SYNCHRONISING OPEN FRAME THREE-PHASE DIESEL GENERATING SET

PERKINS 400 kVA PRIME / 440 kVA STANDBY

50 Hz · 380–415 V · 0.8 pf
UK assembled synchronising open set · Model PL400ZS

PRIME (PRP)	STANDBY (ESP)	CURRENT @ 400 V	ENGINE
400 kVA	**440 kVA**	**577 A**	**2206A-E13TAG3**
320 kWe	352 kWe	per phase, 0.8 pf	Perkins 12.5 L · 6 cyl T/CAC

A UK-assembled open-frame generating set built around the Perkins 2206A-E13TAG3 ElectropaK and a Leroy Somer TAL0473B alternator. Configured as a dual-duty machine: Prime Power for continuous or variable-load site use, and Standby / Emergency Power for automatic mains-failure backup. The open skid is intended for plant rooms, compounds and weather-protected locations where maximum service access and a compact footprint are required.

RATINGS & ELECTRICAL OUTPUT — 50 HZ, 3-PHASE, 4-WIRE

Parameter	Prime PRP	Standby ESP	380 V	400 V	415 V	Notes
Apparent power	400 kVA	440 kVA	—	—	—	ISO 8528
Active power (0.8 pf)	320 kWe	352 kWe	—	—	—	Net electrical
Line current / phase	—	—	607.5 A PRP	577.4 A PRP	556.4 A PRP	At 0.8 pf
Standby current / ph	—	—	668.3 A ESP	635.1 A ESP	612.0 A ESP	At 0.8 pf
Frequency / speed	50 Hz	50 Hz	—	—	—	1,500 r/min
Voltage regulation	±1 %	±1 %	—	—	—	Steady state, AVR
Power factor	0.8 lag	0.8 lag	—	—	—	Standard 3-phase
Circuit breaker	650 A	650 A	—	—	—	3-pole MCCB + CTs

RATING DEFINITIONS

PRIME POWER (PRP) — ISO 8528-1

Unlimited running hours in a variable-load application in place of a mains supply. Average load factor over 24 hours not to exceed 70% of the PRP rating. A 10% overload is available for 1 hour in any 12 hours of operation.

STANDBY / EMERGENCY (ESP) — ISO 8528-1

Available under variable load in the event of a utility outage. No overload capability is permitted on the ESP rating. Typical annual utilisation is limited; intended for automatic mains-failure duty, not continuous baseload.

TYPICAL APPLICATIONS

- **Industrial & manufacturing**
  Process lines, workshops, batch plant, factories needing either prime site power or standby cover.
- **Healthcare & care**
  Clinics, care homes and support services where a tested standby source is specified.
- **Agriculture & rural**
  Grain stores, dairies, pumping and remote sites with limited grid capacity.
- **Commercial buildings**
  Offices, retail, hotels, data rooms and mixed-use sites with automatic mains-failure duty.
- **Construction & hire**
  Open-set prime power for compounds, towers and temporary works (weather protection required).
- **Utilities & infrastructure**
  Pumping stations, comms, water treatment and critical plant rooms.

PRIME AND STANDBY CONFIGURATION — SUPPLIED AS ONE DUAL-DUTY PACKAGE

This data sheet covers the OPEN generating set in both Prime and Standby duty. The mechanical package is common. Duty is selected at build: Prime sets include engine glow-plug / pre-heat for reliable cold starting on variable-load sites; Standby sets include a mains-powered coolant heater and mains battery charger so the set is always ready for automatic start on utility failure. Both duties use the Deep Sea 8610 synchronising controller, 650 A motorised three-phase MCCB, tropical radiator and an 8-hour insulated bunded base fuel tank.

