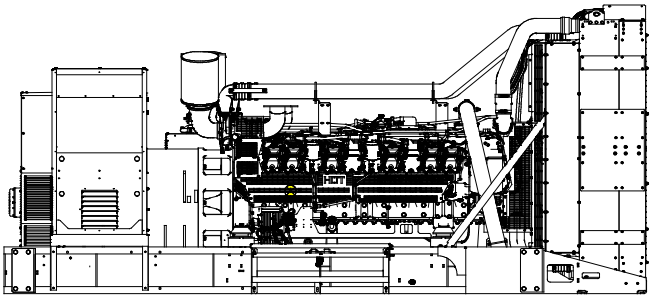
KOHLER®

Industrial Diesel Generator Set - KD1600

Tier 2 EPA-Certified for Stationary Emergency Applications



KDxxxx designates a generator set with a Tier 2 EPA-Certified engine.
KDxxxx-F designates a 60 Hz generator set with a fuel optimized engine.

Ratings Range

		60 Hz
Standby:	**kW**	1410- 1600
	kVA	1762- 2000
Prime:	**kW**	1260- 1440
	kVA	1575- 1800

Standard Features

- Kohler Co. provides one-source responsibility for the generating system and accessories.
- The generator set and its components are prototype-tested, factory-built, and production-tested.
- The 60 Hz generator set offers a UL 2200 listing.
- The generator set accepts rated load in one step.
- The 60 Hz generator set meets NFPA 110, Level 1, when equipped with the necessary accessories and installed per NFPA standards.
- A standard three-year unlimited-hour limited warranty for standby applications in the U.S. And Canada. Five-year basic, five-year comprehensive, and ten-year extended limited warranties are also available.
- A standard two-year or 8700-hour limited warranty for prime power applications.
- Other features:
  - Kohler designed controllers for one-source system integration and remote communication. See Controllers on page 4.
  - The low coolant level shutdown prevents overheating (standard on radiator models only).

General Specifications

Orderable Generator Model Number	GMKD1600
Manufacturer	Kohler
Engine: model	KD45V20
Alternator Choices	KH04590TO4D KH04920TO4D KH05641TO4D KH05740TO4D KH06721TO4D KH06810TO4D
Performance Class	Per ISO 8528-5
One Step Load Acceptance	100%
Voltage	Wye, 600 V., or 4160 V
Controller	APM603, APM802
Fuel Tank Capacity, L (gal.)	5863- 21985 (1549- 5808)
Fuel Consumption, L/hr (gal./hr) 100% at Standby	423 (111.8)
Fuel Consumption, L/hr (gal./hr) 100% at Prime Power	392 (103.5)
Emission Level Compliance (KDxxxx)	Tier 2
Open Unit Noise Level @ 7 m dB(A) at Rated Load	97
Data Center Continuous (DCC) Rating (Refer to TIB-101 for definitions)	Same as the Standby Rating below

Generator Set Ratings

				150°C Rise Standby Rating		130°C Rise Standby Rating		125°C Rise Prime Rating		105°C Rise Prime Rating	
Alternator	**Voltage**	**Ph**	**Hz**	**kW/kVA**	**Amps**	**kW/kVA**	**Amps**	**kW/kVA**	**Amps**	**kW/kVA**	**Amps**
KH04590TO4D	240/416	3	60	1430/1788	2482	1410/1762	2446	1380/1725	2395	1260/1575	2186
	277/480	3	60	1600/2000	2406	1600/2000	2406	1440/1800	2166	1420/1775	2135
KH04920TO4D	230/400	3	60	1500/1875	2707	1500/1875	2707	1350/1688	2437	1350/1688	2437
	240/416	3	60	1600/2000	2776	1590/1988	2760	1440/1800	2499	1400/1750	2429
	277/480	3	60	1600/2000	2406	1600/2000	2406	1440/1800	2166	1440/1800	2166
KH05740TO4D	220/380	3	60	1600/2000	3039	1600/2000	3039	1440/1800	2735	1440/1800	2735
	230/400	3	60	1500/1875	2707	1500/1875	2707	1350/1688	2437	1350/1688	2437
	240/416	3	60	1600/2000	2776	1600/2000	2776	1440/1800	2499	1440/1800	2499
	277/480	3	60	1600/2000	2406	1600/2000	2406	1440/1800	2166	1440/1800	2166
	347/600	3	60	1600/2000	1925	1600/2000	1925	1440/1800	1733	1440/1800	1733

