

# Generator Set



**25 kW, 31 kVA, Standby**  
**23 kW, 29 kVA, Prime**

## DKAF 60 Hz Diesel Generator Set



Optional Features Shown

### Description

The Cummins® Onan® DK series generator set is a fully integrated power generation system, providing optimum performance, reliability, and versatility for standby or prime power operation in stationary or mobile applications.

A primary feature of the DK GenSet is strong motor starting capability and fast recovery from transient load changes. The DK's torque matched system includes a heavy-duty Onan 4-cycle liquid cooled diesel engine, an AC alternator with high motor starting capacity, and an electronic voltage regulator for precise regulation under steady-state or transient loads. The DK GenSet accepts 100% of the nameplate standby rating in one step, in compliance with NFPA110 requirements.

DK GenSets offer user and environment-friendly operation. The standard Detector™ control features automatic remote start capability, DC gauges, and 7 light engine monitor. The control may be upgraded to the Detector™ 12 Control with NFPA110 compliance. Optional sound attenuating housings, exhaust silencers, and dual wall fuel tanks address environmental concerns.

A wide range of options, accessories, and services are available, allowing configuration to your specific power generation needs.

Every production unit is factory tested at rated load and power factor. This testing includes demonstration of rated power and single-step rated load pickup. Cummins Onan manufacturing facilities are registered to ISO9001 quality standards, emphasizing our commitment to high quality in the design, manufacture, and support of our products. The GenSet is CSA certified.

All Cummins Onan brand power generation systems are backed by a comprehensive warranty program and supported by a worldwide network of 170 distributors and service branches, to assist you with warranty, service, parts, and planned maintenance support.

### Features

- **Low Exhaust Emissions** - Engine is certified for EPA Mobile Off Highway Tier 1 standards.
- **Onan Heavy-Duty Engine** - Rugged 4-cycle, liquid-cooled, industrial diesel delivers reliable power and fast response to load changes.
- **Electronic Voltage Regulator** - Torque-matched regulator provides fast recovery from transient load changes. It also includes underfrequency compensation and precise regulation.
- **Alternator** - Several alternator sizes offer selectable motor starting capability with low reactance 2/3 pitch windings, low waveform distortion with non-linear loads and fault clearing short-circuit capability.
- **Control Systems** - The standard Detector control provides automatic remote starting capability, fault protection features and 7-light engine monitoring. The Detector™ 12 Control, which complies with NFPA110, is optional.
- **Cooling Systems** - Standard cooling package provides reliable running up to 50°C ambient temperature.
- **Integral Vibration Isolation** - Robust skid base supports the engine, alternator, and radiator on isolators, minimizing transmitted vibration.
- **E-coat Finish** - Dual electro-deposition paint system provides high resistance to scratches, corrosion, or fading.
- **Housings** - Optional weather-protective housings are available.
- **Fuel Tanks** - Dual wall sub-base fuel tanks and in-skid day tanks are also offered.
- **Certifications** - Generator sets are designed, manufactured, tested, and certified to relevant UL, NFPA, ISO, IEC, and CSA standards.
- **Warranty and Service** - Backed by a comprehensive warranty and world wide distributor network.

## Generator Set

The general specifications in this document provide representative configuration details, but the outline drawing must be used for installation design.

### Specifications – General

See outline drawing 500-3044 for installation design specifications.

<b>Unit Width, in.(mm)</b>	31.0 (787)
<b>Unit Height, in.(mm)</b>	38.6 (980)
<b>Unit Length, in.(mm)</b>	66.9 (1699)
<b>Unit Dry Weight, lbs. (kgs)</b>	1314 (596)
<b>Unit Wet Weight, lbs. (kgs)</b>	1371 (622)
<b>Rated Speed, rpm</b>	1800
<b>Voltage Regulation, No Load to Full Load</b>	±2.0%
<b>Random Voltage Variation</b>	±1.0%
<b>Frequency Regulation</b>	5%
<b>Random Frequency Variation</b>	±0.5%
<b>Radio Frequency Interference</b>	Meets requirements of most industrial and commercial applications

