
SIMPOWER
generator systems
SERIAL NO. 12815/006
FOR ELECTRICAL EQUIPMENT ONLY


SIMPOWER
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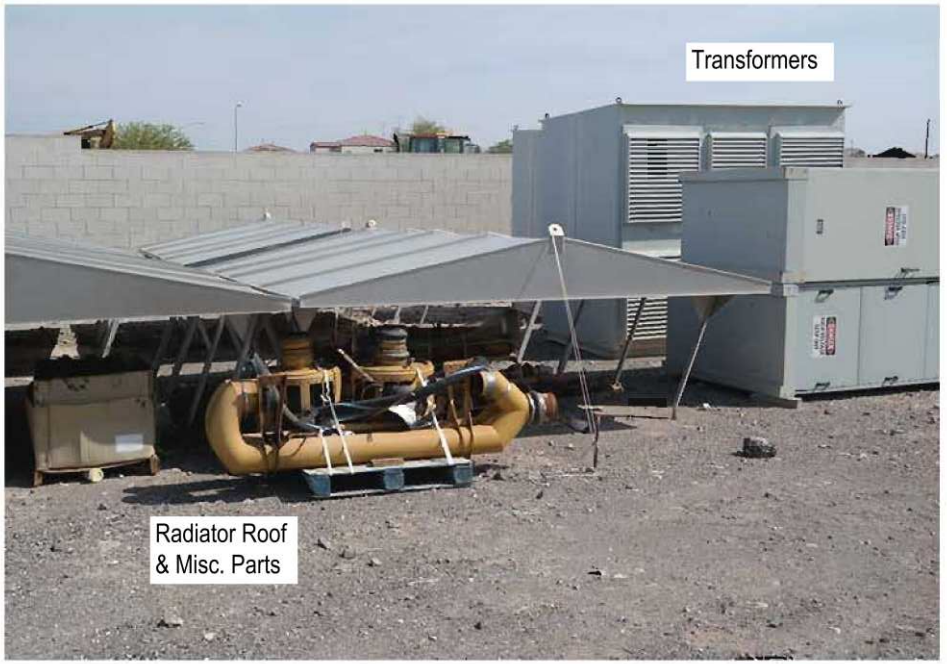
6 LNG Generator Units @ Cashman