RATINGS: All three-phase units are rated at 0.8 power factor. *Standby Ratings:* The standby rating is applicable to varying loads for the duration of a power outage. There is no overload capability for this rating. *Prime Power Ratings:* At varying load, the number of generator set operating hours is unlimited. A 10% overload capacity is available for one hour in twelve. Ratings are in accordance with ISO-8528-1 and ISO-3046-1. For limited running time and continuous ratings, consult the factory. Obtain technical information bulletin (TIB-101) for ratings guidelines, complete ratings definitions, and site condition derates. The generator set manufacturer reserves the right to change the design or specifications without notice and without any obligation or liability whatsoever.

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				150°C Rise Standby Rating		130°C Rise Standby Rating		125°C Rise Prime Rating		105°C Rise Prime Rating	
Alternator	**Voltage**	**Ph**	**Hz**	**kW/kVA**	**Amps**	**kW/kVA**	**Amps**	**kW/kVA**	**Amps**	**kW/kVA**	**Amps**
	220/380	3	60	1600/2000	3039	1600/2000	3039	1440/1800	2735	1440/1800	2735
	230/400	3	60	1500/1875	2707	1500/1875	2707	1350/1688	2437	1350/1688	2437
KH06810TO4D	240/416	3	60	1600/2000	2776	1600/2000	2776	1440/1800	2498	1440/1800	2499
	277/480	3	60	1600/2000	2406	1600/2000	2406	1440/1800	2166	1440/1800	2166
	347/600	3	60	1600/2000	1925	1600/2000	1925	1440/1800	1732	1440/1800	1732
KH05641TO4D	2400/4160	3	60	1600/2000	278	1600/2000	278	1440/1800	250	1440/1800	250
KH06721TO4D	2400/4160	3	60	1600/2000	278	1600/2000	278	1440/1800	250	1440/1800	250

Engine Specifications	**60 Hz**
Manufacturer	Kohler
Engine: model	KD45V20
Engine: type	4-Cycle, Turbocharged, Intercooled
Cylinder arrangement	20-V
Displacement, L (cu. in.)	45 (2746)
Bore and stroke, mm (in.)	135 x 157 (5.31 x 6.18)
Compression ratio	15.0:1
Piston speed, m/min. (ft./min.)	565 (1854)
Main bearings: quantity, type	11, Precision Half Shells
Rated rpm	1800
Max. power at rated rpm, kWm (BHP)	1755 (2353)
Cylinder head material	Cast Iron
Crankshaft material	Steel
Valve (exhaust) material	Steel
Governor: type, make/model	KODEC Electronic Control
Frequency regulation, no-load to-full load	Isochronous
Frequency regulation, steady state	±0.25%
Frequency	Fixed
Air cleaner type, all models	Dry

Lubricating System	**60 Hz**
Type	Full Pressure
Oil pan capacity with filter (dipstick max. mark), L (qt.) §	165 (174)
Oil pan capacity with filter (initial fill), L (qt.) §	180 (190)
Oil filter: quantity, type §	4, Cartridge
Oil cooler	Water-Cooled

§ Kohler recommends the use of Kohler Genuine oil and filters.

Fuel System	**60 Hz**
Fuel supply line, min. ID, mm (in.)	19 (0.75)
Fuel return line, min. ID, mm (in.)	12 (0.5)
Max. fuel flow, Lph (gph)	585 (155)
Min./max. fuel pressure at engine supply connection, kPa (in. Hg)	-30/30 (-8.8/8.8)
Max. return line restriction, kPa (in. Hg)	30 (8.8)
Fuel filter: quantity, type	1, Primary Engine Filter 1, Fuel/Water Separator
Recommended fuel	#2 Diesel ULSD

Fuel Consumption	**60 Hz**
Diesel, Lph (gph) at % load	**Standby Rating**
100%	423 (111.8)
75%	334 (88.2)
50%	235 (62.2)
25%	132 (34.9)
Diesel, Lph (gph) at % load	**Prime Rating**
100%	392 (103.5)
75%	303 (80.1)
50%	215 (56.8)
25%	127 (33.5)

