FUTURE PROOF ENGINE PLATFORMS

NEW AND FUTURE TECHNOLOGIES

ANGLO BELGIAN CORPORATION

We power your future

PRODUCT GUIDE

Contents

ABC headquarters and production facility in Ghent, Belgium

About Anglo Belgian Corporation

Anglo Belgian Corporation (ABC), located in Ghent (Belgium), has over 100 years of expertise in developing and manufacturing medium-speed engines and generating sets for marine applications.

ABC engines are designed for heavy duty usage. They are built to deliver outstanding performance under the toughest and most demanding conditions at sea.

The characteristic medium-speed engine (600 up to 1000 rpm) and cleverly engineered distribution of the loads ensure a low mechanical deterioration and therefore guarantees a long life of the engine and its components.

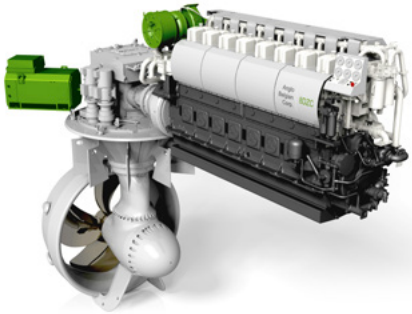
The total cost of ownership of medium-speed engines easily outperforms high-speed engines. This is due to the low fuel and lube oil consumption, the lower frequency of maintenance interventions and general robustness of the medium-speed engine. The benefit is a much lower operating cost.

Manufacturing of medium speed engines

Our efficient engines can run on different types of fuel and fuel qualities. In addition to Marine Gas Oil (MGO) or Marine Diesel Oil (MDO), ABC engines can be specially adapted for operation with Heavy Fuel Oil (HFO), Compressed Natural Gas (CNG), Liquefied Natural Gas (LNG), biofuels and other alternative fuels.

With ABC "Hybrid Systems", we offer a flexible range of marine propulsion and power generation solutions. For this, ABC concluded cooperation agreements with several solid partners. This makes it possible to complete our engines with various options including main engines, complete generator sets, power management systems, alternative power sources and even complete propulsion packages. In addition, ABC serves as a "one-stop shop" where customers can assemble their specific requirements.

We are flexible, always at your service and looking forward to listen to your specific requirements.



One of the many possible setups with DZC and DL36 engines

The world is our playground

Anglo Belgian Corporation serves customers in more than 120 countries. The company relies on highly motivated employees with many years of experience and excellent professional skills who aim at all times to provide its customers with clear and accurate information about ABC's products and services. They will always advise the best, most economical and environmentally friendly solution.

Service support worldwide

Anglo Belgian Corporation operates with branches located all over the world. These divisions provide on-site commissioning, installation works, repairs, preventive maintenance and advice for ABC engines.

ABC's large-scale stock of spare parts ensures that components can be sent within hours to any location in the world. In addition to this service, local service stations provide the fastest delivery with their substantial stock of spares and consumables.

ABC Academy

The service department offers tailored training programs for clients and new partners, according to specific requirements. These training courses can take place at the plant in Ghent or anywhere else in the world.

ABC tailored training programs

Anglo Belgian Corporation – We power your future!

ReFit Genuine Exchange Parts

With its ReFit Genuine Exchange Parts program, ABC recently introduced a new service, offering genuine exchange parts at a competitive and fixed price basis. No complicated core charge system or extra hidden costs: what you see is what you get and what you pay.

The customer is at the heart of ABC's activities. ABC ReFit Genuine Exchange Parts are overhauled according to its strict quality protocols extending the life-cycle of the engine, maximizing the vessels' uptime and strengthening the owners' competitiveness. ABC ReFit Genuine Exchange Parts have the same quality and the same warranty as new parts.

At ABC, the quote 'Time is Money' is not an empty phrase! The company has extensive stocks available and responds quickly and adequately to dynamic market demand. Class approval is available on simple request. A dedicated team of specialist service engineers with full in-depth product knowledge are happy to help you with any questions regarding ABC's ReFit Genuine Exchange Parts progam.

Cylinder head

Water pump

Turbo charger

We reduce emissions

When choosing an ABC after-treatment system, one gets **100% European quality.** ABC's EAT solutions are manufactured and assembled according to European standards, guaranteeing business reliability, service and short delivery times.

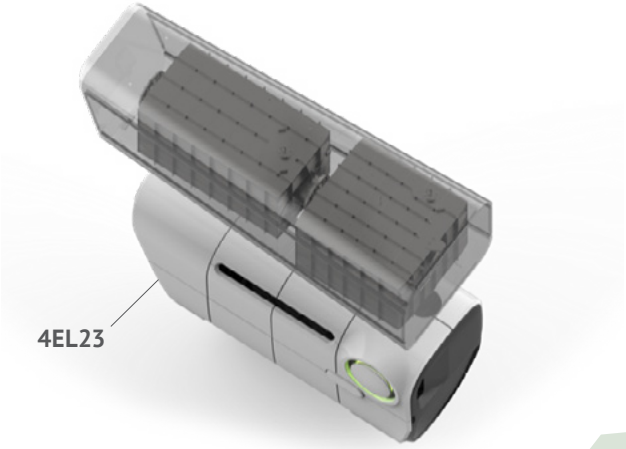
The implementation of an EAT System is challenging. An important advantage of ABC's solutions lies in the fact that we have a **flexible** and **modular system**.

For IMO Tier III we have type approval of our EAT system in combination with our ABC engine. This allows us to navigate in ECA zones. When leaving the ECA zone we can switch off our SCR and the engine will comply with **IMO Tier II limits**.

We also have an EAT solution to meet the stringent Stage V according to EU2016/1628 emission limit which is required for inland water way vessels. The set up will consist of a DPF and SCR. This allows us to go down to **ultra low levels** of particles and NOx.

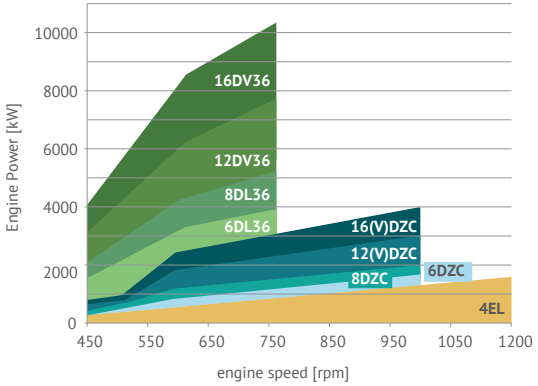
For seagoing vessels, we can offer a similar EAT system which will lead to an ULEV (**Ultra Low Emission Vessel**) notation. For owners operating near to populated area's this can have some advantages: this green image will attract customers, increase the odds of winning tenders based on a more sustainable way of operating, ...

» SCR Type Approval
» **IMO Tier III & EU STAGE V** compliant
» SCR can be extended with **DPF** for stage V
» Flexible, compact and modular system
» 100% European quality
» Comprehensive warranty package

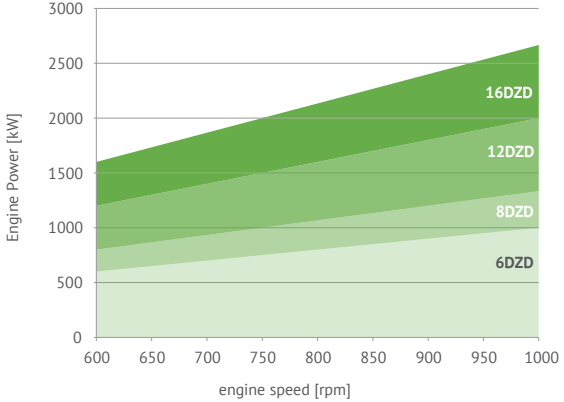


Power range

Diesel & **HFO*** engines



Dual-fuel engines



*HFO engines are limited to 750 rpm

Engine naming

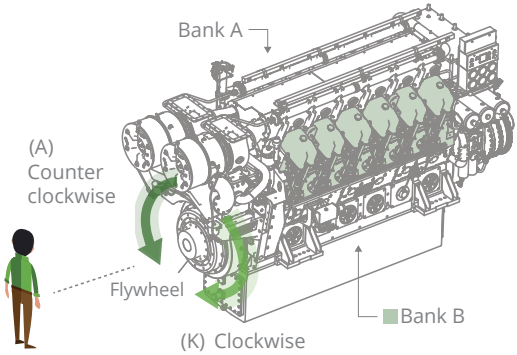
The symbols for the type/designation of each engine are as follows :

6 DZC - 1000 - 166 - A	**DZC and DZD-engines**
» 6	Number of cylinders : 6, 8, 12 or 16
» DZC	Engine type : (V)DZC or (V)DZD
» 1000	Nominal engine speed [rpm]
» 166	Nominal BMEP [bar] multiplied by 10
» A	Sense of rotation : A or K

6DL36	**D36-engines**
» 6	Number of cylinders : 6, 8, 12 or 16
» D	Engine type : DL or DV
» 36	Cylinder bore [cm]

4EL23	**E-engines**
» 4	Number of cylinders : 4
» EL	Engine type : Inline engine
» 23	Cylinder bore [cm]

Engine rotation definition



Abbreviations

BMEP : Brake Mean Effective pressure
RPM : Rotations per minute
Heat Exch : Heat exchanger
PHE : Plate Heat Exchanger
Temp : Temperature
CAC : Charge air cooler

Nm^3/s : Standard cubic meters per second (@25°C – 1 bar)
CP: heat capacity of a fluid or gas, expressed in J/(kg.K) or kJ/(kg.K)
IMO : International Maritime Organization (sea going vessels)
EPA : Environmental Protection Agency (USA)
CCR/ CCNR : Central Commission Navigation of the Rhine (European inland waterways)

ISO 3046-I : ISO standard for internal combustion engines describing an ambient temperature of 25°C, charge air coolant temperature at inlet air cooler of 25°C, a humidity of 30 %, a barometric pressure of 100 kPa and a fuel lower calorific value of 42700 kJ/kg.

Formulas & Calculations

Engine power formulas

Brake mean effective pressure

$$BMEP[bar] = \frac{1.528 \cdot 10^9 \cdot P[kW]}{(B[mm])^2 \cdot S[mm] \cdot n[rpm] \cdot \#Cylinders}$$

Torque

$$T[Nm] = 9549.3 \cdot \frac{P[kW]}{n[rpm]}$$

Engine room ventilation requirements

Total air flow

$$Q_{total}\left[\frac{m^3}{s}\right] = Q_{inletAir} + Q_{rad.\ \&Conv.} + Q_{exhaustPipeRadiation}$$

Air flow to remove engine radiation and convection heat

$$Q_{rad\ \&\ conv}\left[\frac{m^3}{s}\right] = \frac{P_{rad\ \&\ conv}[kW] \cdot 1000}{Q_{Air}\frac{[kg]}{m^3} \cdot CP\frac{J}{kg.K} \cdot \Delta T\ [°C]}$$

Parameters used in practical and emperic formulas

$Q_{air} = 1.13\ kg/m^3$
$CP_{air} = 1010\ j/kg.K$
$\Delta T = 12.5\ °C$

Typical radiation and convection air flow demand

$$Q_{rad\ \&\ conv}\left[\frac{m^3}{s}\right] = \frac{P_{Rad\ \&Conv}[kW]}{14.266}$$

Empiric formula : Air flow to remove exhaust pipe radiation heat

$$Q_{exhaustPipeRadiation}\left[\frac{m^3}{S}\right] = \frac{Length\ [m] \cdot (PipeØ[mm])^{0.68}}{2.454}$$

D36-range

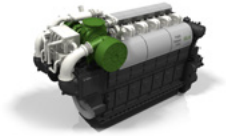
General engine data

4-stroke diesel engine, executions : IMO Tier II & III / EPA Tier III

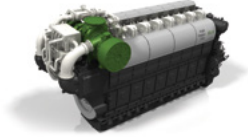
Nominal power range :	3000-5280 kW / 4080-7170 HP	
Cylinders :	6 or 8	
Engine speed :	300 rpm (idling) – 750 rpm	
Bore :	365 mm	14.4 inches
Stroke :	420 mm	16.5 inches
Cylinder volume :	43.9 dm^3(liters)	2679 $inches^3$
Compression ratio :	15.5 : 1	
Nominal BMEP :	up to 24,0 bar	348 psi
Combustion pressure :	240 bar	3046 psi
Cooling water system :		
Nominal temperature at engine outlet :	80-90°C	176-194°F
Alarm temperature at engine outlet :	90°C	194°F
Stop temperature at engine outlet :	95°C	203°F
Nominal temperature at LT outlet :	54°C	129°F
Lube oil system :		
Nominal lube oil temp. at engine inlet :	74-78°C	165-172°F
Alarm temperature at engine inlet :	80°C	176°F
Stop temperature at engine inlet :	85°C	185°F
Standard/minimum (stop) lube oil pressure :	5 bar/ f(rpm)	73 psi/ f(rpm)
Starting air module :		
Starting air pressure :	30 bar	435 psi
Fuel system :		
Fully approved fuels :	MDO/LFO/HFO (UP TO RMG700)	

	6DL36	8DL36	12DV36	16DV36
Cylinders	6 inline	8 inline	V12	V16
Typical power range	3000–3955 kW 4080–5375 HP	4000–5280 kW 5440–7180 HP	6328-7910 kW 8604-10755 HP	8438-10547 kW 11472-14360 HP
Total swept volume	263.4 Liters 16074 in^3	351.2 Liters 21431 in^3	527.4 litres 32184 in^3	703.1 litres 42906 in^3
Approximate dry weight	58500 kg 129000 lbs	71400 kg 157400 lbs	90500 kg 199518 lbs	108000 kg 238099 lbs
lube oil in sump	2100 liters 550 gallons	2300 liters 610 gallons	3300 litres 872 gallons	4000 litres 1057 gallons
Water capacity in the engine	1000 liters 264 gallons	1100 liters 290 gallons	3700 litres 977 gallons	4000 litres 1057 gallons

6DL36



8DL36



12DV36

16DV36

6DL36 engine specifications

4-stroke diesel engine, executions : IMO Tier II & III / EPA Tier III

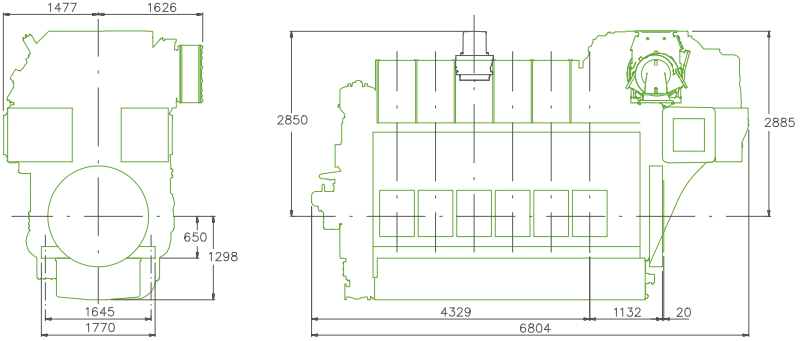
Specifications	6DL36 @720 rpm [IMO II]	6DL36 @750 rpm [IMO II]
Engine speed	720 rpm	750 rpm
Power * (ISO 3046-I)	3797 kW 5160 HP	3955 kW 5375 HP
Nominal torque	49,66 kNm 36630 lbs.ft	49,66 kNm 36630 lbs.ft
BMEP	24 bar 348.09 psi	24 bar 348.09 psi
Average piston speed	10,1 m/s 2000 ft/min	10,5 m/s 2100 ft/min
Lubrication oil system		
Rated flow lube oil pump	172 m^3/hr 757 gpm	180 m^3/hr 793 gpm
Dissipated heat to lube oil heat exchange	280 kW 15900 BTU/min	300 kW 17100 BTU/min

Specifications	6DL36 @720 rpm [IMO II]	6DL36 @750 rpm [IMO II]
Air intake and exhaust		
Combustion air flow (± 10%)	6,7 Nm^3/s 106000 gpm	7,0 Nm^3/s 111000 gpm
Combustion air temperature	55°C 131°F	55°C 131°F
Maximum intake vacuum	20 mbar 8 inches H_2O	20 mbar 8 inches H_2O
Dissipated heat LT air coolers	920 kW 52300 BTU/min	960 kW 54600 BTU/min
Dissipated heat HT air coolers	580 kW 33000 BTU/min	600 kW 34100 BTU/min
Exhaust flow (± 10%)	7,9 kg/s 17 lbs/s	8,2 kg/s 18 lbs/s
Exhaust nominal temperature (± 10°C) *	215°C 419°F	220°C 428°F
Maximum back pressure	30 mbar 12 inches H_2O	30 mbar 12 inches H_2O
Exhaust size	DN500	DN500

*Depending on configuration

Specifications	6DL36 @720 rpm [IMO II]	6DL36 @750 rpm [IMO II]
Cooling water system [calculations "Cooling circuit" on page 119]		
HT pump capacity	111 m³/hr 490 gpm	113 m³/hr 500 gpm
Total HT heat	960 kW 54600 BTU/min	1000 kW 56800 BTU/min
LT pump capacity	102 m³/hr 450 gpm	106 m³/hr 470 gpm
Total LT heat	1200 kW 68200 BTU/min	1260 kW 71700 BTU/min
Thermal balance		
Dissipated heat in the engine jacket	380 kW 21600 BTU/min	400 kW 22700 BTU/min
Radiation & convection heat	126 kW 7150 BTU/min	129 kW 7350 BTU/min

6DL36 engine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8DL36 engine specifications

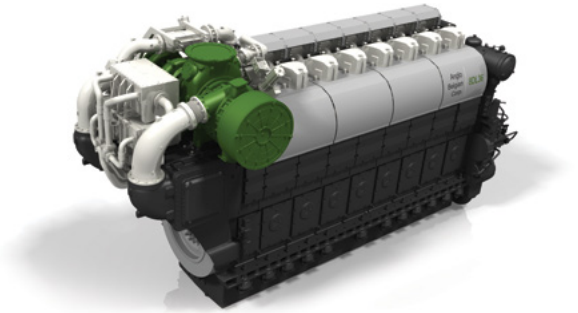
4-stroke diesel engine, executions : IMO Tier II &III / EPA Tier III