Radiator Roof and Misc. parts


Transformers


Radiator Roof
& Misc. Parts


Transformers
Radiator Roof
& Misc. Parts

Transformer Model Information

Transformer Model Information

Transformers

Transformers

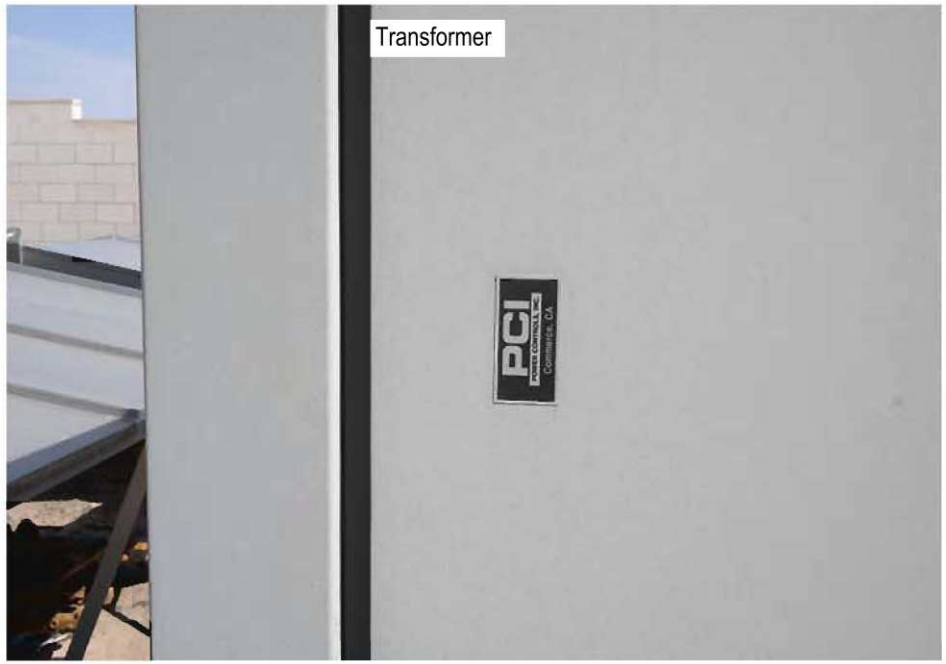
Emission Units

EU Model Information

Transformer Model Information

Emission Units


EU Model Information
EMISSION REDUCTION SYSTEMS DIV.
HOUSTON INDUSTRIAL SILENCING
DeNOx Silencer
MODEL
FLOW
MFG#
PATENT NO. 4,601,168
PATENT NO. 5,016,438
PATENT NO. 5,184,464
PATENT NO. 5,403,557
PATENT NO. 2,015,884
OTHER PATENTS PENDING
BOX 19835, HOUSTON, TEXAS 77224


Transformer
PCI


Emission Unit


EU Model Information
EMISSION REDUCTION SYSTEMS DIV.
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Radiator Roof


Radiator Roof


Radiator Enclosure
Radiator Roof


Radiator Roof
& Misc Parts


Transformers
Radiator Roof
& Misc. Parts


Engine


Radiator Roof
& Misc. Parts


LNG Generator


GUASCOR


DANGER/POISON
CAUTION


altronic®
ALTRONIC CPU-95
IGNITION SYSTEM
ALTRONIC, INC. GIRARD, OHIO


LNG Serial Number
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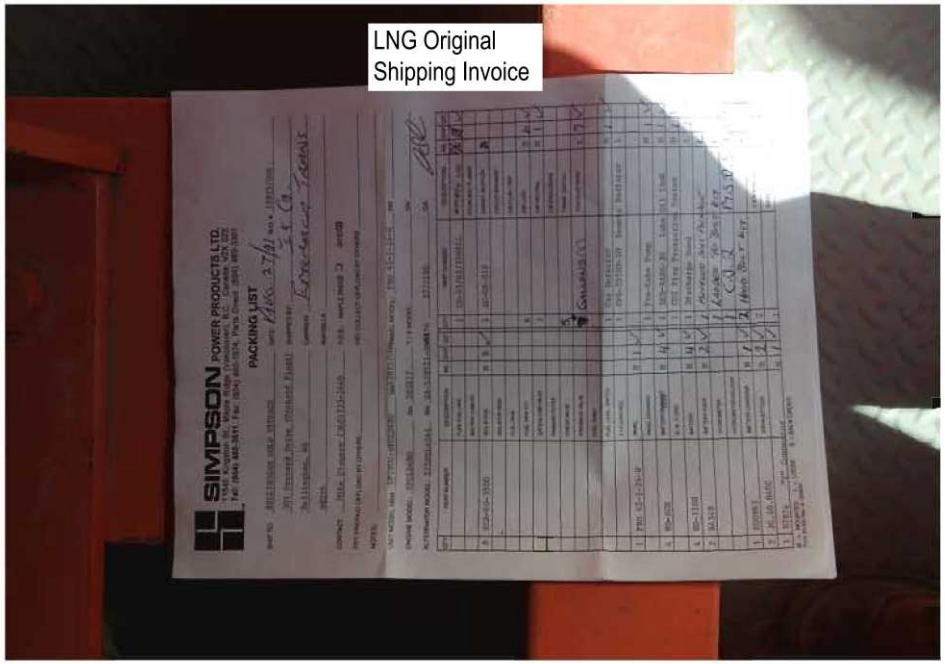
LNG Original
Shipping Invoice
SIMPSON POWER PRODUCTS LTD.
PACKING LIST


LNG Serial Number
SIMPOWER
generator systems
SERIAL NO.
FOR ELECTRICAL EQUIPMENT ONLY

