



Diesel



Watercooled

**60
Hz**

Model: ETCG1000

INDUSTRIAL RANGE

Powered by CUMMINS



Generating Rates

POWER RATING	PRIME CONTINUOUS STANDBY			
	Rated Output	kVA	910	750
	kW	725	600	800
Rated Speed	rpm	1800		
Standard Voltage	V	480 (± 5%)		
Number of Phase	Ø	3		
Rated Frequency	Hz	60		
Rated Power Factor	Cos Phi	0.80		
Sound Pressure Level	dBA	≤120 (1 meter distance)		

Assembly--The engine and alternator are close coupled by means of an SAE flange. A full torsional analysis has been carried out to guarantee no harmful vibration will occur. Anti-vibration pads are affixed between engine alternator feet and heavy duty steel baseframe contained in a sound attenuated and weatherproof enclosure. For durability and corrosion resistance, all iron and steel surfaces of canopy fabrications have been treated for coating by grit blast cleaning. (Crankshaft data-1000kg max overhung weight on rear bearing)

ISO 3046 Part 1 Standard Reference Condition--100 kpa (barometric), 25°C (temperature), 110m (altitude), 30% (relative humidity), 254 mmH₂O (intake), 51 mmH₂O (exhaust), low gaseous emission that will satisfy the requirements of ½ TA Luft (1986) with 700 Mg/Nm³ SO₂ and 2000 Mg/Nm³ NO₂ 5% O₂ limits for power generation engines.

Continuous Power--is applicable for supplying utility power at a constant 100% load for an unlimited number of hours per year. No overload capability is available for this rating.

P.R.P. Prime Power - ISO 8528--Prime power is the maximum power available during a variable power sequence, which may be run for an unlimited hours usage with an average load factor of 80% of the Published Prime Power over each 24 hours period. A 10% overload is available for every 1 hour in every 12 hours operation.

Standby Power (ISO 3046 Fuel Stop power): power available for use at variable loads for limited annual time (500h), within the following limits of maximum operating time: 100% load 25h per year – 90% load 200h per year. No overload available. Applicable in case of failure of the main in areas of reliable electrical network.



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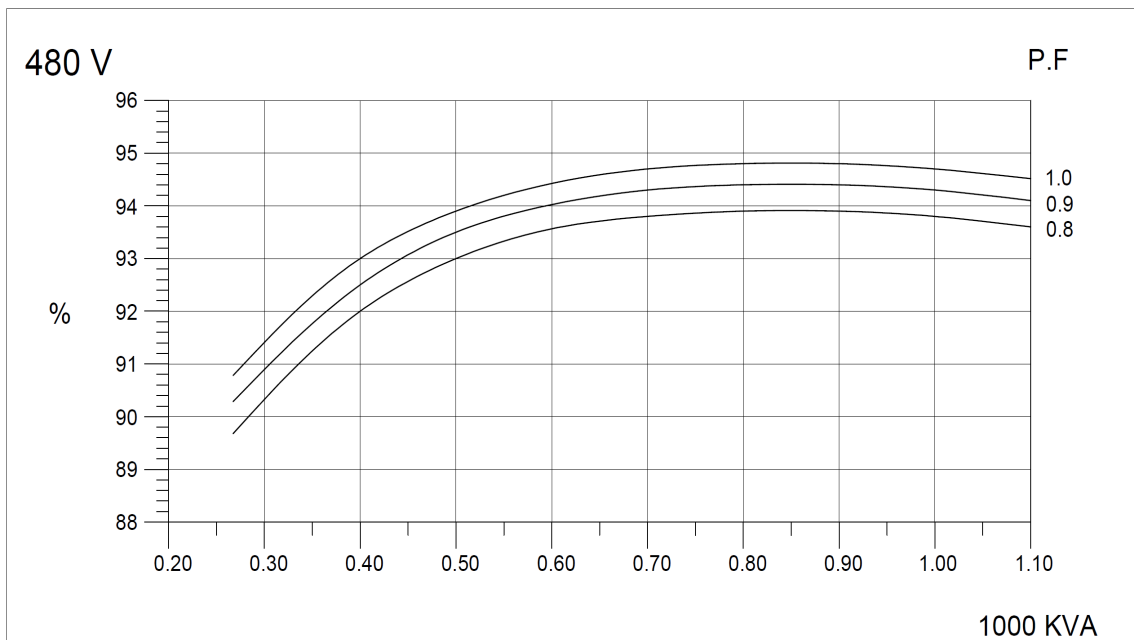
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Diesel Generator Set Efficiency Curve