Cooling	Standby	Prime
Fan Load, HP (kW)	1.3 (1.0)	1.3 (1.0)
Coolant Capacity with radiator, US Gal (L)	3.1 (11.7)	3.1 (12)
Coolant Flow Rate, Gal/min (L/min)	13.0 (49.2)	13.0 (49)
Heat Rejection To Coolant, Btu/min (MJ/min)	2055.0 (2.2)	1781.0 (1.9)
Heat Radiated To Room, Btu/min (MJ/min)	420.0 (0.4)	370.0 (0.4)
Maximum Coolant Friction Head, psi (kPa)	3.1 (21.4)	3.1 (21)
Maximum Coolant Static Head, psi (kPa)	29.5 (9.0)	29.5 (9.0)

Air		
Combustion Air, cfm (m <sup>3</sup> /min)	74.2 (2.1)	74.2 (2.1)
Alternator Cooling Air, cfm (m <sup>3</sup> /min)	250.0 (7.1)	250.0 (7.1)
Radiator Cooling Air, scfm (m <sup>3</sup> /min)	3500.0 (99.0)	3500.0 (99.0)
Minimum Air Opening to Room, ft <sup>2</sup> (m <sup>2</sup> )	5.5 (0.5)	5.5 (0.5)
Minimum Discharge Opening, ft <sup>2</sup> (m <sup>2</sup> )	3.5 (0.3)	3.5 (0.3)
Max. Static Restriction, in H <sub>2</sub> O (Pa)	0.5 (125.0)	0.5 (125.0)

## Rating Definitions

**Standby Rating based on:** Applicable for supplying emergency power for the duration of normal power interruption. No sustained overload capability is available for this rating. (Equivalent to Fuel Stop Power in accordance with ISO3046, AS2789, DIN6271 and BS5514). Nominally rated.

**Prime (Unlimited Running Time) Rating based on:** Applicable for supplying power in lieu of commercially purchased power. Prime power is the maximum power available at a variable load for an unlimited number of hours. A 10% overload capability is available for limited time. (Equivalent to Prime Power in accordance with ISO8528 and Overload Power in accordance with ISO3046, AS2789, DIN6271, and BS5514). This rating is not applicable to all generator set models.

**Base Load (Continuous) Rating based on:** Applicable for supplying power continuously to a constant load up to the full output rating for unlimited hours. No sustained overload capability is available for this rating. Consult authorized distributor for rating. (Equivalent to Continuous Power in accordance with ISO8528, ISO3046, AS2789, DIN6271, and BS5514). This rating is not applicable to all generator set models.

## Site Derating Factors

Rated power available up to 1600 ft (488 m) at ambient temperatures up to 77°F (25°C). Above 1600 ft (488 m), derate at 4% per 1000 ft (305 m) and 1% per 10°F (2% per 11°C) above 77°F (25°C).

# Engine

Onan heavy duty diesel engines provide stable power, low fuel consumption, quiet operation, and fast response to sudden load changes.

Mechanical governing is standard. Electronic governing is available for applications requiring constant (isochronous) frequency regulation such as Uninterruptible Power Supply systems, non-linear loads, or sensitive electronic loads. Optional coolant heaters are recommended for all emergency standby installation or any application requiring fast load acceptance after start-up.