Radiator System	**60 Hz**
Ambient temperature, °C (°F)*	50 (122)
Radiator system capacity, including engine, L (gal.)	298 (78.7)
Engine jacket water capacity, L (gal.)	143 (37)
Engine jacket water flow, Lpm (gpm)	2339 (618)
Heat rejected to cooling water at rated kW, dry exhaust, kW (Btu/min.)	651 (37021)
Heat rejected to charge air cooler at rated kW, dry exhaust, kW (Btu/min.)	481 (27354)
Charge cooling air inlet temperature at 25°C (77°F) ambient, °C (°F)	234 (453)
Turbocharger boost (abs), bar (psi)	3.57 (51.8)
Water pump type	Centrifugal
Fan diameter, including blades, mm (in.)	1750 (68.9)
Fan, kWm (HP)	70 (93.9)
Max. restriction of cooling air, intake and discharge side of radiator, kPa (in. H_2O)	0.125 (0.5)

* Enclosure with enclosed silencer reduces ambient temperature capability by 5°C (9°F).

Remote Radiator System†	**60 Hz**
Exhaust manifold type	Dry
Connection sizes:	
Water inlet/outlet, mm (in.)	—
Charge air cooler inlet/outlet (pipe dia. of flange), mm (in.)	—
Static head allowable above engine, kPa (ft. H_2O)	70 (23.5)

† Contact your local distributor for cooling system options and specifications based on your specific requirements.

Exhaust System	60 Hz
Exhaust flow at rated kW, m^3/min. (cfm)	341 (12042)
Exhaust temperature at rated kW at 25°C (77°F) ambient, dry exhaust, °C (°F)	517 (962)
Maximum allowable back pressure, kPa (in. Hg)	8.5 (2.5)
Exh. outlet size at eng. hookup, mm (in.)	See ADV drawing

Electrical System	60 Hz
Battery charging alternator:	
Ground (negative/positive)	Negative
Volts (DC)	24
Ampere rating	140
Starter motor qty. at starter motor power rating, rated voltage (DC)	Standard: 2 @ 8.4 kW, 24; Redundant (optional): 4 @ 8.4 kW, 24
Battery, recommended cold cranking amps (CCA):	
Quantity, CCA rating each, type (with standard starters)	4, 1110, AGM
Quantity, CCA rating each, type (with optional redundant starters)	8, 1110, AGM
Battery voltage (DC)	12

Air Requirements	60 Hz
Radiator-cooled cooling air, m^3/min. (scfm)‡	2129 (75185)
Cooling air required for generator set when equipped with city water cooling or remote radiator, based on 14°C (25°F) rise, m^3/min. (scfm)‡	1125 (39713)
Combustion air, m^3/min. (cfm)	123 (4343)
Heat rejected to ambient air:	
Engine, kW (Btu/min.)	216 (12284)
Alternator, kW (Btu/min.)	98 (5587)

‡ Air density = 1.20 kg/m^3 (0.075 lbm/ft^3)

Alternator Specifications		60 Hz
Type		4-Pole, Rotating-Field
Exciter type		Brushless, Permanent-Magnet Pilot Exciter
Voltage regulator		Solid-State, Volts/Hz
Insulation:		NEMA MG1, UL 1446, Vacuum Pressure Impregnated (VPI)
Material		Class H, Synthetic, Nonhygroscopic
Temperature rise		130°C, 150°C Standby
Bearing: quantity, type		1, Sealed
Coupling type		Flexible Disc
Amortisseur windings		Full
Alternator winding type (up to 600 V)		Random Wound
Alternator winding type (above 600 V)		Form Wound
Rotor balancing		125%
Voltage regulation, no-load to full-load		±0.25%
Unbalanced load capability		100% of Rated Standby Current
Peak motor starting kVA:		(35% dip for voltages below)
480 V	KH04590TO4D	6030
480 V	KH04920TO4D	6509
480 V	KH05740TO4D	6749
480 V	KH06810TO4D	8466

Alternator Standard Features

- The pilot-excited, permanent magnet (PM) alternator provides superior short-circuit capability.
- All models are brushless, rotating-field alternators.
- NEMA MG1, IEEE, and ANSI standards compliance for temperature rise and motor starting.
- Sustained short-circuit current of up to 300% of the rated current for up to 10 seconds.
- Sustained short-circuit current enabling downstream circuit breakers to trip without collapsing the alternator field.
- Self-ventilated and dripproof construction.
- Superior voltage waveform from two-thirds pitch windings and skewed stator.
- Brushless alternator with brushless pilot exciter for excellent load response.