Diesel Generator Set Efficiency Data @ 0.8 PF

GEN-SET OUTPUT (KW/KVA)	GEN-SET LOSSES (KW)	ENGINE OUTPUT (KW)	GEN-SET EFF. (%)
240/300	26	266	90.22
320/400	28	348	91.95
400/500	30	430	93.02
480/600	33	513	93.57
560/700	37	597	93.80
600/750	40	640	93.75
640/800	41	681	93.98
720/900	47	767	93.87
800/1000	53	853	93.78
880/1100	60	940	93.62



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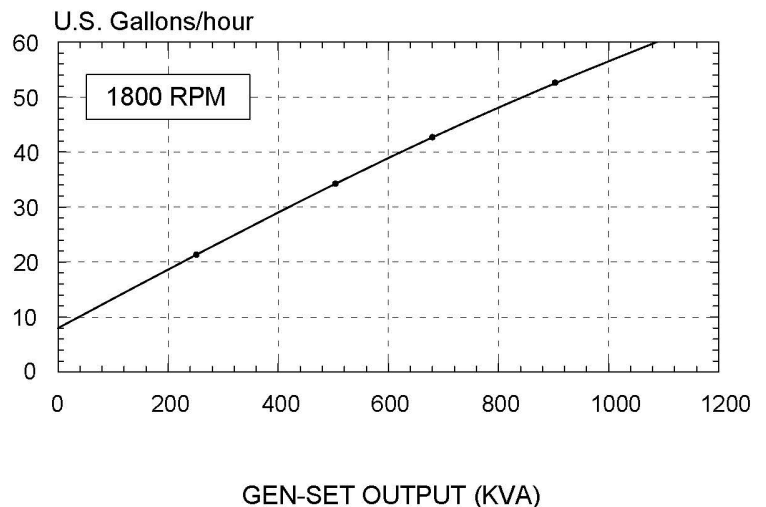
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Diesel Generator Set Performance Data

OUTPUT POWER		FUEL CONSUMPTION			
%	KW	Li/ kw-hr	kg/ kw-hr	liter/ hour	U.S Gal/ hour
STANDBY POWER					
100	800	0.267	0.227	213.8	56.5
PRIME POWER					
100	725	0.274	0.233	198.7	52.5
75	544	0.297	0.253	161.6	42.7
50	363	0.358	0.305	130.2	34.4
25	181	0.447	0.381	81.0	21.4
CONTINUOUS POWER					
100	600	0.275	0.234	165.0	43.6
75	450	0.311	0.265	140.0	37.2
50	300	0.303	0.258	91.0	24.0
25	150	0.406	0.345	61.0	16.0



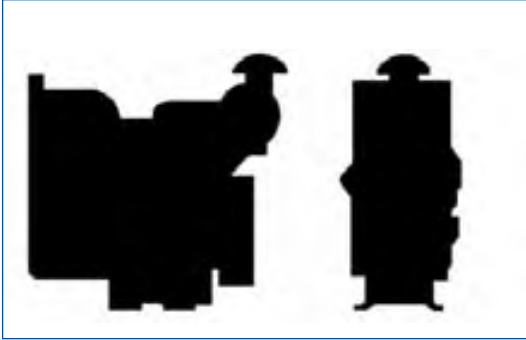
CONVERSION: (Litres = U.S Gal x 3.785)

PERFORMANCE DATA

All data is based on:

- Engine coupled with alternator operating with fuel system, water pump, lubricating oil pump, air cleaner and exhaust silencer; including battery charging alternator, and radiator fan.
- Engine coupled with alternator operating with fuel corresponding to grade No. 2-D per ASTM D975.
- ISO 3046, Part 1, Standard Reference Conditions of:
 - Barometric Pressure : 100 kPa (29.53 in Hg) Air Temperature : 25 °C (77 °F)
 - Altitude : 110 m (361 ft) Relative Humidity : 30%