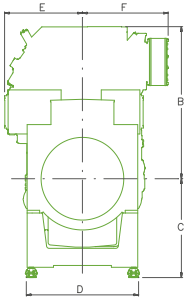
Specifications	8DL36 @720 rpm [IMO II]	8DL36 @750 rpm [IMO II]
Engine speed	720 rpm	750 rpm
Power (ISO 3046-I) *	5063 kW 6880 HP	5274 kW 7165 HP
Nominal torque	66,21 kNm 48840 lbs.ft	66,21 kNm 48840 lbs.ft
BMEP	24 bar 348.09 psi	24 bar 348.09 psi
Average piston speed	10,1 m/s 2000 ft/min	10,5 m/s 2100 ft/min
Lubrication oil system		
Rated flow of the lube oil pump	172 m^3/hr 757 gpm	180 m^3/hr 793 gpm
Dissipated heat to lube oil heat exchange	370 kW 21200 BTU/min	400 kW 22800 BTU/min
Fuel system		
Engine driven fuel pump	1,67 m^3/hr 7.26 gpm	1,74 m^3/hr 7.57 gpm
Maximum suction lift	2,5 m 98 inches H_2O	2,5 m 98 inches H_2O

Specifications	8DL36 @720 rpm [IMO II]	8DL36 @750 rpm [IMO II]
Air intake and exhaust		
Combustion air flow (± 10%)	8,3 Nm^3/s 141000 gpm	9,3 Nm^3/s 148000 gpm
Combustion air temperature	55°C 131°F	55°C 131°F
Maximum intake vacuum	20 mbar 8 inches H_2O	20 mbar 8 inches H_2O
Dissipated heat LT air coolers	1230 kW 69700 BTU/min	1280 kW 72800 BTU/min
Dissipated heat HT air coolers	770 kW 43800 BTU/min	800 kW 45500 BTU/min
Exhaust flow (± 10%)	10,5 kg/s 23 lbs/s	10,9 kg/s 24 lbs/s
Exhaust nominal temperature (± 10°C)	215°C 419°F	220°C 428°F
Maximum back pressure	30 mbar 12 inches H_2O	20 mbar 12 inches H_2O
Exhaust size	DN600	DN600

Specifications	8DL36 @720 rpm [IMO II]	8DL36 @750 rpm [IMO II]
Cooling water system [calculations "Cooling circuit" on page 119]		
HT pump capacity	147 m³/hr 647 gpm	150 m³/hr 660 gpm
Total HT heat	1280 kW 72800 BTU/min	1330 kW 75600 BTU/min
LT pump capacity	135 m³/hr 594 gpm	140 m³/hr 616 gpm
Total LT heat	1600 kW 90300 BTU/min	1680 kW 95600 BTU/min
Thermal balance		
Dissipated heat in the engine jacket	510 kW 29000 BTU/min	530 kW 30100 BTU/min
Radiation & convection heat	154 kW 8740 BTU/min	158 kW 8990 BTU/min

8DL36 engine

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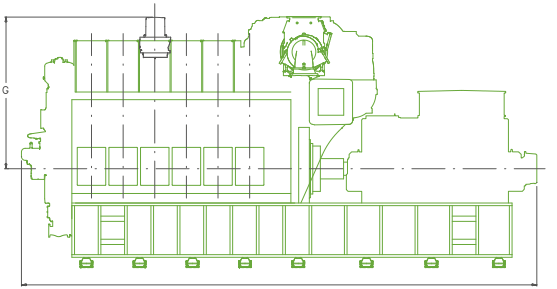
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12DV36 engine specifications

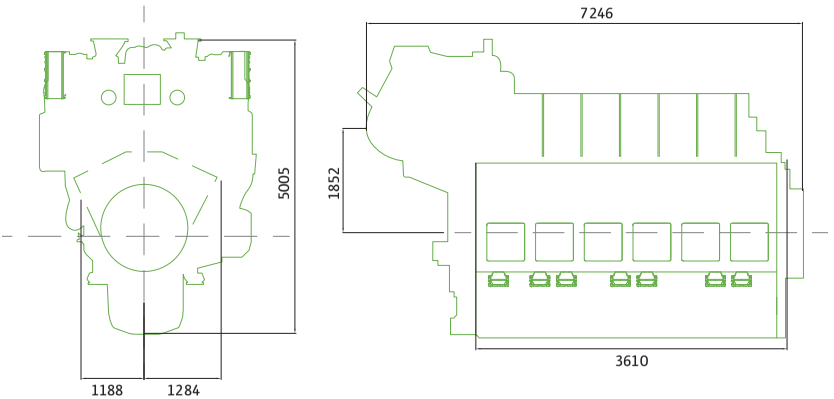
4-stroke diesel engine, executions : IMO Tier II &III / EPA Tier III

Specifications	12DV36 @720 rpm	12DV36 @750 rpm
Engine speed	720 rpm	750 rpm
Power (ISO 3046-I) *	7594 kW 10325 HP	7910 kW 10755 HP
Nominal torque	99,32 kNm 73260 lbs.ft	99,32 kNm 73260 lbs.ft
BMEP	24 bar 348.09 psi	24 bar 348.09 psi
Average piston speed	10,1 m/s 2000 ft/min	10,5 m/s 2100 ft/min
Lubrication oil system		
Rated flow of the lube oil pump	172 m^3/hr 757 gpm	180 m^3/hr 737 gpm
Fuel system		
Engine driven fuel pump	9,3 m^3/hr 41 gpm	9,7 m^3/hr 43 gpm
Maximum suction lift	0,4 m 16 inches H_2O	0,4 m 16 inches H_2O

Specifications	12DV36 @720 rpm	12DV36 @750 rpm
Air intake and exhaust		
Combustion air flow (± 10%)	13,4 Nm^3/s 212256 gpm	14 Nm^3/s 221760 gpm
Combustion air temperature	55°C 131°F	55°C 131°F
Maximum intake vacuum	20 mbar 8 inches H_2O	20 mbar 8 inches H_2O
Exhaust flow (± 10%)	16,7 kg/s 37 lbs/s	17,4 kg/s 38 lbs/s
Exhaust nominal temperature (± 10°C)	300°C 572°F	300°C 572°F
Maximum back pressure	30 mbar inches H_2O	30 mbar inches H_2O
Exhaust size	DN1200	DN1200

Specifications	12DV36 @720 rpm	12DV36 @750 rpm
Cooling water system [calculations "Cooling circuit" on page 119]		
HT pump capacity	83,7 m³/hr 369 gpm	105,2 m³/hr 463 gpm
Total HT heat	1934 kW 110000 BTU/min	2140 kW 122000 BTU/min
LT pump capacity	152,1 m³/hr 670 gpm	180 m³/hr 792 gpm
Total LT heat	2664 kW 151500 BTU/min	2775 kW 157500 BTU/min
Thermal balance		
Radiation & convection heat	303,8 kW 17277 BTU/min	316,4 kW 17993 BTU/min

12DV36 engine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16DV36 engine specifications

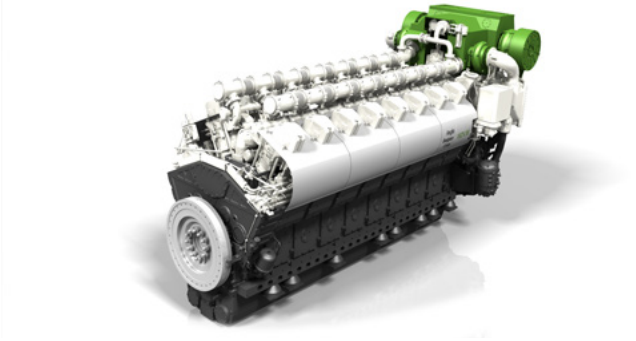
4-stroke diesel engine, executions : IMO Tier II &III / EPA Tier III

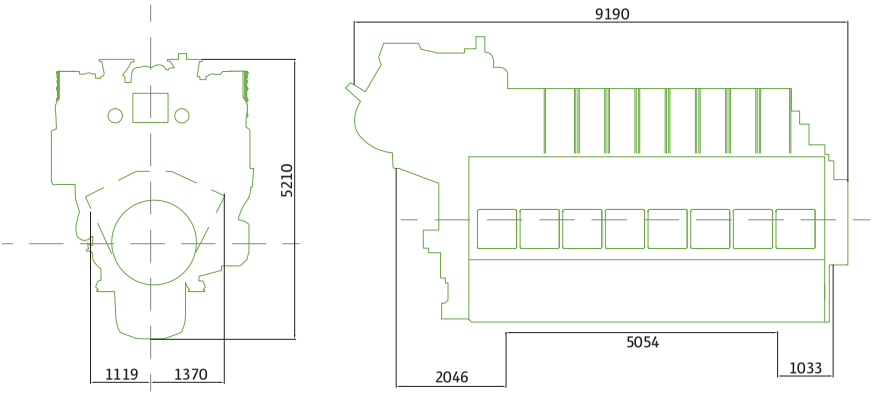
Specifications	16DV36 @720 rpm	16DV36 @750 rpm
Engine speed	720 rpm	750 rpm
Power (ISO 3046-I) *	10125 kW 13766 HP	10547 kW 14340 HP
Nominal torque	132,42 kNm 97680 lbs.ft	132,42 kNm 97680 lbs.ft
BMEP	24 bar 348.09 psi	24 bar 348.09 psi
Average piston speed	10,1 m/s 2000 ft/min	10,5 m/s 2100 ft/min
Lubrication oil system		
Rated flow of the lube oil pump	172 m^3/hr 757 gpm	180 m^3/hr 737 gpm
Fuel system		
Engine driven fuel pump	9,3 m^3/hr 41 gpm	9,7 m^3/hr 43 gpm
Maximum suction lift	0,4 m 16 inches H_2O	0,4 m 16 inches H_2O

Specifications	16DV36 @720 rpm	16DV36 @750 rpm
Air intake and exhaust		
Combustion air flow (± 10%)	17,9 Nm^3/s 283536 gpm	18,7 Nm^3/s 296208 gpm
Combustion air temperature	55°C 131°F	55°C 131°F
Maximum intake vacuum	20 mbar 8 inches H_2O	20 mbar 8 inches H_2O
Exhaust flow (± 10%)	22,3 kg/s 49.2 lbs/s	23,2 kg/s 51.1 lbs/s
Exhaust nominal temperature (± 10°C)	300°C 572°F	300°C 572°F
Maximum back pressure	30 mbar 12 inches H_2O	20 mbar 12 inches H_2O
Exhaust size	DN1200	DN1200

Specifications	16DV36 @720 rpm	16DV36 @750 rpm
Cooling water system [calculations "Cooling circuit" on page 119]		
HT pump capacity	98,9 m³/hr 435 gpm	118,5 m³/hr 522 gpm
Total HT heat	2304 kW 131000 BTU/min	2400 kW 136500 BTU/min
LT pump capacity	208,7 m³/hr 919 gpm	225 m³/hr 991 gpm
Total LT heat	2664 kW 151500 BTU/min	3700 kW 210500 BTU/min
Thermal balance		
Radiation & convection heat	405 kW 23000 BTU/min	421,9 kW 24000 BTU/min

16DV36 engine

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4EL23-range

General engine data

4-stroke diesel engine, executions : IMO TIER II & III/ EPA TIER III/ EU STAGE V

Nominal power range :	820–1320 kW / 1114-1795 HP	
Cylinders :	4	
Engine speed :	400 rpm (idling) – 1200 rpm	
Cylinder volume :	12.9 dm^3(liters)	787 $inches^3$
Bore :	230 mm	9 inches
Stroke :	310 mm	12.2 inches
Compression ratio :	17.5 : 1	
Nominal BMEP :	up to 25,6 bar	371 psi
Combustion pressure :	250 bar	3625.9 psi
Cooling water system :		
Nominal temperature at engine outlet :	77°C	171°F
Alarm temperature at engine outlet :	90°C	194°F
Stop temperature at engine outlet :	95°C	203°F
Nominal temperature at LT outlet :	49°C	120°F
Lube oil system :		
Nominal lube oil temp. at engine inlet :	70°C	158°F
Alarm temp. at engine inlet :	75°C	167°F
Stop temp. at engine inlet :	80°C	176°F
Standard/ lube oil pressure :	5 bar/ f (rpm)	73 psi f (rpm)
Starting air module :		
Starting air pressure :	30 bar	435 psi
Fuel system :		
Fully approved fuels :	Liquid fuels	

4EL

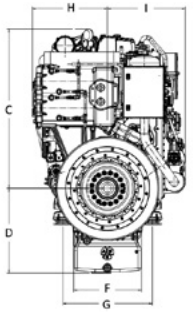
Cylinders	4 inline
Typical power range	820 - 1320 kW 1115 - 1795 HP
Total swept volume	51.5 litres 3142 in^3
Approximate dry weight	9700 kg 21340 lbs
Lube oil in sump	190 litres 50.16 gallons
Water capacity in the engine	250 litres 66 gallons

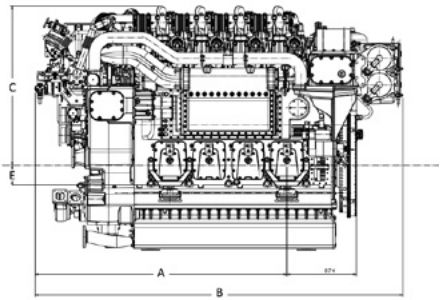
4EL23 engine

Specifications	4EL @750 rpm	4EL @1000 rpm	4EL @1200 rpm
Engine speed	750 rpm	1000 rpm	1200 rpm
Power * (ISO 3046-1)	820 kW 1114 HP	1100 kW 1494 HP	1320 kW 1795 HP
Nominal torque	10441 kNm 7726 lbs.ft	10480 kNm 7726 lbs.ft	10505 kNm 7774 lbs.ft
BMEP	25,5 bar 369 psi	25,5 bar 369 psi	25,6 bar 371 psi
Average piston speed	7,75 m/s 1525 ft/min	10,33 m/s 2033 ft/min	12,4 m/s 2100 ft/min
Lubrication oil system			
Rated flow lubo oil pump	63 m^3/h 277 gpm	84 m^3/h 370 gpm	100 m^3/h 440 gpm
Dissipated head to lube oil heat exchanger	123 kW 6.995 BTU/min	165 kW 9.385 BTU/min	198 kW 11.260 BTU/min
Fuel system			
Engine driven fuel pump	1,133 m^3/h 4.99 gpm	1,510 m^3/h 6.65 gpm	1,813 m^3/h 7.98 gpm
Maximum suction lift	2 m inches H_2O	2 m 78.74 inches H_2O	2 m inches H_2O

Specifications	4EL @750 rpm	4EL @1000 rpm	4EL @1200 rpm
Air intake and exhaust			
Combustion air flow (+- 10%)	4.544 Kg/h 10.018 lbs/h	5882 Kg/h 12967 lbs/h	6.747 kg/h 14.875 lbs/h
Combustion air temperature	52 °C 125.6 °F	52 °C 125.6 °F	52 °C 125.6 °F
Maximum intake vacuum	974 mbar, abs 391 inch H_2O	974 mbar, abs 391 inch H_2O	974 mbar, abs 391 inch H_2O
Dissipated heat LT air coolers	57 kW 3.242 BTU/min	80 kW 4.538 BTU/min	101 kW 5.744 BTU/min
Dissipated heat HT air coolers	159 kW 9.042 BTU/min	222 kW 12.500 BTU/min	283 kW 16.094 BTU/min
Exhaust flow (+- 10%)	4.704 kg/h 10.371 lbs/h	6.045 kg/h 13327 lbs/h	7.001 kg/h 15.435 lbs/h
Exhaust temperature	350 °C 662 °F	351 °C 363.8 °F	355 °C 671 °F
Maximum back pressure	100 mbar 40 inches H_2O	100 mbar 40 inches H_2O	100 mbar 40 inches H_2O
Exhaust size	DN200	DN200	DN200
Cooling water system			
HT pump capacity (flow to the installation)	20,3 m^3/h 89.4 gpm	27.05 m^3/h 119.18 gpm	32,5 m^3/h 143 gpm
Total HT heat	291 kW 16.559 BTU/min	400 kW 22.798 BTU/min	496 kW 28.207 BTU/min
LT pump capacity (flow to the installation)	44 m^3/h 194 gpm	58,6 m^3/h 258 gpm	70,4 m^3/h 310 gpm
Total LT head	180 kW 10.236 BTU/min	244 kW 13.904 BTU/min	299 kW 17.004 BTU/min

Specifications	4EL @750 rpm	4EL @1000 rpm	4EL @1200 rpm
Thermal balance			
Dissipated heat in the engine jacket	132 kW 7.506 BTU/min	177 kW 10.050 BTU/min	213 kW 12.113 BTU/min
Radiation & convention heat	44 kW BTU/min	54 kW 3071 BTU/min	61 kW BTU/min





	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	G (mm)	H (mm)	I (mm)	Dry mass* (kg)
4EL	2456	3584	1554	820	200	660	870	733	754	9700

* Flywheel, vibration damper and coolers are included

DZC-range

General engine data

4-stroke diesel engine, executions : IMO TIER II & III/ EPA TIER III/ EU STAGE V

Nominal power range :	600–4000 kW / 800-5400 HP	
Cylinders :	6, 8, 12 or 16	
Engine speed :	330 rpm (idling) – 1000 rpm	
Cylinder volume :	15,95 dm^3(liters)	973 $inches^3$
Bore :	256 mm	10 inches
Stroke :	310 mm	12 inches
Compression ratio :	12.1 : 1	
Nominal BMEP :	up to 18,8 bar	273 psi
Combustion pressure :	130 bar	1885 psi
Cooling water system :		
Nominal temperature at engine outlet :	80 or 85°C	185°F
Alarm temperature at engine outlet :	90°C	194°F
Stop temperature at engine outlet :	95°C	203°F
Nominal temp. at inlet CAC 6DZC/8DZC :	45°C	113°F
Nominal temp. at inlet CAC 12DZC/16DZC :	41°C	106°F
Maximum external pressure drop :	0,4 bar	6 psi
Typical/minimum (alarm) pressure HT pump :	1,9 bar/0,4 bar	27 psi/6 psi
Lube oil system :		
Nominal lube oil temp. at engine inlet :	75°C	167°F
Alarm temp. at engine inlet :	80°C	176°F
Stop temp. at engine inlet :	85°C	185°F
Standard/minimum (stop) lube oil pressure :	5 bar/2,6 bar	73 psi/38 psi
Starting air module :		
Starting air pressure :	30 bar	435 psi
Fuel system :		
Standard/minimum (alarm) pressure fuel pump :	2,5 bar/1,5 bar	36 psi/22 psi
Approved fuels :	MDO/MGO/HFO up to RMG380	