NOTE: See TIB-102 Alternator Data Sheets for alternator application data and ratings, efficiency curves, voltage dip with motor starting curves, and short circuit decrement curves.

Controllers

APM802 Controller
Provides advanced control, system monitoring, and system diagnostics for optimum performance and compatibility.

- 12-inch graphic display with touch screen and menu control provide easy local data access
- Measurements are selectable in metric or English units
- User language is selectable
- Two USB ports allow connection of a flash drive, mouse, or keypad
- Electrical data, mechanical data, and system settings can be saved to a flash drive
- Ethernet port allows connection to a PC type computer or Ethernet switch
- The controller supports Modbus® RTU and TCP protocols
- NFPA 110 Level 1 capability

Refer to G6-152 for additional controller features and accessories.

Modbus® is a registered trademark of Schneider Electric.

APM603 Controller
Provides advanced control, system monitoring, and system diagnostics for optimum performance and compatibility.

- 7-inch graphic display with touch screen and menu control provides easy local data access
- Measurements are selectable in metric or English units
- Paralleling capability to control up to 8 generators on an isolated bus with first-on logic, synchronizer, kW and kVAR load sharing, and protective relays
  Note: Parallel with other APM603 controllers only
- Generator management to turn paralleled generators off and on as required by load demand
- Load management to connect and disconnect loads as required
- Controller supports Modbus® RTU, Modbus® TCP, SNMP and BACnet®
- Integrated voltage regulator with ±0.25% regulation
- Built-in alternator thermal overload protection
- UL-listed overcurrent protective device
- NFPA 110 Level 1 capability

Refer to G6-162 for additional controller features and accessories.

BACNet® is a registered trademark of ASHRAE.

Codes and Standards

- Engine- generator set is designed and manufactured in facilities certified to ISO 9001.
- Generator set meets NEMA MG1, BS5000, ISO, DIN EN, and IEC standards, NFPA 110.
- Engine generator set is tested to ISO 8528-5 for transient response.
- The generator set and its components are prototype-tested, factory-built, and production-tested.

Third-Party Compliance

- Tier 2 EPA-Certified for Stationary Emergency Applications

Available Approvals and Listings

- ❑ California OSHPD Pre- Approval
- ❑ CSA Certified
- ❑ IBC Seismic Certification
- ❑ UL 2200 Listing
- ❑ cULus
- ❑ Florida Dept. of Environmental Protection (FDEP) Compliance (fuel tanks only)

Warranty Information

- A standard three-year or 1000-hour limited warranty for standby applications. Five-year basic, five-year comprehensive, and ten-year extended limited warranties are also available.
- A standard two-year or 8700-hour limited warranty for prime power applications.

Available Warranties for Standby Applications

- ❑ 5-Year Basic Limited Warranty
- ❑ 5-Year Comprehensive Limited Warranty
- ❑ 10-Year Major Components Limited Warranty

Standard Features

- Closed Crankcase Ventilation (CCV) Filters
- Customer Connection
- Generator Heater (4160 Volt)
- Integral Vibration Isolation
- Local Emergency Stop Switch
- Oil Drain and Coolant Drain Extension
- Operation and Installation Literature

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Available Options

Circuit Breakers

Type

- ❑ Magnetic Trip
- ❑ Thermal Magnetic Trip
- ❑ Electronic Trip (LI)
- ❑ Electronic Trip with Short Time (LSI)

Rating

- ❑ 80%
- ❑ 100%

Operation

- ❑ Manual
- ❑ Electrically Operated (for paralleling)

Circuit Breaker Mounting

- ❑ Bus Bar (for remote mounted breakers)

Enclosed Remote Mounted Circuit Breakers

- ❑ NEMA 3R (15- 1200 A)