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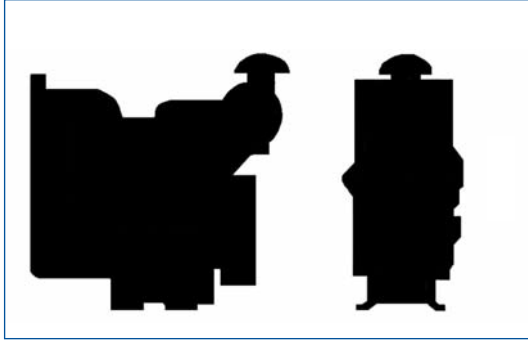
Engine Specifications 1800 r.p.m.

ENGINE		PRIME CONTINUOUS STANDBY			
Rated Output	kW	809	671	895	
Manufacturer		Cummins (China)			
Model		KTA38-G2			
Number of Cylinder		12			
Arrangement and Cycle		60° V - type 4 stroke			
Bore x Stroke	mm	159 x 159			
Compression ratio		14.5:1			
Displacement	L	38			
Piston Displacement and Speed	mm	159			
	m/s	7.9			
Type of Injection		Direct injection Cummins PT Pump			
Type of Governor		Electronic			
Engine Mean Effective Pressure	kg/cm ²	14.3	12.1	16.2	
Idle speed and duration	rpm	725 - 775			
	min	<1			
Minimum load at normal speed	kW	242.7			
Heat dissipation	KJ/hr	1395.67			
Direction of rotation		Anti-clockwise viewed from flywheel			
Fuel Data		To conform to BS2869 class A2			
Continuous fuel consumption	Load	100%	75%	50%	25%
	L/kWh	0.253	0.259	0.275	0.332

ENGINE--Industrial 4 stroke cooled diesel engine made of high tensile strength, stressed relieved cast iron cylinder block. Forged micro alloy crankshaft and camshaft surface and hardened bearing surfaces to 1 micron smoothness. Developed from a proven engine range that offers superior performance and reliability, that last 15 years operating at rated load

Ratings--Electrical ratings are based on average alternator efficiency and are for guidance only. Initial Load Acceptance (cold start), when engine reaches rated speed (15 seconds max. after engine starts to crank). Prime 70%, Load 412kW, Frequency deviation ≤-10%, Frequency recovery 5sec.

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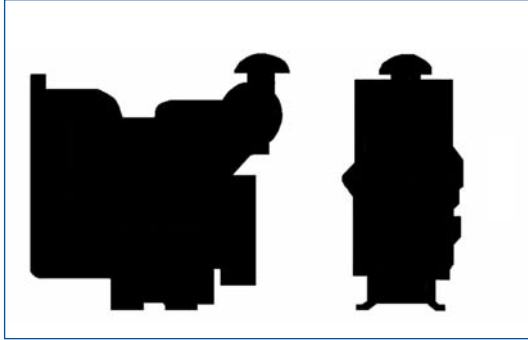


Engine Specifications 1800 r.p.m.

FUEL SYSTEM		
Fuel injection type		Direct injection
Fuel injector nozzle		Cummins PT
Fuel delivery pump (feed)	m ³ /hr	0.428
Discharge head (feed pump)	m	2.5
Fuel injector pressure	kg/cm ²	220 ATS (NOP) 14.276 (max operating pressure)
Fuel filter	microns	10
Governor type		Electronic
Fuel day tank capacity	m ³	1.8
Fuel day tank type		Elevated (Outdoor)
Tank dimension (L x W x H)	m	1.219 x 1.219 x 1.219
Tank shell thickness	mm	5
Tank plate material	ASTM	A 36

FUEL SYSTEM--Recommended fuel to conform to BS2869 1998 class A1, A2. Features Direct fuel injection system, fuel lift pump, fuel cooler, flow meter in supply and return fuel lines.

