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D1146 G-DRIVE

◎ POWER RATING

Engine Speed rev/min	Type of Operation	Engine Power	
		kWm	Ps
1800	Continuous Power	87	118
	Prime Power	96	130
	Standby Power	105	143
1500	Continuous Power	70	95
	Prime Power	77	105
	Standby Power	85	116

Note : -. The engine performance corresponds to ISO 3046, BS 5514 and DIN 6271.

-. Ratings are based on ISO 8528.

→ **Prime power** available at variable load. The permissible average power out put (during 24h period) shell not exceed 70% of the prime power rating.

→ **Standby power** available in the event of a main power network failure. No overload is permitted.

◎ MECHANICAL SYSTEM

○ Engine Model	D1146
○ Engine Type	In-line 4 cycle, water cooled Naturally aspirated
○ Combustion type	Direct injection
○ Cylinder Type	Replaceable dry liner
○ Number of cylinders	6
○ Bore x stroke	111(4.37) x 139(5.47) mm(in.)
○ Displacement	8.071(492.49) lit.(in^3)
○ Compression ratio	17.5 : 1
○ Firing order	1-5-3-6-2-4
○ Injection timing	15° BTDC
○ Compression pressure	Above 28 kg/cm2(398 psi) at 200rpm
○ Dry weight	Approx. 720 kg (1,587 lb)
○ Dimension (LxWxH)	1,224 x 727 x 973 mm (48.2 x 28.6 x 38.3 in.)
○ Rotation	Counter clockwise viewed from Flywheel
○ Fly wheel housing	SAE NO.2
○ Fly wheel	Clutch NO.11 1/2

◎ FUEL CONSUMPTION

○ **Prime Power** (lit/hr)	**1,500 rpm**	**1,800 rpm**
25%	7.5	8.9
50%	11.3	13.6
75%	15.9	19.0
100%	20.6	24.7
○ **Standby Power** (lit/h	**1,500 rpm**	**1,800 rpm**
25%	7.7	9.2
50%	11.6	14.9
75%	16.1	20.8
100%	20.8	26.6

◎ FUEL SYSTEM

○ Injection pump	Zexel in-line “AD” type
○ Governor	RSV type (all speed control)
○ Feed pump	Mechanical type
○ Injection nozzle	Multi hole type
○ Opening pressure	214 kg/cm^2 (3,044 psi)
○ Fuel filter	Full flow, cartridge type
○ Used fuel	Diesel fuel oil

◎ MECHANISM

○ Type	Over head valve
○ Number of valve	Intake 1, exhaust 1 per cylinder
○ Valve lashes at cold	Intake 0.30mm (0.0118 in.) Exhaust 0.30mm (0.0118 in.)

◎ VALVE TIMING

	Opening	**Close**
○ Intake valve	16 deg. BTDC	36 deg. ABDC
○ Exhaust valve	46 deg. BBDC	14 deg. ATDC

◎ LUBRICATION SYSTEM

○ Lub. Method	Fully forced pressure feed type
○ Oil pump	Gear type driven by crankshaft
○ Oil filter	Full flow, cartridge type
○ Oil pan capacity	High level 15.5 liters (4.09 gal.) Low level 12 liters (3.17 gal.)
○ Angularity limit	Front down 25 deg. Front up 25 deg. Side to side 25 deg.
○ Lub. Oil	Refer to Operation Manual

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تهران، کیلومتر۲۱ بزرگراه لشگری (جاده مخصوص کرج)
روبروی پالایشگاه نفت پارس، پلاک ۱۲

D1146 G-DRIVE

◎ COOLING SYSTEM

○ Cooling method	Fresh water forced circulation
○ Water capacity (engine only)	14 liters (3.70 gal.)
○ Pressure system	Max. 0.9 kg/cm^2 (12.8 psi)
○ Water pump	Centrifugal type driven by belt
○ Water pump Capacity	150 liters (39.6 gal.)/min at 1,800 rpm (engine)
○ Thermostat	Wax – pellet type Opening temp. 71°C Full open temp. 85°C
○ Cooling fan	Blower type, steel 590 mm diameter, 6 blade

◎ ENGINEERING DATA

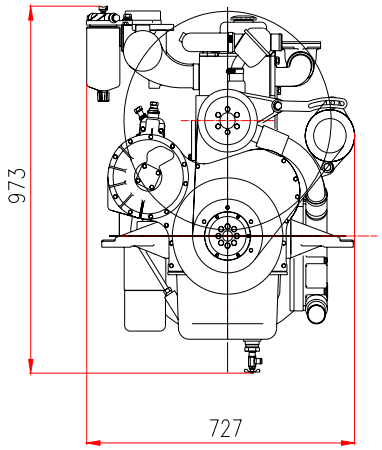
○ Water flow	130 liters/min @1,500 rpm 150 liters/min @1,800 rpm
○ Heat rejection to coolant	16.5 kcal/sec @1,800 rpm
○ Air flow	5.8 m^3/min @1,500 rpm 6.9 m^3/min @1,800 rpm
○ Exhaust gas flow	18.8 m^3/min @1,800 rpm
○ Exhaust gas temp.	620 °C @1,800 rpm
○ Max. permissible restrictions	
−.Intake system	220 mmH_2O initial 635 mmH_2O final
−.Exhaust system	1,000 mmH_2O max.

