non-TR	TR	Non-TR
Duplex with LED Indicator (with self-grounding clip)	White	GFTR1-W	GFNT1-W	GFTR2-W	GFNT2-W
	Ivory	GFTR1-I	GFNT1-I	GFTR2-I	GFNT2-I
	Light Almond	GFTR1-T	GFNT1-T	GFTR2-T	GFNT2-T
	Gray	GFTR1-GY	GFNT1-GY	GFTR2-GY	GFNT2-GY
	Black	GFTR1-E	GFNT1-E	GFTR2-E	GFNT2-E
	Brown	GFTR1	GFNT1	GFTR2	GFNT2
	Red	-	-	-	GFNT2-R
Duplex Weather-Resistant/ Outdoor Grade with LED Indicator	White	GFWT1-W	GFWR1-W	GFWT2-W	GFWR2-W
	Ivory	GFWT1-I	-	GFWT2-I	-
	Light Almond	GFWT1-T	-	GFWT2-T	-
	Gray	GFWT1-GY	-	GFWT2-GY	-
	Black	GFWT1-E	GFWR1-E	GFWT2-E	GFWR2-E
Duplex Guide Light with LED Indicator (with self-grounding clip)	White	GFNL1-W	-	GFNL2-W	-
	Ivory	GFNL1-I	-	GFNL2-I	-
	Light Almond	GFNL1-T	-	GFNL2-T	-
	Black	GFNL1-E	-	-	-
Duplex with Audible Trip Alert with LED Indicator (with self-grounding clip)	White	GFTA1-W	-	GFTA2-W	-
	Ivory	GFTA1-I	-	GFTA2-I	-
	Light Almond	GFTA1-T	-	GFTA2-T	-
Combination Switch with LED Indicator (with self-grounding clip) (15 Amp @ 120 VAC Switch rating)	White	GFSW1-W	-	-	-
	Ivory	GFSW1-I	-	-	-
	Light Almond	GFSW1-T	-	-	-
Blank Face with LED Indicator (with self-grounding clip) (20A feedthrough rating only)	White	GFRBF-W			
	Ivory	GFRBF-I			
	Light Almond	GFRBF-T			

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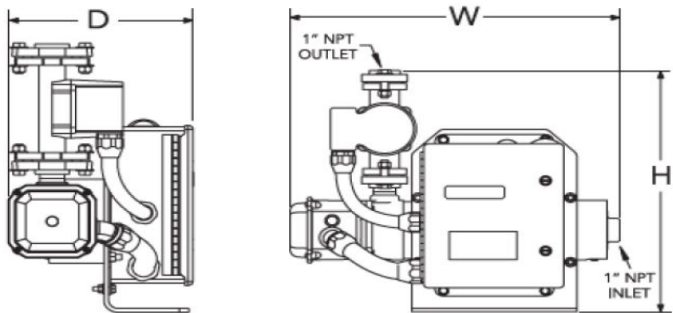


G-8347B/D15-dp

***TOTAL
POWER***

10

12kW BLOCK HEATER



DIMENSIONS & WEIGHTS

Height (H)	Width (W)	Depth (D)	Weight
17.2"	19.4"	9.8"	54lbs
437mm	493mm	249mm	24.5kg

AVAILABLE OPTIONS

Voltage	Phase	Hz	Amps	Man. Number
240	Single	60	50.6	CSM11202-000
208*	Single	60	51.2	CSM11058-000
208	Three	60	33.7	CSM31208-000
480	Three	60	14.6	CSM31208-000
240	Three	60	30.9	CSM31202-000
480	Single	60	25.3	CSM31204-000

12kW HEATER SPECIFICATIONS

- Heat Power 12kW, (*10.5 kW for 208V Single Phase)
- Temperature Control: Fixed, 100-120°F (38-49°C)
- Max working pressure: 125 psi (860 kPa)
- Min/Max Ambient Temp: -4 - 104°F (-20-40°C)
- Motor Ingress protection level: IP44/NEMA 2 (UL-Listed)
- Control Box Ingress: NEMA 4/IP66
- Inlet and Outlet: 1" NPT
- CE-Compliant Models available
- Fluid Type: Coolant Mix (60% antifreeze / 40% water mix) or (50% water / 50% glycol) acceptable
- Pump Power: 97 W (60Hz)
- Forced-Circulation Heater