## Specifications – Engine

<b>Base Engine</b>	Onan Model F2803, naturally aspirated, diesel-fueled
<b>Displacement in<sup>3</sup> (L)</b>	167.0 (2.7)
<b>Overspeed Limit, rpm</b>	2100 ±50
<b>Regenerative Power, kW</b>	9.00
<b>Cylinder Block Configuration</b>	Cast iron, In-line 5 cylinder
<b>Cranking Current</b>	450 amps at ambient temperature of 32°F(0°C)
<b>Battery Charging Alternator</b>	40 amps
<b>Starting Voltage</b>	12-volt, negative ground
<b>Lube Oil Filter Types</b>	Single spin-on, full flow
<b>Standard Cooling System</b>	122°F (50°C) ambient radiator cooling system

<b>Power Output</b>	<b>Standby</b>	<b>Prime</b>							
Gross Engine Power Output, bhp (kWm)	41.0 (30.6)	35.0 (26.1)							
BMEP, psi (kPa)	104.0 (717.1)	92.0 (634.3)							
Bore, in. (mm)	3.43 (87.1)	3.43 (87.1)							
Stroke, in. (mm)	3.62 (91.9)	3.62 (91.9)							
Piston Speed, ft/min (m/s)	1091.0 (5.5)	1091.0 (5.5)							
Compression Ratio	23.0:1	23.0:1							
Lube Oil Capacity, qt. (L)	13.2 (12.5)	13.2 (12.5)							
<b>Fuel Flow</b>									
Maximum Fuel Flow, US gph (L/hr)	3.5 (13.4)	3.5 (13.4)							
Maximum Inlet Restriction, in. Hg (mm Hg)	2 (51)	2 (51)							
Maximum Return Restriction, in. Hg (mm Hg)	6 (147)	6 (147)							
<b>Air Cleaner</b>									
Maximum Air Cleaner Restriction, in. H <sub>2</sub> O (kPa)	25.0 (6.2)	25.0 (6.2)							
<b>Exhaust</b>									
Max Exhaust Flow (Full Load), cfm (m <sup>3</sup> /min)	213.0 (6.0)	200.0 (5.7)							
Max Exhaust Temperature, °F (°C)	970 (521)	910 (488)							
Max Back Pressure, in. H <sub>2</sub> O (kPa)	41.0 (10.2)	41.0 (10.2)							
<b>Fuel System</b>	Indirect injection, number 2 diesel fuel; fuel filter; fuel/water separator; automatic electric fuel shutoff; distributor injection pump with integral mechanical governor.								
<b>Fuel Consumption</b>	<b>Standby</b>	<b>Prime</b>							
<b>60 Hz Ratings, kW (kVA)</b>	<b>25 (31)</b>	<b>23 (29)</b>							
	Load	1/4	1/2	3/4	Full	1/4	1/2	3/4	Full
	US gph	0.90	1.28	1.72	2.33	0.84	1.17	1.60	2.02
	L/hr	3.4	4.8	6.5	8.8	3.2	4.4	6.1	7.6

## Alternator

Several alternators are available for application flexibility based on the required motor starting kVA and other requirements. Larger alternator sizes have lower temperature rise, for longer life of the alternator insulation system. In addition, larger alternator sizes can provide a cost-effective use of engine power in across-the-line motor starting applications and can be used to minimize voltage waveform distortion caused by non-linear loads.

These single-bearing alternators couple directly to the engine flywheel with flexible discs, for drivetrain reliability and durability. No gear reducers or speed changers are used. Two-thirds pitch windings eliminate third-order harmonic content of the AC voltage waveform and provide the standardization desired for paralleling of generator sets. The excitation system is a self (shunt) excited system with the voltage regulator powered directly from the generator set output.

### Alternator Application Notes

**Alternator Sizes** - On any given model, various alternators sizes are available to meet individual application needs. Alternators sizes are differentiated by maximum winding temperature rise, at the generator set standby or prime rating, when operated in a 40°C ambient environment. Available temperature rises range from 80°C to 150°C. Not all temperature rise selections are available on all models. Lower temperature rise is accomplished using larger alternators at lower current density. Lower temperature rise alternators have higher motor starting kVA, lower voltage dip upon load application, and they are generally recommended to limit voltage distortion and heating due to harmonics induced by non-linear loads.