	6DZC	8DZC	12DZC	16DZC
Cylinders	6 inline	8 inline	V12	V16
Typical power range	600–1500 kW 800–2000 HP	1400–2000 kW 1900–2700 HP	1900–3000 kW 2600–4100 HP	2900–4000 kW 3800–5400 HP
Total swept volume	95,7 liters 5840 in³	127,6 liters 7787 in³	191,5 liters 11686 in³	255,2 liters 15573 in³
Approximate dry weight	10620 kg 23400 lbs	13905 kg 30650 lbs	18000 kg 39700 lbs	21750 kg 47950 lbs
Standard lube oil sump	450 liters 120 gallons	510 liters 140 gallons	800 liters 210 gallons	1000 liters 260 gallons
Extra deep lube oil sump	620 liters 160 gallons	650 liters 170 gallons	900 liters 240 gallons	1000 liters 260 gallons
Water capacity in the engine	210 liters 50 gallons	280 liters 70 gallons	500 liters 130 gallons	600 liters 160 gallons

6DZC

8DZC

12DZC

16DZC

6DZC engine specifications

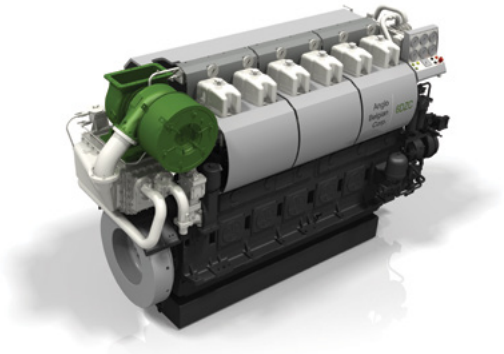
4-stroke diesel engine, executions : IMO TIER II & III/ EPA TIER III/ EU STAGE V

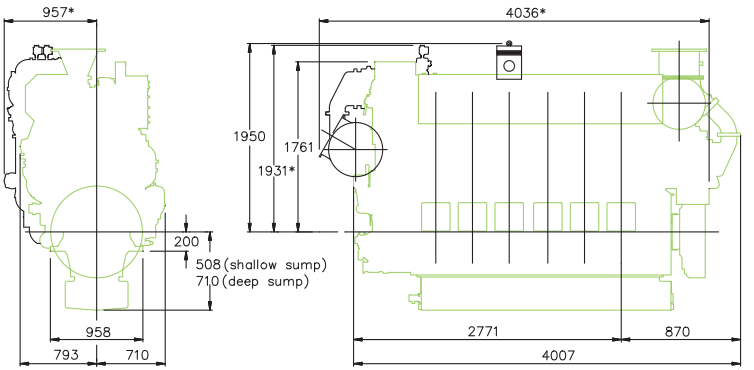
Specifications	6DZC 720-181	6DZC 750-179	6DZC 800-173	6DZC 900-166	6DZC 1000-166
Engine speed	720 rpm	750 rpm	800 rpm	900 rpm	1000 rpm
Power (ISO 3046-I) *	1032 kW 1403 HP	1065 kW 1448 HP	1104 kW 1500 HP	1194 kW 1623 HP	1326 kW 1803 HP
Maximum power harbor tugs					1459 kW 1983 HP
Nominal torque	13,68 kNm 10090 lbs.ft	13,56 kNm 10000 lbs.ft	13,18 kNm 9720 lbs.ft	12,66 kNm 9350 lbs.ft	12,66 kNm 9350 lbs.ft
BMEP	18,1 bar 263 psi	17,9 bar 260 psi	17,3 bar 251 psi	16,6 bar 241 psi	16,6 bar 241 psi
Average piston speed	7,4 m/s 1500 ft/min	7,7 m/s 1500 ft/min	8,2 m/s 1600 ft/min	9,3 m/s 1800 ft/min	10,3 m/s 2000 ft/min
Lubrication oil system					
Rated flow lube oil pump	19,3 m^3/hr 85 gpm	19,5 m^3/hr 86 gpm	19,7 m^3/hr 86 gpm	19,8 m^3/hr 87 gpm	20,2 m^3/hr 89 gpm
Dissipated heat to lube oil heat exchange	95 kW 5400 BTU/min	98 kW 5600 BTU/min	108 kW 6200 BTU/min	127 kW 7200 BTU/min	131 kW 7500 BTU/min
Fuel system					
Fuel feed pump	0,35 m^3/hr 1.52 gpm	0,36 m^3/hr 1.56 gpm	0,39 m^3/hr 1.70 gpm	0,43 m^3/hr 1.87 gpm	0,48 m^3/hr 2.09 gpm
Maximum suction lift	2,5 m 98 inches	2,5 m 98 inches	2,5 m 98 inches	2,5 m 98 inches	2,5 m 98 inches

Specifications	6DZC 720-181	6DZC 750-179	6DZC 800-173	6DZC 900-166	6DZC 1000-166
Air intake and exhaust					
Combustion air flow (± 10%)	1,85 Nm³/s 29300	1,90 Nm³/s 30100	1,97 Nm³/s 31400	2,12 Nm³/s 33600	2,47 Nm³/s 39200
Combustion air temp.	55°C 131°F	55°C 131°F	55°C 131°F	55°C 131°F	55°C 131°F
Maximum intake vacuum	15 mbar 6 inches H_2O	15 mbar 6 inches H_2O	15 mbar 6 inches H_2O	15 mbar 6 inches H_2O	15 mbar 6 inches H_2O
Dissipated heat (CAC)	261 kW 14800 BTU/min	269 kW 15300 BTU/min	265 kW 15100 BTU/min	254 kW 14500 BTU/min	347 kW 19800 BTU/min
Exhaust flow (± 10%)	2,19 kg/s 4.82 lbs/s	2,24 kg/s 4.95 lbs/s	2,34 kg/s 5.15 lbs/s	2,50 kg/s 5.52 lbs/s	2,91 kg/s 6.42 lbs/s
Exhaust nominal temperature (± 10°C)	385°C 725°F	385°C 725°F	390°C 735°F	395°C 745°F	410°C 770°F
Maximum back pressure	25 mbar 10 inches H_2O	25 mbar 10 inches H_2O	25 mbar 10 inches H_2O	25 mbar 10 inches H_2O	25 mbar 10 inches H_2O
Exhaust size	DN400	DN400	DN400	DN400	DN450

Specifications	6DZC 720-181	6DZC 750-179	6DZC 800-173	6DZC 900-166	6DZC 1000-166
Split cooling water system [calculations Split "Cooling circuit" on page 115]					
Pump capacity	36 m³/hr 157 gpm	39 m³/hr 170 gpm	43 m³/hr 187 gpm	48 m³/hr 209 gpm	54 m³/hr 235 gpm
Total heat	645 kW 36700 BTU/min	666 kW 37900 BTU/min	683 kW 38800 BTU/min	715 kW 40700 BTU/min	850 kW 48300 BTU/min
Thermal balance					
Dissipated heat in the engine jacket	289 kW 16400 BTU/min	298 kW 17000 BTU/min	309 kW 17600 BTU/min	334 kW 19000 BTU/min	371 kW 21100 BTU/min
Radiation & convection	51 kW 2900 BTU/min	52 kW 3000 BTU/min	53 kW 3000 BTU/min	56 kW 3200 BTU/min	61 kW 3500 BTU/min

6DZC engine





* [turbo at free end side execution]

8DZC engine specifications

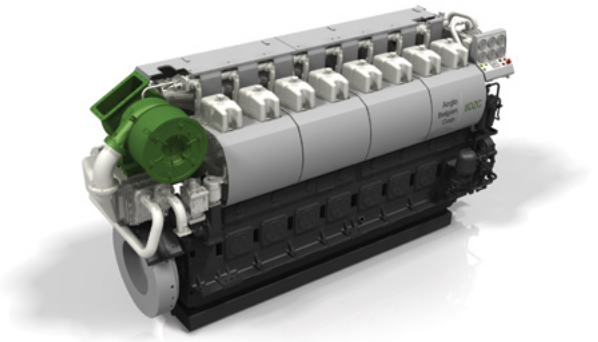
4-stroke diesel engine, executions : IMO TIER II & III/ EPA TIER III/ EU STAGE V

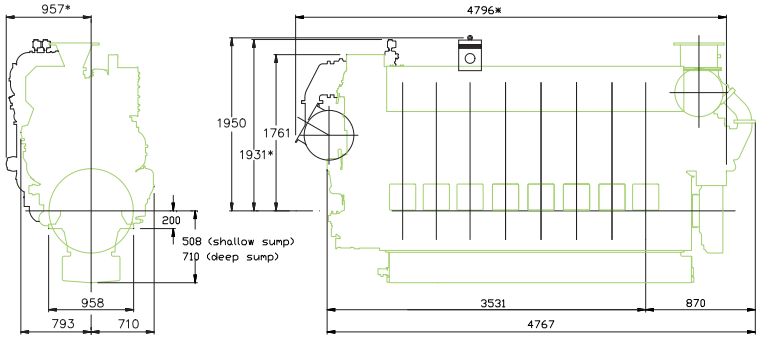
Specifications	8DZC 720-181	8DZC 750-179	8DZC 800-173	8DZC 900-166	8DZC 1000-166
Engine speed	720 rpm	750 rpm	800 rpm	900 rpm	1000 rpm
Power (ISO 3046-I) *	1376 kW 1871 HP	1420 kW 1931 HP	1472 kW 2000 HP	1592 kW 2164 HP	1768 kW 2404 HP
Maximum power harbor tugs					1945 kW 2644 HP
Nominal torque	18,24 kNm 13450 lbs.ft	18,08 kNm 13330 lbs.ft	17,57 kNm 12960 lbs.ft	16,88 kNm 12460 lbs.ft	16,88 kNm 12460 lbs.ft
BMEP	18,1 bar 263 psi	17,9 bar 260 psi	17,3 bar 251 psi	16,6 bar 241 psi	16,6 bar 241 psi
Average piston speed	7,4 m/s 1500 ft/min	7,7 m/s 1500 ft/min	8,2 m/s 1600 ft/min	9,3 m/s 1800 ft/min	10,3 m/s 2000 ft/min
Lubrication oil system					
Rated flow of the lube oil pump	23,0 m^3/hr 100 gpm	23,5 m^3/hr 102 gpm	23,6 m^3/hr 103 gpm	23,8 m^3/hr 103 gpm	24 m^3/hr 104 gpm
Dissipated heat to lube oil heat exchange	124 kW 7040 BTU/min	131 kW 7470 BTU/min	142 kW 8090 BTU/min	169 kW 9600 BTU/min	184 kW 10460 BTU/min
Fuel system					
Engine driven fuel feed pump	0,35 m^3/hr 1.52 gpm	0,36 m^3/hr 1.56 gpm	0,39 m^3/hr 1.70 gpm	0,43 m^3/hr 1.87 gpm	0,48 m^3/hr 2.09 gpm
Maximum suction lift	2,5 m 98 inches	2,5 m 98 inches	2,5 m 98 inches	2,5 m 98 inches	2,5 m 98 inches

Specifications	8DZC 720-181	8DZC 750-179	8DZC 800-173	8DZC 900-166	8DZC 1000-166
Air intake and exhaust					
Combustion air flow (± 10%)	2,55 Nm^3/s 40400	2,62 Nm^3/s 41500	2,72 Nm^3/s 43100	2,91 Nm^3/s 46100	3,42 Nm^3/s 54200
Combustion air temperature	55°C 131°F	55°C 131°F	55°C 131°F	55°C 131°F	55°C 131°F
Maximum intake vacuum	15 mbar 6 inches H_2O	15 mbar 6 inches H_2O	15 mbar 6 inches H_2O	15 mbar 6 inches H_2O	15 mbar 6 inches H_2O
Dissipated heat (CAC)	347 kW 19700 BTU/min	352 kW 20000 BTU/min	334 kW 19000 BTU/min	302 kW 17200 BTU/min	424 kW 24100 BTU/min
Exhaust flow (± 10%)	3,01 kg/s 6.63 lbs/s	3,09 kg/s 6.81 lbs/s	3,21 kg/s 7.07 lbs/s	3,43 kg/s 7.57 lbs/s	4,03 kg/s 8.88 lbs/s
Exhaust nominal temperature (± 10°C)	385°C 725°F	385°C 725°F	390°C 734°F	395°C 743°F	410°C 770°F
Maximum back pressure	25 mbar 10 inches H_2O	25 mbar 10 inches H_2O	25 mbar 10 inches H_2O	25 mbar 10 inches H_2O	25 mbar 10 inches H_2O
Exhaust size	DN450	DN450	DN450	DN500	DN500

Specifications	8DZC 720-181	8DZC 750-179	8DZC 800-173	8DZC 900-166	8DZC 1000-166
Split cooling water system [calculations Split "Cooling circuit" on page 115]					
Pump capacity	52 m³/hr 226 gpm	54 m³/hr 235 gpm	57 m³/hr 248 gpm	64 m³/hr 278 gpm	72 m³/hr 313 gpm
Total heat	856 kW 48700 BTU/min	881 kW 50100 BTU/min	888 kW 50500 BTU/min	917 kW 52100 BTU/min	1103 kW 62700 BTU/min
Thermal balance					
Dissipated heat in the engine jacket	385 kW 21900 BTU/min	398 kW 22600 BTU/min	412 kW 23400 BTU/min	446 kW 25400 BTU/min	495 kW 28200 BTU/min
Radiation & convection	62 kW 3500 BTU/min	64 kW 3600 BTU/min	65 kW 3700 BTU/min	69 kW 3900 BTU/min	74 kW 4200 BTU/min

8DZC engine





* [turbo at free end side execution]

12DZC engine specifications

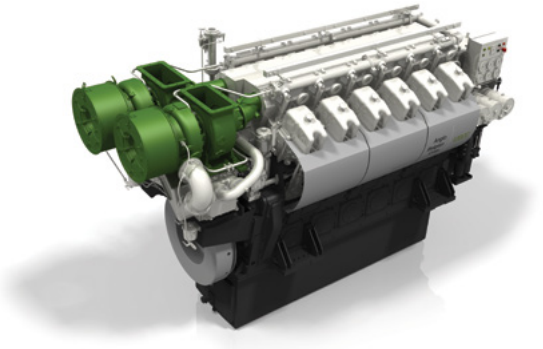
4-stroke diesel engine, executions : IMO TIER II & III/ EPA TIER III/ EU STAGE V

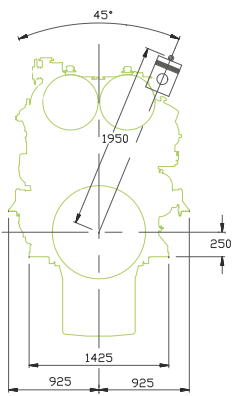
Specifications	12DZC 720-181	12DZC 750-179	12DZC 800-173	12DZC 900-166	12DZC 1000-166
Engine speed	720 rpm	750 rpm	800 rpm	900 rpm	1000 rpm
Power (ISO 3046-I) *	2064 kW 2806 HP	2130 kW 2896 HP	2208 kW 3000 HP	2388 kW 3247 HP	2652 kW 3606 HP
Maximum power harbor tugs					2917 kW 3966 HP
Nominal torque	27,36 kNm 20180 lbs.ft	27,12 kNm 20000 lbs.ft	26,36 kNm 19440 lbs.ft	25,32 kNm 18690 lbs.ft	25,32 kNm 18690 lbs.ft
BMEP	18,1 bar 263 psi	17,9 bar 260 psi	17,3 bar 251 psi	16,6 bar 241 psi	16,6 bar 241 psi
Average piston speed	7,4 m/s 1500 ft/min	7,7 m/s 1500 ft/min	8,2 m/s 1600 ft/min	9,3 m/s 1800 ft/min	10,3 m/s 2000 ft/min
Lubrication oil system					
Rated flow lube oil pump	38,6 m^3/hr 168 gpm	39,0 m^3/hr 170 gpm	40,0 m^3/hr 174 gpm	40,2 m^3/hr 175 gpm	40,4 m^3/hr 176 gpm
Dissipated heat to lube oil heat exchange	190 kW 10800 BTU/ min	199 kW 11300 BTU/ min	218 kW 12400 BTU/ min	253 kW 14400 BTU/ min	263 kW 14900 BTU/ min
Fuel system					
Engine driven fuel pump	0,70 m^3/hr 3.04 gpm	0,72 m^3/hr 3.13 gpm	0,77 m^3/hr 3.35 gpm	0,87 m^3/hr 3.78 gpm	0,97 m^3/hr 4.22 gpm
Maximum suction lift	2,5 m 98 inches	2,5 m 98 inches	2,5 m 98 inches	2,5 m 98 inches	2,5 m 98 inches