OIL HEATER, 3kW

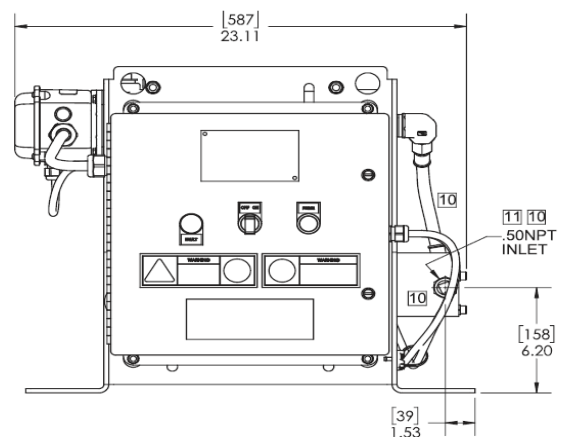
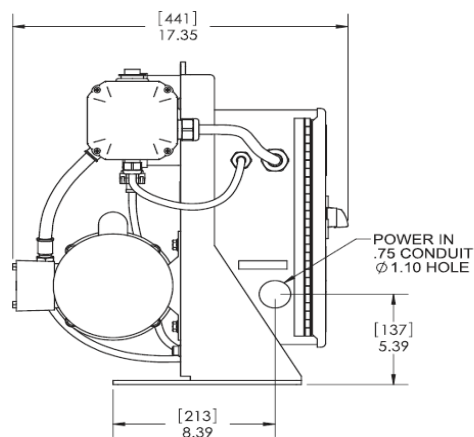
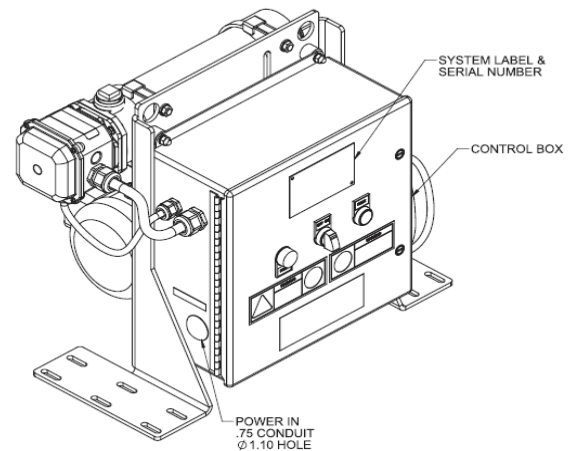
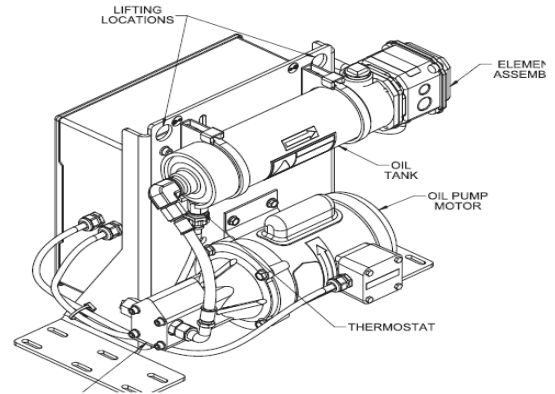
The engine lube oil heater is designed for applications where the engine oil must be kept warm at all times.

SPECIFICATIONS:

- ULC/US Listed
- CE Compliant
- Temperature Controller:
 - Fixed 80°-100°F (27°-38°C)
- High-Limit Temperature Control:
 - Fixed 165°-205°F (74°-96°C)
- Flow Rate - 4 Gallons/min (for 60Hz)
- Pump Power - 0.33 hp (250 W)
- Fluid Type: Lubrication Oil

AVAILABLE OPTIONS:

Voltage	Phase	Hz	Man. Number
240	Single	60	OSM1030208-000
208	Single	60	OSM1030808-000
480	Three	60	OSM3030408-000



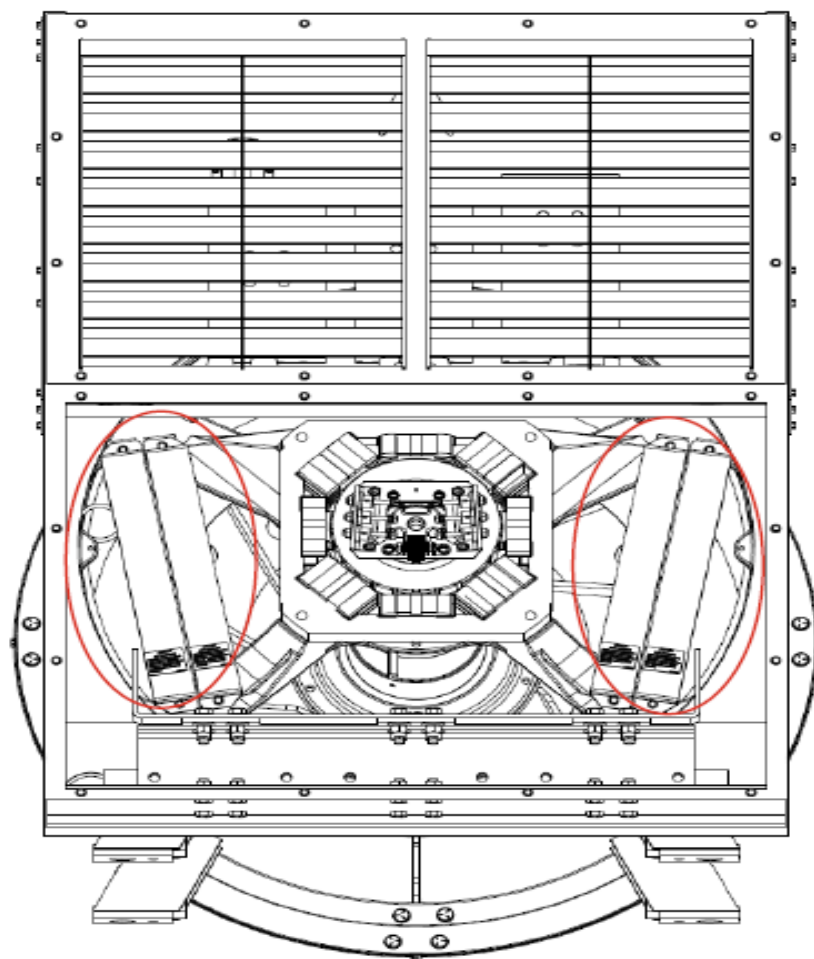
ALTERNATOR HEATER, MARATHON 1200W, 240VAC

DESCRIPTION

The alternator space heater helps prevent condensation in high-humidity conditions.