Engine Type

- ❑ KDxxxx Tier 2 EPA-Certified Engine
- ❑ KDxxxx-F Fuel Optimized Engine

Approvals and Listings

- ❑ California OSHPD Pre- Approval
- ❑ CSA Certified
- ❑ IBC Seismic Certification
- ❑ UL 2200 Listing
- ❑ cULus
- ❑ Florida Dept. of Environmental Protection (FDEP) Compliance (fuel tanks only)
- ❑ Hurricane Rated Enclosure

Enclosed Unit

- ❑ Sound Level 1 Enclosure/Fuel Tank Package
- ❑ Sound Level 2 Enclosure/Fuel Tank Package

Open Unit

- ❑ Exhaust Silencer, Critical (kits: PA-361625 qty. 2)
- ❑ Exhaust Silencer, Hospital (kits: PA-361626 qty. 2)
- ❑ Flexible Exhaust Connector, Stainless Steel

Controller

- ❑ Input/Output, Digital
- ❑ Input/Output, Thermocouple (standard on 4160 V)
- ❑ Load Shed (APM802 only)
- ❑ Manual Key Switch
- ❑ Remote Emergency Stop Switch
- ❑ Lockable Emergency Stop Switch
- ❑ Remote Serial Annunciator Panel

Cooling System

- ❑ Block Heater; 9000 W, 208 V, (Select 1 Ph or 3 Ph) *
- ❑ Block Heater; 9000 W, 240 V, (Select 1 Ph or 3 Ph) *
- ❑ Block Heater; 9000 W, 380 V, 3 Ph *
- ❑ Block Heater; 9000 W, 480 V, (Select 1 Ph or 3 Ph) *

  * Required for ambient temperatures below 10°C (50°F). Block heater kit includes air intake manifold grid heater.
- ❑ Radiator Guard and Duct Flange

Electrical System

- ❑ Battery, AGM (kit with qty. 4)
- ❑ Battery, AGM (kit with qty. 8)
- ❑ Battery Charger
- ❑ Battery Heater; 80 W, 120 V, 1Ph
- ❑ Battery Rack and Cables
- ❑ Generator Heater (up to 600 Volt)
- ❑ Redundant Starters

Fuel System

- ❑ Flexible Fuel Lines
- ❑ Restriction Gauge (for fuel/water separator)

Literature

- ❑ General Maintenance
- ❑ NFPA 110
- ❑ Overhaul
- ❑ Production

Miscellaneous

- ❑ Air Cleaner, Heavy Duty (loose)
- ❑ Air Cleaner Restriction Indicator
- ❑ Alternator Air Filter (will reduce generator set rating by 7%)
- ❑ Automatic Oil Replenishment System
- ❑ Rated Power Factor Testing

Electrical Package (Requires Enclosure selection)

- ❑ Basic Electrical Package (select 1 Ph or 3 Ph)
- ❑ Wire Battery Charger (1 Ph)
- ❑ Wire Block Heater (select 1 Ph or 3 Ph)
- ❑ Wire Controller Heater (1 Ph)
- ❑ Wire Generator Heater (1 Ph)

Warranty (Standby Applications only)

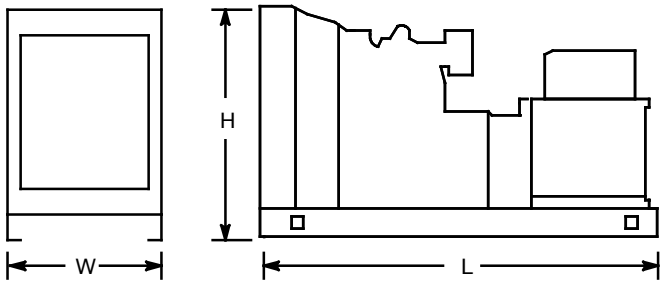
- ❑ 5-Year Basic Limited Warranty
- ❑ 5-Year Comprehensive Limited Warranty
- ❑ 10-Year Major Components Limited Warranty

Other

- ❑
- ❑

Dimensions and Weights

Overall Size, max., L x W x H, mm (in.):	5639 x 2382 x 2580 (222.0 x 93.7 x 101.6)
Weight, radiator model, max. wet, kg (lb.):	13123 (28943)



NOTE: This drawing is provided for reference only and should not be used for planning installation. Contact your local distributor for more detailed information.

