

KD Series Generators

KD Series Product Introduction

- KD Series is the newest line of generators powered with our KOHLER Large Diesel Engines
- KD Series generating sets provide a wide range of power from 800 – 4200kVA (800 - 4000kWe) standby
- Ideal for every industrial power segment use and benefit from KOHLER's worldwide aftermarket parts and service network
- Developed over a 6-year period, each component was designed/tested to offer the best performance while maintaining high industry standards



Design & Development Process

- 2 New Main Engine blocks – K135, K175
- 3 Configurations for each block (V12, V16, V20)
- We designed, tested, and fit every component
- Each genset was designed and qualified from the ground up
 - Mechanical tests for thermal, sound, vibrations performances
 - Electronic tests for control management system, power cable
 - Power Performance tests for voltage and frequency stability, governor regulation, power quality, and harmonic distortion
 - Tested for engine accessories (batteries, block heaters, dual starters, etc.)
 - Codes and standard tests: UL, CSA, IBC, CE, OSHPD, NFPA



50,000 Test Hours to Date
6 Years of Development
3 Years of Testing

KD Series Competitive Advantages

**Revolutionary and
Reliable Engine**

Smooth Running

Cooling System:
50°C Ambient Cooling
Modular Core Radiator

Right Sized Turbo Chargers
Low Combustion Air

Closed Crankcase Ventilation
Up to 50% improvement over
competition

Alternator:
Fast Recovery and Response Time
High Motor Starting Capabilities
PMG Exciter System
Multiple Options available at each node

High Fuel Lift

Concentrated Power
High kW
Displacement
Low Fuel
Consumption

Integrated
Controls

High kW Density
Smaller Footprint

Tested And Approved

**Ultimate
Performance**

KD Series Engine Features and Benefits

Turbocharged After-Cooled

New turbocharged system to provide the optimal quantity of air to reach the maximum power and reduce fuel consumption

Crankcase Ventilation System

This closed loop regeneration system increases filtration efficiency and results in a more environmentally friendly engine

Common Rail Injection System

Efficiency is our objective. The new CR-System offers best-in-class fuel consumption in the market.

Fuel System

The high pressure fuel pump reaches 2,200 bar pressure – perfectly matching the Common Rail System

Oil Filtration

Kohler engines operate under the highest temperature fluctuations and do not affect productivity levels.

Engine Control Unit

All functions of the engine are controlled by the Engine Control Unit, granting a perfect match of hardware and software. The ECU+Kodia includes diagnostic software, offering outstanding engine life

Innovative Cylinder Head Design

Featuring a “cross-flow” design and new valve orientation, our innovative design includes efficient fuel delivery, combustion, and exhaust gas flow

Built to Perform

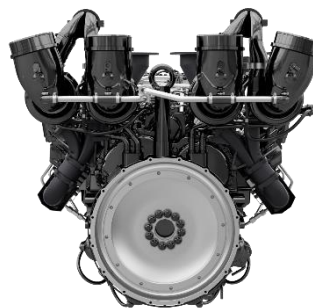
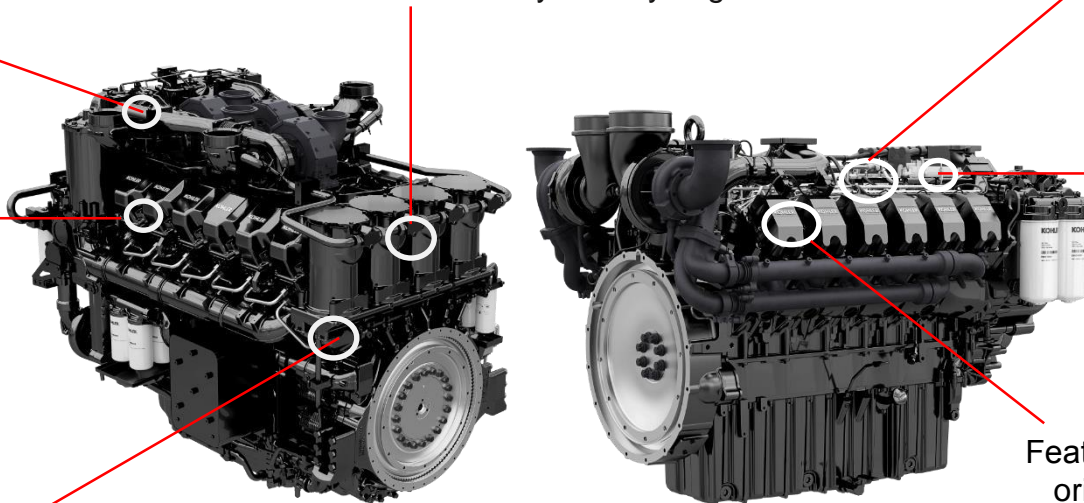
Optimized to reduce noise and vibration, our KD Series are built with high-quality, long-lasting materials. For example – composite bearing shells ensure longevity of crankshaft bearing under increasing loads.