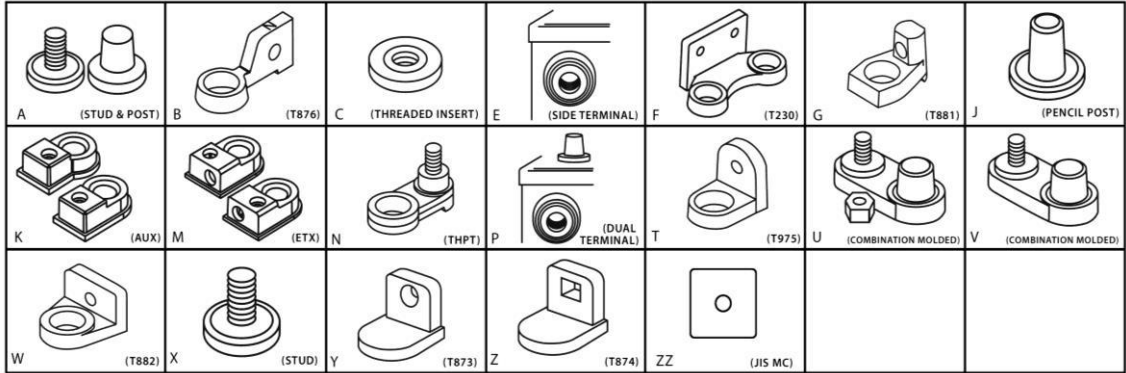
FEATURES

- Factory Installed and Wired
- 1200 Watts (1020 Frame)
- 1000 Watts (764 Frame)
- 240VAC Operation



Mounting Locations

GROUP NO.	PART NO.	PERFORMANCE LEVEL		WEIGHT		MAXIMUM OVERALL DIMENSIONS						Core Value	WARRANTY	FOOTNOTES
		CCA	10 HR CAPACITY	(lb.)	(kg)	LENGTH		WIDTH		HEIGHT				
						in	mm	in	mm	in	mm			
12 VOLT — AGM — AUTHENTIC ETX POWER SPORTS														
	ETX9	120	8	7.5	3.4	5-7/8	150	3-7/16	88	4-3/16	106	0.2	12	38,39,M
	ETX12	180	10	10	4.5	5-7/8	150	3-7/16	88	5-1/8	130	0.2	12	38,39,M
	ETX14	220	12	11.5	5.2	5-7/8	150	3-7/16	88	5-3/4	145	0.2	12	38,39,42,75,M
	ETX14L	220	12	11.5	5.2	5-7/8	150	3-7/16	88	5-3/4	145	0.2	12	38,39,M
	ETX15	220	13	11.5	5.2	5-1/4	134	3-1/2	90	6-9/16	166	0.2	12	38,39,42,76,M
	ETX15L	220	13	11.5	5.2	5-1/4	134	3-1/2	90	6-9/16	166	0.2	12	38,39,M
	ETX16	325	19	17	7.7	6-7/8	175	4	100	6-1/8	155	0.2	12	38,39,42,74,M
	ETX16L	325	19	17	7.7	6-7/8	175	4	100	6-1/8	155	0.2	12	38,39,42,74,M
	ETX18L	340	20	18	8.2	8-1/8	206	3-9/16	91	6-3/8	163	0.2	12	38,39,M
	ETX20L	310	17.5	15	6.8	7	178	3-1/2	90	6-1/8	155	0.2	12	38,39,M
	ETX30LA	400	26	21.5	9.8	6-5/8	168	5-3/16	131	6-15/16	176	0.2	12	38,39,42,78,M



- A. Flush combination terminal w/ 5/16" - 18 stud and SAE post, hex nuts included
B. Flag terminal w/ 3/8" diameter hole (T876)
C. 1/4" - 20 copper Insert Terminal
E. Side terminal automotive
F. Double wide L terminal w/ two 3/8" holes (T230)
G. Offset post w/ horizontal hole, stainless steel 5/16" bolt and hex nut (T881)
J. JIS terminals "pencil post"
K. Molded-in top connection terminal (AUX)
M. Molded-in top and side connection terminal (ETX)
N. Vertical stainless steel 5/16"- 18 stud (THPT)
P. Dual terminal, automotive top and side.
T. Heavy duty L terminal w/ 3/8" diameter hole (T975)
U. Molded-in offset SAE post and vertical 5/16" POS. stainless steel studs & hex nuts
V. Molded-in offset SAE post and vertical 5/16" NEG., 5/16" POS. stainless steel studs
W. "L" type terminal w/ 5/16" diameter hole (T882)
X. 3/8" - 16 stainless steel stud posts
Y. Small L terminal with round hole
Z. Small L terminal with square hole

- Batteries are maintenance-free calcium grids, except where noted
- Batteries manufactured in black polypropylene cases & covers, except where noted
- SAE & DIN automotive posts used, unless noted
- Warranty is suggested months
- Weights are approximates
- CA and MCA ratings @ 32°F are approximations for comparison only
- Ratings other than CCA and RC, are "nominal"
- CCA and RC ratings conform to B.C.I. specifications
- CCA on 8 Volt Marine & Industrial types is for reference only
- EHP stands for Electric & Hybrid Performance

FOOTNOTES

- Black cover / Gray case
- Gray cover / Gray case
- Black cover / Brown case
- Black cover / White case
- Low maintenance-low antimony grids
- Hybrid construction
- AGM Technology
- Centerline terminal posts
- Hard rubber, one-piece cover construction
- Dual terminal, universal design
- Includes handle
- Includes top adaptor
- Includes lifting ledges
- Hard rubber, multi-cell cover construction
- Anchor locked elements
- Flush manifold vented cover
- CCA is an EN rating