ENGINE — PERKINS 2206A-E13TAG3 ELECTROPAK

Manufacturer	**Perkins Engines (UK design)**	Gross power PRP	**368 kWm / 493 hp**
Model	**2206A-E13TAG3**	Gross power ESP	**413 kWm / 554 hp**
Configuration	**6 cylinder, vertical in-line**	Net power PRP	**349 kWm**
Cycle / combustion	**4-stroke, direct injection**	Net power ESP	**392 kWm**
Aspiration	**Turbocharged, air-to-air CAC**	Cooling	**Liquid, tropical radiator**
Bore × stroke	**130 × 157 mm**	Coolant capacity	**51 litres (engine package)**
Displacement	**12.5 litres**	Oil capacity	**40 litres**
Compression ratio	**16.3 : 1**	Electrical system	**12 V DC negative earth**
Rated speed	**1,500 r/min (50 Hz)**	Starting	**Heavy-duty lead-acid battery**
Rotation (flywheel)	**Anti-clockwise**	Combustion air (PRP)	**approx. 23.6 m³/min**
Governor	**Mechanical**	Exhaust flow (ESP max)	**approx. 23.6 m³/min**
Emissions class	**Fuel-optimised**	Max exhaust temp.	**approx. 450–520 °C**

FUEL CONSUMPTION — 1,500 R/MIN, PERKINS PUBLISHED DATA

Load point	g/kWh	Litres / hour	Approx. 8 h use	Duty reference
Standby (ESP)	—	88 L/h	—	Standby rating
100 % prime (PRP)	194	81 L/h	≈ 648 L	Full prime load
75 % prime	197	62 L/h	≈ 496 L	Typical average load
50 % prime	202	42 L/h	≈ 336 L	Light / standby test
25 % prime	—	≈ 24 L/h	≈ 192 L	Light load running

Fuel figures are engine manufacturer data at 1,500 r/min on distillate diesel to the relevant BS / EN specification, and will vary with site altitude, ambient temperature, fuel quality, load profile and installation. The standard base tank is an insulated bunded 8-hour tank with contents gauge, typically sized around 75 % prime load. Bulk tanks, bunded day tanks and automatic fuel-transfer systems are available.

ALTERNATOR — LEROY SOMER TAL0473B

Manufacturer	**Leroy Somer (Nidec)**	Continuous rating 40 °C	**400 kVA class (440 ESP)**
Model	**TAL0473B**	Frequency / speed	**50 Hz / 1,500 r/min**
Type	**Brushless, 4-pole, self-excited**	Voltage range	**380 / 400 / 415 V star**
Winding	**2/3 pitch, 6-wire (12-wire opt.)**	THD (no-load, typ.)	**< 2.5 – 3.5 %**
Bearings	**Single bearing, SAE coupled**	THD (linear load, typ.)	**< 5 %**
Insulation	**Class H**	Waveform THF / TIF	**< 2 % / < 50**
Enclosure	**IP23, drip-proof, self-cooled**	Overspeed	**2,250 r/min**
AVR (typical)	**R150 shunt (±0.8 to ±1 %)**	Altitude (std derate)	**≤ 1,000 m asl**

CONTROL, PROTECTION & ELECTRICAL PACKAGE

Controller	**Deep Sea DSE8610**	Circuit breaker	**650 A motorised 3-pole MCCB**
Function	**Sync + load share + AMF**	Current transformers	**Fitted as standard**
Display	**Back-lit LCD + LED alarms**	Emergency stop	**Set-mounted E-stop**
Sensing	**3-ph generator & 3-ph mains**	Engine protection	**HET, over/under speed**
Current	**Generator / load CTs**	Electrical protection	**V, Hz, I, battery**
Modes	**Stop / Manual / Auto / Test**	Remote start	**Input available**
Event log	**10 events (configurable)**	Outputs	**Fuel, crank, configurable**
PC software	**DSE Configuration Suite**	Control voltage	**24 V DC**

DSE8610: auto-start, check-sync, kW / kVAr load-share, closed-transition and peak-lop control, 3-phase V / Hz / I monitoring, oil pressure, coolant temperature, fuel level, battery volts, hours-run, pre-heat and warning/shutdown protection. Configured by front panel or PC.