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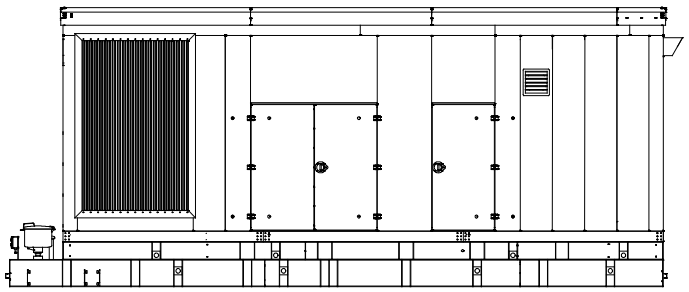
KOHLER CO., Kohler, Wisconsin 53044 USA
Phone 920-457-4441, Fax 920-459-1646
For the nearest sales and service outlet in the US and Canada, phone 1-800-544-2444
KOHLERPower.com

Sound Enclosures and Subbase Fuel Tank

Sound Level 1 Enclosure Standard Features

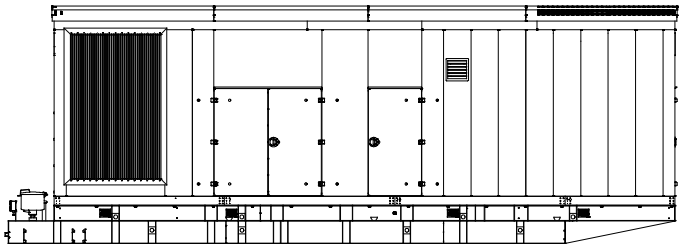
- Lift base or tank-mounted, aluminum construction enclosure with internal-mounted, exhaust silencers.
- Every enclosure has a sloped roof to reduce the buildup of moisture and debris.
- Sound attenuated enclosure that offers noise reduction using acoustic insulation, acoustic-lined air inlets and an acoustic-lined air discharge.
- Fade-, scratch-, and corrosion-resistant Kohler® Power Armor™ automotive-grade textured finish.
- Acoustic insulation that meets UL 94 HF1 flammability classification.
- Enclosure has large access doors that are hinged and removable which allow for easy maintenance.
- Lockable, flush-mounted door latches.
- Air inlet louvers reduce rain and snow entry.
- High wind bracing, 241 kph (150 mph).



Sound Level 1 Enclosure
(Shown with available spill containment)

Sound Level 2 Enclosure Standard Features

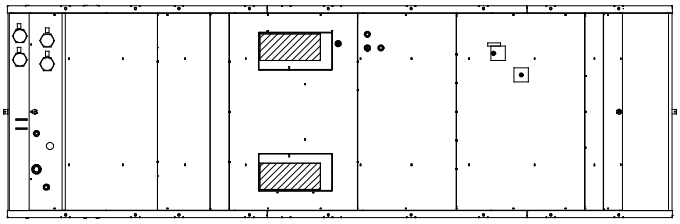
- Includes all of the sound level 1 enclosure features with the addition of up to 51 mm (2 in.) acoustic insulation material, intake sound baffles, vertical air discharge, and secondary silencers.
- Louvered air inlet and vertical outlet hood with 90 degree angles to redirect air and reduce noise.



Sound Level 2 Enclosure
(Shown with available spill containment)

Subbase Fuel Tank Features

- The fuel tank has a Power Armor Plus™ textured epoxy-based rubberized coating.
- The above-ground rectangular secondary containment tank mounts directly to the generator set, below the generator set skid (subbase).
- Both the inner and outer tanks have UL-listed emergency relief vents.
- Flexible fuel lines are provided with subbase fuel tank selection.
- The containment tank's construction protects against fuel leaks or ruptures. The inner (primary) tank is sealed inside the outer (secondary) tank. The outer tank contains the fuel if the inner tank leaks or ruptures.
- The above ground secondary containment subbase fuel tank meets UL 142 requirements.
- Features include:
  - Additional fittings for optional accessories (qty. 3)
  - Electrical stub-up area open to bottom
  - Emergency inner and outer tank relief vents
  - Fuel fill with lockable cap and 51 mm (2 in.) riser
  - Fuel leak detection switch
  - Fuel level mechanical gauge
  - Fuel level sender
  - Normal vent
  - Removable engine supply and return diptubes



Subbase Fuel Tank (Top View)

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