- With individual vent caps
- For height with adaptor add 5/8" (16mm)
- Fahrenheit Thermal Shielding Technology
- Ratings after 15 cycles
- Deduct 15% from CCA and CA to allow for double insulation (glass mat)
- Peak performance capacity
- For height with adapter add 7/8" (22mm)
- "Non-spillable" as defined by DOT (Department of Transportation) definitions
- "Non-spillable" as defined by ICAO (International Civil Aviation Organization) and IATA (International Air Transport Association) definitions
- Height without adaptor
- Free replacement warranty is 12 months in deep-cycle use and 3 months in full electric vehicle use
- Free replacement warranty is 3 months in full electric vehicle use
- If battery is used in on-highway vehicles equipped with two-way radios (such as taxis, police, and emergency vehicles), marine applications, off-highway use, and other non-automotive usage, free warranty replacement period will be 6 months and 3 months in full electric vehicle use
- If battery is used in on-highway vehicles equipped with two-way radios (such as taxis, police, and emergency vehicles), marine applications, off-highway use, and other non-automotive usage, free warranty replacement period will be 18 months, free replacement warranty is 12 months in deep-cycle use and 3 months in full electric vehicle use
- Shipped with 20mm height adaptor
- Shipped with two 17mm height adapters
- Shipped with 10mm height adaptor
- Shipped with 22mm height adaptor
- To be discontinued

PROPOSITION 65 WARNING: Battery posts, terminals and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and reproductive harm. Batteries also contain other chemicals known to the State of California to cause cancer.

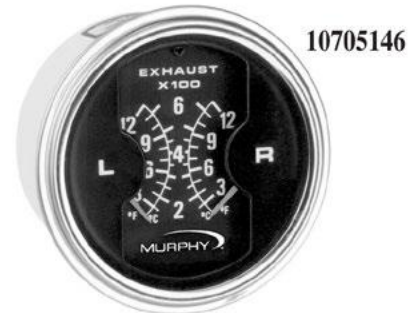
WASH HANDS AFTER HANDLING.

Exhaust Pyrometers for Diesel Engines

Models 10705146 and 10705147

Excessive exhaust temperature is a major damaging factor to all engines. The best way to monitor this temperature is with the use of a pyrometer. Excessive exhaust temperature is caused by an upset fuel/air ratio or more fuel in the engine than there is air to support it. This condition can occur as a result of over throttling, a dirty air cleaner, different fuels, a malfunctioning fuel system, change of altitude, an out-of-tune engine and many other causes. But whatever the cause, a pyrometer indicates this condition before serious damage occurs.

The Single 10705147 and Dual 10705146 Port Pyrometers monitor exhaust temperatures in all types of engines. The Dual Port Pyrometer can monitor each bank of a V-type engine allowing you to compare readings at all times. Both pyrometers feature an easy-to-read illuminated dial with scales in both Fahrenheit and Celsius. They require no outside power (except for dial lighting). Spring-loaded jewels and alloy pivots increase durability. Murphy offers pyrometer accessories such as thermocouples and wire lead assembly suitable for stationary or mobile engines, power units, agricultural and construction equipment, as well as marine and trucking.



Features

- Large sweep scales for maximum legibility
- Internal illumination for night use
- Accuracy: 2% full scale
- Sealed housing
- Ambient temperature compensation
- Calibrated permanently at 2/3 scale
- Flush type mounting on any plane

Benefits of Using a Pyrometer

- Longer engine life
- Better fuel economy
- Less lubrication oil dilution
- Lubrication oil stays clean much longer
- Exhaust emissions drop to a minimum
- Malfunctions indicated before excessive damage occurs

Specifications

Dial Scale

Single: 300° to 1300°F (150° to 700°C)
Dual: 300° to 1200°F (150° to 649°C)*

Dial Sweep (both models): 100°

Accuracy: Full scale 2%

Illumination: Internal 12 or 24 VDC

Bezel: Polished stainless steel*

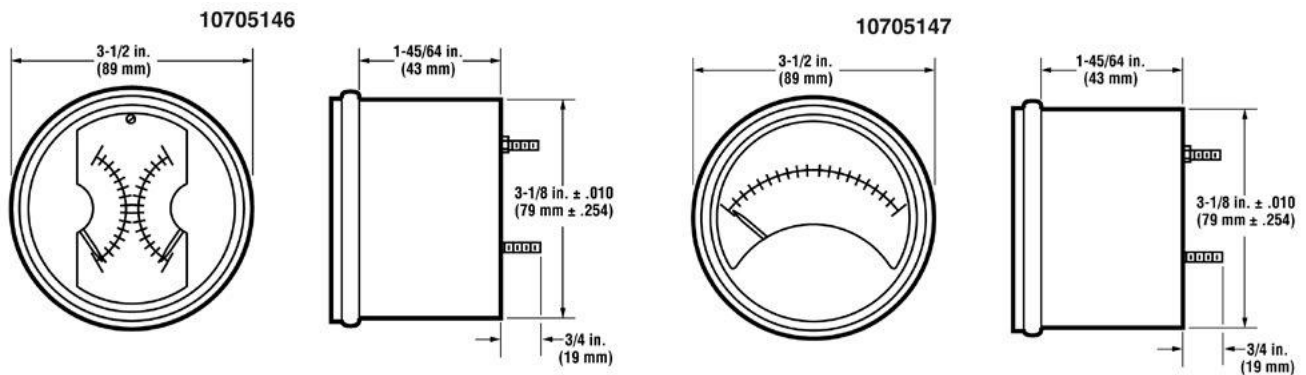
Case: PVC

Pointer(s): Fire Orange

* Celsius only dials available

* Black Bezel available. See special order.