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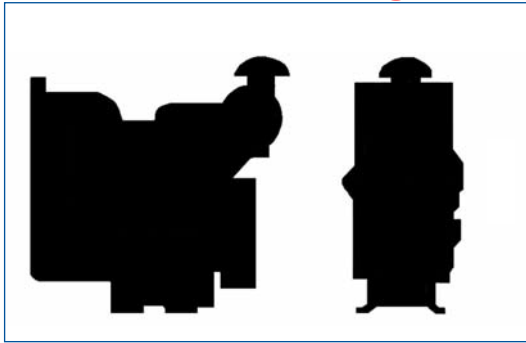
Engine Specifications 1800 r.p.m.

LUBRICATION SYSTEM

Oil cooler type/method		Water cooled
Oil pressure	kg/cm ²	1.402
Oil temperature		121 °C (250 °F) max
Oil pump capacity	m ³ /hr	27
Oil Purifier type/capacity		Free jet centrifuge 8 liters
Oil consumption	g/kwh	<0.98
Oil filter	microns	40
Total oil system capacity	L	135

LUBRICATION SYSTEM--Recommended lubricating oil to conform with the specification of API CG4 15W/40. Features wet sump with filler and dipstick, Lubrication oil filters, Oil cooler with separate filter head. (Priming pump not applicable)

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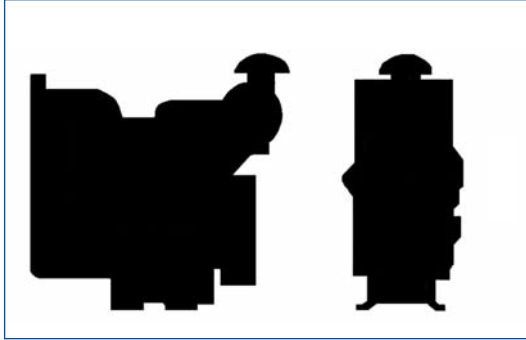


Engine Specifications 1800 r.p.m.

COOLING SYSTEM		
Nominal jacket water pressure	kg/cm ²	1.734
Max top temperature	°C	100
Radiator area and materials		3.505 m ²
		3 rows of brass tubes
Fan air flow	m ³ /hr	109530
Radiated heat to ambient	kW/hr	101
Cooling pump capacity	m ³ /hr	88.56
Jacket pump capacity	m ³ /hr	43.2
Total Coolant Capacity	L	202
Radiator dimension (L x W x H)	m	2.003 x 1.750 x 0.803
Cooling water properties	ASTM	D6210
PH value	ppm	7 to 7.5
Total Hardness	mg/l	460
Total dissolved solids (TDS)	ppm	900
Chloride	ppm	<80
Sulfate	ppm	80
Silica	mg/l	<30
Iron	ppm	0.3
Conductivity	µS/cm	1.2

COOLING--Recommended coolant: 50% inhibited ethylene glycol or 50% inhibited propylene glycol and 50% clean fresh water. For combined heat and power systems and where there is no likelihood of ambient temperature below 10°C, then clean soft water may be used. Features twin thermostats, water pump, radiator supplied loose incorporating air-to-air charge cooler, elevated expansion tank not applicable. System design for ambients up to 35°C to 50°C.

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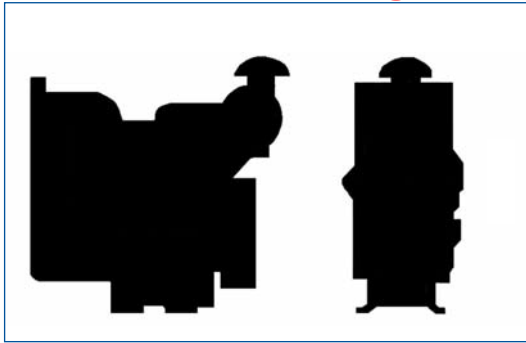
Engine Specifications 1800 r.p.m.