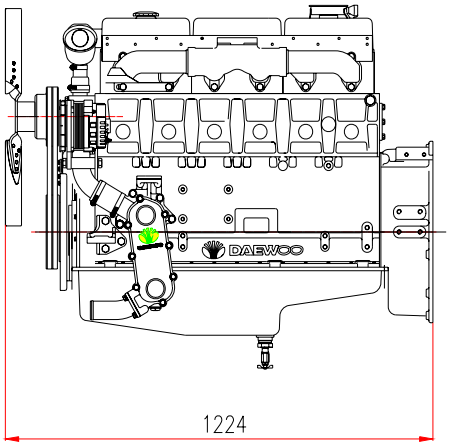
◎ ELECTRICAL SYSTEM

○ Charging generator	24V x 45A [or 12V x 26A] Aalternator
○ Voltage regulator	Built-in type IC regulator
○ Starting motor	24V x 4.5kW [or 12V x 2.5kW]
○ Battery Voltage	24V [or 12V]
○ Battery Capacity	100 AH [or 150 AH] (recommended)
○ Starting aid (Option)	Block heater

◆ CONVERSION TABLE

in. = mm x 0.0394	lb/ft = N.m x 0.737
PS = kW x 1.3596	U.S. gal = lit. x 0.264
psi = kg/cm2 x 14.2233	kW = 0.2388 kcal/s
in3 = lit. x 61.02	lb/PS.h = g/kW.h x 0.00162
hp = PS x 0.98635	cfm = m^3/min x 35.336
lb = kg x 2.20462	





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روبروی پالایشگاه نفت پارس، پلاک ۱۲

DOOSAN INFRACORE GENERATOR ENGINE

D1146T

Ratings (kWm/PS)	Gross Engine Output		Net Engine Output	
	Standby	Prime	Standby	Prime
1500rpm(50Hz)	118/160	107/145	114/155	103/140
1800rpm(60Hz)	138/187	125/170	131/177	118/160

Ratings Definitions

The power ratings of Emergency Standby and Prime are in accordance with ISO 8528.
Fuel Stop power in accordance with ISO 3046.
Electric power (kWe) must be considered cooling fan loss, alternator efficiency, altitude derating and ambient temperature.

STANDBY POWER RATING is applicable for supplying emergency power for the duration of the utility power outage. No overload capability is available for this rating. A standby rated engine should be sized for a maximum of an 80% average load factor and 200 hours of operation per year. This includes less than 25 hours per year at the Standby Power rating.

PRIME POWER RATING is available for an unlimited number of hours per year in variable load application. Variable load should not exceed a 70% average of the Prime Power rating during any operating period of 24 hours. The Total operating time at 100% Prime Power shall not exceed 500 hours per year. A 10% overload capability is available for a period of 1 hour withing a 12 hour period of operation. Total operating time at the 10% overload power shall not exceed 25 hours per year.

◎ GENERAL ENGINE DATA	
○ Engine Model	D1146T
○ Engine Type	4-Cycle, In-line, 6-Cylinder Diesel, Turbo charged
○ Bore x stroke	111 x 139 mm
○ Displacement	8.071 liters
○ Compression ratio	16.8 : 1
○ Rotation	Counter clockwise viewed from Flywheel
○ Firing order	1-5-3-6-2-4
○ Injection timing	16˚±1˚ BTDC
○ Dry weight	780kg(with Fan)
○ Dimension (LxWxH)	1,276 x 823 x 1,079 mm
○ Fly wheel housing	SAE NO.2M
○ Fly wheel	Clutch NO.11 1/2M
○ Number of teeth on flywheel	140
◎ ENGINE MOUNTING	
Maximum Bending Moment at Rear Face to Block	1325 N・M
◎ EXHAUST SYSTEM	
Maximum Back Pressure	5.9 kPa
◎ AIR INDUCTION SYSTEM	
Maximum Intake Air Restriction	
. With Clean Filter Element	2.16 kPa
. With Dirty Filter Element	6.23 kPa
○ Max. static pressure after Radiator	0.125 kPa

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◎ COOLING SYSTEM

Water circulation by centrifugal pump on engine.

○ Cooling method	Fresh water forced circulation
○ Coolant capacity	Engine Only : Approx. 14 lit., With Radiator : Approx 34 lit.(standard)
○ Coolant flow rate	liters / min
○ Pressure Cap	49 kPa
○ Water Temperature	
- Maximum for standby and Prime	103℃
- Before start of full load	40.0℃
○ Water pump	Centrifugal type driven by belt
○ Thermostat Type and Range	Wax – pellet type, Opening temp. 71°C , Full open temp. 85°C
○ Cooling fan	Blower type, Steel , 590 mm diameter, 6 blade
○ Max. external coolant system restriction	Not Available

◎ LUBRICATION SYSTEM

Force-feed lubrication by gear pump, lubricating oil cooling in cooling water circuit of engine.

○ Lub. Method	Fully forced pressure feed type
○ Oil pump	Gear type driven by crank-shaft gear
○ Oil filter	Full flow, cartridge type
○ Oil capacity	Max. 15.5 liters , Min. 12 liters
○ Lub oil pressure	Idle Speed : Min 100 kPa
	Governed Speed : Min 250 kPa
○ Maximum oil temperature	120℃
○ Angularity limit	Front down 10 deg , Front up 10 deg , Side to side 22.5 deg
○ Lubrication oil	Refer to Operation Manual

◎ FUEL SYSTEM

Bosch type in-line pump with integrated, electromagnetic actuator.