Dimensions



Accessories

Type K thermocouples can mount in the engine manifold or in 2 to 3-1/2 in. (51 to 89 mm) diameter exhaust ports. In turbocharged engines, a thermocouple mounts between the engine and the turbo. Thermocouple 00000818 is a grounded, type K (Chromel Alumel). Thermocouple 00003488 is ungrounded type K (Chromel Alumel).

Thermocouple Specifications

Element K: type (NiCr/Ni) solid wire
 Hot Junction: fusion welded
 Protecting Tube: inconel for no carbon absorption, end closed by heliarc melt down
 Wire Insulation: Q-glass with stainless steel overbraid

Wire Lead Assembly 00000817 is a 14 ft. (4.27 m) extension with mating plug connections for the 00000818 and 00003488 thermocouples. The wire is PVC covered, non-shielded, 18 AWG (1.0 mm²), with heat shrinkable sleeve provided for insulating terminals after installation. Extension up to 100 ft. (30.48 m) can be made with 18 AWG (1.0 mm²) or larger copper wire at the gage head.



How to Order

Part Number	Model and Description	Notes
00000819	10705146 Dual Pyrometer	
00000956	10705147 Single Pyrometer	
00000817	14 ft. (4.27m) Wire Lead Assembly	Accessories
00000818	Thermocouple, grounded, Type K, 3/8 NPT *	
00003488	Thermocouple, ungrounded, Type K, 1/4 NPT *	
00003578	3/8 NPT Adaptor	
00003577	1/8 NPT Adaptor	
00003450	1/4 NPT Adaptor	
00003579	1/2 NPT Adaptor	

*1/8 NPT, 1/4 NPT and 1/2 NPT adaptors available.

***TOTAL
POWER***

11



START-UP WELCOME LETTER

Thank you for your recent purchase from Total Power!

Please be advised that the following **must** be completed before a technician can be scheduled for the start-up:

- Included in this package is a Pre Start-up Checklist which must be filled out in its entirety and returned to us with the photos requested in the checklist. **A start-up date is not firm until this form is received.**
- **If the site and generator are not ready at the time of the scheduled start-up, Total Power will remove the field technician from site. A purchase order covering the technicians lost time must be provided before rescheduling and returning to site.**
- If security clearance is required to access the site, please advise us as soon as possible to avoid commissioning delays. Please note that it can take several months to get security clearance for some sites.
- **Please note that any outstanding balances are due prior to commissioning. The start-up date will not be confirmed without the go ahead from our Accounting department.**
- We are currently booking technicians up to 3-4 weeks in advance. Please provide a minimum of 7-10 business days if a cancellation or postponement is required.
- Please plan the start-up with a minimum of 4 weeks prior to occupancy.
- Once this completed package is received, we will check availability on the dates requested. Please note that dates are booked on a first come, first service basis and if the requested dates are not available, the next available date will be provided for approval.
- For diesel installations, please ensure that an OBT1 inspection (Ontario only) has been completed and tank fill has been arranged prior to the scheduled commissioning day. Diesel is not provided by TPL.
- For natural gas installations, please ensure your gas technician is on site at the time of commissioning. While our technicians may be able to verify gas pressure, they are unable to make any alterations or changes to installation, should an issue arise. Upon completion of the start-up, the technician will complete a detailed report and submit it.
- **If the generator will not be commissioned within 1 year of the ship date, please let us know immediately. Please note that a preservation fee will apply and warranty may be affected. Warranty coverage for most equipment begins 12 months after purchasing, even if not commissioned.**

Upon completion of the start-up, the technician will complete a detailed report and our Projects team will compile the final commissioning report. Once approved by our Accounting department, the commissioning report will be emailed directly to you.

If you have any questions, please reach out to our Project Coordinator Laura (lstephenson@totalpower.ca).



GENERATOR COMMISSIONING GUIDELINES (LIFE SAFETY)

PURPOSE:

The purpose of this guideline is to clarify the commissioning statement in the submittal package. The below describes the commissioning process and what is included. Should your scope of work vary from the below, please contact your Total Power representative, as additional costs may apply.

To satisfy the requirements of CSA 282, the commissioning process may take up to two (2) days to complete. Total Power is currently booking technicians up to 3-4 weeks in advance. Please provide a minimum of 7-10 business days if a cancellation or postponement is required.

PLEASE NOTE: Failure to submit an accurate Pre Start-up Checklist can result in delays or rescheduling the commissioning date until the requirements are satisfied. Additional charges may apply.

STANDARD GENERATOR COMMISSIONING INCLUDES:

1. Site arrival and initial site representation communication.
2. Perform a walkthrough of the commissioning site, identifying all equipment supplied by TPL and ensuring all conductors are properly terminated.
3. Perform initial operational checks of the generator. On natural gas (NG) units, this includes verifying fuel pressure and volume (BTU's) with a certified gas contractor.
4. Prepare load bank equipment for 100% load test.
5. Perform standard four (4) hour CSA load bank test. Longer testing is available if required by spec (additional charges may apply).
6. Complete generator control wiring and programming:
 - a. Provide two (2) alarm outputs: Gen Run and Gen Trouble. For additional outputs, please contact your Total Power representative.
 - b. Perform all safety shutdowns on the generator. **Please note that all required site witnesses should be available at this time. Additional charges may apply should safety and operational tests need to be repeated.**
7. Perform transfer switch commissioning on TPL supplied equipment.
 - a. Control wiring termination:
 - i. Provide elevator pre/post signals (if required).
 - ii. Verify building phase rotation.
 - iii. Program ATS controller.
 - iv. Perform functional transfer tests.
 - b. **Please note, any commissioning of TPL supplied transfer switches will require the ATS to be de-energized before any work can commence.**
8. In order to satisfy the requirements of CSA 282, building load will be required at the time of commissioning. Should building load not be present, additional trips may be required and will be charged accordingly.