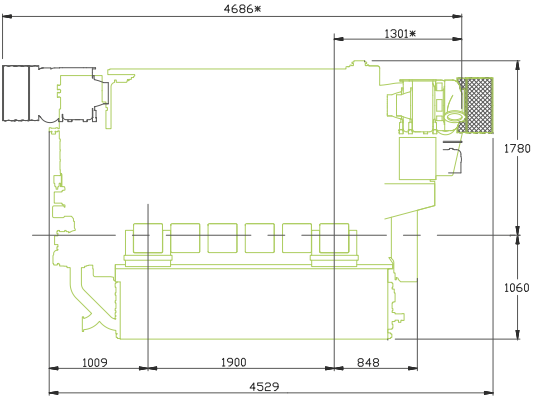
Specifications	12DZC 720-181	12DZC 750-179	12DZC 800-173	12DZC 900-166	12DZC 1000-166
Air intake and exhaust					
Combustion air flow (± 10%)	3,70 Nm^3/s 58700	3,80 Nm^3/s 60200	3,96 Nm^3/s 62800	4,24 Nm^3/s 67200	4,94 Nm^3/s 78300
Combustion air temperature	55°C 131°F	55°C 131°F	55°C 131°F	55°C 131°F	55°C 131°F
Maximum intake vacuum	15 mbar 6 inches H_2O	15 mbar 6 inches H_2O	15 mbar 6 inches H_2O	15 mbar 6 inches H_2O	15 mbar 6 inches H_2O
Dissipated heat (CAC)	522 kW 29700 BTU/min	537 kW 30600 BTU/min	531 kW 30200 BTU/min	509 kW 28900 BTU/min	695 kW 39500 BTU/min
Exhaust flow (± 10%)	4,37 kg/s 9.63 lbs/s	4,49 kg/s 9.89 lbs/s	4,67 kg/s 10.30 lbs/s	5,01 kg/s 11.04 lbs/s	5,83 kg/s 12.84 lbs/s
Exhaust nominal temperature.(± 10°C)	385°C 725°F	385°C 725°F	390°C 734°F	395°C 743°F	410°C 770°F
Maximum back pressure	25 mbar 10 inches H_2O	25 mbar 10 inches H_2O	25 mbar 10 inches H_2O	25 mbar 10 inches H_2O	25 mbar 10 inches H_2O
Exhaust size	DN550	DN550	DN550	DN600	DN600

Specifications	12DZC 720-181	12DZC 750-179	12DZC 800-173	12DZC 900-166	12DZC 1000-166
Split cooling water system [calculations Split "Cooling circuit" on page 115]					
Pump capacity	76 m³/hr 335 gpm	79 m³/hr 348 gpm	83 m³/hr 360 gpm	94 m³/hr 414 gpm	108 m³/hr 476 gpm
Total heat	1290 kW 73400 BTU/min	1332 kW 75800 BTU/min	1367 kW 77700 BTU/min	1430 kW 81300 BTU/min	1700 kW 96700 BTU/min
Thermal balance					
Dissipated heat in the engine jacket	578 kW 32900 BTU/min	596 kW 33900 BTU/min	618 kW 35200 BTU/min	669 kW 38000 BTU/min	743 kW 42200 BTU/min
Radiation and convection	83 kW 4700 BTU/min	85 kW 4800 BTU/min	87 kW 4900 BTU/min	92 kW 5200 BTU/min	99 kW 5600 BTU/min

12DZC engine







* [turbo at free end side execution]

16DZC engine specifications

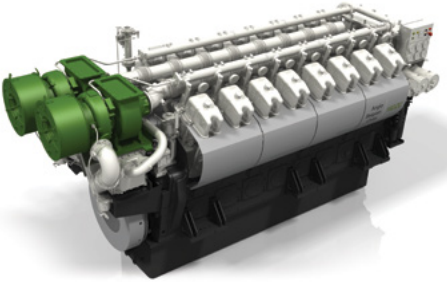
4-stroke diesel engine, executions : IMO TIER II & III/ EPA TIER III/ EU STAGE V

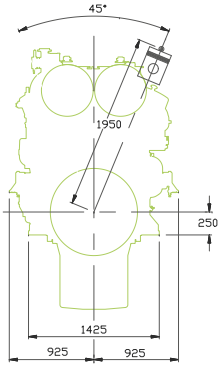
Specifications	16DZC 720-181	16DZC 750-179	16DZC 800-173	16DZC 900-166	16DZC 1000-166
Engine speed	720 rpm	750 rpm	800 rpm	900 rpm	1000 rpm
Power (ISO 3046-I) *	2752 kW 3742 HP	2840 kW 3840 HP	2944 kW 4000 HP	3184 kW 4329 HP	3536 kW 4808 HP
Maximum power harbor tugs					3890 kW 5288 HP
Nominal torque	36,48 kNm 26900 lbs.ft	36,16 kNm 26670 lbs.ft	35,14 kNm 25920 lbs.ft	33,76 kNm 24920 lbs.ft	33,76 kNm 24920 lbs.ft
BMEP	18,1 bar 263 psi	17,9 bar 260 psi	17,3 bar 251 psi	16,6 bar 241 psi	16,6 bar 241 psi
Average piston speed	7,4 m/s 1500 ft/min	7,7 m/s 1500 ft/min	8,2 m/s 1600 ft/min	9,3 m/s 1800 ft/min	10,3 m/s 2000 ft/min
Lubrication oil system					
Rated flow lube oil pump	46,6 m³/hr 203 gpm	47,0 m³/hr 204 gpm	47,4 m³/hr 206 gpm	47,8 m³/hr 208 gpm	48,0 m³/hr 209 gpm
Dissipated heat to lube oil heat exchange	248 kW 14100 BTU/min	265 kW 15100 BTU/min	290 kW 16500 BTU/min	338 kW 19200 BTU/min	368 kW 20900 BTU/min
Fuel system					
Engine driven fuel feed pump	0,70 m³/hr 3.04 gpm	0,72 m³/hr 3.13 gpm	0,77 m³/hr 3.35 gpm	0,87 m³/hr 3.78 gpm	0,97 m³/hr 4.22 gpm
Maximum suction lift	2,5 m 98 inches	2,5 m 98 inches	2,5 m 98 inches	2,5 m 98 inches	2,5 m 98 inches

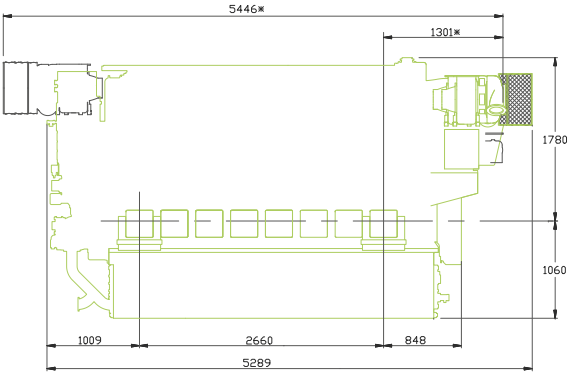
Specifications	16DZC 720-181	16DZC 750-179	16DZC 800-173	16DZC 900-166	16DZC 1000-166
Air intake and exhaust					
Combustion air flow (± 10%)	5,10 Nm^3/s 80800	5,24 Nm^3/s 83100	5,43 Nm^3/s 86200	5,82 Nm^3/s 92300	6,84 Nm^3/s 108400
Combustion air temperature	55°C 131°F	55°C 131°F	55°C 131°F	55°C 131°F	55°C 131°F
Maximum intake vacuum	15 mbar 6 inches H_2O	15 mbar 6 inches H_2O	15 mbar 6 inches H_2O	15 mbar 6 inches H_2O	15 mbar 6 inches H_2O
Dissipated heat (CAC)	694 kW 39400 BTU/min	704 kW 40100 BTU/min	669 kW 38000 BTU/min	605 kW 34400 BTU/min	884 kW 50300 BTU/min
Exhaust flow (± 10%)	6,01 kg/s 13.25 lbs/s	6,18 kg/s 13.63 lbs/s	6,41 kg/s 14.13 lbs/s	6,87 kg/s 15.14 lbs/s	8,06 kg/s 17.76 lbs/s
Exhaust nominal temperature (± 10°C)	385°C 725°F	385°C 725°F	390°C 734°F	395°C 743°F	410°C 770°F
Maximum back pressure	25 mbar 10 inches H_2O	25 mbar 10 inches H_2O	25 mbar 10 inches H_2O	25 mbar 10 inches H_2O	25 mbar 10 inches H_2O
Exhaust size	DN650	DN650	DN650	DN650	DN700

Specifications	16DZC 720-181	16DZC 750-179	16DZC 800-173	16DZC 900-166	16DZC 1000-166
Split cooling water system [calculations Split "Cooling circuit" on page 115]					
Pump capacity	104 m³/hr 458 gpm	108 m³/hr 476 gpm	115 m³/hr 500 gpm	130 m³/hr 572 gpm	144 m³/hr 634 gpm
Total heat	1781 kW 101300 BTU/min	1835 kW 104400 BTU/min	1857 kW 105600 BTU/min	1914 kW 108800 BTU/min	2330 kW 132500 BTU/min
Thermal balance					
Dissipated heat in the engine jacket	839 kW 47700 BTU/min	866 kW 49300 BTU/min	898 kW 51100 BTU/min	971 kW 55200 BTU/min	1078 kW 61300 BTU/min
Radiation and convection	101 kW 5800 BTU/min	104 kW 5900 BTU/min	106 kW 6000 BTU/min	112 kW 6400 BTU/min	121 kW 6900 BTU/min

16DZC engine







* [turbo at free end side execution]

DZD-range

General engine data

4-stroke dual-fuel engine, executions : IMO TIER II & III / EPA Tier III

Nominal power range :	600–2670 kW / 880-3630 HP	
Cylinders :	6, 8, 12 or 16	
Engine speed :	330 rpm (idling) – 1000 rpm	
Bore :	256 mm	10 inches
Stroke :	310 mm	12 inches
Cylinder volume :	15,95 dm^3(liters)	973 $inches^3$
Compression ratio :	12.1 : 1	
Nominal BMEP :	12,5 bar	181 psi
Combustion pressure :	130 bar	1885 psi
Cooling water system :		
Nominal temperature at engine outlet :	85°C	185°F
Alarm temperature at engine outlet :	90°C	194°F
Stop temperature at engine outlet :	95°C	203°F
Nominal temperature at inlet CAC :	35°C	95 °F
Maximum external pressure drop :	0,4 bar	6 psi
Typical/minimum (alarm) pressure HT pump :	1,9 bar/0,4 bar	27 psi/6 psi
Lube oil system :		
Nominal lube oil temperature at engine inlet :	75°C	167°F
Alarm temperature at engine inlet :	80°C	176°F
Stop temperature at engine inlet :	85°C	185°F
Standard/minimum (stop) lube oil pressure :	5 bar/2,6 bar	73 psi/38 psi
Starting air module :		
Starting air pressure :	30 bar	435 psi
Fuel system :		
Standard/minimum (alarm) pressure fuel pump :	2,5 bar/1,5 bar	36 psi/22 psi
Approved fuels :	MDO/MGO	
Approved gasses :	Natural gas (after check ABC)	

	6DZD	8DZD	12DZD	16DZD
Cylinders	6 inline	8 inline	V12	V16
Typical power range	500–1000 kW 680–1360 HP	1000–1330 kW 1360–1810 HP	1330–2000 kW 1810–2720 HP	2000–2670 kW 2720–3630 HP
Total swept volume	95,7 liters 5840 in³	127,6 liters 7787 in³	191,5 liters 11686 in³	255,2 liters 15573 in³
Approximate dry weight	10620 kg 23413 lbs	13905 kg 30655 lbs	18000 kg 39683 lbs	21750 kg 47951 lbs
standard lube oil sump	450 liters 119 gallons	510 liters 135 gallons	800 liters 211 gallons	1000 liters 264 gallons
Extra deep lube oil sump	615 liters 162 gallons	650 liters 172 gallons	900 liters 238 gallons	1000 liters 264 gallons
Water capacity in the engine	205 liters 54 gallons	275 liters 73 gallons	500 liters 132 gallons	600 liters 159 gallons

6 DZD

8DZD

12DZD

16DZD

6DZD engine specifications

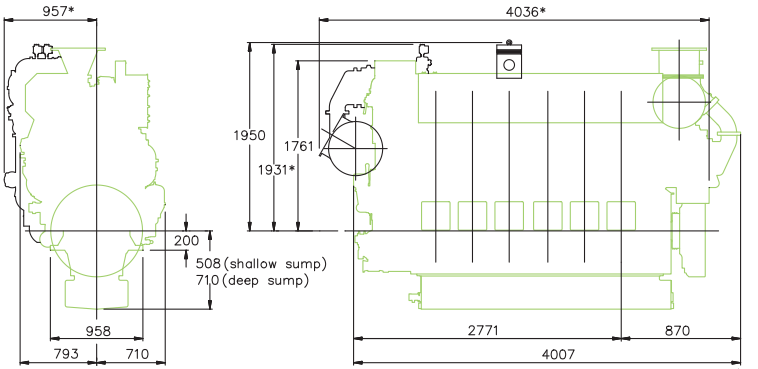
4-stroke dual-fuel engine, executions : IMO Tier II & III / EPA Tier III

Specifications	6DZD 720-125	6DZD 750-125	6DZD 800-125	6DZD 900-125	6DZD 1000-125
Engine speed	720 rpm	750 rpm	800 rpm	900 rpm	1000 rpm
Power (ISO 3046-I) *	720 kW 978 HP	750 kW 1019 HP	800 kW 1086 HP	900 kW 1223 HP	1000 kW 1359 HP
Nominal torque	9,55 kNm 7040 lbs.ft	9,55 kNm 7040 lbs.ft	9,55 kNm 7040 lbs.ft	9,55 kNm 7040 lbs.ft	9,55 kNm 7040 lbs.ft
BMEP	12,5 bar 181 psi	12,5 bar 181 psi	12,5 bar 181 psi	12,5 bar 181 psi	12,5 bar 181 psi
Average piston speed	7,4 m/s 1500 ft/min	7,7 m/s 1500 ft/min	8,2 m/s 1600 ft/min	9,3 m/s 1800 ft/min	10,3 m/s 2000 ft/min
Lubrication oil system					
Rated flow lube oil pump	19,3 m^3/hr 85 gpm	19,5 m^3/hr 86 gpm	19,7 m^3/hr 86 gpm	19,8 m^3/hr 87 gpm	20,2 m^3/hr 89 gpm
Dissipated heat to lube oil heat exchange	86 kW 4900 BTU/min	90 kW 5100 BTU/min	98 kW 5600 BTU/min	114 kW 6500 BTU/min	119 kW 6700 BTU/min
Fuel system					
Engine driven fuel feed pump	0,35 m^3/hr 1.52 gpm	0,36 m^3/hr 1.56 gpm	0,39 m^3/hr 1.70 gpm	0,43 m^3/hr 1.87 gpm	0,48 m^3/hr 2.09 gpm
Maximum suction lift	2,5 m 98 inches	2,5 m 98 inches	2,5 m 98 inches	2,5 m 98 inches	2,5 m 98 inches

Specifications	6DZD 720-125	6DZD 750-125	6DZD 800-125	6DZD 900-125	6DZD 1000-125
Air intake and exhaust					
Combustion air flow (± 10%)	1,39 Nm^3/s 22000	1,45 Nm^3/s 22900	1,53 Nm^3/s 24200	1,68 Nm^3/s 26600	2,03 Nm^3/s 32100
Combustion air temperature	55°C 131°F	55°C 131°F	55°C 131°F	55°C 131°F	55°C 131°F
Maximum intake vacuum	15 mbar 6 inches H_2O	15 mbar 6 inches H_2O	15 mbar 6 inches H_2O	15 mbar 6 inches H_2O	15 mbar 6 inches H_2O
Dissipated heat (CAC)	170 kW 9700 BTU/min	169 kW 9600 BTU/min	164 kW 9300 BTU/min	148 kW 8400 BTU/min	197 kW 11200 BTU/min
Exhaust flow (± 10%)	1,63 kg/s 3.59 lbs/s	1,70 kg/s 3.74 lbs/s	1,79 kg/s 3.95 lbs/s	1,97 kg/s 4.35 lbs/s	2,38 kg/s 5.24 lbs/s
Exhaust temperature (± 10%)	490°C 914°F	490°C 914°F	495°C 923°F	502°C 936°F	515°C 959°F
Maximum back pressure	25 mbar 10 inches H_2O	25 mbar 10 inches H_2O	25 mbar 10 inches H_2O	25 mbar 10 inches H_2O	25 mbar 10 inches H_2O
Exhaust size	DN350	DN350	DN350	DN350	DN400

Specifications	6DZD 720-125	6DZD 750-125	6DZD 800-125	6DZD 900-125	6DZD 1000-125
HT/LT cooling water system [calculations "Cooling circuit" on page 117]					
HT Pump capacity	36 m³/hr 157 gpm	39 m³/hr 170 gpm	43 m³/hr 187 gpm	48 m³/hr 209 gpm	54 m³/hr 235 gpm
Total HT heat	288 kW 16400 BTU/min	300 kW 17000 BTU/min	322 kW 18300 BTU/min	366 kW 20800 BTU/min	400 kW 22700 BTU/min
LT pump capacity	43 m³/hr 189 gpm	45 m³/hr 189 gpm	48 m³/hr 211 gpm	54 m³/hr 238 gpm	60 m³/hr 264 gpm
Total LT heat	170 kW 9700 BTU/min	169 kW 9600 BTU/min	164 kW 9300 BTU/min	148 kW 8400 BTU/min	197 kW 11200 BTU/min
Thermal balance					
Dissipated heat in the engine jacket	202 kW 11500 BTU/min	210 kW 11900 BTU/min	224 kW 12700 BTU/min	252 kW 14300 BTU/min	280 kW 15900 BTU/min
Radiation & convection heat	40 kW 2300 BTU/min	41 kW 2300 BTU/min	43 kW 2400 BTU/min	46 kW 2600 BTU/min	50 kW 2800 BTU/min

6DZD engine



* [turbo at free end side execution]

8DZD engine specifications

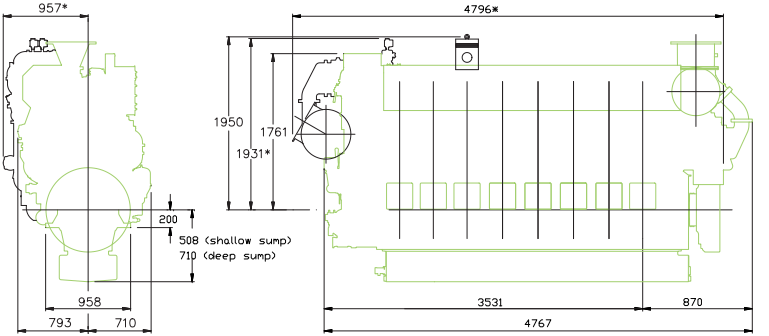
4-stroke dual-fuel engine, executions : IMO Tier II & III / EPA Tier III

