

TECHNICAL SPECIFICATIONS - PRIME RATED GENERATOR
0.5 kVA to 5 kVA

1. GENERAL AND SCOPE OF SUPPLY

This section specifies the design, manufacture, supply to the site, install, testing and commissioning of one low voltage Prime rated generator.

The Generator supplier shall have accredited agency in Sri Lanka for the make of generator set offered and also shall have proven record of providing after sales services including maintenance services at least during last five years. The generator set shall be brand new, having petrol/kerosene engine and alternator, and the offered make & type shall have satisfactory service record in Sri Lanka at least during last five years.

The generator shall be installed at the location indicated in the drawings. Generator body and Generator neutral shall be solidly earthed.

The set is to be reasonably self-contained to minimize the installation work at site. The engine and alternator shall be mounted on a combined underbase of stress relieved fabricated steel and engine accessories shall also be mounted on the under base where appropriate, provided that this does not result in difficulty of access for maintenance.

The set is to be mounted on suitable arrangement of antivibration mounting designed to minimize the transmission of vibration but without resulting in excessive amplitudes of movement of any parts of the set. If rubber is employed in the mounts, their design should incorporate means of preventing deterioration due oil leakages.

2. STANDARDS

The following Standards apply:

- BS 5000 Part 3 - Generators to be driven by Reciprocating Internal Combustion Engines
- BS 5514 (ISO3046) - Specification for Reciprocating Internal Combustion Engines Part 1-6
- BS 5486 (IEC 439) - Factory Built assemblies of Low Voltage Switchgear and Control Gear
- BS 4999(IEC34-1) - General requirements for Rotating Electrical Machines

3. DESIGN CRITERIA

Rated continuous output shall be not less than* kVA at 0.8 power factor at generator output terminals. (Based on 35°C ambient temperature, a relative humidity of 90% and at altitude of* m MSL.)

The unit shall be capable of delivering the rated output for continuous period of not less than 12 hours at a time. It shall have overload capacity of 110% of the rated output for one hour during a period of 12 hours.

Note : * To be specified by the Employer.

3.1 **ENGINE**

Number of strokes	- 2 or 4
Speed	- 1500 rpm - 3600 rpm
Cooling	- Air-cooled
Loading	- Asynchronous motor loads of upto 100% may be switched on with a maximum admissible speed droop of twelve (12) percent.

3.2 **GENERATOR**

Frequency	- $50 \pm 2\%$ Hz
Voltage	- 400/230 V $\pm 5\%$ 3 phase & neutral
Speed	- 1500 rpm - 3600 rpm
Deviation Factor of voltage wave form	- 5%
Insulation Class for rotor and stator windings	- H
Protection class of enclosure	- IP 23

4. **DETAIL REQUIREMENTS OF THE GENERATOR**

4.1 **ENGINE**

Petrol/Kerosene engine shall be of a well-proven make, complying with the requirements of BS 5514 (ISO 3046). The engine shall meet all the performance requirements of the set under the specified operating conditions and shall be suitable for operation on Petrol Octane 90 or Kerosene meeting the Ceylon Petroleum Corporation standards.

A sturdy elastic coupling shall connect the engine and the generator, and both shall be mounted on a common base plate forming part of the supply, Proven and highly effective antivibrating mountings shall be provided.

The engine shall be started manually by a re-coil start system and disengaging automatically when the engine starts.

The engine shall be air cooled.

Lubrication of the engine shall be by means of an engine driven integral pump or splash lubrication system.

The engine shall be provided with following protection devices for alarm and shutting down the engine automatically.

- Low lubricating oil pressure / Oil Alert where crank case oil drop below safe level
- Engine overspeed

4.2 GENERATOR

Generator shall comply with BS 5000 (IEC 34-1) and shall be brush or brushless design.

Generator shall be directly coupled to and share a common bedplate with the prime mover. The degree of protection for the generator and exciter shall be not less than IP 23.

Cooling of the generator shall be by a radial-flow fan. Generator bearings shall be of the ball or roller type, rated for long life and prepacked with sufficient grease for operating over a long periods without replenishment.

The stator and field windings shall consist of electrolytic copper conductors insulated throughout with Class H materials as defined in IEC 85. A generator winding temperature detector (thermistor) installed at the hottest spot and wired to give alarm and shoutdown.