STANDARD SPECIFICATION — OPEN SET

- Perkins 2206A-E13TAG3 diesel engine with tropical radiator, fan and matrix guards, radiator drain valve
- Air, fuel and lubricating-oil filters; industrial exhaust silencer and flexible bellows
- Inboard anti-vibration mounts (AVMs) between engine/alternator and fabricated steel baseframe
- Leroy Somer TAL0473B single-bearing alternator, Class H, IP23, AVR regulated
- Deep Sea 8610 synchronising / load-share controller with 3-phase generator and mains sensing
- 650 A three-phase MCCB with current transformers and set-mounted emergency stop
- 12 V DC control system and heavy-duty lead-acid starting battery
- Insulated bunded 8-hour base fuel tank with contents gauge
- High engine-temperature and over / under-speed protection
- Works test to ISO 8528 with test certificate issued with the set
- PRIME BUILD: engine glow plugs / cold-start aid for reliable starting on variable-load prime sites
- STANDBY BUILD: mains-powered engine coolant heater and mains battery charger so the set remains warm and the battery charged while on standby
- Open skid construction — no acoustic canopy — for plant-room or compound installation with free cooling airflow
- Powder-coated / industrial finish baseframe designed for forklift / sling handling points as built
- Operation and maintenance documentation pack
- UK assembly and pre-delivery inspection before despatch
- Free mainland UK delivery on the PL400 open set (offloading by others unless HIAB is specified)

OPTIONAL EXTRAS & SYSTEM UPGRADES

ACOUSTIC / SITE
Weather canopy or container conversion; residential silencers; attenuation packs; plant-room acoustic treatment advice.

ELECTRICAL
4-pole MCCB; motorised breaker; AMF / ATS panel; synch / load-share (DSE86xx class); earth-fault; dual voltage; socket kits.

FUEL
Bulk bunded tanks; automatic fuel transfer; polishing; water-in-fuel alarms; extended-run base tanks; HVO compatibility advice.

STARTING & HEATING
Additional battery set; battery isolator; jacket water heater upgrade; oil-sump heater; anti-condensation heater on alternator.

MONITORING
Remote monitoring & control — fuel, performance, alarms and start/stop from off-site; SMS / cloud options.

EMISSIONS / FUEL
Guidance on fuel-optimised operation, HVO blends and local planning / environmental constraints.

HYBRID / OFF-GRID
Battery storage, UPS and solar-hybrid packages to cut run hours and fuel on prime or remote sites.

INSTALLATION KIT
Flue / extract design, flexible exhaust, wall flashings, drip-trays, cable containment, plinth design.

INSTALLATION ENVELOPE, ENVIRONMENT & COMPLIANCE

Set type	**Open frame / skid (no canopy)**	Design ambient	**Tropical radiator (hot climate)**
Typical L × W × H	**Issued on GA drawing**	Standard altitude	**≤ 1,000 m (derate above)**
Typical wet weight	**Issued on GA drawing**	Works test	**ISO 8528 load test**
Engine dry weight	**approx. 1,200 kg (ElectropaK)**	Genset standard	**ISO 8528**
Engine package L×W×H	**approx. 1,900 × 900 × 1,250 mm**	Alternator std.	**IEC 60034 / ISO 8528-3**
Fuel tank	**8 h insulated bunded base**	Engine std.	**ISO 3046 / ISO 8528**
Noise (open set)	**Plant-room / compound use**	Wiring	**BS 7671 installation practice**
Cooling air	**Free inlet & discharge required**	Handling	**Fork / lift points as built**