**Alternator Space Heater** - is recommended to inhibit condensation.

### Available Output Voltages

Three Phase  
Reconnectable

- 120/208
- 127/220
- 139/240
- 120/240
- 240/416
- 254/440
- 277/480

Single Phase Non-  
Reconnectable

- 120/240

Three Phase Non-  
Reconnectable

- 220/380
- 347/600

# Specifications – Alternator

<b>Design</b>	Revolving field, single bearing, 4-pole, brushless, drip-proof construction.
<b>Stator</b>	Skewed stator and 2/3 pitch windings minimize field heating and voltage harmonics.
<b>Rotor</b>	Dynamically balanced assembly. Direct coupled to engine by a flexible drive disc. Complete amortisseur (damper) windings help minimize voltage deviations and heating effects under unbalanced loads. The rotor is supported by a pre-lubricated, maintenance-free ball-bearing.
<b>Insulation System</b>	Class F per NEMA MG1-1.65 and BS2757
<b>Standard Temperature Rise</b>	At rated load is less than 125°C at standby rating, per NEMA MG1.22.40, IEEE115 and IEC 34-1.
<b>Exciter Type</b>	The excitation system derives its power from the main output of the generator, eliminating the need for a separate excitation power source.
<b>Phase Rotation</b>	A (U), B (V), C (W)
<b>Alternator Cooling</b>	Direct drive centrifugal blower
<b>AC Waveform Total Harmonic Distortion</b>	Less than 7% total no load to full linear load, and less than 3% for any single harmonic
<b>Telephone Influence Factor (TIF)</b>	Less than 40 per NEMA MG1-22.43
<b>Telephone Harmonic Factor (THF)</b>	Less than 3

<b>Three Phase Table<sup>1</sup></b>		<b>80° C</b>	<b>80° C</b>	<b>80° C</b>	<b>80° C</b>	<b>105° C</b>	<b>105° C</b>	<b>105° C</b>	<b>105° C</b>	<b>125° C</b>	<b>125° C</b>	<b>125° C</b>	<b>125° C</b>
Feature Code		B257	B269	B386	B305	B256	B268	B385	B304	B255	B267	B384	B303
Voltage Ranges		120/208 Thru 139/240 240/416 Thru 277/480	120/208 Thru 139/240 240/416 Thru 277/480	220/380	347/600	120/208 Thru 139/240 240/416 Thru 277/480	120/208 Thru 139/240 240/416 Thru 277/480	220/380	347/600	120/208 Thru 139/240 240/416 Thru 277/480	120/208 Thru 139/240 240/416 Thru 277/480	220/380	347/600
Surge kW		26	26	26	26	26	26	26	26	26	26	26	26
Motor Starting kVA (at 90% sustained voltage)	Shunt	111	111	111	111	70	111	90	70	70	111	90	70
Full Load Current - Amps at Standby Rating		$\frac{120/208}{87}$	$\frac{127/220}{82}$	$\frac{139/240}{75}$	$\frac{240/416}{43}$	$\frac{254/440}{41}$	$\frac{277/480}{38}$	$\frac{347/600}{30}$					

**Notes:**

1. Single phase power can be taken from a three phase generator set at up to 2/3 set rated 3-phase kW at 1.0 power factor. Also see Note 2 below.

<b>Single Phase Table</b>		<b>80° C</b>	<b>80° C</b>	<b>80° C</b>	<b>105° C</b>	<b>105° C</b>	<b>105° C</b>	<b>125° C</b>	<b>125° C</b>	<b>125° C</b>			
Feature Code		B275	B257	B269	B274	B256	B268	B273	B255	B267			
Voltage Ranges		120/240 <sup>2</sup>	120/240 <sup>1</sup>	120/240 <sup>2</sup>	120/240 <sup>2</sup>	120/240 <sup>1</sup>	120/240 <sup>2</sup>	120/240 <sup>2</sup>	120/240 <sup>1</sup>	120/240 <sup>2</sup>			
Surge kW		25	26	26	25	26	26	25	26	26			
Motor Starting kVA (at 90% sustained voltage)	Shunt	62	83	83	44	44	83	44	44	83			
Full Load Current - Amps at Standby Rating		$\frac{120/240^1}{69}$	$\frac{120/240^2}{104}$										

**Notes:**

1. The broad range alternators can supply single phase output up to 2/3 set rated 3-phase kW at 1.0 power factor.  
 2. The extended stack (full single phase output) and 4 lead alternators can supply single phase output up to full set rated 3-phase kW at 1.0 power factor.