LNG Serial Number

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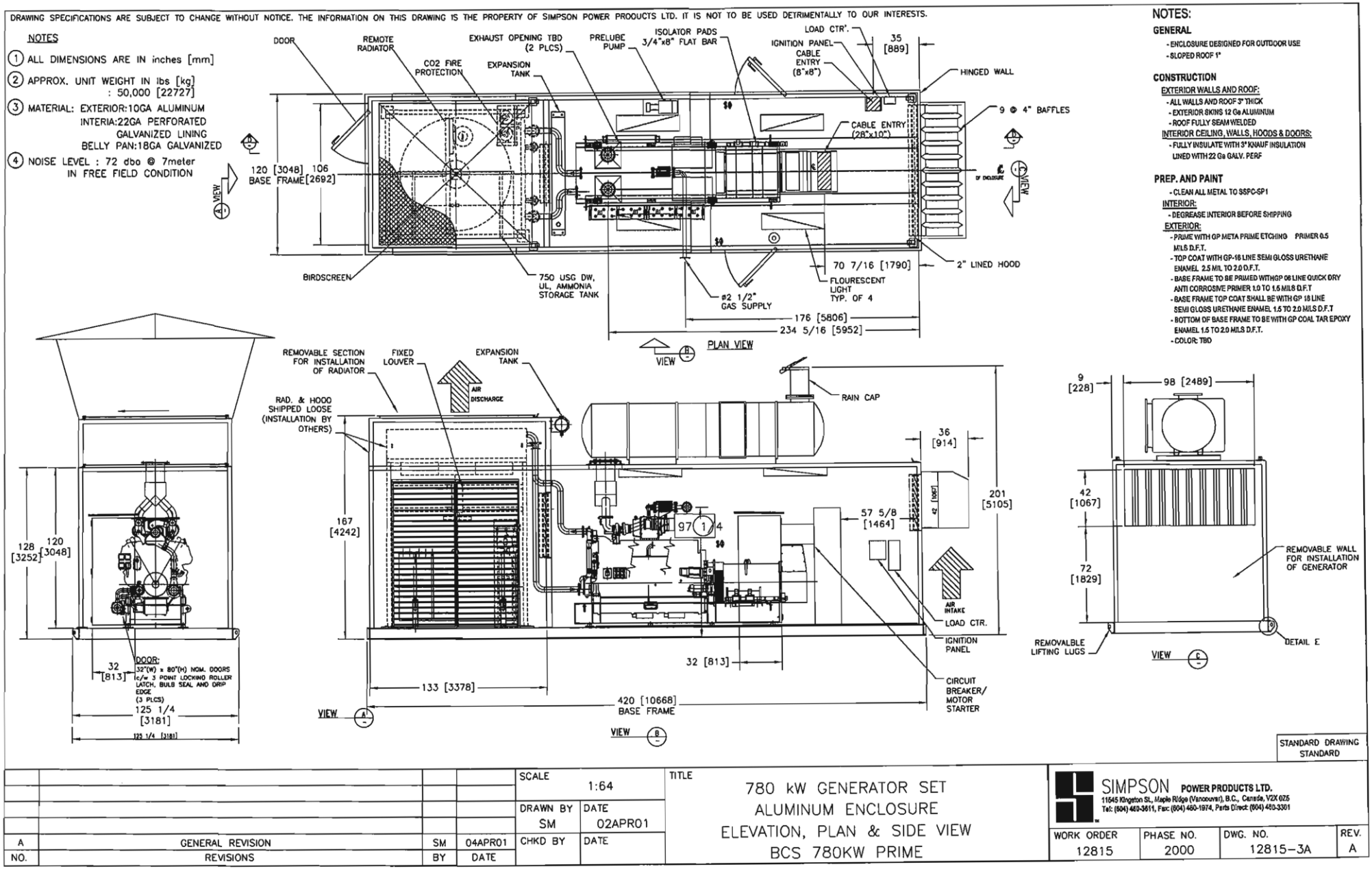
Schematic of Simpson - Simpower LNG Generator Unit
(not actual unit - visual representation of complete unit only)



NO.	REVISIONS	BY	DATE
A	GENERAL REVISION	SM	04APR01

SCALE 1:64
DRAWN BY SM DATE 02APR01
CHKD BY DATE

TITLE
780 kW GENERATOR SET
ALUMINUM ENCLOSURE
ELEVATION, PLAN & SIDE VIEW
BCS 780KW PRIME

SIMPSON POWER PRODUCTS LTD.
11545 Kingston St., Maple Ridge (Vancouver), B.C., Canada, V2X 0Z5
Tel: (604) 460-3611, Fax: (604) 460-1974, Parts Direct: (604) 460-3301