Concentrated Power

Industry leading power output in a package that enables a smaller footprint. The engine architecture, injection system, and engine management of the KD Series engine have been designed to achieve optimal performance.

Engine Control

Manage physical parameters for optimal control of the injection system. The control system includes integrated, intuitive, operable diagnostic software



KD Series – Key Performance Characteristics

- Power quality in accordance to ISO8528-5 performance class G3
- Achieve 100% load in one step, meet the NFPA110 standards
- Power definition load acceptance over the ISO8528 requirements, and leading the industry with 85% ESP and 75% PRP
- Engine maximum power available up to 50°C
- KD Series Generators lead the industry in Fuel Efficiency, Power Density, Fuel Lift, Exhaust Flow, and many other performance characteristics
- 60 Hz range is certified U.S. EPA Nonroad Tier 2 (40 CFR 60)
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High kW Density means high BMEP – ?

1970

Average diesel engine was **14L** and produced **225 Hp**, overhaul at **250k** miles



Today

Average diesel engine is **15L** and produces **600 Hp**, overhaul at **1MM** miles



Competitors argue against BMEP to justify a lack of investment in their antiquated product lines
Longer service intervals & reduced maintenance costs disqualify any argument against BMEP

Engine Branding

Engine Color: Black

Engine Brand: KOHLER

KOHLER nameplate

KOHLER branded components

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KD Series Warranty

The KD Series Global 3 year standard warranty will be the strongest in the industry

	KD SERIES	KPS/SDMO Current
ESP	3 YR 1000 HR*	2 YR 3000 HR
PRP	2 YR 8700 HR	1 YR 2000 HR

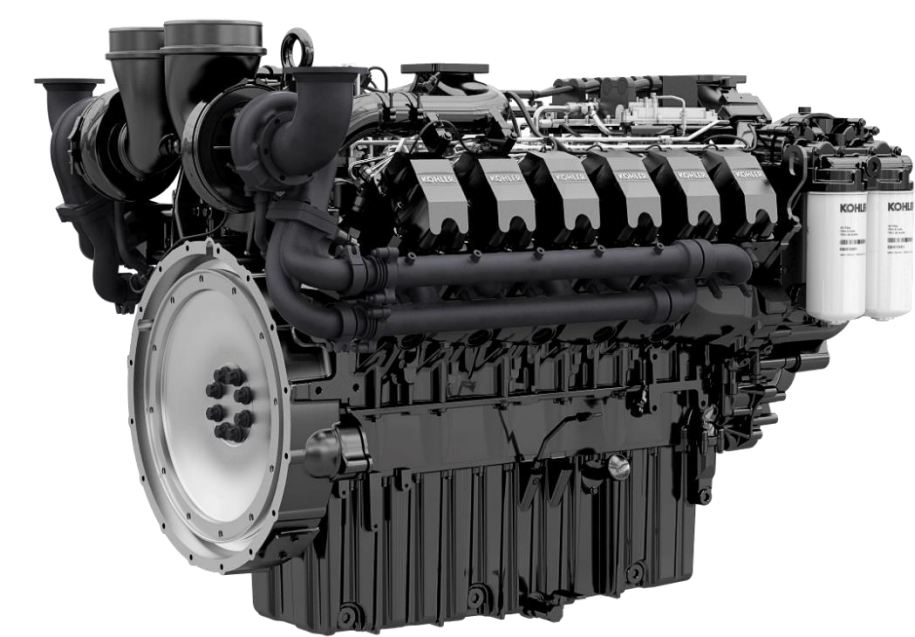
* Warranty will be 3yrs, unlimited hours for KD Series ESP installations within the United States