- Open sets are not weatherproof. They must be installed in a ventilated plant room, container or weather-protected compound with correct combustion-air, cooling-air and exhaust routes.
- Noise from an open set is significantly higher than a canopied machine. Where neighbours, planning or workplace noise limits apply, specify a silent canopy, container or acoustic room.
- Final dimensions, wet weight, tank litres, exhaust flange size and cable-entry details are confirmed on the general arrangement drawing issued with the quotation / order acknowledgement.
- Ratings are at 25 °C, 100 kPa, 30 % RH unless stated. Site derate applies for altitude, temperature and poorly ventilated rooms — GES Power Ltd will calculate this at survey.
- A 10 % overload on Prime is available for 1 hour in 12. Standby (ESP) has no overload. Do not apply ESP as a continuous rating.

Why specify GES Power Ltd

Family-run UK specialists in diesel generation. We do not just sell a skid — we size, build, deliver, install, commission and look after the set for its working life.

REASONS CLIENTS CHOOSE GES POWER LTD

1 One accountable UK partner

Supply, installation, electrical connection, commissioning and aftercare sit in one company. You are not passed between a seller, an electrician and a service agent when the set is on site.

2 Genuine Perkins-powered, UK-assembled sets

British-built Perkins and Caterpillar powered generators from small commercial units through to 2,000 kVA industrial machines. This 400 / 440 kVA open set is assembled and works-tested in the UK before it leaves.

3 Right-sized, not oversold

We design the package around your actual load, starting kVA, ambient, fuel strategy and budget. That avoids wasted capital, excess fuel burn and hire-set overspend.

4 Prime and standby from one platform

The same open set can be built for continuous / prime site duty or automatic standby. Glow plugs, coolant heaters, battery chargers, ATS and remote monitoring are selected to match how you will actually run the machine.

5 Turnkey installation nationwide

Site survey, plinth and location advice, HIAB offload and positioning, certified electrical installation to BS 7671, exhaust and extract systems, bulk fuel tanks and fuel-transfer, cable containment and making-good.

6 Commissioning that is more than a start-up

Functional testing of AMF / ATS, protection settings, load proving, customer training and a documented handover so your team know how to run, test and call for help.

7 Planned maintenance, not breakdown roulette

Prime and standby service schedules, genuine filters and parts, annual black-start / blackout tests and load-bank testing to prove the set still carries the building when the grid fails.

8 Repair, fault-finding and 24/7 support

Power cuts and failed starts do not keep office hours. Engineers operate nationwide from Chesterfield with common Perkins and control-system spares. Critical-site response is part of the offer, not an afterthought.

9 Life-extension and compliance support

Controller upgrades, remote monitoring, exhaust and extract redesign, fuel polishing, battery replacement, and help meeting insurer, healthcare and facilities-management test regimes.

10 Wider power systems, not just a diesel

ATS / AMF and synchronising panels, UPS, off-grid battery and solar-hybrid packages, and installation into vehicles or vessels. The generator can sit inside a larger resilience scheme.

11 Plain commercial terms

Clear quotations, free mainland UK delivery on this PL400 open set, and a family-run team you can actually speak to on 01246 380525. Established 2016 with more than twenty years' combined industry experience.

12 Return on the investment

Reduced downtime, fewer emergency hire invoices, lower fuel through correct sizing, and a maintained asset that holds value. The set is only half the product — the service wrap is the other half.

FULL SERVICE WRAP AVAILABLE WITH THIS GENERATING SET

- Load assessment & kVA sizing
- Site survey & plant-room design
- Open or canopied build options
- HIAB delivery & positioning
- Certified electrical installation
- AMF / ATS panel supply & wire-in
- Exhaust, flue & extract systems
- Bulk fuel tanks & transfer
- Remote monitoring & telemetry
- Training & documented commission
- Planned service agreements
- Load-bank & black-start testing
- 24/7 breakdown attendance
- Genuine parts & service kits
- Controller / ATS upgrades
- Hybrid battery & off-grid packages

Talk to an engineer before you buy

Written for every type of client — facilities managers, contractors, farmers, healthcare estates and industrial engineers. If you are unsure about Prime versus Standby, open versus silent, ATS, exhaust routing or a service contract, call us. We will size the set and quote the installation as well as the machine.