WORK ORDER	PHASE NO.	DWG. NO.	REV.
12815	2000	12815-3A	A

SIMPSON POWER PRODUCTS LTD.
11545 Kingston St., Maple Ridge (Vancouver), B.C. Canada, V2X 0Z5
Tel: (604) 460-3611, Fax: (604) 460-1974, Parts Direct: (604) 460-3301

PACKING LIST

SHIP TO: BELLINGHAM COLD STORAGE
301 Orchard Drive (Orchard Plant)
Bellingham, WA
98225
CONTACT: Mike Clausen (360)733-1640

DATE: Aug. 27/01 W.O.# 12815/006
SHIPPED BY: T.K Co.
CARRIER: Emerald Trans.
WAYBILL#:
F.O.B.: MAPLE RIDGE ☐ SITE ☒

FRT PREPAID OFFLOAD BY OTHERS
FRT COLLECT OFFLOAD BY OTHERS
NOTES:

UNIT MODEL NBR: SP780G:SFGLD480 SN: 12815/006 PANEL MODEL: PRO 42-I-24-W SN:
ENGINE MODEL: SFGLD480 SN: 283277 T / S MODEL: SN:
ALTERNATOR MODEL: 575RSL4044 SN: WA-528521-0601 VOLTS: 277/480 QA:

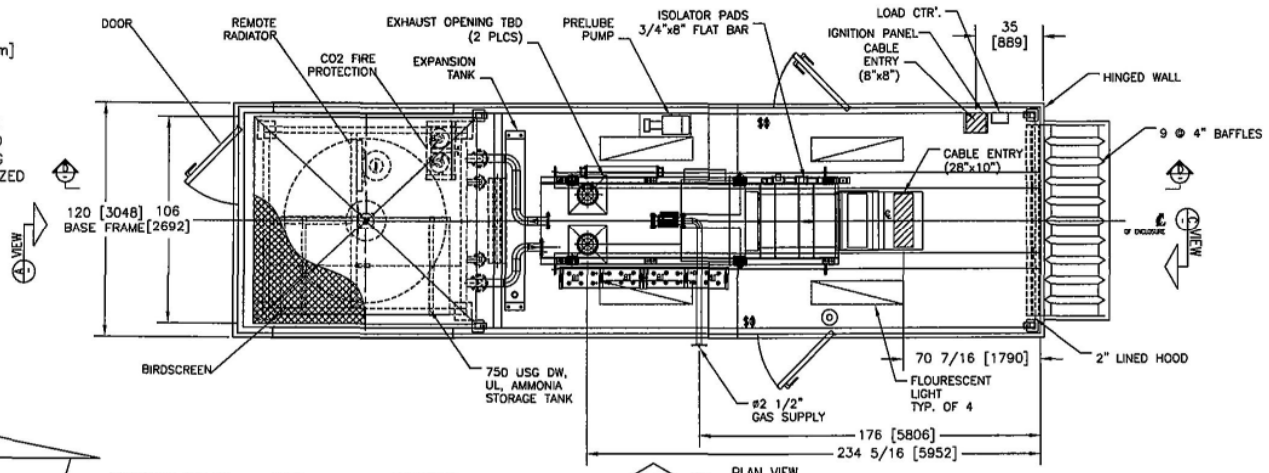
QTY	PART NUMBER	DESCRIPTION	M/L	SHP	Q/C	QTY	PART NUMBER	DESCRIPTION	M/L	SHP	Q/C
		FLEX FUEL LINE				1	CR-45/65/14WRLL	MUFFLER c/w cap	P/S	Ø	✓
		BATTERY CABLES						COUPLING / FLANGE			
8	RCA-60-3500	ISOLATORS	M	8	✓	1	AC-GS-014	GASKET, MUFFLER	B		
		ISOLATOR PADS						CIRCUIT BREAKER			
		FUEL TANK						C/B PLUG / TRIP			
		FUEL TANK KIT				6		C/B LUGS	M	6	✓
		GATE/GLOBE VALVE				1		C/B NEUTRAL	M	1	✓
		PRIMARY FILTER						C/B ENCLOSURE			
		CHECK VALVE				5		TRANS. SWITCH			
		FIROMATIC VALVE				9	GALLONS(S)	TOUCH UP PAINT	L	7	✓
		FUEL PUMP									
		FUEL LEVEL SWITCH				1	Gas Detector		M	1	✓
		F / P CONTROL				1	CVR-255HR-50 Remote Radiator		L		
1	PRO 42-I-24-W	PANEL	M	1	✓						
		PANEL DRAWING				1	Pre-Lube Pump		M	1	✓
4	8D-BOX	BATTERY BLANKET BOX	M	4	✓	1	REN-RABK-30 Lube Oil TAnk		M	1	✓
		B / B T/ STAT.				1	CO2 Fire Protection System		M	1	✓
4	8D-1100	BATTERY	M	4	✓	1	Discharge Hood		L	1	✓
2	B4348	BATTERY RACK	M	2	✓	1	MUFFLER BOLT PACKAGE		L		
		HYDROMETER				1	LADDER C/O BOLT KIT.		L		
		HYDROMETER HOLDER				1	C.O.2 M.S.D.		L	1	✓
1	E00963	BATTERY CHARGER	M	1	✓	2	HOOD BOLT KIT		L		
2	JG.40.040C	EXHAUST FLEX	M	2	✓	2		O & M MANUAL			
1	B7874 "Y" Connector		M	1	✓	1		INSTALLATION			