KD Series Generators

Technical Overview

Kohler Engine Main Features – Series K135

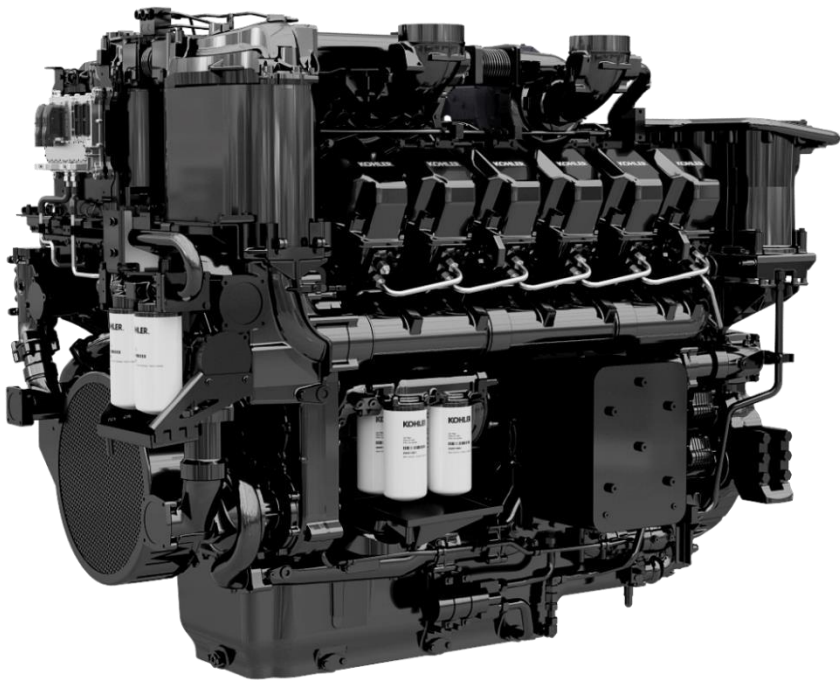
- Bore: 135 mm
- Stroke: 157 mm
- V-Angle: 90° (except V20: 108°)
- Rated speed: 1500 – 1800 RPM
- Base Power: 709kWm – 1910kWm
- Mechanical fan drive
- Injection system: Liebherr Common Rail
- Combustion Pressure: up to 225 bar
- Injection Pressure: up to 2200 bar
- Flywheel Housing: V12 & V16: SAE 0 / V20: SAE 00
- Emission level: Fuel or Emission Optimized
- Built in Bulle, Switzerland



Engine Model	KD27V12		KD36V16		KD45V20	
	50 Hz	60 Hz	50 Hz	60 Hz	50 Hz	60 Hz
Cylinder	V12		V16		V20	
Displacement	27L		36L		45L	
Genset Nodes kVa/kWe	800	800	1250	1250	1650	1500
	900	900	1440		1800	1600
	1000	1000	1500			1750
	1100					

Kohler Engine Main Features – Series K175

- Bore: 175 mm
- Stroke: 215 mm
- V-Angle: 60°
- Rated speed: 1500 – 1800 RPM
- Base Power: 2000kWm to 4250kWm
- Mechanical fan drive
- Injection system: Liebherr Common Rail
- Combustion Pressure: up to 240 bar
- Injection Pressure: up to 2200 bar
- Flywheel Housing: SAE 00
- Emission level: Fuel or Emission Optimized
- Built in Colmar, France



Engine Model	KD62V12		KD83V16		KD103V20	
	50 Hz	60 Hz	50 Hz	60 Hz	50 Hz	60 Hz
Cylinder	V12		V16		V20	
Displacement	62L		83L		103L	
Genset Nodes kVa/kWe	2000	2000	3000	2800	3800	3500
	2250	2250	3300	3000	4200	3800
	2500	2500	3500	3250		4000
	2800					

APM802 - Why this controller?