Specifications	8DZD 720-125	8DZD 750-125	8DZD 800-125	8DZD 900-125	8DZD 1000-125
Engine speed	720 rpm	750 rpm	800 rpm	900 rpm	1000 rpm
Power (ISO 3046-I) *	960 kW 1304 HP	1000 kW 1359 HP	1065 kW 1450 HP	1200 kW 1630 HP	1335 kW 1814 HP
Nominal torque	12,73 kNm 9390 lbs.ft	12,73 kNm 9390 lbs.ft	12,73 kNm 9390 lbs.ft	12,73 kNm 9390 lbs.ft	12,73 kNm 9390 lbs.ft
BMEP	12,5 bar 181 psi	12,5 bar 181 psi	12,5 bar 181 psi	12,5 bar 181 psi	12,5 bar 181 psi
Average piston speed	7,4 m/s 1500 ft/min	7,7 m/s 1500 ft/min	8,2 m/s 1600 ft/min	9,3 m/s 1800 ft/min	10,3 m/s 2000 ft/min
Lubrication oil system					
Rated flow of the lube oil pump	23,0 m³/hr 100 gpm	23,5 m³/hr 102 gpm	23,6 m³/hr 103 gpm	23,8 m³/hr 103 gpm	24 m³/hr 104 gpm
Dissipated heat to lube oil heat exchange	102 kW 5820 BTU/min	107 kW 6070 BTU/min	121 kW 6080 BTU/min	152 kW 8640 BTU/min	163 kW 9260 BTU/min
Fuel system					
Engine driven fuel pump	0,35 m³/hr 1.52 gpm	0,36 m³/hr 1.56 gpm	0,39 m³/hr 1.70 gpm	0,43 m³/hr 1.87 gpm	0,48 m³/hr 2.09 gpm
Maximum suction lift	2,5 m 98 inches	2,5 m 98 inches	2,5 m 98 inches	2,5 m 98 inches	2,5 m 98 inches

Specifications	8DZD 720-125	8DZD 750-125	8DZD 800-125	8DZD 900-125	8DZD 1000-125
Air intake and exhaust					
Combustion air flow (± 10%)	1,84 Nm^3/s 29200	1,92 Nm^3/s 30500	2,04 Nm^3/s 32400	2,28 Nm^3/s 36200	2,71 Nm^3/s 42900
Combustion air temperature	55°C 131°F	55°C 131°F	55°C 131°F	55°C 131°F	55°C 131°F
Maximum intake vacuum	15 mbar 6 inches H_2O	15 mbar 6 inches H_2O	15 mbar 6 inches H_2O	15 mbar 6 inches H_2O	15 mbar 6 inches H_2O
Dissipated heat (CAC)	165 kW 9400 BTU/min	172 kW 9800 BTU/min	176 kW 1000 BTU/min	184 kW 10500 BTU/min	256 kW 14600 BTU/min
Exhaust flow (± 10%)	2,17 kg/s 4.78 lbs/s	2,26 kg/s 4.97 lbs/s	2,40 kg/s 5.29 lbs/s	2,68 kg/s 5.91 lbs/s	3,17 kg/s 6.99 lbs/s
Exhaust temperature (± 10%)	490°C 914°F	490°C 914°F	495°C 923°F	502°C 936°F	515°C 959°F
Maximum back pressure	25 mbar 10 inches H_2O	25 mbar 10 inches H_2O	25 mbar 10 inches H_2O	25 mbar 10 inches H_2O	25 mbar 10 inches H_2O
Exhaust size	DN400	DN400	DN400	DN400	DN450

Specifications	8DZD 720-125	8DZD 750-125	8DZD 800-125	8DZD 900-125	8DZD 1000-125
HT/LT cooling water system [calculations "Cooling circuit" on page 117]					
HT Pump capacity	52 m³/hr 226 gpm	54 m³/hr 235 gpm	57 m³/hr 248 gpm	64 m³/hr 278 gpm	72 m³/hr 313 gpm
Total HT heat	371 kW 21100 BTU/min	387 kW 22000 BTU/min	419 kW 23800 BTU/min	488 kW 27800 BTU/min	537 kW 30500 BTU/min
LT pump capacity	43 m³/hr 189 gpm	45 m³/hr 189 gpm	48 m³/hr 211 gpm	54 m³/hr 238 gpm	60 m³/hr 264 gpm
Total LT heat	165 kW 9400 BTU/min	172 kW 9800 BTU/min	176 kW 10000 BTU/min	184 kW 10500 BTU/min	256 kW 14600 BTU/min
Thermal balance					
Dissipated heat in the engine jacket	269 kW 15300 BTU/min	280 kW 15900 BTU/min	298 kW 16700 BTU/min	336 kW 19100 BTU/min	374 kW 21300 BTU/min
Radiation & convection heat	48 kW 2800 BTU/min	50 kW 2800 BTU/min	52 kW 3000 BTU/min	57 kW 3200 BTU/min	61 kW 3500 BTU/min

8DZD engine



* [turbo at free end side execution]

12DZD engine specifications

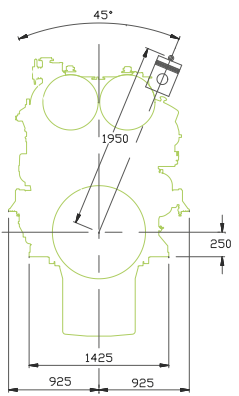
4-stroke dual-fuel engine, executions : IMO Tier II & III / EPA Tier III

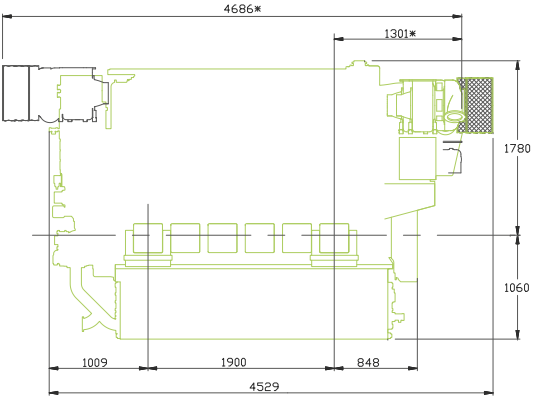
Specifications	12DZD 720-125	12DZD 750-125	12DZD 800-125	12DZD 900-125	12DZD 1000-125
Engine speed	720 rpm	750 rpm	800 rpm	900 rpm	1000 rpm
Power (ISO 3046-I) *	1440 kW 1957 HP	1500 kW 2038 HP	1600 kW 2174 HP	1800 kW 2446 HP	2000 kW 2717 HP
Nominal torque	19,10 kNm 14090 lbs.ft	19,10 kNm 14090 lbs.ft	19,10 kNm 14090 lbs.ft	19,10 kNm 14090 lbs.ft	19,10 kNm 14090 lbs.ft
BMEP	12,5 bar 181 psi	12,5 bar 181 psi	12,5 bar 181 psi	12,5 bar 181 psi	12,5 bar 181 psi
Average piston speed	7,4 m/s 1500 ft/min	7,7 m/s 1500 ft/min	8,2 m/s 1600 ft/min	9,3 m/s 1800 ft/min	10,3 m/s 2000 ft/min
Lubrication oil system					
Rated flow of the lube oil pump	38,6 m^3/hr 168 gpm	39,0 m^3/hr 170 gpm	40,0 m^3/hr 174 gpm	40,2 m^3/hr 175 gpm	40,4 m^3/hr 176 gpm
Dissipated heat to lube oil heat exch.	172 kW 9800 BTU/min	180 kW 10200 BTU/min	196 kW 1100 BTU/min	228 kW 13000 BTU/min	238 kW 13500 BTU/min
Fuel system					
Engine driven fuel feed pump	0,70 m^3/hr 3.04 gpm	0,72 m^3/hr 3.13 gpm	0,77 m^3/hr 3.35 gpm	0,87 m^3/hr 3.78 gpm	0,97 m^3/hr 4.22 gpm
Maximum suction lift	2,5 m 98 inches	2,5 m 98 inches	2,5 m 98 inches	2,5 m 98 inches	2,5 m 98 inches

Specifications	12DZD 720-125	12DZD 750-125	12DZD 800-125	12DZD 900-125	12DZD 1000-125
Air intake and exhaust					
Combustion air flow (± 10%)	2,78 Nm^3/s 44000 gpm	2,89 Nm^3/s 45800 gpm	3,05 Nm^3/s 48400 gpm	3,36 Nm^3/s 53200 gpm	4,05 Nm^3/s 64200 gpm
Combustion air temperature	55°C 131°F	55°C 131°F	55°C 131°F	55°C 131°F	55°C 131°F
Maximum intake vacuum	15 mbar 6 inches H_2O	15 mbar 6 inches H_2O	15 mbar 6 inches H_2O	15 mbar 6 inches H_2O	15 mbar 6 inches H_2O
Dissipated heat (CAC)	340 kW 19400 BTU/min	338 kW 19200 BTU/min	328 kW 18600 BTU/min	296 kW 16800 BTU/min	394 kW 22400 BTU/min
Exhaust flow (± 10%)	3,26 kg/s 7.19 lbs/s	3,40 kg/s 7.49 lbs/s	3,58 kg/s 7.90 lbs/s	3,95 kg/s 8.70 lbs/s	4,75 kg/s 10.47 lbs/s
Exhaust temp. (± 10%)	490°C 914°F	490°C 914°F	495°C 923°F	500°C 936°F	540°C 959°F
Maximum back pressure	25 mbar 10 inches H_2O	25 mbar 10 inches H_2O	25 mbar 10 inches H_2O	25 mbar 10 inches H_2O	25 mbar 10 inches H_2O
Exhaust size	DN450	DN450	DN500	DN500	DN500

Specifications	12DZD 720-125	12DZD 750-125	12DZD 800-125	12DZD 900-125	12DZD 1000-125
HT/LT cooling water system [calculations "Cooling circuit" on page 117]					
HT Pump capacity	76 m³/hr 335 gpm	79 m³/hr 348 gpm	83 m³/hr 360 gpm	94 m³/hr 414 gpm	108 m³/hr 476 gpm
Total HT heat	576 kW 32700 BTU/min	600 kW 43100 BTU/min	644 kW 36600 BTU/min	732 kW 41600 BTU/min	800 kW 45300 BTU/min
LT pump capacity	43 m³/hr 189 gpm	45 m³/hr 189 gpm	48 m³/hr 211 gpm	54 m³/hr 238 gpm	60 m³/hr 264 gpm
Total LT heat	340 kW 19400 BTU/min	338 kW 19200 BTU/min	328 kW 18600 BTU/min	296 kW 16800 BTU/min	394 kW 22400 BTU/min
Thermal balance					
Dissipated heat in the engine jacket	404 kW 22300 BTU/min	420 kW 23900 BTU/min	448 kW 25500 BTU/min	504 kW 28700 BTU/min	560 kW 31800 BTU/min
Radiation and convection heat	64 kW 3700 BTU/min	66 kW 3800 BTU/min	69 kW 3900 BTU/min	75 kW 4300 BTU/min	80 kW 4600 BTU/min

12DZD engine





* [turbo at free end side execution]

16DZD engine specifications

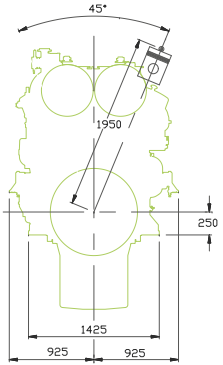
4-stroke dual-fuel engine, executions : IMO Tier II & III / EPA Tier III

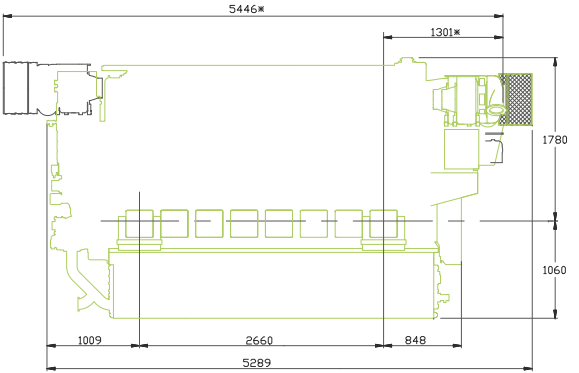
Specifications	16DZD 720-125	16DZD 750-125	16DZD 800-125	16DZD 900-125	16DZD 1000-125
Engine speed	720 rpm	750 rpm	800 rpm	900 rpm	1000 rpm
Power (ISO 3046-I) *	1920 kW 2609 HP	2000 kW 2717 HP	2133 kW 2898 HP	2400 kW 3261 HP	2670 kW 3628 HP
Nominal torque	25,46 kNm 18780 lbs.ft	25,46 kNm 18780 lbs.ft	25,46 kNm 18780 lbs.ft	25,46 kNm 18780 lbs.ft	25,46 kNm 18780 lbs.ft
BMEP	12,5 bar 181 psi	12,5 bar 181 psi	12,5 bar 181 psi	12,5 bar 181 psi	12,5 bar 181 psi
Average piston speed	7,4 m/s 1500 ft/min	7,7 m/s 1500 ft/min	8,2 m/s 1600 ft/min	9,3 m/s 1800 ft/min	10,3 m/s 2000 ft/min
Lubrication oil system					
Rated flow of the lube oil pump	46,6 m^3/hr 203 gpm	47,0 m^3/hr 204 gpm	47,4 m^3/hr 206 gpm	47,8 m^3/hr 208 gpm	48,0 m^3/hr 209 gpm
Dissipated heat to lube oil heat exchange	204 kW 11600 BTU/min	214 kW 12100 BTU/min	242 kW 13700 BTU/min	304 kW 17300 BTU/min	326 kW 18500 BTU/min
Fuel system					
Engine driven fuel pump	0,70 m^3/hr 3.04 gpm	0,72 m^3/hr 3.13 gpm	0,77 m^3/hr 3.35 gpm	0,87 m^3/hr 3.78 gpm	0,97 m^3/hr 4.22 gpm
Maximum suction lift	2,5 m 98 inches	2,5 m 98 inches	2,5 m 98 inches	2,5 m 98 inches	2,5 m 98 inches

Specifications	16DZD 720-125	16DZD 750-125	16DZD 800-125	16DZD 900-125	16DZD 1000-125
Air intake and exhaust					
Combustion air flow (± 10%)	3,69 Nm^3/s 58500 gpm	3,84 Nm^3/s 60900 gpm	4,08 Nm^3/s 64700 gpm	4,56 Nm^3/s 72300 gpm	5,41 Nm^3/s 85800 gpm
Combustion air temperature	55°C 131°F	55°C 131°F	55°C 131°F	55°C 131°F	55°C 131°F
Maximum intake vacuum	15 mbar 6 inches H_2O	15 mbar 6 inches H_2O	15 mbar 6 inches H_2O	15 mbar 6 inches H_2O	15 mbar 6 inches H_2O
Dissipated heat (CAC)	330 kW 18700 BTU/min	344 kW 19500 BTU/min	352 kW 20100 BTU/min	368 kW 21000 BTU/min	512 kW 29200 BTU/min
Exhaust flow (± 10%)	4,33 kg/s 9.55 lbs/s	4,51 kg/s 9.95 lbs/s	4,80 kg/s 10.58 lbs/s	5,36 kg/s 11.81 lbs/s	6,35 kg/s 13.99 lbs/s
Exhaust temperature (± 10%)	490°C 914°F	490°C 914°F	495°C 923°F	502°C 936°F	515°C 959°F
Maximum back pressure	25 mbar 10 inches H_2O	25 mbar 10 inches H_2O	25 mbar 10 inches H_2O	25 mbar 10 inches H_2O	25 mbar 10 inches H_2O
Exhaust size	DN500	DN500	DN550	DN600	DN600

Specifications	16DZD 720-125	16DZD 750-125	16DZD 800-125	16DZD 900-125	16DZD 1000-125
HT/LT cooling water system [calculations "Cooling circuit" on page 117]					
HT Pump capacity	104 m³/hr 458 gpm	108 m³/hr 476 gpm	115 m³/hr 500 gpm	130 m³/hr 572 gpm	144 m³/hr 634 gpm
Total HT heat	742 kW 42200 BTU/min	774 kW 42000 BTU/min	838 kW 47600 BTU/min	976 kW 55500 BTU/min	1074 kW 61000 BTU/min
LT pump capacity	43 m³/hr 189 gpm	45 m³/hr 189 gpm	48 m³/hr 211 gpm	54 m³/hr 238 gpm	60 m³/hr 264 gpm
Total LT heat	330 kW 18700 BTU/min	344 kW 19500 BTU/min	352 kW 20100 BTU/min	368 kW 21000 BTU/min	512 kW 29200 BTU/min
Thermal balance					
Dissipated heat in the engine jacket	538 kW 30600 BTU/min	560 kW 31800 BTU/min	596 kW 33900 BTU/min	672 kW 38200 BTU/min	748 kW 42500 BTU/min
Radiation & convection heat	79 kW 4500 BTU/min	80 kW 4600 BTU/min	85 kW 4800 BTU/min	92 kW 5200 BTU/min	99 kW 5600 BTU/min

16DZD engine





* [turbo at free end side execution]

BEH$_2$YDRO-range

General engine data

4-stroke dual-fuel engine, executions : IMO TIER II & III / EPA Tier III / EU STAGE V