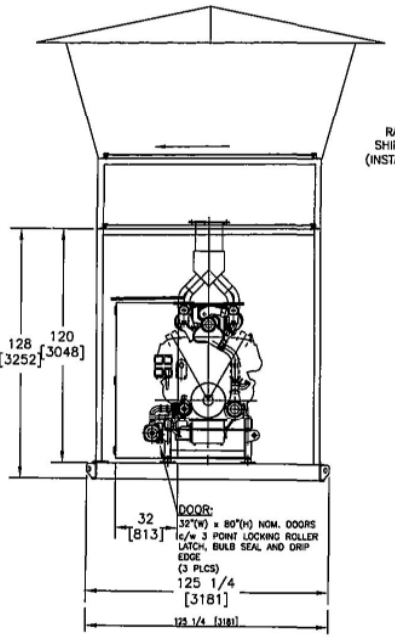
M = MOUNTED L = LOOSE B = BACK ORDER

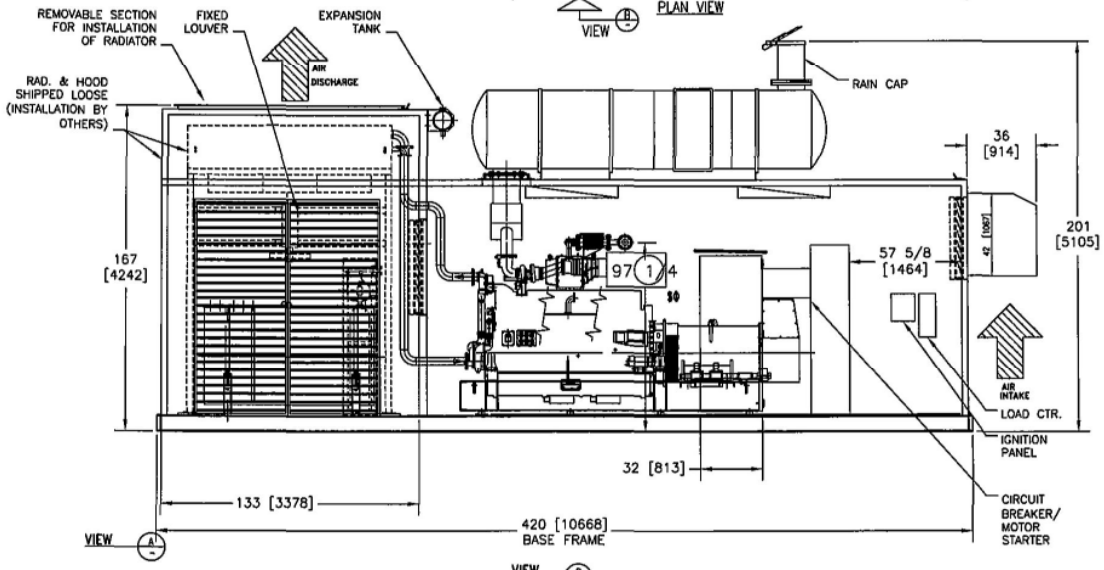
	UPGRADES & MODIFICATIONS TO BASE EQUIPMENT PACKAGE
6	**Engine Control Systems Modifications (CoMap)**
	Description : Provide all components and materials to upgrade equipment purchased in Base Equipment package with Genset Controls, air/fuel ratio controls and paralleling/load sharing controls. Provide CoMap InteliGen/InteliSys-NT with fully integrated HMI's and a remote monitoring and operational capability via internet. Provide connectivity of the Controls System to the LCPD Shweitzer SCADA system via Modbus. (Note: Pricing reflects all work to be accomplished in Bellingham, WA prior to delivery).
6	**Engine Control Systems Modifications Upgrade to Distributed Breakers and Controls**
	Description : Change order item to upgrade controls and breaker system to be distributed in each generator unit. Will provide for ability for system to operate without the need of a centralized controls module, with each unit having the capability to monitor and control itself independently, as well as provide access for controlling the complete plant of units. Centralized controls will also be provided through remote PC connection. (Note: represents additional scope to line item 1.a. from original contract scope.)
6	**Emissions Sensors w/installation & testing**
	Description : Provide all components and labor to retrofit (6) Sensors on equipment purchased in Base Equipment package. One sensor per unit, to detect changes in exhaust emission level outputs. Provide the integration of all sensors in to the CoMap controls for the purpose of monitoring and notifying operators of changes in emissions levels. (Note: Pricing reflects all work to be accomplished in Bellingham, WA prior to delivery).