# Control System



Optional Features Shown

Standard Detector Control System	
<ul style="list-style-type: none"> <li>Automatic remote starting</li> <li>Control components designed to withstand the vibration levels typical in generator sets</li> <li>Controls generator set starting and shutdown</li> </ul>	
Detector Control Description	
<ul style="list-style-type: none"> <li>Light engine monitor (NFPA110 level)</li> <li>Common alarm contact</li> <li>Coolant temperature gauge</li> <li>DC Voltmeter</li> <li>Field circuit breaker</li> <li>Individual 1/2 A relay signals</li> </ul>	<ul style="list-style-type: none"> <li>Lamp test switch</li> <li>Oil pressure gauge</li> <li>Remote starting, 12 V, 2 wire</li> <li>Reset switch</li> <li>Run-Off-Auto switch</li> <li>Running time meter</li> </ul>
Standard Features	Optional Features
<ul style="list-style-type: none"> <li>High coolant temp shutdown (red light)</li> <li>Low coolant temperature (yellow light)</li> <li>Low oil pressure shutdown (red light)</li> <li>Low oil pressure warning (yellow light)</li> <li>Overcrank shutdown (red light)</li> <li>Overspeed shutdown (red light)</li> <li>Run indicator (green light)</li> </ul>	<ul style="list-style-type: none"> <li>CSA282</li> <li>Emergency stop</li> </ul>



Optional Features Shown

Optional Detector Control System	
<ul style="list-style-type: none"> <li>Automatic remote starting</li> <li>Control components designed to withstand the vibration levels typical in generator sets</li> <li>Controls generator set starting and shutdown</li> </ul>	
Standard Detector 12 Light (NFPA110) Control Description	
<ul style="list-style-type: none"> <li>12 light engine monitor (NFPA110 level)</li> <li>Common alarm contact</li> <li>Coolant temperature gauge</li> <li>Cycle cranking control</li> <li>DC Voltmeter</li> <li>Field circuit breaker</li> <li>Individual 1/2 A relay signals</li> </ul>	<ul style="list-style-type: none"> <li>Lamp test switch</li> <li>Oil pressure gauge</li> <li>Remote starting, 12 V, 2 wire</li> <li>Reset switch</li> <li>Run-Off-Auto switch</li> <li>Running time meter</li> </ul>

Standard Features		Optional Features
<ul style="list-style-type: none"> <li>5% voltage adjust rheostat</li> <li>AC ammeter (dual scale)</li> <li>AC voltmeter (dual scale)</li> <li>Dual scale frequency/engine RPM meter</li> <li>Engine gauges</li> <li>High coolant temperature shutdown (red light)</li> <li>Low coolant temperature (yellow light)</li> <li>Low oil pressure shutdown (red light)</li> <li>Low oil pressure warning (yellow light)</li> </ul>	<ul style="list-style-type: none"> <li>Overcrank shutdown (red light)</li> <li>Overspeed shutdown (red light)</li> <li>Pre-alarm high coolant temp (yellow light)</li> <li>Pre-alarm low oil pressure (yellow light)</li> <li>Run indicator (green light)</li> <li>Two customer selected faults (red light)</li> <li>Voltmeter/Ammeter phase selector</li> </ul>	<ul style="list-style-type: none"> <li>Audible alarm</li> <li>CSA282</li> <li>Emergency stop</li> <li>Low battery voltage warning</li> <li>Remote fault signal package</li> <li>Speed adjust rheostat</li> <li>Time delay start/stop</li> </ul>