- Controller introduced in 2014
 - Proven design
- Fully featured controller
 - Ranges from standalone operation to power plant systems
 - Kohler Power Systems is focused on standalone operation and integration with paralleling switchgear
- Provides a consistent, global offering for Kohler KD generators
 - An additional new controller will be added as an option beginning in 2018

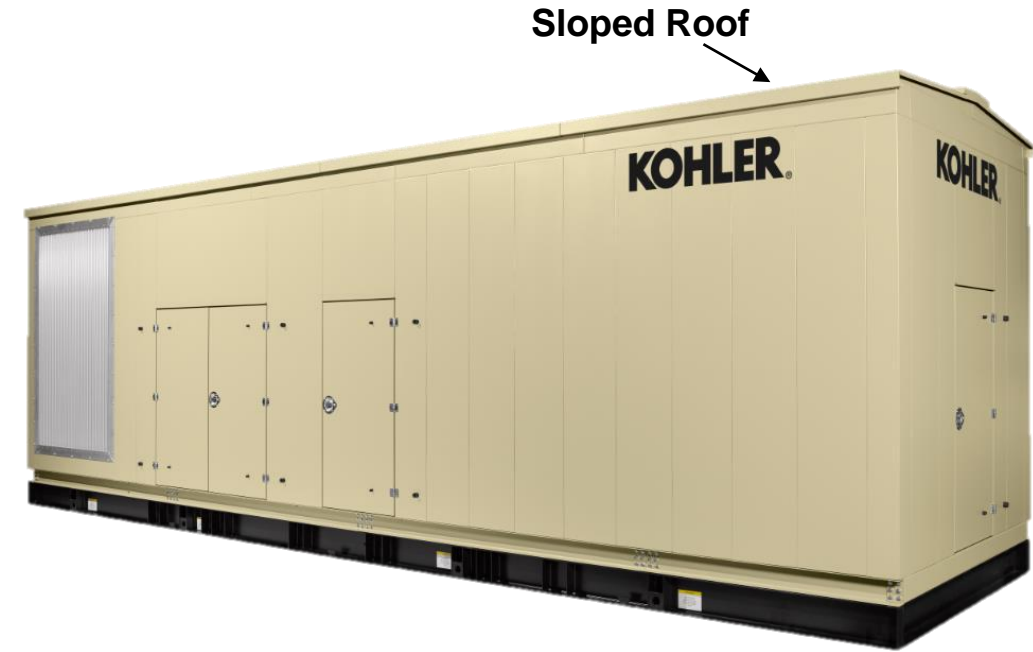


Feature Overview

- Large color, graphical touchscreen
- Multilanguage support – English, French, Spanish and more
- Ethernet and RS-485 ports for Modbus TCP and RTU
- Remote VNC access for troubleshooting
- Standard Inputs and Outputs along with expansion options
- Data collection to capture key data for troubleshooting
- Data graphing for onsite trending and troubleshooting
- Standards:
 - NFPA 99
 - NFPA 110, Level 1
 - CSA 282-09
 - UL508
 - IEC/EN60068-2-52 (salt spray)
 - CE Directive

Enclosures

- KD Series will launch with full line of tanks and enclosures
- Includes the following certifications:
 - IBC
 - OSHPD
 - Windload (being reviewed)
 - Full Factory UL2200
- KOHLER enclosures will have a 10% average price reduction over the current product offering
 - Aluminum Construction Standard
 - SL1 and SL2 enclosure offerings
 - No standalone Weather units
- AQMD Ready SL2 and SL1 version available at launch
- All enclosures will feature a sloped roof
- KD Series enclosures 10 – 15% smaller vs. current offering
- Louvered air inlets limit water ingress/shorten overall length
- Fade-, scratch-, and corrosion-resistant KP Armor finish
- Stainless steel external hardware standard