Nominal power range :	600–2670 kW / 880-3630 HP	
Cylinders :	6, 8, 12 or 16	
Engine speed :	330 rpm (idling) – 1000 rpm	
Bore :	256 mm	10 inches
Stroke :	310 mm	12 inches
Cylinder volume :	15,95 dm^3(liters)	973 inches^3
Nominal BMEP :	12,5 bar	181 psi
Combustion pressure :	130 bar	1885 psi
Cooling water system :		
Nominal temperature at engine outlet :	85°C	185°F
Alarm temperature at engine outlet :	90°C	194°F
Stop temperature at engine outlet :	95°C	203°F
Nominal temperature at inlet CAC :	35°C	95 °F
Maximum external pressure drop :	0,4 bar	6 psi
Typical/minimum (alarm) pressure HT pump :	1,9 bar/0,4 bar	27 psi/6 psi
Lube oil system :		
Nominal lube oil temperature at engine inlet :	75°C	167°F
Alarm temperature at engine inlet :	80°C	176°F
Stop temperature at engine inlet :	85°C	185°F
Standard/minimum (stop) lube oil pressure :	5 bar/2,6 bar	73 psi/38 psi
Starting air module :		
Starting air pressure :	30 bar	435 psi
Fuel system :		
Standard/minimum (alarm) pressure fuel pump :	2,5 bar/1,5 bar	36 psi/22 psi
Approved fuels :	MDO/biodiesel 15%	
Approved gasses :	Hydrogen 85%	

	6DZD H_2	8DZD H_2	12DZD H_2	16DZD H_2
Cylinders	6 inline	8 inline	V12	V16
Typical power range	500–1000 kW 680–1360 HP	1000–1330 kW 1360–1810 HP	1330–2000 kW 1810–2720 HP	2000–2670 kW 2720–3630 HP
Total swept volume	95,7 liters 5840 in^3	127,6 liters 7787 in^3	191,5 liters 11686 in^3	255,2 liters 15573 in^3
Approximate dry weight	10620 kg 23413 lbs	13905 kg 30655 lbs	18000 kg 39683 lbs	21750 kg 47951 lbs
standard lube oil sump	450 liters 119 gallons	510 liters 135 gallons	800 liters 211 gallons	1000 liters 264 gallons
Extra deep lube oil sump	615 liters 162 gallons	650 liters 172 gallons	900 liters 238 gallons	1000 liters 264 gallons
Water capacity in the engine	205 liters 54 gallons	275 liters 73 gallons	500 liters 132 gallons	600 liters 159 gallons

6DZD H_2

8DZD H_2

12DZD H_2

16DZD H_2

6DZD engine specifications

4-stroke dual-fuel engine, executions : IMO Tier II & III / EPA Tier III / EU STAGE V

Specifications	6DZD H_2 900-125	6DZD H_2 1000-125
Engine speed	900 rpm	1000 rpm
Power (ISO 3046-I) *	900 kW 1223 HP	1000 kW 1359 HP
Nominal torque	9,55 kNm 7040 lbs.ft	9,55 kNm 7040 lbs.ft
BMEP	12,5 bar 181 psi	12,5 bar 181 psi
Average piston speed	9,3 m/s 1800 ft/min	10,3 m/s 2000 ft/min
Lubrication oil system		
Rated flow lube oil pump	19,8 m^3/hr 87 gpm *	20,2 m^3/hr 89 gpm *
Dissipated heat to lube oil heat exchange	114 kW 6500 BTU/min	119 kW 6700 BTU/min
Fuel system		
Engine driven fuel feed pump	0,43 m^3/hr 1.87 gpm *	0,48 m^3/hr 2.09 gpm *
Maximum suction lift	2,5 m 98 inches	2,5 m 98 inches

* gpm: gallons per minute

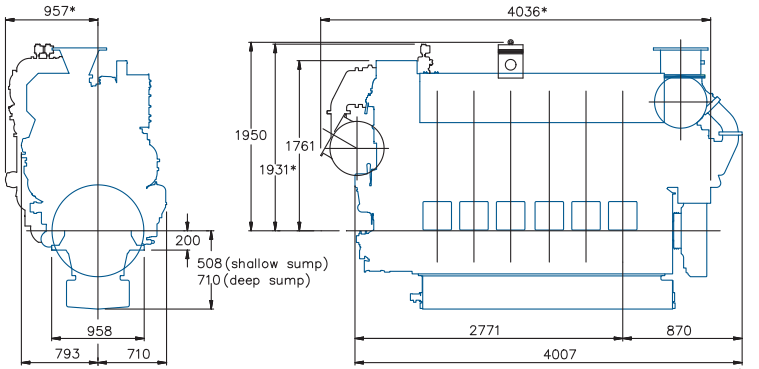
Specifications	6DZD H_2 900-125	6DZD H_2 1000-125
Air intake and exhaust		
Combustion air flow (± 10%)	2,11 Nm^3/s 33444 gpm *	2,34 Nm^3/s 37090 gpm *
Combustion air temperature	40°C 104°F	40°C 104°F
Maximum intake vacuum	15 mbar 6 inches H_2O	15 mbar 6 inches H_2O
Dissipated heat (CAC)	254 kW 14400 BTU/min	347 kW 19700 BTU/min
Exhaust flow (± 10%)	2,77 kg/s 6.11 lbs/s	3,08 kg/s 6.79 lbs/s
Exhaust temperature (± 10%)	290°C 554°F	290°C 554°F
Maximum back pressure Maximum back pressure with DPF/SCR	25 mbar 100 mbar	25 mbar 100 mbar
Exhaust size	DN400	DN400

* gpm: gallons per minute

Specifications	6DZD H_2 900-125	6DZD H_2 1000-125
HT/LT cooling water system [calculations "Cooling circuit" on page page 117]		
HT Pump capacity	48 m^3/hr 209 gpm *	54 m^3/hr 235 gpm *
Total HT heat	366 kW 20800 BTU/min	400 kW 22700 BTU/min
LT pump capacity	54 m^3/hr 238 gpm *	60 m^3/hr 264 gpm *
Total LT heat	254 kW 14400 BTU/min	347 kW 19700 BTU/min
Thermal balance		
Dissipated heat in the engine jacket	252 kW 14300 BTU/min	280 kW 15900 BTU/min
Radiation & convection heat	46 kW 2600 BTU/min	50 kW 2800 BTU/min

6DZD H_2 engine

* gpm: gallons per minute



* [turbo at free end side execution]

8DZD engine specifications

4-stroke dual-fuel engine, executions : IMO Tier II & III / EPA Tier III / EU STAGE V

Specifications	8DZD H_2 900-125	8DZD H_2 1000-125
Engine speed	900 rpm	1000 rpm
Power (ISO 3046-I) *	1200 kW 1630 HP	1335 kW 1814 HP
Nominal torque	12,73 kNm 9390 lbs.ft	12,73 kNm 9390 lbs.ft
BMEP	12,5 bar 181 psi	12,5 bar 181 psi
Average piston speed	9,3 m/s 1800 ft/min	10,3 m/s 2000 ft/min
Lubrication oil system		
Rated flow of the lube oil pump	23,8 m^3/hr 103 gpm *	24 m^3/hr 104 gpm *
Dissipated heat to lube oil heat exchange	152 kW 8640 BTU/min	163 kW 9260 BTU/min
Fuel system		
Engine driven fuel pump	0,43 m^3/hr 1.87 gpm *	0,48 m^3/hr 2.09 gpm *
Maximum suction lift	2,5 m 98 inches	2,5 m 98 inches

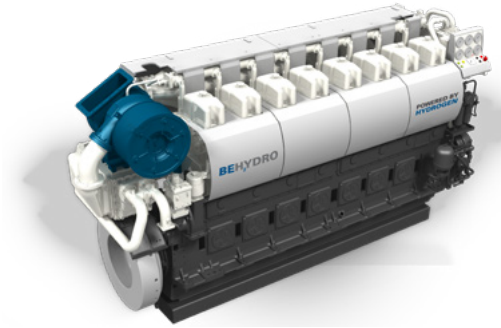
* gpm: gallons per minute

Specifications	8DZD H_2 900-125	8DZD H_2 1000-125
Air intake and exhaust		
Combustion air flow (± 10%)	3,81 Nm^3/s 60400 gpm *	3,12 Nm^3/s 49500 gpm *
Combustion air temperature	40°C 104°F	40°C 104°F
Maximum intake vacuum	15 mbar 6 inches H_2O	15 mbar 6 inches H_2O
Dissipated heat (CAC)	338 kW 19200 BTU/min	463 kW 26300 BTU/min
Exhaust flow (± 10%)	3,70 kg/s 8.16 lbs/s	4,11 kg/s 9.06 lbs/s
Exhaust temperature (± 10%)	290°C 554°F	290°C 554°F
Maximum back pressure Maximum back pressure with DPF/SCR	25 mbar 100 mbar	25 mbar 100 mbar
Exhaust size	DN400	DN450

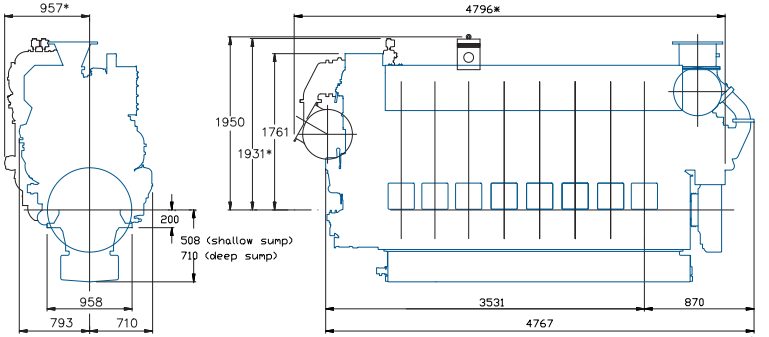
* gpm: gallons per minute

Specifications	8DZD H_2 900-125	8DZD H_2 1000-125
HT/LT cooling water system [calculations "Cooling circuit" on page page 117]		
HT Pump capacity	64 m^3/hr 278 gpm *	72 m^3/hr 313 gpm *
Total HT heat	488 kW 27800 BTU/min	537 kW 30500 BTU/min
LT pump capacity	54 m^3/hr 238 gpm *	60 m^3/hr 264 gpm *
Total LT heat	338 kW 19200 BTU/min	463 kW 26300 BTU/min
Thermal balance		
Dissipated heat in the engine jacket	336 kW 19100 BTU/min	374 kW 21300 BTU/min
Radiation & convection heat	57 kW 3200 BTU/min	61 kW 3500 BTU/min

8DZD H_2 engine



* gpm: gallons per minute



* [turbo at free end side execution]

12DZD engine specifications

4-stroke dual-fuel engine, executions : IMO Tier II & III / EPA Tier III / EU STAGE V

Specifications	12DZD H_2 900-125	12DZD H_2 1000-125
Engine speed	900 rpm	1000 rpm
Power (ISO 3046-I) *	1800 kW 2446 HP	2000 kW 2717 HP
Nominal torque	19,10 kNm 14090 lbs.ft	19,10 kNm 14090 lbs.ft
BMEP	12,5 bar 181 psi	12,5 bar 181 psi
Average piston speed	9,3 m/s 1800 ft/min	10,3 m/s 2000 ft/min
Lubrication oil system		
Rated flow of the lube oil pump	40,2 m^3/hr 175 gpm *	40,4 m^3/hr 176 gpm *
Dissipated heat to lube oil heat exchange	228 kW 13000 BTU/min	238 kW 13500 BTU/min
Fuel system		
Engine driven fuel feed pump	0,87 m^3/hr 3.78 gpm *	0,97 m^3/hr 4.22 gpm *
Maximum suction lift	2,5 m 98 inches	2,5 m 98 inches

* gpm: gallons per minute

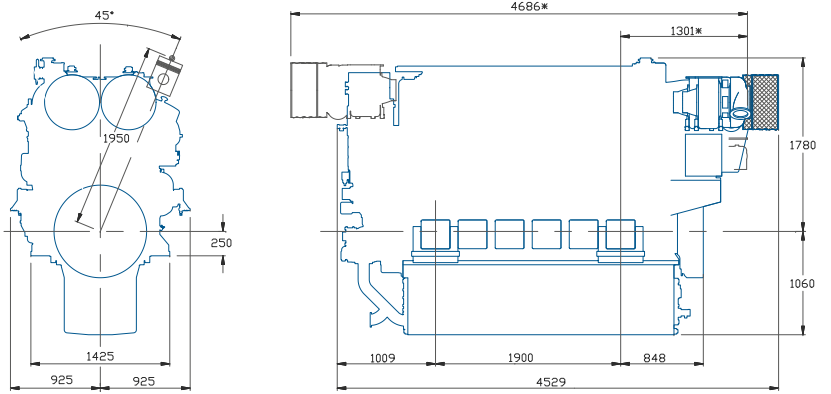
Specifications	12DZD H_2 900-125	12DZD H_2 1000-125
Air intake and exhaust		
Combustion air flow (± 10%)	4,22 Nm^3/s 66900 gpm *	4,68 Nm^3/s 74200 gpm *
Combustion air temperature	40°C 104°F	40°C 104°F
Maximum intake vacuum	15 mbar 6 inches H_2O	15 mbar 6 inches H_2O
Dissipated heat (CAC)	508 kW 28900 BTU/min	694 kW 39500 BTU/min
Exhaust flow (± 10%)	5,54 kg/s 12.21 lbs/s	6,18 kg/s 13.62 lbs/s
Exhaust temp. (± 10%)	290°C 554°F	290°C 554°F
Maximum back pressure Maximum back pressure with DPF/SCR	25 mbar 100 mbar	25 mbar 100 mbar
Exhaust size	DN500	DN500

* gpm: gallons per minute

Specifications	12DZD H_2 900-125	12DZD H_2 1000-125
HT/LT cooling water system [calculations "Cooling circuit" on page page 117]		
HT Pump capacity	94 m^3/hr 414 gpm *	108 m^3/hr 476 gpm *
Total HT heat	732 kW 41600 BTU/min	800 kW 45300 BTU/min
LT pump capacity	54 m^3/hr 238 gpm *	60 m^3/hr 264 gpm *
Total LT heat	504 kW 28700 BTU/min	560 kW 31800 BTU/min
Thermal balance		
Dissipated heat in the engine jacket	504 kW 28700 BTU/min	560 kW 31800 BTU/min
Radiation and convection heat	75 kW 4300 BTU/min	80 kW 4600 BTU/min

12DZD H_2 engine

* gpm: gallons per minute



* [turbo at free end side execution]

16DZD engine specifications

4-stroke dual-fuel engine, executions : IMO Tier II & III / EPA Tier III / EU STAGE V

Specifications	16DZD H_2 900-125	16DZD H_2 1000-125
Engine speed	900 rpm	1000 rpm
Power (ISO 3046-I) *	2400 kW 3261 HP	2670 kW 3628 HP
Nominal torque	25,64 kNm 18780 lbs.ft	25,46 kNm 18780 lbs.ft
BMEP	12,5 bar 181 psi	12,5 bar 181 psi
Average piston speed	9,3 m/s 1800 ft/min	10,3 m/s 2000 t/min
Lubrication oil system		
Rated flow of the lube oil pump	47,8 m^3/hr 208 gpm *	48,0 m^3/hr 209 gpm *
Dissipated heat to lube oil heat exchange	304 kW 17300 BTU/min	326 kW 18500 BTU/min
Fuel system		
Engine driven fuel pump	0,87 m^3/hr 3.78 gpm *	0,97 m^3/hr 4.22 gpm *
Maximum suction lift	2,5 m 98 inches	2,5 m 98 inches

* gpm: gallons per minute

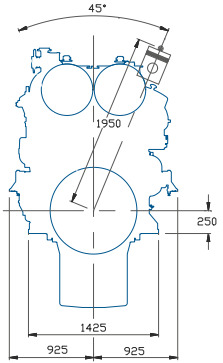
Specifications	16DZD H_2 900-125	16DZD H_2 1000-125
Air intake and exhaust		
Combustion air flow (± 10%)	5,63 Nm^3/s 89200 gpm *	6,24 Nm^3/s 98900 gpm *
Combustion air temperature	40°C 104°F	40°C 104°F
Maximum intake vacuum	15 mbar 6 inches H_2O	15 mbar 6 inches H_2O
Dissipated heat (CAC)	677 kW 38500 BTU/min	925 kW 52600 BTU/min
Exhaust flow (± 10%)	7,39 kg/s 16.29 lbs/s	8,24 kg/s 18.17 lbs/s
Exhaust temperature (± 10%)	290°C 554°F	290°C 554°F
Maximum back pressure Maximum back pressure with DPF/SCR	25 mbar 100 mbar	25 mbar 100 mbar
Exhaust size	DN600	DN600

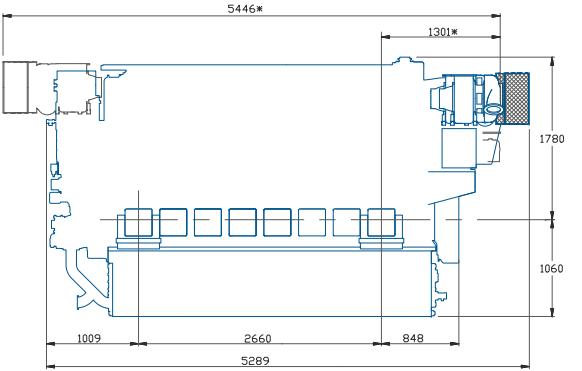
* gpm: gallons per minute

Specifications	16DZD H_2 900-125	16DZD H_2 1000-125
HT/LT cooling water system [calculations "Cooling circuit" on page page 117]		
HT Pump capacity	130 m^3/hr 572 gpm *	144 m^3/hr 634 gpm *
Total HT heat	976 kW 55500 BTU/min	1074 kW 61000 BTU/min
LT pump capacity	54 m^3/hr 238 gpm *	60 m^3/hr 264 gpm *
Total LT heat	677 kW 38500 BTU/min	925 kW 52600 BTU/min
Thermal balance		
Dissipated heat in the engine jacket	672 kW 38200 BTU/min	748 kW 42500 BTU/min
Radiation & convection heat	92 kW 5200 BTU/min	99 kW 5600 BTU/min

16DZD H_2 engine

* gpm: gallons per minute





* [turbo at free end side execution]