## Generator Set Options

Engine	Control Panel	Generator Set
<input type="checkbox"/> 120 V, 1000 W coolant heater (thermostatically controlled)	<input type="checkbox"/> 12 light Detector Control for NFPA 110 compliance	<input type="checkbox"/> 24 hour dual wall sub-base tank
<input type="checkbox"/> 240 V, 1000 W coolant heater (thermostatically controlled)	<input type="checkbox"/> AC meter package	<input type="checkbox"/> 48 hour dual wall sub-base fuel tank
<input type="checkbox"/> Electronic governor	<input type="checkbox"/> 120/240 V, 100 W control anti-condensation space heater	<input type="checkbox"/> Batteries
	<input type="checkbox"/> Emergency stop	<input type="checkbox"/> Battery charger, equalizer, float-type
<b>Alternator</b>	<input type="checkbox"/> Low coolant level/shutdown	<input type="checkbox"/> Export box packaging
<input type="checkbox"/> 80°C rise alternator	<input type="checkbox"/> Run/common alarm relay package	<input type="checkbox"/> In-skid fuel tank
<input type="checkbox"/> 105°C rise alternator	<input type="checkbox"/> Run/common alarm relay package with 12 form C remote annunciation relays	<input type="checkbox"/> Main line circuit breaker
<input type="checkbox"/> 120/240 V, 100 W anti-condensation heater	<input type="checkbox"/> Tachometer	<input type="checkbox"/> Remote annunciator panel
<input type="checkbox"/> Extended stack (full single phase output)		<input type="checkbox"/> Sound attenuated housings with mounted silencer
<input type="checkbox"/> Full single phase output (Non-Reconnectible)	<b>Exhaust System</b>	<input type="checkbox"/> Spring isolators
<input type="checkbox"/> Single phase - 4 lead	<input type="checkbox"/> Critical grade exhaust silencer	<input type="checkbox"/> Weather protective enclosure with silencer
<input type="checkbox"/> Voltage reconnect switch	<input type="checkbox"/> Industrial grade exhaust silencer	<input type="checkbox"/> 2 year prime power warranty
	<input type="checkbox"/> Residential grade exhaust silencer	<input type="checkbox"/> 2 year standby warranty
	<input type="checkbox"/> Set mounted critical grade exhaust silencer	<input type="checkbox"/> 5 year standby power warranty

## Available Products and Services

A wide range of products and services is available to match your power generation system requirements. Cummins Onan products and services include:

- Diesel and Spark-Ignited Generator Sets
- Transfer Switches
- Bypass Switches
- Parallel Load Transfer Equipment
- Digital Paralleling Switchgear
- PowerCommand Network and Software
- Distributor Application Support
- Planned Maintenance Agreements

## Warranty

All components and subsystems are covered by an express limited one-year warranty. Other optional and extended factory warranties and local distributor maintenance agreements are available.

Other available warranties include: 2-year prime power, 2-year standby, 5-year basic power, 5-year comprehensive power and 10-year major component. The 2-year prime power and the 10-year major component warranties are available in North America only.

## Certifications



**ISO9001** - This generator set was designed and manufactured in facilities certified to ISO9001.

**CSA** - This generator set is CSA certified to product class 4215-01.

**NFPA Testing** - The Prototype Test Support (PTS) program verifies the performance integrity of the generator set design. Cummins Onan products bearing the PTS symbol meet the prototype test requirements of NFPA 110 for Level 1 systems. A complete representative prototype generator set has been subjected to a number of demanding tests to verify the design integrity and performance under both normal and abnormal operating conditions per the requirements of NFPA 110 for Level 1 systems. Tests include short circuit, endurance, temperature rise, torsional vibration, and transient response, including full load pickup in one step.

## See your distributor for more information



**Onan**

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**Important: Backfeed to a utility system can cause electrocution and/or property damage. Do not connect to any building's electrical system except through an approved device or after building main switch is open.**