○ Injection pump	Zexel in-line "AD" type
○ Governor	RSV type (all speed control)
○ Speed drop	G2 Class (ISO 8528)
○ Feed pump	Mechanical type in injection pump
○ Injection nozzle	Multi hole type
○ Opening pressure	21.0 MPa
○ Fuel filter	Full flow, cartridge type with water drain valve
○ Maximum fuel inlet restriction	10 kPa
○ Maximum fuel return restriction	60 kPa
○ Fuel feed pump Capacity	175 liters / hr
○ Used fuel	Diesel fuel oil

◎ ELECTRICAL SYSTEM

○ Battery Charging Alternator	28.5V x 45A alternator
○ Voltage regulator	Built-in type IC regulator
○ Starting motor	24V x 6.0 kW
○ Battery Voltage	24V
○ Battery Capacity	100 Ah (recommended)
○ Starting aid (Option)	Block heater

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◎ VALVE SYSTEM

○ Type	Overhead valve type	
○ Number of valve	Intake 1, exhaust 1 per cylinder	
○ Valve lashes at cold	Intake 0.3mm , Exhaust 0.3mm	
○ Valve timing		
	Opening	Close
-. Intake valve	16 deg. BTDC	36 deg. ABDC
-. Exhaust valve	46 deg. BBDC	14 deg. ATDC

◎ PERFORMANCE DATA

		Prime Power		Standby Power	
○ Governed Engine speed	rpm	1500	1800	1500	1800
○ Engine Idle Speed	rpm	800	800	800	800
○ Over speed limit	rpm	1650	1980	1650	1980
○ Gross Engine Power Output	kW	107	125	118	138
	ps	145	170	160	187
○ Break Mean effective pressure	Mpa	1.06	1.03	1.17	1.14
○ Mean Piston Speed	m/s	6.95	8.34	6.95	8.34
○ Friction Power	kW	18	24	18	24
	ps	24.47	32.63	24.47	32.63
○ Specific fuel consumption					
25% load	liters/hr	8.2	11.4	8.6	11.9
50% load	liters/hr	13.6	18.1	14.3	19.6
75% load	liters/hr	19.5	24.9	20.4	27.3
100% load	liters/hr	25.9	32.5	27.0	35.1
○ Fan Power	kW	4	7	4	7
○ Sound Pressure at 1m from the each side of Cylinder Block					
(without Fan)	dB(A)	93.9	95.5	93.9	95.5

The all data and the specific fuel consumption are based on ISO 3046/1, Standard reference conditions are in accordance 298 K(25° Celsius) air temperature, 100kPa(1000mbar) air pressure, 60% relative humidity, 110m(361ft) altitude.

Operation At Elevated Temperature And Altitude: The engine may be operated at :

1800 rpm & 1500rpm up to 750~ 1000m and 30°C without power deration

For sustained operation above these conditions, derate by 3% per 304m , and 2% per 11 °C

Engine Data with Dry Type Exhaust Manifold

○ Intake Air Flow	m3/min	11.78	17.71	12.40	18.43
○ Exhaust gas temp. after turbo.	°C	–	470	–	-
○ Exhaust Gas Flow	m3/min	–	25.7	–	-
○ Heat Rejection to Exhaust	kW	91.3	114.5	95.1	123.7
○ Heat Rejection to Coolant	kW	39.7	49.8	41.4	53.8
○ Heat Rejetion to Intercooler	kW	-	-	-	-
○ Radiated Heat to Ambient	kW	9.3	11.6	9.7	12.5
○ Cooling water circulation	liters/min	130	150	130	150
○ Cooling fan air flow	m3/min	200	230	200	230

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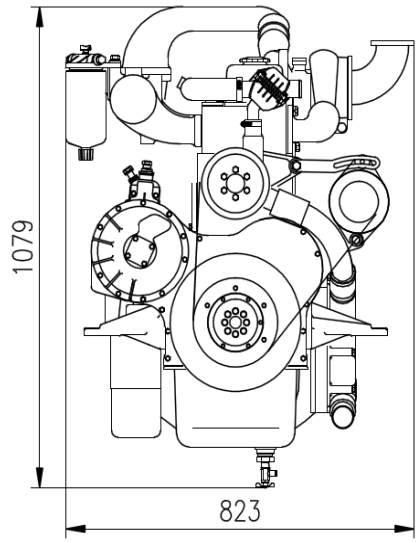
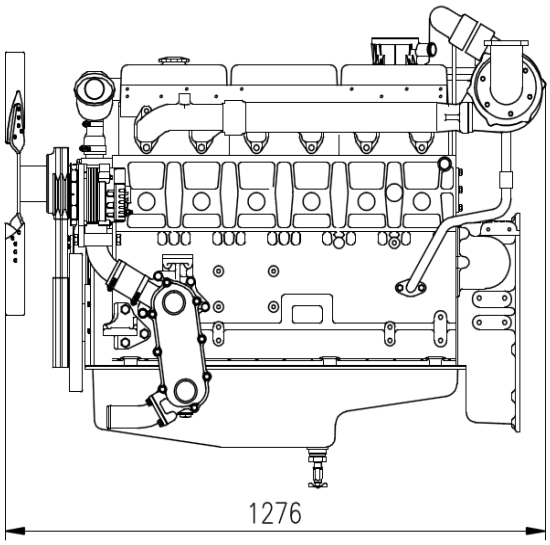
◆ ENGINE DIMENSION





◆ CONVERSION TABLE

in. = mm x 0.0394
PS = kW x 1.3596
psi = kg/cm2 x 14.2233
in3 = lit. x 61.02
hp = PS x 0.98635
lb = kg x 2.20462
kW = Kcal/sec x 0.239

lb/ft = N.m x 0.737
U.S. gal = lit. x 0.264
kW = 0.2388 kcal/s
lb/PS.h = g/kW.h x 0.00162
cfm = m^3/min x 35.336
Mpa = Pa x 1000 = bar x 10

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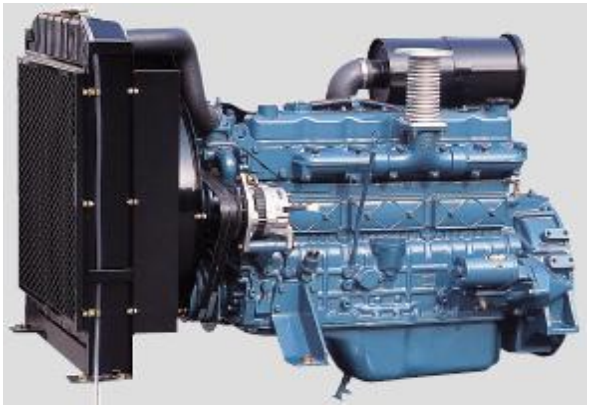
DOOSAN INFRACORE GENERATOR ENGINE