ELECTRICAL SYSTEM

Type		Insulated return
Starter motor rating	HP	10.05
Alternator		55 amps at 24 volts, stabilised output at 20 °C ambient
Battery capacity	AH	150
Charging type		Battery charging alternator
Time of cranking	sec	10
From start to rated speed duration	min	0.25
Cold start to rated speed (Load)	min	0.34
Starting voltage system	V	Electric 24VDC
Full load cranking current (cold)	A	890

ELECTRICAL SYSTEM--24V starter motor, 24 volt 55 amps battery charging alternator with integral voltage regulator and activating switch. High capacity lead acid battery, and battery tray mounted on the generator base frame, and heavy duty interconnecting cable with terminations.

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Engine Specifications 1800 r.p.m.

INDUCTION SYSTEM

Type		Turbocharged
Turbocharger type		Nature aspiration
Charge air cooler type		Air-to-air
Turbocharger speed	rpm	100,000
Air intake restriction		274 mm H ₂ O clean filter 635 mm H ₂ O dirty filter
Combustion Air intake flow	m ³ /hr	3312
Air filter type		Dry - paper

INDUCTION SYSTEM--Mounted standard twin air filter element. Turbocharged and air-to-air charge cooled with restriction indicator setting. (optional - Heavy-duty air cleaners - paper element with pre-cleaner.)

EXHAUST SYSTEM

Manifold type		Dry
Exhaust gas flow	m ³ /hr	11400
Exhaust gas temperature	°C	485
Exhaust back pressure	mm H ₂ O	1033
Exhaust pipe (Ø x L x Weight)		152 mmØ x 1500 mmL x 9 kgWeight
Exhaust pipe material	ASTM	A 106
Silencer (Ø x L x Weight)		500 mmØ x 1200 mmL x 60 kgWeight
Silencer material	ASTM	A 106

EXHAUST SYSTEM--Heavy duty industrial exhaust silencer with flexible piping. Exhaust flange outlet. (optional - industrial, residential, critical muffler.)

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Alternator Technical Specifications

ALTERNATOR		ETONE (China)
Model		ET634C
Continuous Rated Output	kW	600
Number of Phase	Ø	3
Rated voltage	V	480 (± 5%)
Frequency	Hz	60
Angular speed	rpm	1800
Power factor	Cos Phi	0.80
Number of pole		4
Number of bearing		2
Number of leads		6
Winding connection		Wye connection with neutral
Steady Voltage Precision		± 1%
Efficiency at 100% load		94%
IP Rating		IP23 (drip proof)
TIF (1960 Weightings)		<50

ALTERNATOR--Etone industrial generators meet the requirements of BS EN 60034 and the relevant section of other international standards such as BS5000, VDE 0530, NEMA MG1 - 32, IEC34, CSA C22.2 100, AS1359. Rotating field synchronous AC generator, 3-phase horizontal shaft. Brushless, self exciting system, with AVR standard. ANSI class H insulation (armature and windings), temperature rise is limited to class B. Can operate satisfactorily though the terminal voltage may vary at ± 5% of rated frequency, voltage, kilo-voltampere, and power factor value. Screen protected, drip proof rated in accordance with IEC60034. Voltage regulation maintained within ±0.5% from no load to full load between 0.8 lagging and unity. All standard voltages available.

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Control Panel Technical Specifications

Control Panel - COMAP ICNT

The mounted control panel in a vibration isolated steel IP65 enclosure. The control panel is equipped as follows:

- a) Compact gen-set controller for gensets operating in multiple island and/or parallel to mains mode (together with MainsCompact NT)
- b) Cooperation of up to 32 gen-sets
- c) Simple paralleling (easy wiring, installation and programmable logic controller)
- d) Alpha numeric screen and annunciator window with horn output alarm, user programmable fault reports and data logger

Main Features

- Δ Generator measurements: Voltmeter (V), Ammeter (A), Kilo-Watt meter (kW), kVAr (3 phase, true RMS), Frequency (Hz), including energy counters
- Δ Bus measurements: V (3 phase, true RMS), Frequency (Hz)
- Δ Generator and Engine protections (incl. Vector Shift)
- Δ Automatic synchronizing and load control (via speed governor or ECU)
- Δ AVR control (Volt and PF control)
- Δ Digital active and reactive load sharing
- Δ Advanced power management function
 - Load Dependent Start/Stop
 - Load Demand Swap
 - Running Hours Equalization
- Δ Wide range of communication interfaces – RS232, RS485, USB, Modbus, GSM/Analog modem, GPRS, Ethernet
- Δ Support of electronic controlled engines (J1939, Modbus)
- Δ Event based history with capacity for nearby 200 records.