IMPORTANT GENERATOR WARRANTY **INFORMATION**

START-UP / COMMISSIONING REQUIREMENTS:

1. Generac Power Systems requires that all Industrial Product have a Start-up Inspection Performed by an authorized Generac Power Systems servicing dealer.
2. The Generator must be started-up / commissioned within one-year (365 days) from the initial factory ship date.
3. Warranty Start Date is set to the start-up / commissioning date.

START-UP / COMMISSIONING PERFORMED AFTER ONE YEAR LIMIT, WITHOUT PRESERVATION PROCESS (Beyond 1 year from the initial factory ship date)

OR

START-UP / COMMISSIONING PERFORMED AFTER ONE YEAR LIMIT FOLLOWING PRESERVATION PROCESS (Beyond 2 years from the initial factory ship date)

THEN

Generac requires proof of problem free startup and commissioning, followed by operation for 90 days before they will honor any subsequent failures under any remaining warranty. If that condition is satisfied the warranty terms will be reinstated, effective from the initial ship date if still in effect as quoted.

PRESERVATION PROCESS REQUIRED TO ALLOW DELAYED START-UP / COMMISSIONING UP TO TWO YEARS FROM SHIP DATE:

1. BEFORE the first year after the ship date has expired, any product not started-up within the first year must have **the Long-Term Preservation and Storage Procedure (0G4018) performed and the required forms submitted to Generac.**
 - a. If the project requires more than one-year from the ship date to start-up/commission the product, the Customer must advise the Dealer and the dealer must provide the customer a quote for the preservation process, and if approved, file an Addendum to extend the one-year cut-off date and provide proof that the preservation process has been initiated.
 - b. The Customer must provide the dealer with a new tentative start-up date, not to exceed two years from the original ship date.
 - c. Any date greater than two years from the original ship date must also include a detailed letter of explanation as to the unusual circumstances delaying the dealer from performing a timely start-up/commissioning inspection.

IF YOUR START-UP COMMISSIONING WILL BE MORE THAN ONE YEAR FROM THE SHIP DATE, AND YOU WANT TO DELAY THE WARRANTY START DATE, YOU MUST ADVISE GAL POWER'S SALES AND PROJECT TEAMS AND MEET GENERAC'S PRESERVATION PROCESS REQUIREMENTS. GAL POWER WILL PROVIDE YOU WITH A PRESERVATION PROCESS QUOTE AND ASSIST WITH MEETING GENERAC'S DELAYED START UP APPROVAL.

**PLEASE REQUEST ANDC REVIEW THE
Long Term Preservation and Storage Procedure-0G4018 Document**

Terms & Conditions of Sale

Total Power Limited (the "Seller") agrees to sell the goods covered in the Quotation on, and subject to, these terms and conditions.