DB58

Ratings (kWm/PS)	Gross Engine Output		Net Engine Output	
	Standby	Prime	Standby	Prime
1500rpm(50Hz)	59/80	54/73	57/78	52/71
1800rpm(60Hz)	70/95	64/87	68/92	62/84



Ratings Definitions

The power ratings of Emergency Standby and Prime are in accordance with ISO 8528.
Fuel Stop power in accordance with ISO 3046.
STANDBY POWER RATING is applicable for supplying emergency power for the duration of the utility power outage. No overload capability is available for this rating. A standby rated engine should be sized for a maximum of an 80% average load factor and 200 hours of operation per year. This includes less than 25 hours per year at the Standby Power rating.

PRIME POWER RATING is available for an unlimited number of hours per year in variable load application. Variable load should not exceed a 70% average of the Prime Power rating during any operating period of 250 hours. The Total operating time at 100% Prime Power shall not exceed 500 hours per year. A 10% overload capability is available for a period of 1 hour withing a 12 hour period of operation. Total operating time at the 10% overload power shall not exceed 25 hous per year

◎ GENERAL ENGINE DATA	
○ Engine Model	DB58
○ Engine Type	4-Cycle, In-line, 6-Cylinder Diesel, water cooled, Naturally aspirated
○ Bore x stroke	102 x 118 mm
○ Displacement	5.785 liters
○ Compression ratio	17.5 : 1
○ Rotation	Counter clockwise viewed from Flywheel
○ Firing order	1-5-3-6-2-4
○ Injection timing	12˚±1˚ BTDC
○ Dry weight	450kg(with Fan)
○ Dimension (LxWxH)	1,144 x 705 x 836 mm
○ Fly wheel housing	SAE NO.3M
○ Fly wheel	Clutch NO.11 1/2M
○ Number of teeth on flywheel	129
◎ ENGINE MOUNTING	
Maximum Bending Moment at Rear Face to Block	1325 N・M
◎ EXHAUST SYSTEM	
Maximum Back Pressure	5.9 kPa
◎ AIR INDUCTION SYSTEM	
Maximum Intake Air Restriction	
. With Clean Filter Element	2.16 kPa
. With Dirty Filter Element	6.23 kPa
○ Max. static pressure after Radiator	0.125 kPa

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◎ COOLING SYSTEM

Water circulation by centrifugal pump on engine.

○ Cooling method	Fresh water forced circulation
○ Coolant capacity	Engine Only : Approx. 12 lit, With Radiator : Approx 31 lit. (standard)
○ Coolant flow rate	liters / min
○ Pressure Cap	Max. 49 kPa
○ Water Temperature	
- Maximum for standby and Prime	103℃
- Before start of full load	40.0℃
○ Water pump	Centrifugal type driven by belt
○ Thermostat Type and Range	Wax – pellet type, Opening temp. 82°C , Full open temp. 95°C
○ Cooling fan	Blower type, steel , 520 mm diameter, 6 blade
○ Max. external coolant system restriction	Not Available

◎ LUBRICATION SYSTEM

Force-feed lubrication by gear pump, lubricating oil cooling in cooling water circuit of engine.

○ Lub. Method	Fully forced pressure feed type
○ Oil pump	Gear type driven by crank-shaft gear
○ Oil filter	Full flow, cartridge type
○ Oil capacity	Max. 19 liters , Min. 16 liters
○ Lub oil pressure	Idle Speed : Min 100 kPa
	Governed Speed : Min 250 kPa
○ Maximum oil temperature	120℃
○ Angularity limit	Front down 10 deg , Front up 10 deg , Side to side 22.5 deg
○ Lubrication oil	Refer to Operation Manual

◎ FUEL SYSTEM

Bosch type in-line pump with integrated, electromagnetic actuator.

○ Injection pump	Zexel in-line "A" type
○ Governor	RSV type (all speed control)
○ Speed drop	G2 Class (ISO 8528)
○ Feed pump	Mechanical type in injpump.
○ Injection nozzle	Multi hole type
○ Opening pressure	21.6 MPa
○ Fuel filter	Full flow, cartridge type with water drain valve.
○ Maximum fuel inlet restriction	10 kPa
○ Maximum fuel return restriction	60 kPa
○ Fuel feed pump Capacity	175 liters / hr
○ Used fuel	Diesel fuel oil

◎ ELECTRICAL SYSTEM

○ Battery Charging Alternator	28.5V x 45A alternator
○ Voltage regulator	Built-in type IC regulator
○ Starting motor	24V x 4.5 kW
○ Battery Voltage	24V
○ Battery Capacity	100 Ah (recommended)
○ Starting aid (Option)	Block heater

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◎ VALVE SYSTEM

○ Type	Overhead valve type	
○ Number of valve	Intake 1, exhaust 1 per cylinder	
○ Valve lashes at cold	Intake 0.4mm , Exhaust 0.4mm	
○ Valve timing		
	Opening	Close
-. Intake valve	28 deg. BTDC	62 deg. ABDC
-. Exhaust valve	70 deg. BBDC	28 deg. ATDC