Protection Circuits

- Δ Annunciator (ANSI code 30)
- Δ Directional power relay (ANSI code 32)
- Δ Ground protective relay (ANSI code 64)
- Δ Engine overspeed (ANSI code 12)
- Δ Field relay (ANSI code 40)
- Δ Reverse phase relay (ANSI code 46)
- Δ AC time/instantaneous overcurrent relay (ANSI code 50/51)
- Δ Generator under/overfrequency (ANSI code 81H/81L)
- Δ Generator undervoltage (ANSI code 27)
- Δ Overvoltage Relay (ANSI code 59)
- Δ Phase sequence (ANSI code 47)
- Δ Synchronism check (ANSI code 25)
- Δ Thermal relay (ANSI code 49)
- Δ Tripping relay (ANSI code 94)

Instruments and Indication

- Watt-hour meter
- Running hour counter (hours)
- Engine speed (rpm)
- Oil pressure (high/low) (kg/cm²)
- Oil temperature (high/low) (°C)
- Coolant temperature (high/low) (°C)
- Fuel level (high/low)
- Battery voltage (high/low) (V)
- Power factor meter
- Current (L1-L2-L3)
- Voltage (L-L, L-N)
- Cylinder exhaust gas temperature (°C)



Interface Control

- Manual start/stop and auto/remote start button
- Auto test run and emergency stop button
- Ready start indicator
- Fault reset button
- Alpha Numeric Screen
- Discrete status indicator
- Breaker open and close position
- Remote control position

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Generating Sets Standard Features

Three phase four wire, output voltage 480V ($\pm 5\%$), 60HZ, between 0.8 lagging, protection capability according with the standard of NEMA 1 and IP23.

General Features:

- ΔComposed of Perkins diesel engine and Etone alternator
- ΔOil and fuel filter fitted, water separator
- ΔLube-oil drain valve fitted
- ΔElectric Starter Charge motor 24 VD.C
- ΔWater-cooled
- Δ8-hours operation base tank
- ΔAuto start, Failure to crank, and Overcrank
- ΔOptional soundproof and weatherproof canopy
- Δ3 pole ACB Chint (China) breaker 480V, 1000A (continuous), 30kA (symmetrical)
- ΔOperation & Maintenance manual
- ΔSpecial Integrated Steel Base tank and sprayed overall in gloss enamel paint

Voltage Regulation:

- Voltage regulation maintained within $\pm 0.5\%$
- Between 0.8 and 1.0 lagging and unity
- From no load to full load
- At speed drop variation upto 4.5%

Frequency Adjustable Ratio:

- Change load from 0-100%, within 1.0% (electric speed regulator), within 4.5% (mechanical speed regulator)

Frequency Undulation:

- load from 0-100%, frequency undulation within 0.25%
- No load wire volts max undulation ratio within 1.8%
- Three Phrase balanced load in the order of 5%
- Effect factor of Telecom
- TIF better than 50
- THF to IEC60034 Part 40 better than 2%

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Generating Sets other Features

Generating Sets Optional Features

- ΔLow fuel level alarm shutdown
- ΔAutomatic Fuel Filling System
- ΔEngine oil feeding and drain pump
- ΔAuto Transfer Switch(ATS)
- ΔParallel control panels
- ΔCircuit Breaker MCCB & ACB
- ΔRemote Control Panel
- Δweatherproof/soundproof Canopy
- ΔTrailer type Gensets

Quality Standards

ISO9001:2000,ISO14000,ISO3046/1
ISO8528 BS4999
BS5514,AS1359,ICE34
CE Compliance

Assembly

Manufacturer:	Etone Power Co., Ltd.
Design code:	ISO 9001:2000
Dimensions (L x W x H):	4.1m x 1.7m x 2.3m (on skid - open type)
Weight:	5113 kg (on skid - open type)