1. **ACCEPTANCE.** This quotation may be withdrawn by the Seller at any time before it is accepted by the Purchaser. Acceptance is accomplished by the Purchaser giving the Seller written acceptance accompanied by a purchase order. The quotation does not apply to any other orders from Purchaser for the same goods and/or services.
2. **TERMS OF AGREEMENT.** The Quotation supersedes all previous quotations for the same subject matter from the Seller, and all purchase orders and terms and conditions from Purchaser. No standard terms or conditions in any Purchaser purchase order shall modify, supplement or otherwise amend the terms of this Quotation or otherwise increase the liability of the Seller beyond the terms set forth in this Quotation. If there are any discrepancies or inconsistencies whatsoever between the Quotation and the terms and conditions of a purchase order or other document of Purchaser, then the terms and conditions of the Quotation govern, regardless of which document was first executed and regardless of the terms of the purchase order or other document. The Seller makes no representations or warranties other than as expressly set forth in this Quotation.
3. **PRICE.** All prices and discounts are in accordance with the Seller's quotation. Total purchase price is due prior to start-up. Subject to establishment of satisfactory credit, payment is due in full on delivery unless credit is authorized and approved by the Seller. Credit is extended in the sole and absolute discretion of the Seller and may be reduced, suspended or terminated at any time, without cause and without notice. The Seller may change the terms of credit at any time. Seller reserves the right, by giving notice to Purchaser at any time, to increase the price of goods and services to cover (i) foreign exchange or market fluctuations, or (ii) all taxes, tariffs, duties (including dumping and countervailing duties), surtaxes, fees, and other governmental charges that could be imposed by any governmental authority in connection with the importation or exportation of any product or the performance of any service by Seller.
4. **CREDIT CONDITIONS.** If at any time, the Purchaser is or has been default under the terms of this or any other agreement with Seller, or if the Seller acting reasonably and in good faith determines the Purchaser's financial condition may impair the Purchaser's ability to perform its obligations under this agreement, the Seller may demand adequate assurance of Purchaser's financial condition and ability to perform. Such demand for assurance may require full payment of all amounts then due and owing by Purchaser or may require partial or full advance payment of the purchase price of goods which have been scheduled for delivery but shall not be limited to the foregoing. If Purchaser fails within 10 days of Seller's demands to provide the seller with such assurance, Seller shall be entitled to cancel any order then outstanding, shall be entitled to receive reimbursement for its cancellation charges, and may proceed to collect, without limitations any sums due and owing, its cancellation charges and all damages resulting from Purchaser's default. In the event of bankruptcy or insolvency of Purchaser, or in the event of any proceeding brought against Purchaser, voluntary or involuntary, under the bankruptcy or any insolvency laws, Seller shall be entitled to cancel any orders then outstanding at any time during the period allowed for filing claims against the estate and shall receive reimbursement for its reasonable and proper cancellation charges. The Purchaser hereby consents to the Seller conducting a credit investigation of the Purchaser and to the Seller making inquiries with financial institutions or other persons in a business relationship with the Purchaser in connection therewith; the Purchaser hereby authorizes and directs persons to answer the Seller's inquiries.
5. **DELIVERY OF GOODS.** Delivery dates for the goods and services described in the Quotation are estimates only, the Seller will use commercially reasonable efforts to delivery such goods and services by the estimated delivery date specified in the Quotation for each item of the goods.
6. **INVOICING.** Invoices shall be payable in accordance with the terms of payment agreed upon in the Quotation by cheque, bank transfer or any other way accepted by the Seller. Unpaid invoices shall accrue interest at the rate of 2% per month (24% annually) for any amount remaining unpaid more than 30 days following the invoice date. All invoices shall be paid in full by the Purchaser without charge-back, set-off or deduction of any kind. The Seller shall be solely responsible for all costs and expenses incurred by the Purchaser in collecting any amounts payable by the Purchaser including all legal fees and disbursements, and all collection agency fees and disbursements.
7. **RETENTION OF TITLE.** The Seller remains the owner of all goods sold to the Purchaser until full and complete payment is received from the Purchaser. To the extent the Purchaser acquires any interest in the goods prior to payment in full, the Purchaser grants to the Seller a security interest in such goods to secure payment in full of all amounts payable to the Seller, and the Seller is entitled to register and perfect a Personal Property Security registration against the Purchaser with respect to such goods as a secured creditor. The Purchaser waives, to the extent permitted by applicable law, all rights to receive copies of financing statements, financing change statements, verification statements or copies of other notices or filings made by the Seller at any time in connection with this Agreement.
8. **CHANGE ORDERS.** No modification, addition or deletion of any goods or services or any change in specification is effective unless a written change order is accepted and signed by an authorized signatory of the Seller. If a change order results in the imposition of costs or charges on the Seller or an increase in price or time required for supply of any part of the goods and/or services, then the Seller may adjust the price, delivery date or both as the Seller may determine and such adjustments are binding upon Purchaser.
9. **SHIPPING.** All goods are at the risk of the Purchaser upon delivery for the goods to Purchaser, its agent or a carrier for shipment, whichever delivery first occurs. Purchaser shall pay the Seller all costs for special shipping or packaging. All insurance charges and related taxes and duties are for Purchaser's account unless otherwise specified in the quotation. For the avoidance of doubt, all taxes, surtaxes, tariffs, duties (including dumping and countervailing duties), fees, fines and penalties and other governmental charges levied or assessed in connection with the importation or exportation of any product or the performance of its obligations hereunder are for Purchaser's account unless otherwise specified in the quotation. Should the Purchaser not be ready to accept any shipment the Purchaser will be responsible to find alternative storage at the Purchaser's sole cost. The Seller, at its sole discretion, may elect to store the goods for a limited period of time.
10. **STORAGE.** In the event that the Seller stores any goods at its facility on behalf of the Purchaser such goods will be at Purchaser's risk and the Purchaser will be charged at a rate of 0.75% of the total purchase price per month for as long as the equipment is in storage. The Seller may cease storage of the goods at any time. All insurance on the equipment will be the sole responsibility of the Purchaser. Any and all outstanding milestones, warranty dates, payment due dates and other timelines will continue to run during the period of time the

goods are in storage.. Any additional handling charges related to storage will be solely for the Purchaser's account.

11. LIMITED WARRANTY / DISCLAIMER. The Seller does not guarantee, assume any responsibility for, or make any representation or warranty with respect to any goods or service or the performance thereof, save and except as expressly set forth in this Quotation. To the maximum extent permitted by applicable law the Purchaser hereby waives the benefit of any implied or statutory representations or warranties. Without limiting the foregoing the Seller makes no representations or warranties with respect to merchantability, fitness for purpose, profitability or expected savings.
12. LIMIT OF LIABILITY. The liability of the Seller whether arising under this Agreement, contract, tort, negligence, statutory liability or other legal theory, shall be limited to the direct and actual money damages effectively incurred by the Purchaser and in any event such liability shall not exceed in the aggregate the purchase price actually paid by the Purchaser to the Seller pursuant to this Quotation for the goods or services in question, regardless of the number of claims. In no event shall the Seller be liable for (i) any loss of revenue, profits or goodwill, or loss of use of any equipment, or (ii) any special, indirect, aggravated, punitive or consequential damages, in either case even if the Seller has been notified of the possibility of such damages, and the Purchaser hereby waives any claim or recourse against the Seller for such damages.
13. FORCE MAJEURE. The Seller will not be held liable in any way for delays in performance or non-performance due to contingencies or events beyond its reasonable control, including any government order or war, civil insurrection, act of terrorism, riot, weather, labour or transportation, strikes, flood, fire, earthquake, volcanic eruption or act of God, shortages of materials or energy, epidemic, pandemic (including COVID-19) or any other causes beyond the reasonable control.
14. CANCELLATION. Purchaser may cancel orders only upon reasonable advance written notice and upon payment to the Seller of Seller's cancellation charges which include among other things, all costs and expenses incurred, and to cover commitments made by the Seller. Seller's determination of such termination charges shall be final.
15. INITIAL START-UP. The initial start-up of any equipment provided to the Purchaser must be preceded by submitting a duly completed "Start-Up Request" form to the Seller. The start-up of the equipment is considered complete when the equipment is performing in accordance with manufacturer's specifications.
16. ASSIGNMENT. The Purchaser shall not have the right to transfer or assign this Agreement or any rights, remedies, obligations or benefits hereunder. For purposes of the foregoing, transfer shall include any change in the ownership of shares in any Purchaser that