◎ PERFORMANCE DATA

		Prime Power		Standby Power	
○ Governed Engine speed	rpm	1500	1800	1500	1800
○ Engine Idle Speed	rpm	800	800	800	800
○ Over speed limit	rpm	1650	1980	1650	1980
○ Gross Engine Power Output	kW	54	64	59	70
	ps	73	87	80	95
○ Break Mean effective pressure	Mpa	0.54	0.53	0.59	0.58
○ Mean Piston Speed	m/s	5.9	7.08	5.9	7.08
○ Friction Horsepower	kW	13	17	13	17
	ps	17.67	23.11	17.67	23.11
○ Specific fuel consumption					
25% load	liters/hr	4.8	5.7	5.9	6.4
50% load	liters/hr	7.6	8.4	8.8	9.8
75% load	liters/hr	10.5	12.2	11.7	13.1
100% load	liters/hr	13.9	16.4	15.3	18.1
○ Maximum Lube oil consumptio	g/h	51.1	60.9	56	66.5
○ Fan Power	kW	1.5	2	1.5	2
○ Exhaust Noise at 1m Horizontally from Centerline of Exhaust Pipe dista					
(without Fan)	dB(A)	93.6	94.5	93.6	94.5

The all data and the specific fuel consumption are based on ISO 3046/1, Standard reference conditions are in accordance v
298 K(25° Celsius) air temperature, 100kPa(1000mbar) air pressure, 60% relative humidity, 110m(361ft) altitude.

Operation At Elevated Temperature And Altitude: The engine may be operated at :

1800 rpm & 1500rpm up to 750~ 1000m and 30°C without power deration

For sustained operation above these conditions, derate by 3% per 304m , and 2% per 11 °C

Engine Data with Dry Type Exhaust Manifold

○ Intake Air Flow	m3/min	8.80	14.19	9.09	14.53
○ Exhaust gas temp. after turbo.	°C	603	570	-	-
○ Exhaust Gas Flow	m3/min	–	8.46	–	8.46
○ Heat Rejection to Exhaust	kW	49.0	57.8	53.9	63.8
○ Heat Rejection to Coolant	kW	21.3	25.1	23.4	27.7
○ Heat Rejetion to Intercooler	kW	-	-	-	-
○ Radiated Heat to Ambient	kW	5.0	5.9	5.5	6.5
○ Cooling water circulation	liters/min	77	95	77	95
○ Cooling fan air flow	m3/min	100	118	100	118

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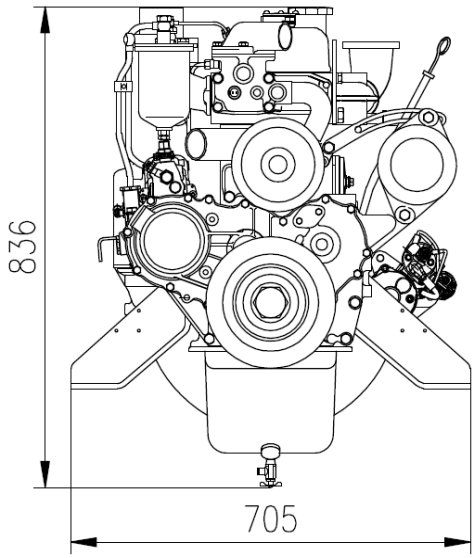
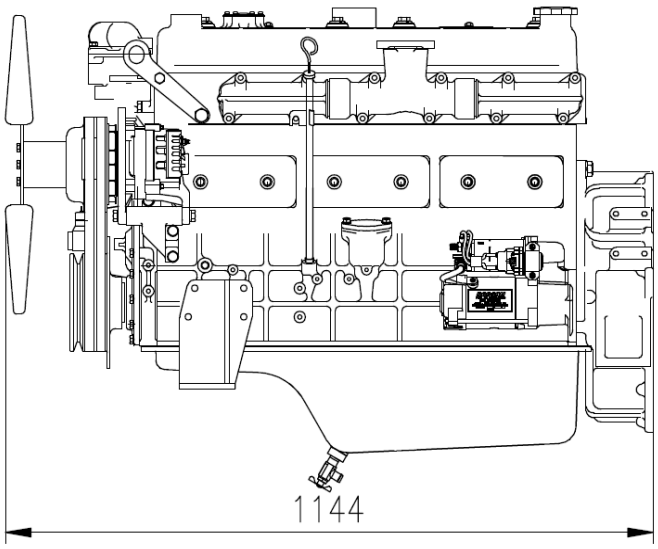
روبروی پالایشگاه نفت پارس، پلاک ۱۲

◆ ENGINE DIMENSION





◆ CONVERSION TABLE

in. = mm x 0.0394
PS = kW x 1.3596
psi = kg/cm2 x 14.2233
in3 = lit. x 61.02
hp = PS x 0.98635
lb = kg x 2.20462
kW = Kcal/sec x 0.239

lb/ft = N.m x 0.737
U.S. gal = lit. x 0.264
kW = 0.2388 kcal/s
lb/PS.h = g/kW.h x 0.00162
cfm = m^3/min x 35.336
Mpa = Pa x 1000 = bar x 10

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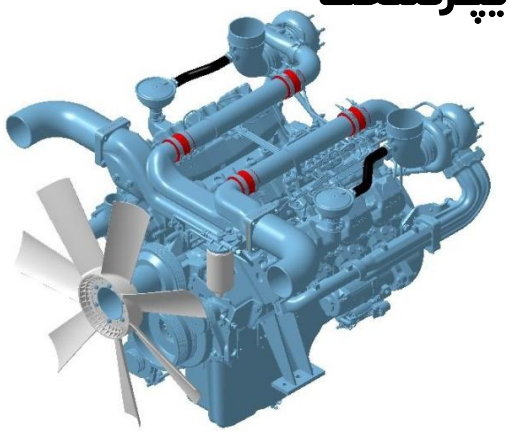
تهران، کیلومتر۲۱ بزرگراه لشگری (جاده مخصوص کرج)
روبروی پالایشگاه نفت پارس، پلاک ۱۲

DOOSAN INFRACORE GENERATOR ENGINE

DP158LC



Ratings (kWm/PS)	Gross Engine Output - without Cooling Fan		Net Engine Output - with Cooling Fan	
	Standby	Prime	Standby	Prime
1500rpm(50Hz)	449/610	408/555	433/589	392/533
1800rpm(60Hz)	513/697	466/634	489/665	442/601

* 50Hz : DP158LCF, 60Hz : DP158LCS

Ratings Definitions

The power ratings of Emergency Standby and Prime are in accordance with ISO 8528.
Fuel Stop power in accordance with ISO 3046.
Electric power(kWe) should be estimated by considering generator efficiency, cooling fan power loss and power derating due to altitude and ambient temperature.