BEH$_2$YDRO-range DZ H$_2$

General engine data

4-stroke engine executions : IMO TIER II & III / EPA Tier III / EU STAGE V

Nominal power range :	600–2670 kW / 880-3630 HP	
Cylinders :	6, 8, 12 or 16	
Engine speed :	330 rpm (idling) – 1000 rpm	
Bore :	256 mm	10 inches
Stroke :	310 mm	12 inches
Cylinder volume :	15,95 dm^3(liters)	973 inches^3
Nominal BMEP :	12,5 bar	181 psi
Combustion pressure :	130 bar	1885 psi
Cooling water system :		
Nominal temperature at engine outlet :	85°C	185°F
Alarm temperature at engine outlet :	90°C	194°F
Stop temperature at engine outlet :	95°C	203°F
Nominal temperature at inlet CAC :	35°C	95 °F
Maximum external pressure drop :	0,4 bar	6 psi
Typical/minimum (alarm) pressure HT pump :	1,9 bar/0,4 bar	27 psi/6 psi
Lube oil system :		
Nominal lube oil temperature at engine inlet :	75°C	167°F
Alarm temperature at engine inlet :	80°C	176°F
Stop temperature at engine inlet :	85°C	185°F
Standard/minimum (stop) lube oil pressure :	5 bar/2,6 bar	73 psi/38 psi
Starting air module :		
Starting air pressure :	30 bar	435 psi
Fuel system :		
Standard/min. (alarm) pressure fuel pump :	2,5 bar/1,5 bar	36 psi/22 psi
Approved gasses :	H_2 or less purified H_2 on request	

	6DZ H_2	8DZ H_2	12DZ H_2	16DZ H_2
Cylinders	6 inline	8 inline	V12	V16
Typical power range	500–1000 kW 680–1360 HP	1000–1330 kW 1360–1810 HP	1330–2000 kW 1810–2720 HP	2000–2670 kW 2720–3630 HP
Total swept volume	95,7 liters 5840 in^3	127,6 liters 7787 in^3	191,5 liters 11686 in^3	255,2 liters 15573 in^3
Approximate dry weight	10620 kg 23413 lbs	13905 kg 30655 lbs	18000 kg 39683 lbs	21750 kg 47951 lbs
standard lube oil sump	450 liters 119 gallons	510 liters 135 gallons	800 liters 211 gallons	1000 liters 264 gallons
Extra deep lube oil sump	615 liters 162 gallons	650 liters 172 gallons	900 liters 238 gallons	1000 liters 264 gallons
Water capacity in the engine	205 liters 54 gallons	275 liters 73 gallons	500 liters 132 gallons	600 liters 159 gallons

6DZ H_2

8DZ H_2

12DZ H_2

16DZ H_2

6DZ H_2 engine specifications

4-stroke engine executions : IMO Tier II & III / EPA Tier III / EU STAGE V

Specifications	6DZ H_2 900-125	6DZ H_2 1000-125
Engine speed	900 rpm	1000 rpm
Power (ISO 3046-I) *	900 kW 1223 HP	1000 kW 1359 HP
Nominal torque	9,55 kNm 7040 lbs.ft	9,55 kNm 7040 lbs.ft
BMEP	12,5 bar 181 psi	12,5 bar 181 psi
Average piston speed	9,3 m/s 1800 ft/min	10,3 m/s 2000 ft/min
Lubrication oil system		
Rated flow lube oil pump	19,8 m^3/hr 87 gpm *	20,2 m^3/hr 89 gpm *
Dissipated heat to lube oil heat exchange	114 kW 6500 BTU/min	119 kW 6700 BTU/min
Fuel system		
Engine driven fuel feed pump	0,43 m^3/hr 1.87 gpm *	0,48 m^3/hr 2.09 gpm *
Maximum suction lift	2,5 m 98 inches	2,5 m 98 inches

* gpm: gallons per minute

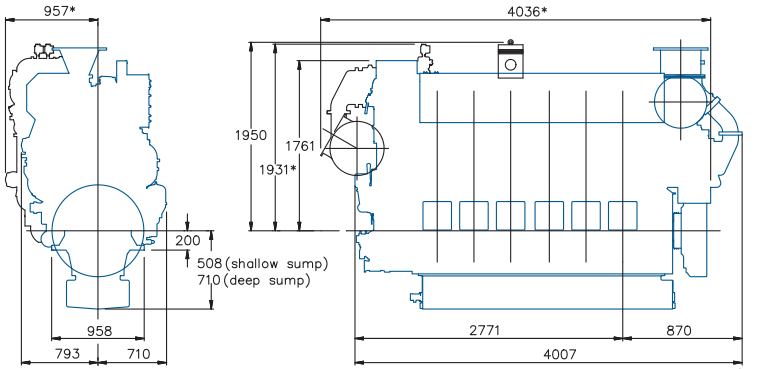
Specifications	6DZ H_2 900-125	6DZ H_2 1000-125
Air intake and exhaust		
Combustion air flow (± 10%)	2,11 Nm^3/s 33444 gpm *	2,34 Nm^3/s 37090 gpm *
Combustion air temperature	40°C 104°F	40°C 104°F
Maximum intake vacuum	15 mbar 6 inches H_2O	15 mbar 6 inches H_2O
Dissipated heat (CAC)	254 kW 14400 BTU/min	347 kW 19700 BTU/min
Exhaust flow (± 10%)	2,77 kg/s 6.11 lbs/s	3,08 kg/s 6.79 lbs/s
Exhaust temperature (± 10%)	290°C 554°F	290°C 554°F
Maximum back pressure Maximum back pressure with DPF/SCR	25 mbar 100 mbar	25 mbar 100 mbar
Exhaust size	DN400	DN400

* gpm: gallons per minute

Specifications	6DZ H_2 900-125	6DZ H_2 1000-125
HT/LT cooling water system [calculations "Cooling circuit" on page page 117]		
HT Pump capacity	48 m³/hr 209 gpm *	54 m³/hr 235 gpm *
Total HT heat	366 kW 20800 BTU/min	400 kW 22700 BTU/min
LT pump capacity	54 m³/hr 238 gpm *	60 m³/hr 264 gpm *
Total LT heat	254 kW 14400 BTU/min	347 kW 19700 BTU/min
Thermal balance		
Dissipated heat in the engine jacket	252 kW 14300 BTU/min	280 kW 15900 BTU/min
Radiation & convection heat	46 kW 2600 BTU/min	50 kW 2800 BTU/min

6DZ H_2 engine

* gpm: gallons per minute



* [turbo at free end side execution]

8DZ H_2 engine specifications

4-stroke engine executions : IMO Tier II & III / EPA Tier III / EU STAGE V

Specifications	8DZ H_2 900-125	8DZ H_2 1000-125
Engine speed	900 rpm	1000 rpm
Power (ISO 3046-I) *	1200 kW 1630 HP	1335 kW 1814 HP
Nominal torque	12,73 kNm 9390 lbs.ft	12,73 kNm 9390 lbs.ft
BMEP	12,5 bar 181 psi	12,5 bar 181 psi
Average piston speed	9,3 m/s 1800 ft/min	10,3 m/s 2000 ft/min
Lubrication oil system		
Rated flow of the lube oil pump	23,8 m^3/hr 103 gpm *	24 m^3/hr 104 gpm *
Dissipated heat to lube oil heat exchange	152 kW 8640 BTU/min	163 kW 9260 BTU/min
Fuel system		
Engine driven fuel pump	0,43 m^3/hr 1.87 gpm *	0,48 m^3/hr 2.09 gpm *
Maximum suction lift	2,5 m 98 inches	2,5 m 98 inches

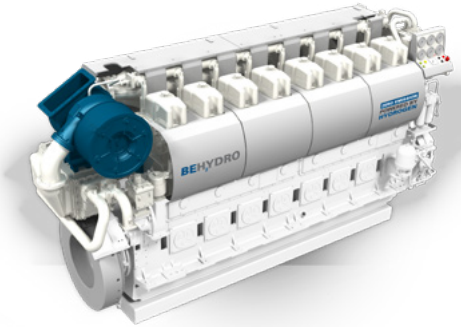
* gpm: gallons per minute

Specifications	8DZ H_2 900-125	8DZ H_2 1000-125
Air intake and exhaust		
Combustion air flow (± 10%)	3,81 Nm^3/s 60400 gpm *	3,12 Nm^3/s 49500 gpm *
Combustion air temperature	40°C 104°F	40°C 104°F
Maximum intake vacuum	15 mbar 6 inches H_2O	15 mbar 6 inches H_2O
Dissipated heat (CAC)	338 kW 19200 BTU/min	463 kW 26300 BTU/min
Exhaust flow (± 10%)	3,70 kg/s 8.16 lbs/s	4,11 kg/s 9.06 lbs/s
Exhaust temperature (± 10%)	290°C 554°F	290°C 554°F
Maximum back pressure Maximum back pressure with DPF/SCR	25 mbar 100 mbar	25 mbar 100 mbar
Exhaust size	DN400	DN450

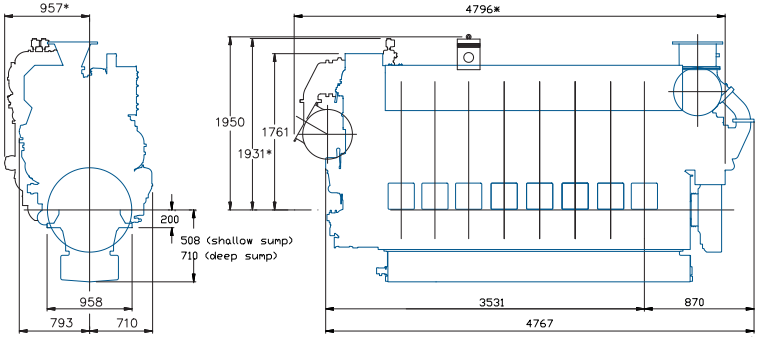
* gpm: gallons per minute

Specifications	8DZ H_2 900-125	8DZ H_2 1000-125
HT/LT cooling water system [calculations "Cooling circuit" on page page 117]		
HT Pump capacity	64 m³/hr 278 gpm *	72 m³/hr 313 gpm *
Total HT heat	488 kW 27800 BTU/min	537 kW 30500 BTU/min
LT pump capacity	54 m³/hr 238 gpm *	60 m³/hr 264 gpm *
Total LT heat	338 kW 19200 BTU/min	463 kW 26300 BTU/min
Thermal balance		
Dissipated heat in the engine jacket	336 kW 19100 BTU/min	374 kW 21300 BTU/min
Radiation & convection heat	57 kW 3200 BTU/min	61 kW 3500 BTU/min

8DZ H_2 engine



* gpm: gallons per minute



* [turbo at free end side execution]

12DZ H_2 engine specifications

4-stroke engine executions : IMO Tier II & III / EPA Tier III / EU STAGE V

Specifications	12DZ H_2 900-125	12DZ H_2 1000-125
Engine speed	900 rpm	1000 rpm
Power (ISO 3046-I) *	1800 kW 2446 HP	2000 kW 2717 HP
Nominal torque	19,10 kNm 14090 lbs.ft	19,10 kNm 14090 lbs.ft
BMEP	12,5 bar 181 psi	12,5 bar 181 psi
Average piston speed	9,3 m/s 1800 ft/min	10,3 m/s 2000 ft/min
Lubrication oil system		
Rated flow of the lube oil pump	40,2 m^3/hr 175 gpm *	40,4 m^3/hr 176 gpm *
Dissipated heat to lube oil heat exchange	228 kW 13000 BTU/min	238 kW 13500 BTU/min
Fuel system		
Engine driven fuel feed pump	0,87 m^3/hr 3.78 gpm *	0,97 m^3/hr 4.22 gpm *
Maximum suction lift	2,5 m 98 inches	2,5 m 98 inches

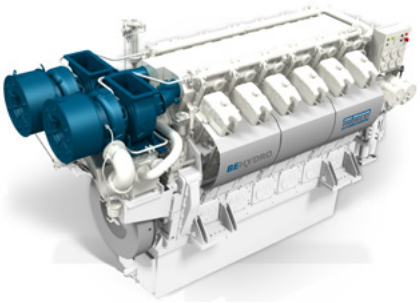
* gpm: gallons per minute

Specifications	12DZ H_2 900-125	12DZ H_2 1000-125
Air intake and exhaust		
Combustion air flow (± 10%)	4,22 Nm^3/s 66900 gpm *	4,68 Nm^3/s 74200 gpm *
Combustion air temperature	40°C 104°F	40°C 104°F
Maximum intake vacuum	15 mbar 6 inches H_2O	15 mbar 6 inches H_2O
Dissipated heat (CAC)	508 kW 28900 BTU/min	694 kW 39500 BTU/min
Exhaust flow (± 10%)	5,54 kg/s 12.21 lbs/s	6,18 kg/s 13.62 lbs/s
Exhaust temp. (± 10%)	290°C 554°F	290°C 554°F
Maximum back pressure Maximum back pressure with DPF/SCR	25 mbar 100 mbar	25 mbar 100 mbar
Exhaust size	DN500	DN500

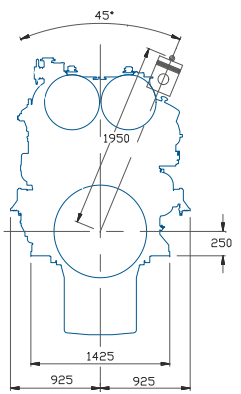
* gpm: gallons per minute

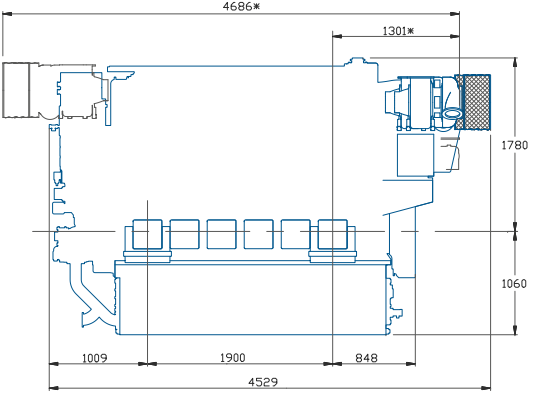
Specifications	12DZ H_2 900-125	12DZ H_2 1000-125
HT/LT cooling water system [calculations "Cooling circuit" on page page 117]		
HT Pump capacity	94 m^3/hr 414 gpm *	108 m^3/hr 476 gpm *
Total HT heat	732 kW 41600 BTU/min	800 kW 45300 BTU/min
LT pump capacity	54 m^3/hr 238 gpm *	60 m^3/hr 264 gpm *
Total LT heat	504 kW 28700 BTU/min	560 kW 31800 BTU/min
Thermal balance		
Dissipated heat in the engine jacket	504 kW 28700 BTU/min	560 kW 31800 BTU/min
Radiation and convection heat	75 kW 4300 BTU/min	80 kW 4600 BTU/min

12DZ H_2 engine



* gpm: gallons per minute





* [turbo at free end side execution]

16DZ H_2 engine specifications

4-stroke engine executions : IMO Tier II & III / EPA Tier III / EU STAGE V

Specifications	16DZ H_2 900-125	16DZ H_2 1000-125
Engine speed	900 rpm	1000 rpm
Power (ISO 3046-I) *	2400 kW 3261 HP	2670 kW 3628 HP
Nominal torque	25,64 kNm 18780 lbs.ft	25,46 kNm 18780 lbs.ft
BMEP	12,5 bar 181 psi	12,5 bar 181 psi
Average piston speed	9,3 m/s 1800 ft/min	10,3 m/s 2000 t/min
Lubrication oil system		
Rated flow of the lube oil pump	47,8 m^3/hr 208 gpm *	48.0m^3/hr 209 gpm *
Dissipated heat to lube oil heat exchange	304 kW 17300 BTU/min	326 kW 18500 BTU/min
Fuel system		
Engine driven fuel pump	0,87 m^3/hr 3.78 gpm *	0,97 m^3/hr 4.22 gpm *
Maximum suction lift	2,5 m 98 inches	2,5 m 98 inches

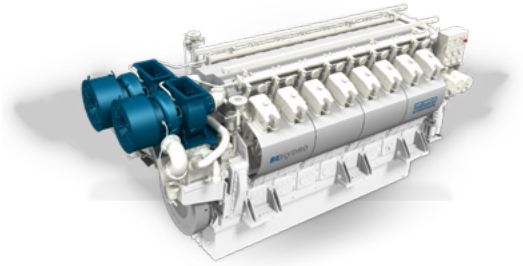
* gpm: gallons per minute

Specifications	16DZ H_2 900-125	16DZ H_2 1000-125
Air intake and exhaust		
Combustion air flow (± 10%)	5,63 Nm^3/s 89200 gpm *	6,24 Nm^3/s 98900 gpm *
Combustion air temperature	40°C 104°F	40°C 104°F
Maximum intake vacuum	15 mbar 6 inches H_2O	15 mbar 6 inches H_2O
Dissipated heat (CAC)	677 kW 38500 BTU/min	925 kW 52600 BTU/min
Exhaust flow (± 10%)	7,39 kg/s 16.29 lbs/s	8,24 kg/s 18.17 lbs/s
Exhaust temperature (± 10%)	290°C 554°F	290°C 554°F
Maximum back pressure Maximum back pressure with DPF/SCR	25 mbar 100 mbar	25 mbar 100 mbar
Exhaust size	DN600	DN600