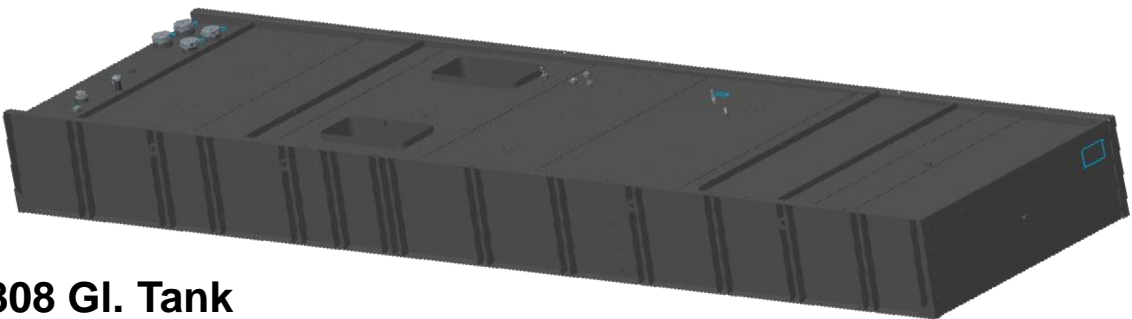


KD1750 SL2 Enclosure

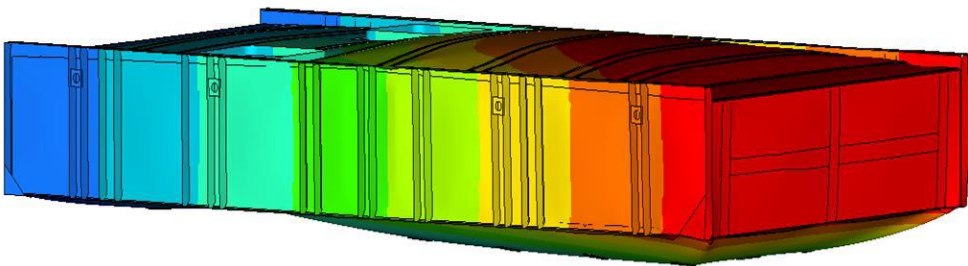


Large Diesel Tank Features

- UL142 listed
- Power Armor Plus textured epoxy-based rubberized coating standard
- Sloped tops to reduce water pooling standard
- Engineered to accommodate most state and municipality requirements
- Sized to optimize footprint beneath the enclosure



5808 Gl. Tank
Shown



Kohler Large Diesel Standard Tank Offerings

Unit	Usable Capacity (gallons)	Fillable Capacity (Gallons)	Run Time (Hrs.)
KD800-1000	829	918	12
KD800-1000	1658	1749	24
KD800	2690	2793	48
KD900-1000	3316	3426	48
KD800	4035	4158	72
KD900-1000	4973	5120	72
KD1250-1750	1411	1549	Varies Based on Unit
	2456	2605	
	2821	2960	
	4911	5076	
KD2000-2500	5641	5808	Varies Based on Unit
	2072	2266	
	3533	3733	
	4143	4346	

Revision A; 3-10-16, resized in lieu of additional tank overhang to enclosure on generator end of 30"

Hydrostatic Tank Pressure Test

Colors show stress levels. Red predicts areas of high stress during test. This simulation allows us to design around critical areas.