Voltage regulation should be maintained within $\pm 2\frac{1}{2}\%$ from no load to full load including cold to hot variation at any power factor from 0.8 to unity.

Neutral shall be solidly earthed. Generator shall be protected using suitable Circuit Breaker with short circuit & earth fault protection. Suitable terminals or full capacity 3-phase, N&E outlet with a suitable plug shall be provided at the Generator panel for connection to the load.

4.3 FUEL STORAGE

The following shall be supplied with the unit.

4.3.1 Integral Fuel Tank

- The Engine shall have one integral metal fuel tank (capacity sufficient for 2 hrs. - 5 hours operation at full load and shall be installed in a position where any fuel leakage cannot impinge on exhaust pipe or other hot engine surfaces. The tank shall be provided with all necessary fittings including fill, vent, drain, overflow line and level indication.

5. TESTS

The required tests shall be carried out to show that the generator set meets the duty requirements specified.

6. OPERATION AND MAINTENANCE MANUALS

The Operation and Maintenance manuals of equipment supplied shall be furnished with the generator set with detail diagram of wiring of equipment, frequency of lubrication, operating instructions, etc.

7. FREE MAINTENANCE AND DEFECTS LIABILITY PERIOD

The contractor shall provide regular maintenance services as per the manufacturer's instructions, which shall include but not limited to the following work, during the twelve (12) months warranty period.

- Inspect, clean, oil and grease where necessary
- Adjustment of machinery
- Replacement of any defective parts

TECHNICAL SCHEDULE – PRIME RATED DIESEL GENERATOR
0.5 kVA to 5 kVA

REF.		UNITS	PARTICULARS	
			As Specified	As Offered
1	<u>Diesel Engine</u>			
1.1	Manufacturer's Name			
1.2	Country of Origin			
1.3	ISO rating	kW brake		
1.4	Site rating at 35°C and m MSL	kW brake		
1.5	Speed	rpm		
1.6	Type of Lubrication System		Splash/pump	
1.7	Noise Level	dba		
1.8	Year this type was put in service			
1.9	Integral Fuel tank		Mounted integrally with engine	
	Capacity	litre	For 2hrs.-5hrs. full load operation	
	Fitted with level gauge		Yes	
2	<u>A.C. Generator</u>		Clause 4.2	
2.1	Manufacturer's name			
2.2	Type			
2.3	Country of Origin			
2.4	Rated output	KVA		
2.5	Terminal voltage	V		
2.6	Power factor	Cosφ	0.8	
2.7	Frequency	Hz	50	
2.8	Winding Connection		star	
2.9	Insulation Class		H	
2.10	Applicable Standard		Clause 2	
2.11	Weight of complete alternator	Kg		
2.12	Generator mechanical protection class		IP 23	
3	<u>Generator Automatic Voltage Regulator</u>			
3.1	Manufacturer's name			
3.2	Type			
3.3	Range of manual voltage control	V		
3.4	Brush/Brushless			
4	<u>Generator Circuit Breaker</u>			
4.1	Applicable standard		BS or Eq.	
4.2	Manufacturer's Name			
4.3	Type			
4.4	Country of origin			
4.5	Rated current	A		
4.6	Rated voltage	V	400	
4.7	Breaking capacity		(mini. 5kA)	
4.8	Inherent protections provided			
	Short circuit		Yes	

REF.		UNITS	PARTICULARS	
			As Specified	As Offered
5	Overcurrent Range of adjustment of overcurrent Range of adjustment for under voltage Type of Connection to the load		Yes% to.....%% Fully rated output socket and plug	

BILL OF QUANTITIES

**SUPPLY, INSTALLATION, TESTING & COMMISSIONING OF PRIME RATED GENERATOR
0.5 KVA TO 5 KVA**

Item No	Description	Unit	Qty	Amount Before VAT (Rs.)	Amount After VAT (Rs.)
1	Supply & Delivery Petrol/Kerosene Generator to the specified location.	Item	1		
2	Installation of Generator complete with Control Panel, Inter connecting cables, Generator Earthing, Control Cabling and other accessories as per specifications.	Sum			
3	Testing & Commissioning and Training of owner's staff assigned for generator operation.	Sum			
	Sub Total				
	Discount if any (.....%)				
	Sub Total after Discount				
	VAT				
	Total				

Tenderer's VAT No. (if any)

Tender Amount before VAT (in words) Rupees

Tenderer's Signature :

Tenderer's Seal :

Date :