01246 380525 GES Power Ltd · Unit 2 Cavendish Business Park, Chesterfield S41 9EY · Nationwide UK · Out-of-hours power-failure support

SYNCHRONISING THIS SET — MAINS AND MULTI-SET

This Z-series machine is a live-paralleling set. It is not a break-before-make AMF generator. The DSE8610 matches voltage, frequency, phase angle and phase sequence to a live bus, then closes the motorised breaker. Once closed, kW (governor bias) and kVAr (AVR bias) are controlled independently.

CHECK-SYNC WINDOW (SITE-TUNED ON COMMISSION)

Parameter	Typical window	Purpose
Voltage match	±10 % (often ±5 %)	Limit inrush and AVR fight
Frequency / slip	±0.2 Hz	Limit the kW bump at close
Phase angle	±10° (often ±7°)	Limit coupling torque
Phase sequence	Must match	Reverse phase is a short
Dead-bus close	Bus < ~20–30 V	First set onto a dark board

FOUR DUTIES THIS SET IS BUILT FOR

- Island / isolated plant — first set dead-bus closes; following GES Z-sets sync to the generator bus.
- Closed-transition AMF — on DNO return the set syncs to mains, ramps load back, then opens. No second outage.
- Generator-to-generator — isochronous kW and kVAr share with other Z-sets. Load-demand start/stop and N+1.
- Peak lopping / shaving — run in parallel with a healthy DNO. Import CT holds site import at a kW target; the set takes only the peak.

UK NETWORK INTERFACE

Any scheme that can run in parallel with the DNO is a G98/G99 generating installation, including peak lop that never exports. GES scopes loss-of-mains (U/O volts, U/O frequency, ROCOF or vector shift), reverse-power, G100 export limit if required, and 3-pole vs 4-pole neutral with the ICP/DNO. Witness test documentation is produced with the switchgear package.

PEAK LOPPING — HOW GES SETS THE LOOP

Peak lopping is not standby. The DNO is healthy. Site import is measured on a CT (or MID / Modbus meter) ahead of the generator incomer. When import stays above the target for the start delay, this set starts, syncs and ramps on until import falls back to the target. A second Z-set is added automatically if the peak keeps rising. A minimum-load floor (typically 30–40 % of prime) prevents wet stacking on a short peak.

SWITCHGEAR GES SUPPLIES WITH THIS SET

- Set-mounted DSE8610 with motorised 3-pole MCCB/ACB — electrically closed only inside the check-sync window.
- Optional DSE8660 / DSE8680 mains and bus controller for multi-set plants and import/export control.
- Hi-spec motorised ATS 40 A–3,200 A, with or without bypass, where a closed-transition or life-safety board is required.
- BS 8519 dual-line / bypass ATS for fire and life-safety loads.
- Manual changeover 20 A–3,200 A in steel or GRP where auto-changeover is not required.
- Generator intake / Powerlock panels for hire and temporary incomers.
- Bespoke Form 4 plant boards: busbars rated for combined fault level, protection graded, BMS / DNO RTU interface.

WHAT WE NEED TO QUOTE THE PLANT, NOT JUST THE ENGINE

Incoming single-line (voltage, rating, fault level, 3- or 4-pole), duty (AMF, closed-transition, multi-set, peak lop or a mix), site maximum demand and half-hour data if peak-lopping, whether export is allowed, acoustic limit, and fuel-storage hours. GES then designs the set, the board, the interconnect, G99 paperwork, commissioning and aftercare as one package.

Synchronising · Peak lopping · Multi-set plant

T 01246 380525 Unit 2 Cavendish Business Park, Chesterfield S41 9EY

Individual ZS / ZC sheets · Range guide issued separately