KD Series Options

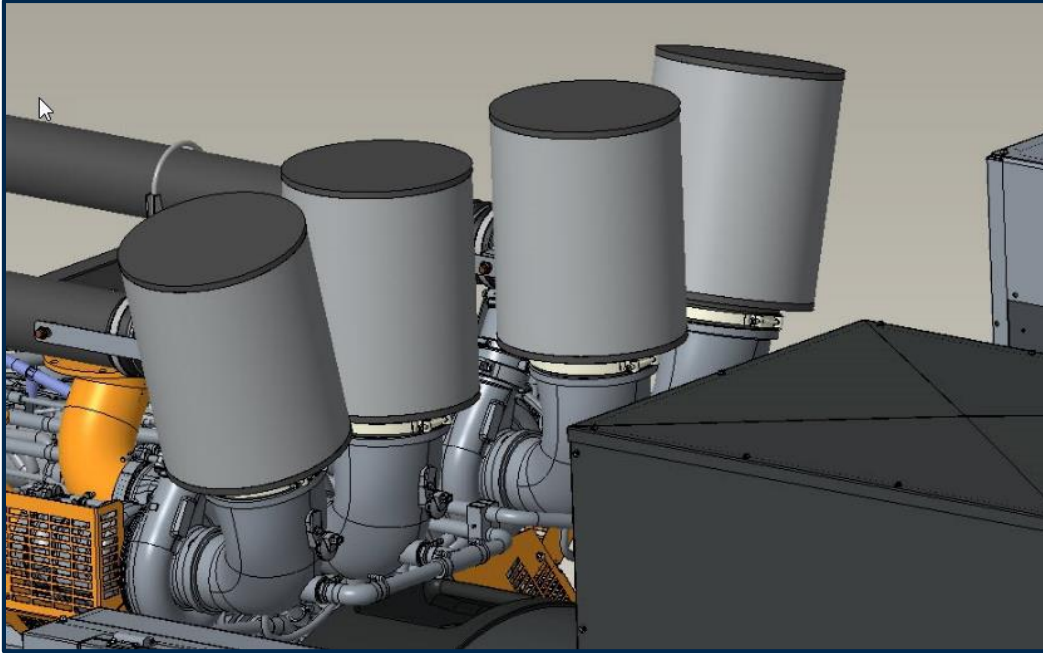
Generator Options

- Block Heater kits: Recommended below 40F (5C)
 - 6000W on KD800-1000 models
 - 9000W on KD1250-2500 models
 - Note: on KD800-1750 models, the block heater kit also includes an air intake heater to further enhance the cold weather startability
 - Include ambient vs cold start delay chart
- Basic Electrical Packages:
 - 1Ph: 120/208V or 120/240V
 - 3PH: 120/208V or 120/240V
- Genset Accessory Wiring Options: block heater, battery charger, generator heater, controller heater
- Battery Rack and Cables: Battery Rack is mounted to the genset skid
- AGM Batteries
- Battery Heater
- Flexible Fuel Lines for open and subbase tanks