STANDBY POWER RATING is applicable for supplying emergency power for the duration of the utility power outage. No overload capability is available for this rating. A standby rated engine should be sized for a maximum of an 70% average load factor and 200 hours of operation per year. This includes less than 25 hours per year at the Standby Power rating.

PRIME POWER RATING is available for an unlimited of hours per year in variable load application. Variable load should not exceed a 70% average of the Prime Power rating during any operating period of 24 hours. The Total operating time at 100% Prime Power shall not exceed 500 hours per year. A 10% overload capability is available for a period of 1 hour within a 12 hour period of operation. Total operating time at the 10% overload power shall not exceed 25 hours per year.

◎ GENERAL ENGINE DATA

○ Engine Model	DP158LC
○ Engine Type	4-Cycle, V-type, 8-Cylinder, Turbo charged & intercooled (air to air)
○ Bore x stroke	128 x 142 mm
○ Displacement	14.618 liters
○ Compression ratio	15 : 1
○ Rotation	Counter clockwise viewed from Flywheel
○ Firing order	1-5-7-2-6-3-4-8
○ Injection timing	23˚±1˚ BTDC @ 1800 rpm, 18˚±1˚ BTDC @ 1500 rpm,
○ Dry weight	1155 kg (with fan)
○ Dimension (LxWxH)	1,274 x 1,138 x 1,207 mm
○ Fly wheel housing	SAE NO.1M
○ Fly wheel	Clutch NO.14M
○ Number of teeth on flywheel	160

◎ ENGINE MOUNTING

○ Maximum Bending Moment at Rear Face to Block	1,325 N.m

◎ EXHAUST SYSTEM

○ Maximum Back Pressure	5.9 kPa

◎ AIR INDUCTION SYSTEM

○ Maximum Intake Air Restriction	
. With Clean Filter Element	2.16 kPa
. With Dirty Filter Element	6.23 kPa
○ Max. static pressure after Radiator	0.125 kPa

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تهران، کیلومتر۲۱ بزرگراه لشگری (جاده مخصوص کرج)
روبروی پالایشگاه نفت پارس، پلاک ۱۲

◎ COOLING SYSTEM

Water circulation by centrifugal pump on engine.	
○ Cooling method	Fresh water forced circulation
○ Coolant capacity	Engine Only : Approx. 20 lit, With Radiator(*Air On 43℃) : Approx 79 lit.
○ Coolant flow rate	660 liters / min @ 1800 rpm, 550 liters / min @ 1500 rpm,
○ Pressure Cap	Max. 49 kPa
○ Water Temperature	
- Maximum for standby and Prime	103℃
- Before start of full load	40.0℃
○ Water pump	Centrifugal type driven by belt
○ Thermostat Type and Range	Wax – pellet type, Opening temp. 71°C , Full open temp. 85°C
○ Cooling fan	Blower type, plastic , 915 mm diameter, 7 blade
○ Max. external coolant system restriction	Not available

* Two radiator options are provided, based on allowable maximum Air temperature On radiator inlet (Air On) : Air On 43°C / Air On 52°C
- ATB(Ambient Temperature before Boiling) of generator set varies depending on the engine room ventilation design, even if the same radiator applied. Adequate selection of radiator options by means of the cooling test is highly recommended, and generator set makers are responsible for the selection.

◎ LUBRICATION SYSTEM

Force-feed lubrication by gear pump, lubricating oil cooling in cooling water circuit of engine.	
○ Lub. Method	Fully forced pressure feed type
○ Oil pump	Gear type driven by crank-shaft gear
○ Oil filter	Full flow, cartridge type
○ Oil capacity	Max. 22 liters , Min. 13 liters
○ Lub oil pressure	Idle Speed : Min 100 kPa
	Governed Speed : Min 250 kPa
○ Maximum oil temperature	120℃
○ Angularity limit	Front down 10 deg , Front up 10 deg , Side to side 22.5 deg
○ Lubrication oil	Refer to Operation Manual

◎ FUEL SYSTEM

Bosch type in-line pump with integrated, electromagnetic actuator.	
○ Injection pump	Bosch in-line "P" type
○ Governor	Electric type
○ Speed drop	G3 Class (ISO 8528)
○ Feed pump	Mechanical type in injpump.
○ Injection nozzle	Multi hole type
○ Opening pressure	28 MPa
○ Fuel filter	Full flow, cartridge type with water drain valve.
○ Maximum fuel inlet restriction	30 kPa
○ Maximum fuel return restriction	60 kPa
○ Fuel feed pump Capacity	315 liters / hr
○ Used fuel	Diesel fuel oil

◎ ELECTRICAL SYSTEM

○ Battery Charging Alternator	27.5V x 45A alternator
○ Voltage regulator	Built-in type IC regulator
○ Starting motor	24V x 7.0 kW
○ Battery Voltage	24V
○ Battery Capacity	2 x 200 Ah (recommended)
○ Starting aid (Option)	Block heater