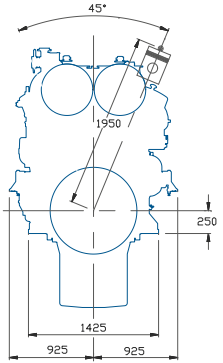
* gpm: gallons per minute

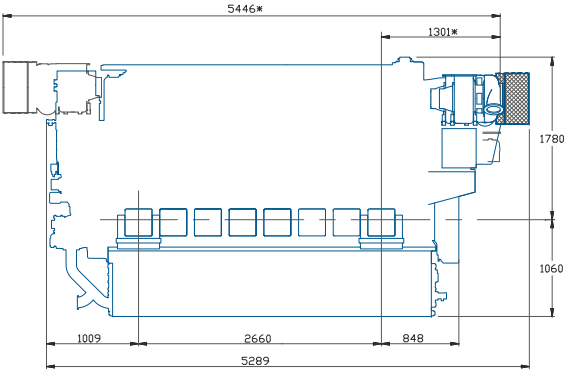
Specifications	16DZ H_2 900-125	16DZ H_2 1000-125
HT/LT cooling water system [calculations "Cooling circuit" on page page 117]		
HT Pump capacity	130 m^3/hr 572 gpm *	144 m^3/hr 634 gpm *
Total HT heat	976 kW 55500 BTU/min	1074 kW 61000 BTU/min
LT pump capacity	54 m^3/hr 238 gpm *	60 m^3/hr 264 gpm *
Total LT heat	677 kW 38500 BTU/min	925 kW 52600 BTU/min
Thermal balance		
Dissipated heat in the engine jacket	672 kW 38200 BTU/min	748 kW 42500 BTU/min
Radiation & convection heat	92 kW 5200 BTU/min	99 kW 5600 BTU/min

16DZ H_2 engine



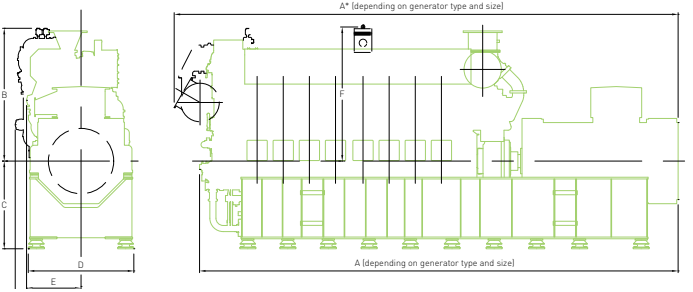
* gpm: gallons per minute





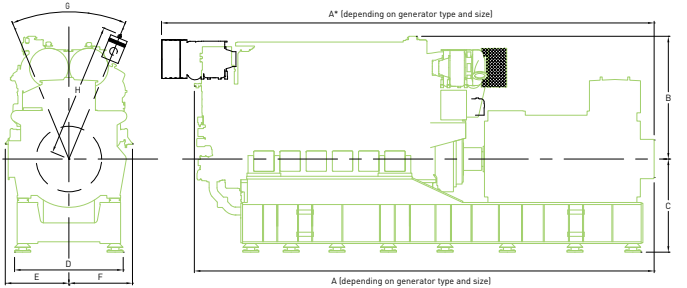
* [turbo at free end side execution]

DZC/DZD Genset execution



	A (mm)	A* (mm)	B (mm)	C (mm)	D (mm)	E (mm)	E* (mm)	F (mm)	Dry mass** (kg)
6DZ	6037	6406	1931	1276	1535	793	957	1950	22100
8DZ	6959	7328	1931	1276	1535	793	957	1950	26500

(V)DZC / (V)DZD Genset execution

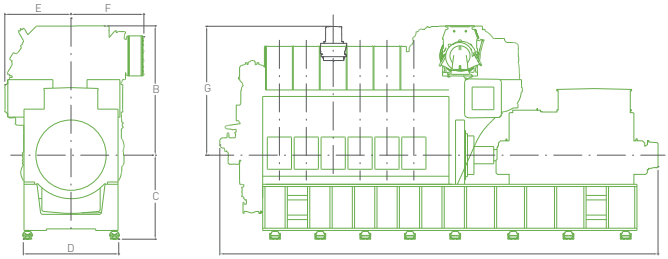


	A (mm)	A* (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	G (mm)	H (mm)	Dry mass** (kg)
12DZ	6667	7143	1780	1351	1575	925	925	45	1950	33500
16DZ	7847	8323	1780	1351	1575	925	925	45	1950	43200

*Turbocharger at free end side

**Genset total mass depending on generator type and size

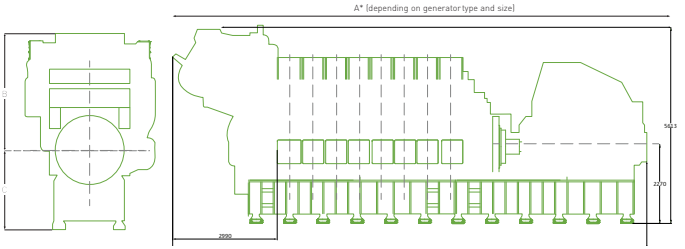
DL36 Genset execution



	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	G (mm)	Dry mass* (kg)
6DL36	9780	2885	1875	2130	1477	1626	2850	91700
8DL36	10980	2885	1875	2130	1477	1626	2850	106700

*Genset total mass depending on generator type and size

DV36 Genset execution



	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	G (mm)	Dry mass** (kg)
12DV36	12122	3343	2270	2026	1918	1853	3343	145500
16DV36	13566	3343	2270	2026	1918	1853	3343	163000

Electrical power of 50HZ-gensets*

	600 rpm		750 rpm		1000 rpm	
DZC-gensets						
6DZC	-	-	1020 kW_e	1280 kVA	1275 kW_e	1590 kVA
8DZC	-	-	1365 kW_e	1705 kVA	1695 kW_e	2120 kVA
12DZC	-	-	2045 kW_e	2555 kVA	2545 kW_e	3180 kVA
16DZC	-	-	2725 kW_e	3410 kVA	3395 kW_e	4245 kVA
DZD-gensets / BEH_2YDRO-gensets						
6DZD	-	-	720 kW_e	900 kVA	960 kW_e	1200 kVA
8DZD	-	-	960 kW_e	1200 kVA	1280 kW_e	1600 kVA
12DZD	-	-	1440 kW_e	1800 kVA	1920 kW_e	2400 kVA
16DZD	-	-	1920 kW_e	2400 kVA	2565 kW_e	3205 kVA
DL36						
6DL36	3000 kW_e	3750 kVA	3750 kW_e	4690 kVA		
8DL36	4000 kW_e	5000 kVA	5000 kW_e	6250 kVA		
DV36						
12DV36	6075 kW_e	7594 kVA	7594 kW_e	9492 kVA		
16DV36	8100 kW_e	10125 kVA	10125 kW_e	12657 kVA		
4EL23-gensets						
4EL23	-	-	787 kW_e	984 kVA	1056 kW_e	1320 kVA

*Engine power output under ISO 3046-I conditions, with generator efficiency of 96% and a power factor of 0.8

Electrical power of 60HZ-gensets*

	600 rpm		720 rpm		900 rpm	
DZC-gensets						
6DZC	-	-	990 kW_e	1240 kVA	1145 kW_e	1435 kVA
8DZC	-	-	1320 kW_e	1650 kVA	1530 kW_e	1910 kVA
12DZC	-	-	1980 kW_e	2475 kVA	2290 kW_e	2865 kVA
16DZC	-	-	2640 kW_e	3300 kVA	3055 kW_e	3820 kVA
DZD-gensets / BEH$_2$YDRO-gensets						
6DZD	-	-	690 kW_e	865 kVA	865 kW_e	1080 kVA
8DZD	-	-	920 kW_e	1150 kVA	1150 kW_e	1440 kVA
12DZD	-	-	1380 kW_e	1730 kVA	1730 kW_e	2160 kVA
16DZD	-	-	1845 kW_e	2305 kVA	2305 kW_e	2880 kVA
DL36						
6DL36	3000 kW_e	3750 kVA	3600 kW_e	4500 kVA		
8DL36	4000 kW_e	5000 kVA	4800 kW_e	6000 kVA		
DV36						
12DV36	6075 kW_e	7594 kVA	7290 kW_e	9113 kVA		
16DV36	8100 kW_e	10125 kVA	9720 kW_e	12150 kVA		

	720 rpm		900 rpm		1200 rpm	
4EL23						
4EL23	-	-	960 kW_e	1200 kVA	1267 kW_e	1584 kVA

*Engine power output under ISO 3046-I conditions, with generator efficiency of 96% and a power factor of 0.8

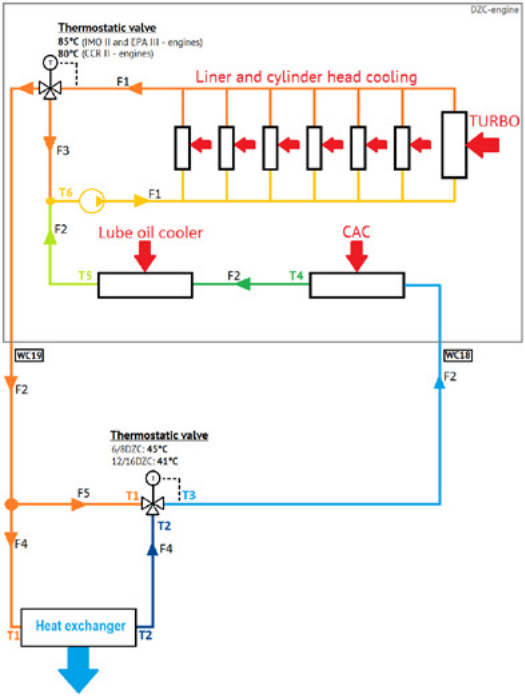
**Higher power ranges are available for emergency gensets

Cooling circuit

Split cooling circuit for DZC-engines (standard circuit)

	Value	remarks
Temperatures [°C]		
T1	80°C or 85°C	According required emission level
T2	$T_0+\Delta T$	Depending on the cooling efficiency of the chosen cooler (calculation below diagram)
T3	≥ 45°C/ 41°C	According thermostatic valve element Needs to be higher or equal to T2
Flows [kg/s]		
F1	HT-pump capacity	See DZC pump specifications
F2	$\frac{total\ heat}{(T1\text{-}T3).\ CP}$	total_heat according engine specs, CP= heat capacity coolant, according water/glycol mix *
F3	F1-F2	
F4	$\frac{total\ heat}{(T1\text{-}T3).\ CP}$	Total_heat according engine specs, CP= heat capacity coolant, according water/ glycol mix
F5	F2-F4	

* Typical configuration: 30% glycol - 3.60 KJ / (Kg.K)



T2 depends on:

- ◊ Ambient air temperature or coolant temperature T_0
- ◊ Efficiency of the heat exchanger ΔT

Typical values:

- ◊ PHE : $T_0 = T_{coolant}$; ΔT = 7°C
- ◊ Box cooler : $T_0 = T_{seaWater}$; ΔT = 5°C
- ◊ Radiator : $T_0 = T_{air}$; ΔT = 7°C

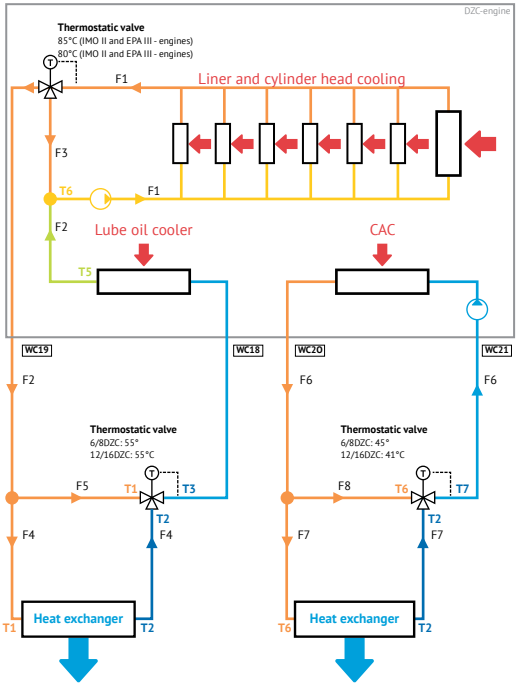
Note: For 12/16 DZC engine with **turbo at free end side** execution the **CAC is after the lube oil cooler**.

Cooling circuit

HT/LT–double cooling circuit for DZD- and heavy duty DZC engines

Value		remarks
Temperatures [°C]		
T1	80°C or 85°C	According engine type and emission level
T2	$T_0+\Delta T$	Depending on the cooling efficiency of the chosen cooler (calculation see below diagram)
T3	55°C or T2	According thermostic valve HT-cooler, needs to be higher or equal to T2
T6	$T7 + \frac{LT\ heat}{F6.\ CP}$	LT_heat according engine specs, CP= heat capacity coolant, according water/glycol mix *
T7	≥ 35°C/41°C / 45°C	According thermostatic valve element. Needs to be higher or equal to T2
Flows [kg/s]		
F1	HT-pump capacity	See DZC pump specifications
F2	$\frac{HT\ heat}{(T1-T3).\ CP}$	HT_heat according engine specs, CP= heat capacity coolant, according water/glycol mix *
F3	F1-F2	
F4	$\frac{HT\ heat}{(T1-T2).\ CP}$	HT_heat according engine specs, CP= heat capacity coolant, according water/glycol mix *
F5	F2-F4	
F6	LT-pump capacity	See DZC pump specifications
F7	$\frac{HT\ heat}{(T6-T2).\ CP}$	LT_heat according engine specs, CP= heat capacity coolant, according water/glycol mix
F8	F6-F7	

* Typical configuration: 30% glycol - 3.60 KJ / (Kg.K)



T2 depends on:

- ◊ Ambient air temperature or coolant temperature T_0
- ◊ Efficiency of the heat exchanger ΔT

Typical values:

- ◊ PHE : $T_0 = T_{coolant}$; ΔT = 7°C
- ◊ Box cooler : $T_0 = T_{seaWater}$; ΔT = 5°C
- ◊ Radiator : $T_0 = T_{air}$; ΔT = 7°C

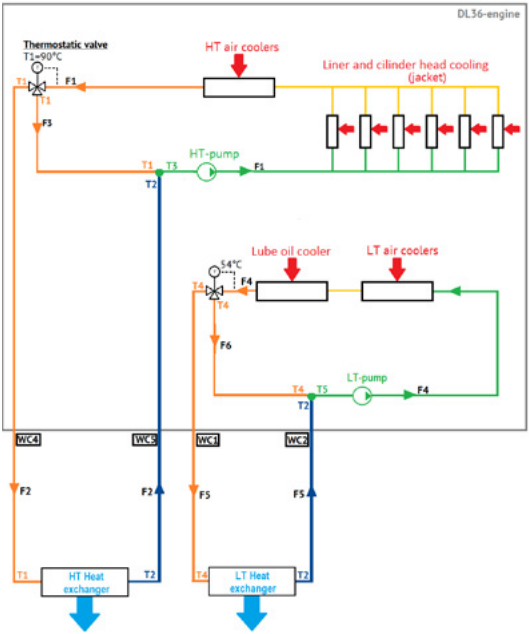
Note: For 12/16 DZC engine with **turbo at free end side** execution the **CAC is after the lube oil cooler**.

Cooling circuit

HT/LT – cooling circuit for DL36-engines

	Value	remarks
Temperatures [°C]		
T1	90°C	Thermostatic valve nominal value
T2	$T_0+\Lambda T$	Depending on the cooling efficiency of the chosen cooler (calculation below diagram)
T4	54°C	Thermostatic valve nominal value
Flows [kg/s]		
F1	HT-pump capacity	See 6/8DL36- specifications
F2	$\frac{HT\ heat}{(T2\text{-}T1).\ CP}$	HT_heat according engine specs, CP= heat capacity coolant, according water/glycol mix *
F4	LT-pump capacity	See 6/8DL36- specifications
F5	$\frac{HT\ heat}{(T5\text{-}T4).\ CP}$	

*Typical configuration: 30% glycol - 3.60 KJ / (Kg.K)



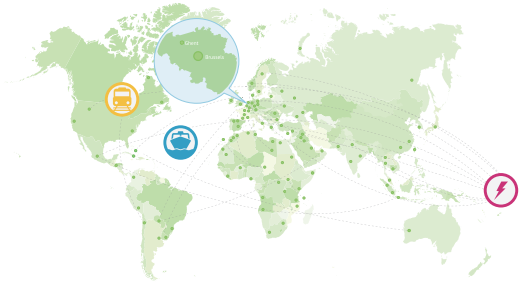
T2 depends on:

- Ambient air temperature or coolant temperature T_0
- Efficiency of the heat exchanger ΔT

Typical values:

- PHE : $T_0 = T_{coolant}$; ΔT = 7°C
- Box cooler : $T_0 = T_{seaWater}$; ΔT = 5°C
- Radiator : $T_0 = T_{air}$; ΔT = 7°C

Network distribution and service



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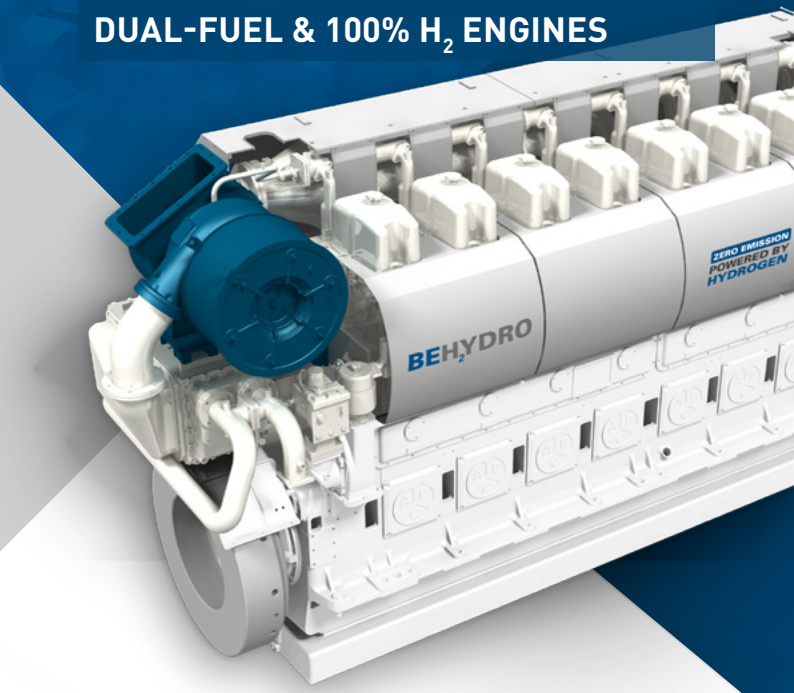

BEH$_2$YDRO

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