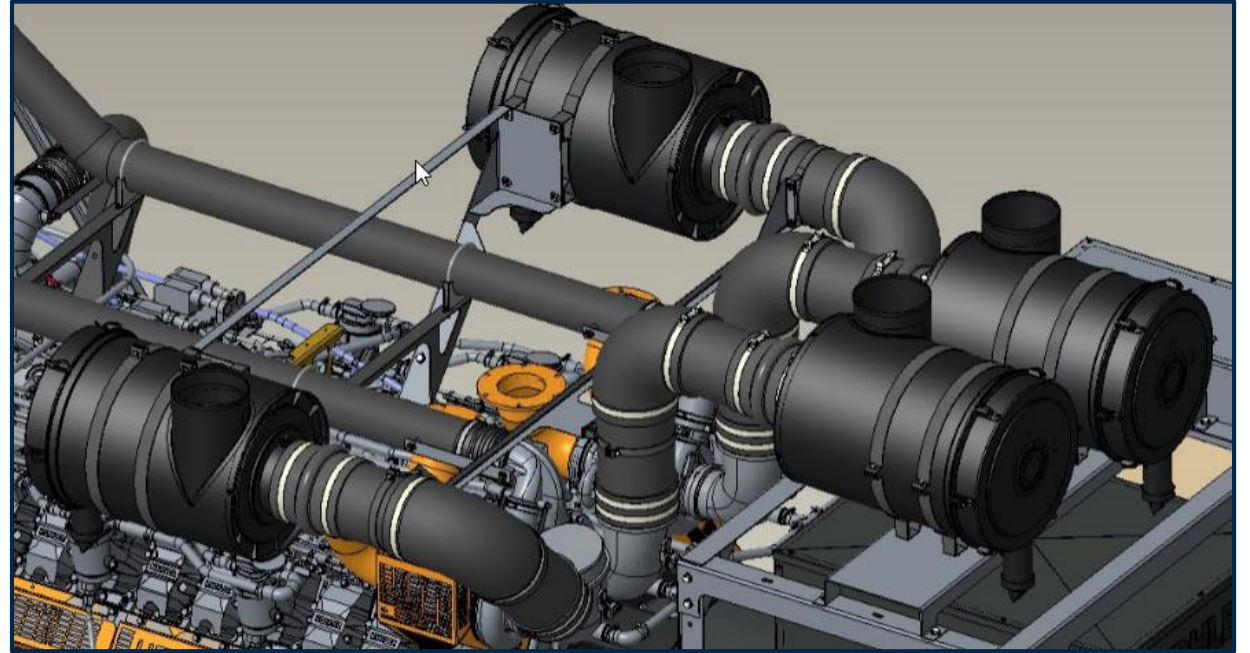
Skid Options

- KD800-1750 Skid and Mounting Design – Integral vibration isolation between engine/alternator and skid
 - Standard vibromounts 75-80% efficient isolation – meets ISO8528-9
 - High Isolation vibromounts: 95% efficient isolation
 - Autoselected when IBC or OShPD are selected
- KD2000-2500 Skid and Mounting Design – Solid Mounting of engine/alternator to the skid
 - Spring Isolators are required between the skid and pad or between skid and lift base when ordering a tank and/or enclosure
 - Seismic spring isolators are the only option available

Air Intake Options



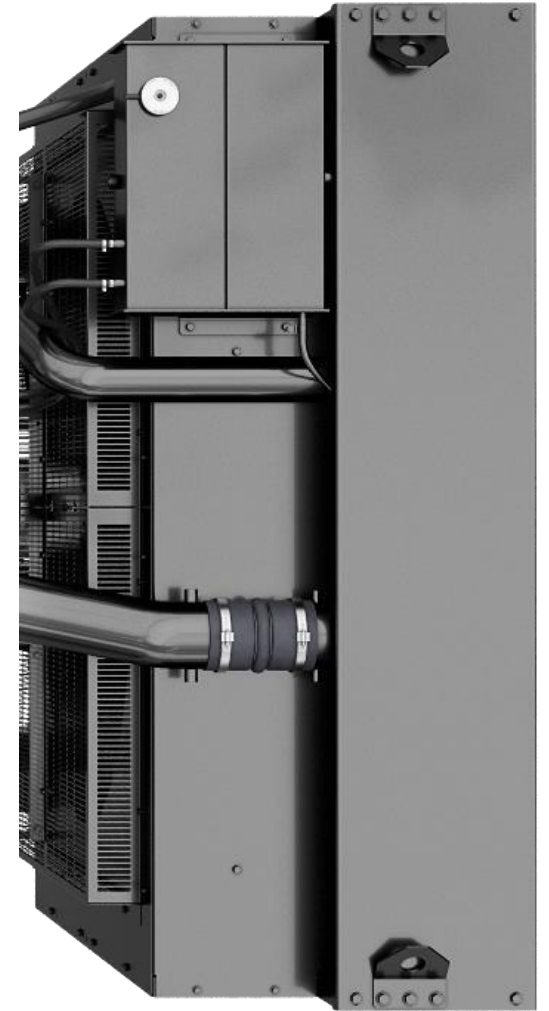
Standard Duty Air Cleaners
(KD1250-KD1750 shown)



Heavy Duty Air Cleaners
(KD1250-KD1750 shown)