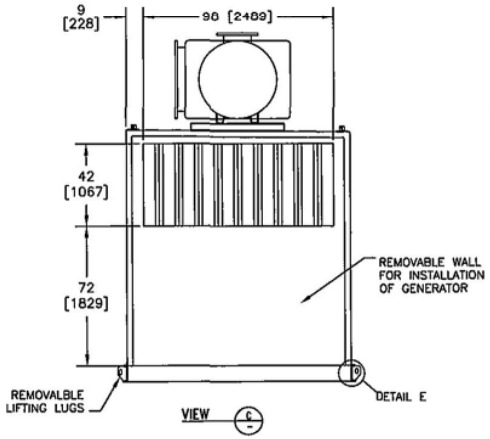
NOTES

1. ALL DIMENSIONS ARE IN inches [mm]
2. APPROX. UNIT WEIGHT IN lbs [kg] : 50,000 [22727]
3. MATERIAL: EXTERIOR:10GA ALUMINUM INTERIA:22GA PERFORATED GALVANIZED LINING BELLY PAN:18GA GALVANIZED
4. NOISE LEVEL : 72 dbo @ 7meter IN FREE FIELD CONDITION









NOTES:

GENERAL
- ENCLOSURE DESIGNED FOR OUTDOOR USE
- SLOPED ROOF 1°

CONSTRUCTION

EXTERIOR WALLS AND ROOF:
- ALL WALLS AND ROOF 3" THICK
- EXTERIOR SKINS 12 Ga ALUMINUM
- ROOF FULLY SEAM WELDED

INTERIOR CEILING, WALLS, HOODS & DOORS:
- FULLY INSULATE WITH 3" KNAUF INSULATION LINED WITH 22 Ga GALV. PERF

PREP. AND PAINT
- CLEAN ALL METAL TO SSPC-SP1

INTERIOR:
- DEGREASE INTERIOR BEFORE SHIPPING

EXTERIOR:
- PRIME WITH GP META PRIME ETCHING PRIMER 0.5 MILS D.F.T.
- TOP COAT WITH GP-16 LINE SEMI GLOSS URETHANE ENAMEL 2.5 MIL TO 2.0 D.F.T.
- BASE FRAME TO BE PRIMED WITHGP 06 LINE QUICK DRY ANTI CORROSIVE PRIMER 1.0 TO 1.5 MILS D.F.T
- BASE FRAME TOP COAT SHALL BE WITH GP 16 LINE SEMI GLOSS URETHANE ENAMEL 1.5 TO 2.0 MILS D.F.T
- BOTTOM OF BASE FRAME TO BE WITH GP COAL TAR EPOXY ENAMEL 1.5 TO 2.0 MILS D.F.T.
- COLOR: TBD