◎ VALVE SYSTEM

○ Type	Overhead valve type	
○ Number of valve	Intake 1, exhaust 1 per cylinder	
○ Valve lashes at cold	Intake 0.25 mm , Exhaust 0.35 mm	
○ Valve timing		
	Opening	Close
-. Intake valve	24 deg. BTDC	36 deg. ABDC
-. Exhaust valve	63 deg. BBDC	27 deg. ATDC

◎ PERFORMANCE DATA

		Prime Power		Standby Power	
○ Governed Engine speed	rpm	1500	1800	1500	1800
○ Engine Idle Speed	rpm	800	800	800	800
○ Over speed limit	rpm	1650	1980	1650	1980
○ Gross Engine Power Output	kW	408	466	449	513
	PS	555	634	610	697
○ Break Mean effective pressure	MPa	2.34	2.12	2.45	2.33
○ Mean Piston Speed	m/s	7.1	8.5	7.1	8.5
○ Friction Power	kW	32	44	32	44
	PS	43.5	59.8	43.5	59.8
○ Specific fuel consumption					
25% load	liters/hr	27.6	32.3	29.6	34.9
50% load	liters/hr	48.9	57.7	53.4	62.7
75% load	liters/hr	72.9	83.4	80.5	91.4
100% load	liters/hr	99.6	111.5	110.9	123.8
○ Maximum Lube oil consumption	g/h	389	444	427	488
○ Fan Power	kW	16	24	16	24
○ Sound Pressure at 1m from the each side of Cylinder Block					
(without Fan)	dB(A)	97.65	100.33	97.65	100.33

The all data and the specific fuel consumption are based on ISO 3046/1, Standard reference conditions are in accordance with 298 K(25˚ Celsius) air temperature, 100kPa(1000mbar) air pressure, 60% relative humidity, 110m(361ft) altitude.

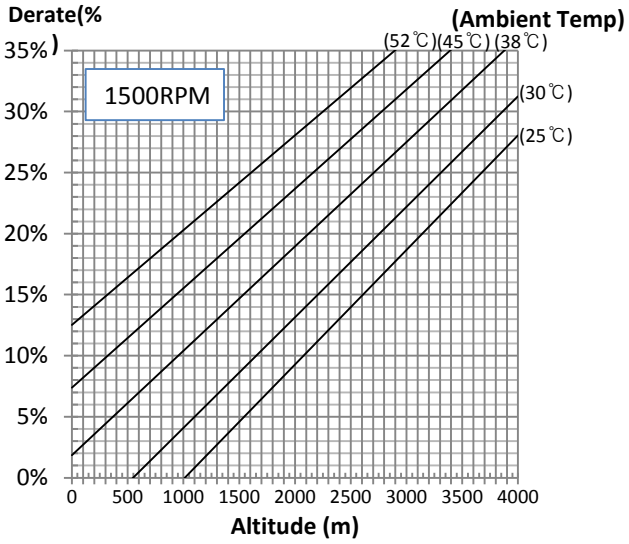
◎ Engine Data with Dry Type Exhaust Manifold

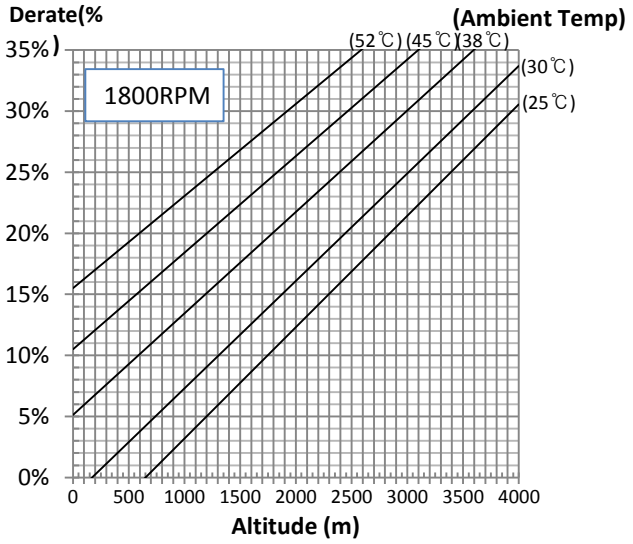
○ Intake Air Flow	m3/min	28.1	32.3	30.1	34.5
○ Exhaust gas temp. after turbo.	°C	507	518	529	543
○ Exhaust Gas Flow	m3/min	81	93	88	101
○ Heat Rejection to Exhaust	kW	368	413	410	458
○ Heat Rejection to Coolant	kW	176	197	196	219
○ Heat Rejetion to Intercooler	kW	90	100	100	112
○ Radiated Heat to Ambient	kW	37	42	42	46
○ Cooling water circulation	liters/min	590	660	590	660
○ Cooling fan air flow	m3/min	700	850	700	850

◎ DERATING FROM ISO 3046 STANDARD CONDITIONS

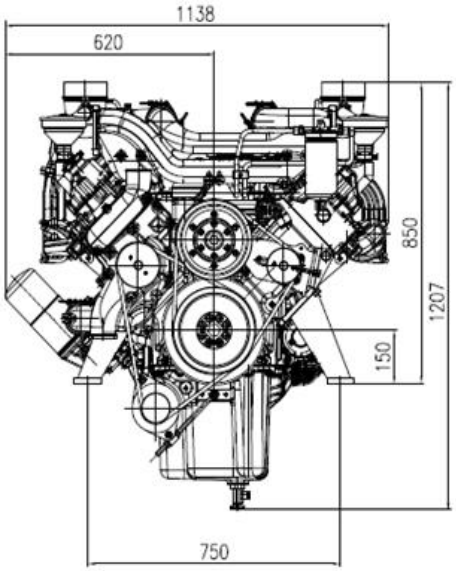
The maximum power is the STANDBY rating when assessing derate prameters.