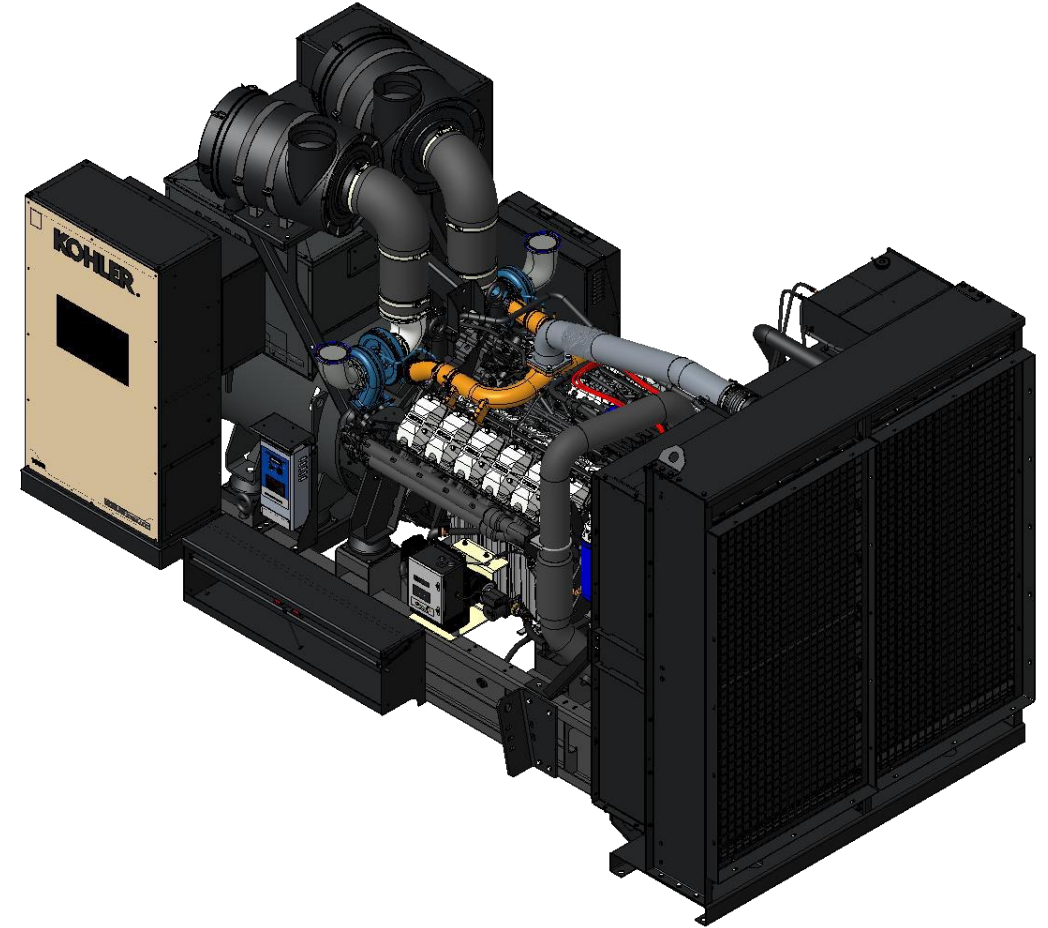
Cooling System Options

- 50°C standard, 45°C enclosed
- Radiator Duct Guard and Duct Flange: Standard on open gensets
- Remote Radiator Setup
 - KD800-1750: Includes CAC and High Temperature heat exchanger with water inlet/outlet flange connections
 - KD2000-2500: Includes High Temperature and Low Temperature circuit coolant inlet/outlet flange connections
- KD800-1750: Engine Mounted Mechanical Fan Drive System
- KD2000-2500: Cooling System Mounted Mechanical Fan Drive System



Circuit Breaker Options

- Left and/or Right side genset mounting options allowing for complete separation of emergency and non-emergency breakers
- Up to 8 breaker can be mounted, depending on the size of breakers chosen
- Top and bottom stub-in available (top is standard, bottom is an option)
- 127 million potential breaker permutations



Kohler Global Product Value Proposition

KD Series large diesel product range designed and built to match the customer needs



All detailed information on our global dedicated launching website <http://www.kdseries.com/>

