

Chapter 7 POWER SUPPLY --- SYSTEMS

Introduction

This section has been prepared to facilitate the selection of appropriate power generating equipment suitable for installation as a part of emergency relief operations.

The range of equipment covered essentially addresses the requirements of electric power in an emergency relief camp with about three thousand to four thousand persons housed in approximately 800 - 1000 temporary shelters.

Camps of approximately the above size are estimated to require about 50-60 kVA to cope with the primary needs of adequate lighting in the community kitchens and security lighting, whilst also allowing some minimal lighting of the shared facilities such as toilets etc., and of the shelters themselves.

Apart from the above, there are perceived some specific power requirements for mobile communications and also for a field office set-up, which are desirable for the effective functioning of the personnel from relief organizations. These aspects are estimated to require approximately 5 kVA for basic office equipment, and a minimum of 0.3 kVA for mobile communications equipment.

It is recommended that when power generating sets of the larger capacities are purchased for emergency relief (i.e. over 45 kVA), these should be obtained along with weather proof or acoustic canopies, as available, to minimize the nuisance from noise, and also to obviate the need for provision of a separate shelter for the power generating equipment itself.

As a rule, the power generating equipment listed in this catalogue will need to be installed and commissioned at emergency sites. Hence, it is unlikely that properly prepared foundations can initially be made available. These are intended for standby duty in more permanent installations.

However, the smallest power generators (below 1.0 kVA) are suitable for use without any special foundations, whereas the larger equipment can be used for several days simply placed on firm and well-levelled ground (which must be able to support the weight of the set).

Basis for estimating power requirements

For the purpose of classification, the power supply equipment is categorized into the three generic types of:

- Power supply for 800 - 1000 emergency relief shelters
- Power supply for a field office of the relief agency
- Power supply for mobile communications

The power requirements for each of the above are arrived at as follows:

- (i) Lighting for 800 - 1000 temporary shelters
(an average lighting of 20 - 30 watts in each shelter)
to house 3000 - 4000 persons (approx) 20 kW
- Security lights for camp as above 15 - 20 kW
- Lighting/power for community kitchens, first-aid rooms, toilets 15 - 20 kW



(ii) **Lighting/power for a field office equipped with:**

<u>Appliance</u>	<u>Approx. power requirements (kW)</u>
Computer (personal)	0.3 - 0.5
Computer (laser printer)	1.0
Lights (bulbs)	0.03 - 0.1
Lights (fluorescent tubes)	0.02 - 0.1
Lights (security, halogen)	0.1 - 0.5
Photocopier (desktop)	1.0 - 2.0
Typewriter/Word processor	0.2 - 0.4

(iii) Mobile communications systems of A, C and M types are currently supplied with a power requirement ranging between 120 watts and 250 watts.

Spare Parts

It is recommended that spare parts packs be ordered together with the equipment (for regions with poor or non-existing local services). Suppliers or IAPSO may be contacted for details of the content of recommended spare parts packs.

Some notes on installation

Advance planning and installation work is desirable before arrival of the larger power generators at site.

Some aspects to be considered in planning installations at emergency relief sites include:

a) Generator Location

The larger generators are supplied with anti-vibration mounts and on a fabricated skid base, which allows the equipment to be installed for temporary use without elaborate foundations.

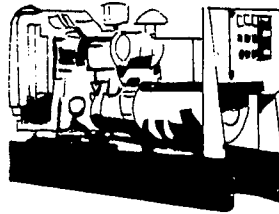
However, it is important to ensure that the area of installation is on a firm and hard ground surface, which must be carefully checked and levelled. Any irregularities which can lead to unbalanced seating of the set on its base must be completely eliminated, and full and secure seating confirmed before starting up of the equipment.

b) Foundations

Though, the power generating sets may be used temporarily as above, without specially constructed foundations. It is important that proper foundations are prepared according to the manufacturer's specifications as soon as possible.

**DIESEL GENERATING
SETS, 60 kVA**

Shipping weight: Approx. 1000 kg
Shipping volume: Approx. 3 m³
UNCCS Code: 461133 (a)



Principal particulars:

Rated Power: 60 kVA continuous (10% overload for 1 hour in 12)
Power factor: 0.8
Voltage: 380V/220V [210/120V] 3 phase
Output: 90 A
Speed: 1500 [1800] rpm
Frequency: 50Hz [60 Hz]

Engine:

- Diesel, 4 stroke cycle
 - Direct injection
 - Turbo charged
 - 4 or 6 cylinders in-line
 - Water cooled with tropical radiator
 - 12 or 24 Volt electrical system with starter and battery
 - Electronic or mechanical governor
- Output: 48 kW at 1500 rpm

Alternator:

Output: Minimum 60 kVA at 1500 rpm base rating

- Insulation to class H
- To CEI 2.3, IEC 34.1, VDE 0530, BS 5000
- Self regulating, 4 pole, single bearing type
- Fabricated steel shell with drip proof air ducts (minimum level of drip proof protection: IP23)

General:

- Engine close coupled to alternator
- Mounted on anti-vibration mounts on fabricated skid base
- Fuel tank incorporated into base
- Lifting points for handling.

