

500 kVA Diesel Generator

Sizing & Specification Checklist

Pre-project reference · 2026 · Based on ASO field deployments

400 kW

real power at 0.8 pf

30–110 L/hr

fuel · 25% → 100% load

~4,000×1,500×2,300 mm

silent canopy footprint

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Electrical Specification

Apparent power	500 kVA	Frequency / RPM	50 Hz · 1500 RPM · 60 Hz · 1800 RPM
Real power	400 kW at 0.8 pf	Alternator	Brushless, PMG or AVR
Voltage	400/230 V (50 Hz) · 480/277 V (60 Hz)	Power factor	0.8 industrial standard
Current	~720 A at 400 V, 50 Hz	Duty rating	PRP / COP — confirm with OEM

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Fuel Consumption by Load

Load	kW output	L/hr (typical range)	Gal/hr (US)	Runtime · 1,000 L tank
25%	100 kW	28 – 34 L/hr	7.4 – 9.0	~33 hours
50%	200 kW	48 – 56 L/hr	12.7 – 14.8	~19 hours
75%	300 kW	70 – 82 L/hr	18.5 – 21.7	~13 hours
100%	400 kW	90 – 110 L/hr	23.8 – 29.1	~10 hours

Compiled from representative OEM datasheets — confirm against selected engine and rating.

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Site Requirements · Preliminary Planning

- ☐ Concrete pad ~300–400 mm thick, sized for dry weight + vibration isolators (confirm soil bearing)

☐ Room floor area ≥ 6 × 3 m (8 × 4 m preferred for maintenance walkaround)

☐ Ceiling height ≥ 3 m (4 m if canopy lift is required for major service)

☐ Ventilation intake + exhaust sized to radiator airflow (~500–700 m³/min for this class)

☐ Exhaust ~200 mm diameter, sized by backpressure calc; terminate above roofline per local code
- ☐ Integrated fuel tank 500–1,000 L → ~4.5–11 hr runtime at full load

☐ Bulk fuel storage 5,000–20,000 L for extended autonomy (day tank + fuel polishing)

☐ Grounding & bonding per applicable electrical code and IEEE 3000-series guidance

☐ Switchgear rated for full load current; ATS if standby application

TIP N+1 for data centers: two 500 kVA units do NOT protect a 700 kW load with single-unit redundancy. Each unit is ~400 kW, so the N+1 protected ceiling stays within one unit (~400 kW). For 500–750 kW critical load with N+1, size individual units larger or use three units in an N+1 topology.

Lifecycle Cost, Engine Options & Sizing Decision

Illustrative — actual project economics depend on region, contract, spec, run-hours.

4 Sizing Decision · 250 vs 500 vs 750 kVA

Size	kW @ 0.8 pf	Sweet spot load	Typical applications
250 kVA	200 kW	100 – 160 kW continuous	Small commercial buildings · small hospitals · telecom nodes
500 kVA	400 kW	200 – 320 kW continuous	Mid DC · mid hospitals · industrial process · telecom hubs
750 kVA	600 kW	300 – 480 kW continuous	Large DC · large hospitals · small mining sites

- Avoid oversizing: 750 kVA on a 200 kW load (~27%) burns 5–10% more fuel per kWh + wet-stacking risk.
- Don't run at PRP top continuously — check average-load profile against manufacturer's COP rating.
- Consider paralleling for growth: two 500 kVA units can carry up to ~800 kW jointly (no single-unit redundancy).

5 Illustrative 5-Year Lifecycle Cost · Prime · 3,000 hr/yr @ 75% · \$1.50/L

Component	Assumption	5-year cost
CAPEX	Mid-market silent canopy	~\$70,000
Fuel	76 L/hr × 3,000 hr × \$1.50 × 5 yr	~\$1,710,000
Preventive maint.	~\$15,000/yr × 5 yr	~\$75,000
Major overhaul	Year 4–5	\$30,000 – \$50,000
Total	Illustrative	~\$1.89 M – \$1.91 M

Fuel dominates ≥90% of prime/continuous TCO — operating in the 50–80% load sweet spot outweighs CAPEX choice.

6 Engine Brand Quick Reference · 500 kVA Class

Brand	Typical engine	Positioning
Cummins	QSX15-G8	Continuous-duty efficient · broad parts network
Perkins	2206C-E13TAG3 / 2506C	Competitive CAPEX · EU / MEA / Asia common
Caterpillar	C13 (60 Hz) · C15 for 50 Hz	Premium build · mining · mission-critical
MAN	D2842 (project reference)	EU industrial · robust continuous prime
Volvo Penta	TWD1643 / TWD1663	Marine strong · industrial standby
Mitsubishi	S12H / S16R	High reliability · Asian + marine
Doosan	DP158LC / DP180LB	Cost-competitive · growing globally

Fuel efficiency across major brands is typically within ±5% at this size — parts availability, service network, and lifecycle cost drive selection.

Planning a 500 kVA project?

Cummins / Perkins / CAT / MAN engines · open-frame or silent canopy · CE / ISO 8528 · shipped worldwide.
Contact ASO engineering: asogenset.com · Full guide: </500-kva-diesel-generator-guide/>