STANDARD DRAWING STANDARD

NO.	REVISIONS	BY	DATE
A	GENERAL REVISION	SM	04APR01

SCALE 1:64 | DRAWN BY SM | DATE 02APR01 | CHKD BY | DATE

TITLE

780 kW GENERATOR SET ALUMINUM ENCLOSURE ELEVATION, PLAN & SIDE VIEW BCS 780KW PRIME

SIMPSON POWER PRODUCTS LTD.
11845 Kingston St., Maple Ridge (Vancouver), B.C., Canada, V2X 0Z5
Tel: (604) 460-3611, Fax: (604) 460-1974, Parts Direct: (604) 460-3301

WORK ORDER	PHASE NO.	DWG. NO.	REV.
12815	2000	12815-3A	A

GROUP	GAS	PRODUCT INFORMATION	INDEX
IC		IC-G-B-48-033	
POWER RATING		DATE 16-08-07	DEP. 2

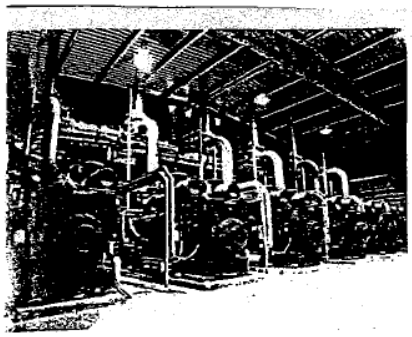
ENGINE:	**SFGLD 480**	**SPEED:**	**1800**
JACKET WATER TEMPERATURE(ºC):	**90**	**FUEL TYPE:**	**Natural Gas**
INTERCOOLER WATER TEMP(ºC):	**55**		

APPLICATION:	**CONTINUOUS**			COMPRESSION RATIO:	**11.8:1**
COOLING SYSTEM:	**TWO CIRCUITS**			REGULATION:	**Electronic**
				IGNITION TIMING:	**10º**
EXHAUST MANIFOLD TYPE:	WATER COOLED			MAX. BACK PRESSURE:	**450 mmH2O**
EMISSIONS:					
NOX	mg/Nm3 (8)	**450**		AMBIENT CONDITIONS ISO 3046/1:	
CO	mg/Nm3(8)	**<800**		Atmospheric pressure (kPa)=	**100**
NMHC	mg/Nm3	**<300**		Ambient temperature (ºC)=	**25**
				Relative humidity (%)=	**30**

POWER RATING (4)			NOMINAL	PARTIAL LOADS		
LOAD		%	**100%**	80%	60%	40%
MECHANICAL POWER	**(3, 4, 5)**	kWb	**906**	725	544	362
BMEP		bar	**126**	101	76	5
FUEL CONSUMPTION	**(1)**	kW	**2495**	2040	1595	1135
THERMAL EFFICIENCY		%	**36,3**	35.5	34.1	31.9
HEAT IN MAIN WATER CIRCUIT	**(1)**	kW	**654**	555	462	350
HEAT IN SECONDARY WATER CIRCUIT	**(1)**	kW	**255**	195	144	102
HEAT IN CHARGE COOLER	**(1)**	kW	**155**	102	58	22
HEAT IN OIL COOLER	**(1)**	kW	**100**	93	86	80
HEAT IN EXHAUST GASES (25 ºC)	**(1)**	kW	**647**	536	419	301
HEAT IN EXHAUST GASES (120ºC)	**(1)**	kW	**497**	414	326	236
EXHAUST GAS TEMPERATURE	**(1)**	ºC	**435**	445	453	461
HEAT TO RADIATION	**(1)**	kW	**33**	29	26	20
CARBURETION SETTINGS (2)						
O_2 TO EXHAUST(DRY)(ONLY A REFERENCE)		%	**8.0**	7,8	7,5	7,2
MASS FLOWS						
INTAKE AIR FLOW	**(1)**	kg/h	**4750**	3830	2940	2080
EXHAUST GAS FLOW (WET)	**(1)**	kg/h	**4940**	3990	3060	2160

NOTES:

1. 100% LOAD TOLERANCES:
   FUEL CONSUMPTION ±5%,
   COOLING CIRCUIT AND EXHAUST GASES ± 15%, RADIATION ±25
   EXHAUST TEMPERATURE ±20ºC, MASS FLOWS ± 10%.
2. THE ENGINE PERFORMANCE DATA, TIMING ADVANCE AND CARBURETION SETTINGS ARE VALID FOR A GAS THAT FULFILS THE REQUIREMENTS DEFINED IN IC-G-D-30-001, IC-G-D-30-002 AND IC-G-D-30-003
3. NET POWER, MECHANICAL PUMPS NOT INCLUDED.
4. POWERS ARE VALID FOR AMBIENT TEMP.< 25ºC AND AN ALTITUDE OF < 500m. OTHER CONDITIONS IN IC-G-B-00-001
5. OVERLOAD NOT ALLOWED
6. THE SPECIFICATIONS AND MATERIALS ARE SUBJECT TO CHANGE WITHOUT NOTIFICATION
7. A ENGINE WITH INLET OR OUTPUT RESTRICTION OVER PUBLISHED LIMITS, OR WITH INADEQUATE MAINTENANCE OR INSTALLATION CAN MODIFY POWER RATING DATA.
8. EMISSIONS ARE CORRECTED TO 5% OF O2



POWER GENERATION APPLICATIONS

RATINGS 1200/1500 RPM

Engine Model		SFGLD 180	SFGLD 240	SFGLD 360	SFGLD 480	SFGLD 560
Continuous Rating	kWb	/314	335/419	/628	670/838	792/985

Continuous rating: Output available without load variation for an unlimited time

RATINGS 1800 RPM

Engine Model		SFGLD 240	SFGLD 480
Prime Rating	kWb	453	906
Stand-By Rating	kWb	527	1026

Prime rating: Unlimited time of operation at 80% load average with full load limited to 750 hours/year
Stand-by rating: Output available with variable load for the outage period. Maximum 250h/year

ENGINE SPECIFICATIONS

Engine Model		SFGLD 180	SFGLD 240	SFGLD 360	SFGLD 480	SFGLD 560
Configuration		6L	8L	12V	16V	16V
Rotating Speed	RPM	1200/1500/1800				1200/1500
Bore x Stroke	mm(in)	150(5.98) x 165(6.50)				160(6.3) x 175(6.89)
Displacement	L(cu.in)	18 (1096)	24 (1465)	36 (2197)	48 (2929)	56 (3417)
Compression Ratio		11.7:1				
Piston Speed	m/s(ft/min)	9.91 (1950) @ 1800 rpm				8.75 (1722)
Efficiency	%		38.5		36.5	37.5
Emissions						
NOx (##)	gr/bhp-hr		2		2	2
CO (##)	gr/bhp-hr		1.5		1.5	1.5

(##) Lower emissions are available

GUASCOR

GAS ENGINE GENERAL CHARACTERISTICS (SFGLD)

ITEM	UNITS	SFGLD 180	SFGLD 240	SFGLD 360	SFGLD 480	SFGLD 560
No of Cylinders		6 in line	8 in line	12 Vee	16 Vee	16 Vee
Cycle		4 stroke				
Cylinder Dia. X Stroke	mm	152 x 165				160 x 175
Displacement	L	18	24	36	48	56
Compression ratio		9.3:1 Stand-by 11.7:1 Prime and continuous				
Speed range	rpm	1200 -1800				1200-1500
Piston speed	m/sec	9.9 (1800 rpm)				8.75 (1500 rpm)
Low idle	rpm	650 - 750				
Flywheel Housing/Flywheel		SAE 0/18"		SAE 00/18"		
Engine Weight	kg	2620	3400	4055	5300	5800
COOLING SYSTEM						
Types		Water/air intercooler, Heat exchanger, Radiator				
Main circuit capacity	L	50	65	180	200	200
Normal Jacket water operatin	°C	75/90				
Auxiliary Water Temp. (in)	°C	55	55	55	55	50
LUBRICATION SYSTEM						
Normal lube oil pressure	Bar	4.5 - 6				
Oil capacity (oil sump)	L	70	90	180	210	210
COMBUSTION SYSTEM						
Type		Lean Burn (Lambda 1.5 - 1.7				
Fuel		Natural/Digester/landfill gas				
Carburation		Woodward Deltec, Tecjet, Flo-Tech, EGS-01				