Control Panel: Steel panel fitted on the set including:

- Ammeter with switch, Voltmeter with switch, Hour meter, Tachometer and Frequency meter
- Key start/stop
- Main 3-pole circuit breaker
- Instruments:
 - Water temperature
 - Oil pressure
 - Battery voltmeter

Standard Accessories:

- Automatic shutdown on low oil pressure or high engine temperature
- Engine Makers' tool kit

**DIESEL GENERATING SETS, 60
kVA, Contd..**

Shipping weight:	Approx. 1000 kg
Shipping volume:	Approx. 3 m ³
UNCCS Code:	461133 (a)

- Operator manuals
- Tropical radiator
- Oil, air and fuel filters
- Flexible exhaust pipe, heavy duty industrial silencer and guards
- Fuel tank gauge
- Heavy duty air cleaner

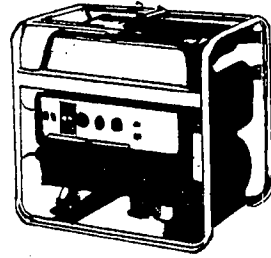
Spares and optional extras:

- Spare parts (2500 h)
- Automatic mains failure panel comprising of:
 - (a) autostart control panel
 - (b) battery trickle charger
 - (c) auto changeover panel
- Weatherproof canopy
- Acoustic canopy (85 dBA at 1m)
- Fast moving road trailer
- Socket outlets (CEE type) - 1 x 32 AMP, 3 phase
- 2 x 16 Amp. single phase
- 25 m supply cables (1 x 3 phase, 2 x single phase) with plugs
- Low resistance earth rod with 4 m cable.

Note: *Values for [60 Hz, 220V,3phase] are shown in italics*

**DIESEL GENERATING
SETS, 5 kVA**

Shipping weight : Approx. 180 kg
Shipping volume: Approx. 0.5 m³
UNCCS Code: 461131/461132 (a)



Principal particulars:

Rated Power: 5 kVA
Power Factor: 0.8
Voltage: 220/380 V [120/210 V] 3 phase
Output: 8 A [14 A]
Speed: 1500 rpm [1800 rpm]
Frequency: 50 Hz [60 Hz]

Engine:

- Diesel, 4 stroke cycle
 - Direct injection
 - Naturally aspirated
 - 1 cylinder
 - Forced Air Cooling by flywheel mounted/separate Fan or Water Cooling by Radiator and Fan
 - Electric/Hand start
 - Mechanical governor
- Output: 4.5 kW at 1500 rpm

Alternator:

- Output: 5 kVA at 1500 rpm
- Insulation to class H
 - To IEC 34.1, VDE 0530, BS 5000 part 3, UTE 5100, NEMA MG1 22, CSA 22.2, AS 1359
 - Self regulating, 4 pole, single bearing type
 - Fabricated steel shell with drip proof air ducts to IP23

General:

- Engine close coupled to alternator
- Mounted on anti-vibration mounts on fabricated skid base
- fuel tank mounted on engine or incorporated into base
- Lifting points for handling

Control Panel:

Panel fitted on the set including:

- 3 x Ammeter, Voltmeter with switch, Hour meter and Frequency meter
- 1 x 380/3/50 [210/3/60] outlet socket (CEE type) c/w circuit breaker
- 1 x 220/1/50 [120/1/60] outlet socket (CEE type) c/w circuit breaker

Power Supply

**DIESEL GENERATING SETS,
5 kVA, Contd..**

Shipping weight :	Approx. 180 kg
Shipping volume:	Approx. 0.5 m³
UNCCS Code:	461131/461132

Standard Accessories:

- Automatic shutdown on low oil pressure or high engine temperature when ordered with electric start option
- Low resistance earth rod with 4 m cable
- 1 x 25 m supply cable with plug (H07) suitable for sockets supplied
- Engine makers' tool kit
- Operator manuals
- Oil, air and fuel filters
- Engine mounted exhaust silencer

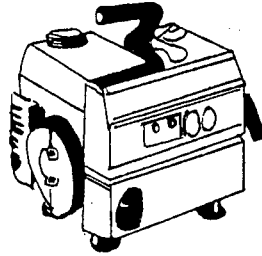
Spares and optional extras:

- Spare parts (500 h)
- Wheeled trolley kit
- Electric starting system with battery
- Acoustic canopy
- Engine instruments:
 - Temperature
 - Oil pressure
 - Battery ammeter

Note: *Values for [60 Hz, 220V,3phase] are shown in italics.*

**PORTABLE GENERATORS,
0.5 kVA**

Shipping weight : Approx. 20 kg
Shipping volume: Approx. 0.05 m³
UNCCS Code: 461141



Area of use:

- For use as a power supply for mobile field communication equipment

Type:

- Portable petrol power generator

Principal Particulars: Rated Power: 0.5 kVA

- Voltage: 220 V [*120 V*] 1 phase
- Output: 1.3 - 3 A [*2.3 - 5.2 A*]
- Speed: 3000 rpm [*3600 rpm*]
- Frequency: 50 Hz [*60 Hz*]

Engine:

- Petrol, 4 stroke cycle
- 1 cylinder
- Forced Air Cooling by flywheel-mounted fan
- Hand start
- Fuel consumption: approx. 0.25 - 0.6 litres/hour
- Output: 0.65 - 1.1 kW at 3000 rpm
- Fuel tank: 1 - 3 litres (to last 4 - 5 hrs at approx. full power & output)

Alternator:

- Output:** 0.5 kVA at 3000 rpm
- 220 volts - 50 Hz [*120 V - 60 Hz*]
 - Construction to IP 23 or equivalent

Features:

- 2 - power outlets
- Quiet operation
- Easy starting
- Petrol level indicator
- Automatic power regulator

Standard Accessories:

- Battery charger, output: 12V, 72W
- Tool kit for routine maintenance
- Operation manuals
- Oil, air and fuel filters

Note: Values for [*60 Hz, 110V, 1phase*] are shown in italics.