is a corporation or any change in the effective control of the Purchaser, whether by transfer of shares, operation of law or otherwise.

17. ENUREMENT. Subject to the terms hereof, this Agreement shall enure to the benefit of and be binding upon the parties hereto and their respective heirs, executors, administrators, successors, permitted assigns and legal representatives.
18. INTERPRETATION. Whenever the context of this Agreement so requires, the singular shall include the plural and vice versa and words importing the masculine gender shall include the feminine and neuter genders. Headings are for convenience of reference only and do not affect interpretation. Unless the context otherwise requires, the meaning ascribed thereto by such use. In this Agreement, the word "including" means "including without limitation".
19. NOTICES. Any notice required or permitted to be given hereunder must be in writing and will conclusively have been deemed to have been received by its recipient on the business day it is delivered or sent by electronic transmission to a party at the address indicated in the Agreement (or at such other address as such party specifies to the other party in writing) or, if sent by, registered mail, provided there is no interruption in postal services, on the fifth business day after the day of mailing, addressed to such party at such address, or if delivered personally or by courier on the business day so delivered.
20. SEVERABILITY. Any provision of this Agreement prohibited by or unlawful or unenforceable under any applicable law shall, at the sole option of the Seller, be ineffective without invalidating the remaining provisions of this Agreement; provided, however, that to the extent that the provisions of any such applicable law can be waived, they are hereby waived by the Purchaser.
21. FURTHER ASSURANCES. The Purchaser agrees to do all things and execute or obtain all documents as may be required by the Seller in order to give effect to or better evidence this Agreement.
22. ENTIRE AGREEMENT. This Agreement contains the entire understanding between the parties and other than as expressly set forth herein there are no other terms, conditions, representations or warranties of any kind. This Agreement may not be modified except by another agreement, in writing, signed by both parties to this agreement.
23. APPLICABLE LAW AND JURISDICTION. This Agreement shall be governed by the laws of the Province of Ontario and the federal laws of Canada applicable therein, without regard to conflict of laws principles. The *United Nations Convention on Contracts for the International Sale of Goods* shall not apply to this Agreement and its application is strictly excluded.



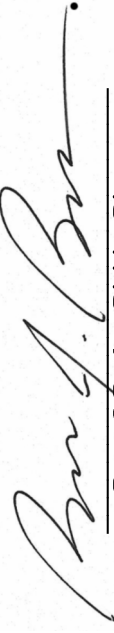
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
2026 MODEL YEAR
CERTIFICATE OF CONFORMITY
WITH THE CLEAN AIR ACT

OFFICE OF TRANSPORTATION
AND AIR QUALITY
ANN ARBOR, MICHIGAN 48105

Certificate Issued To: Societe Internationale des Moteurs-Baudouin
(U.S. Manufacturer or Importer)

Certificate Number: TMRBL65.4EMS-003

Effective Date:
12/15/2025
Expiration Date:
12/31/2026


Byron J. Bunker, Division Director
Compliance Division

Issue Date:
12/15/2025
Revision Date:
N/A

Model Year: 2026

Manufacturer Type: Original Engine Manufacturer

Engine Family: TMRBL65.4EMS

Mobile/Stationary Indicator: Stationary
Emissions Power Category: kW>560
Fuel Type: Diesel
After Treatment Devices: No After Treatment Devices Installed
Non-after Treatment Devices: Electronic Control

Pursuant to Section 111 and Section 213 of the Clean Air Act (42 U.S.C. sections 7411 and 7547) and 40 CFR Part 60, and subject to the terms and conditions prescribed in those provisions, this certificate of conformity is hereby issued with respect to the test engines which have been found to conform to applicable requirements and which represent the following engines, by engine family, more fully described in the documentation required by 40 CFR Part 60 and produced in the stated model year.

This certificate of conformity covers only those new compression-ignition engines which conform in all material respects to the design specifications that applied to those engines described in the documentation required by 40 CFR Part 60 and which are produced during the model year stated on this certificate of the said manufacturer, as defined in 40 CFR Part 60.

It is a term of this certificate that the manufacturer shall consent to all inspections described in 40 CFR 1068 and authorized in a warrant or court order. Failure to comply with the requirements of such a warrant or court order may lead to revocation or suspension of this certificate for reasons specified in 40 CFR Part 60. It is also a term of this certificate that this certificate may be revoked or suspended or rendered void *ab initio* for other reasons specified in 40 CFR Part 60.

This certificate does not cover engines sold, offered for sale, or introduced, or delivered for introduction, into commerce in the U.S. prior to the effective date of the certificate.

The actual engine power may lie outside the limits of the Emissions Power Category shown above. See the certificate application for details.