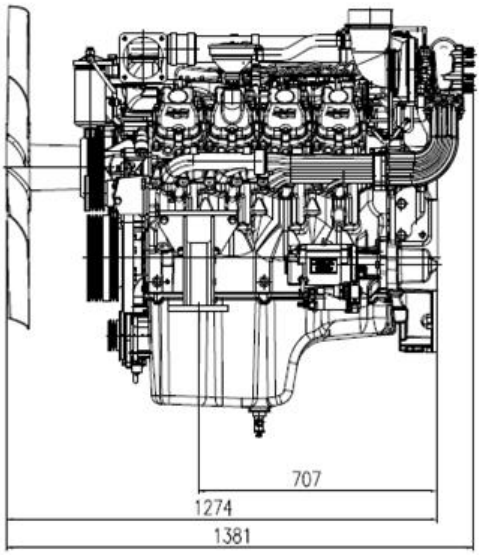
Ambient temperature is air inlet temperature.





◎ ENGINE DIMENSION





◆ CONVERSION TABLE

in. = mm x 0.0394
PS = kW x 1.3596
psi = kg/cm2 x 14.2233
in3 = lit. x 61.02
hp = PS x 0.98635
lb = kg x 2.20462
kW = kcal/sec x 0.239

lb/ft = N.m x 0.737
U.S. gal = lit. x 0.264
kW = 0.2388 kcal/s
lb/PS.h = g/kW.h x 0.00162
cfm = m^3/min x 35.336
MPa = kPa x 1000 = bar x 10

※ Specifications are subject to change without prior notice.

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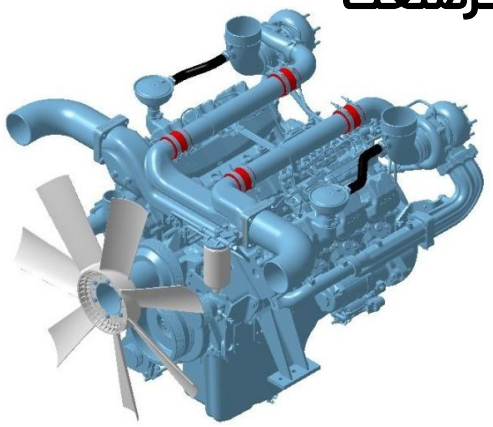
روبروی پالایشگاه نفت پارس، پلاک ۱۲

DOOSAN INFRACORE GENERATOR ENGINE

DP158LD



Ratings (kWm/PS)	Gross Engine Output - without Cooling Fan		Net Engine Output - with Cooling Fan	
	Standby	Prime	Standby	Prime
1500rpm(50Hz)	510/693	464/630	494/672	448/609
1800rpm(60Hz)	556/756	505/687	552/750	481/654

* 50Hz : DP158LDF, 60Hz : DP158LDS

Ratings Definitions

The power ratings of Emergency Standby and Prime are in accordance with ISO 8528.
Fuel Stop power in accordance with ISO 3046.
Electric power(kWe) should be estimated by considering generator efficiency, cooling fan power loss and power derating due to altitude and ambient temperature.

STANDBY POWER RATING is applicable for supplying emergency power for the duration of the utility power outage. No overload capability is available for this rating. A standby rated engine should be sized for a maximum of an 70% average load factor and 200 hours of operation per year. This includes less than 25 hours per year at the Standby Power rating.

PRIME POWER RATING is available for an unlimited of hours per year in variable load application. Variable load should not exceed a 70% average of the Prime Power rating during any operating period of 24 hours. The Total operating time at 100% Prime Power shall not exceed 500 hours per year. A 10% overload capability is available for a period of 1 hour within a 12 hour period of operation. Total operating time at the 10% overload power shall not exceed 25 hours per year.

◎ GENERAL ENGINE DATA

○ Engine Model	DP158LD
○ Engine Type	4-Cycle, V-type, 8-Cylinder, Turbo charged & intercooled (air to air)
○ Bore x stroke	128 x 142 mm
○ Displacement	14.618 liters
○ Compression ratio	15 : 1
○ Rotation	Counter clockwise viewed from Flywheel
○ Firing order	1-5-7-2-6-3-4-8
○ Injection timing	23˚±1˚ BTDC @ 1800 rpm, 18˚±1˚ BTDC @ 1500 rpm,
○ Dry weight	1155 kg (with fan)
○ Dimension (LxWxH)	1,274 x 1,138 x 1,207 mm
○ Fly wheel housing	SAE NO.1M
○ Fly wheel	Clutch NO.14M
○ Number of teeth on flywheel	160

◎ ENGINE MOUNTING

○ Maximum Bending Moment at Rear Face to Block	1,325 N.m

◎ EXHAUST SYSTEM

○ Maximum Back Pressure	5.9 kPa

◎ AIR INDUCTION SYSTEM

○ Maximum Intake Air Restriction	
. With Clean Filter Element	2.16 kPa
. With Dirty Filter Element	6.23 kPa
○ Max. static pressure after Radiator	0.125 kPa

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روبروی پالایشگاه نفت پارس، پلاک ۱۲

◎ COOLING SYSTEM

Water circulation by centrifugal pump on engine.

○ Cooling method	Fresh water forced circulation
○ Coolant capacity	Engine Only : Approx. 20 lit, With Radiator(*Air On 43℃) : Approx 79 lit.
○ Coolant flow rate	660 liters / min @ 1800 rpm, 550 liters / min @ 1500 rpm,
○ Pressure Cap	Max. 49 kPa
○ Water Temperature	
- Maximum for standby and Prime	103℃
- Before start of full load	40.0℃
○ Water pump	Centrifugal type driven by belt
○ Thermostat Type and Range	Wax – pellet type, Opening temp. 71°C , Full open temp. 85°C
○ Cooling fan	Blower type, plastic , 915 mm diameter, 7 blade
○ Max. external coolant system restriction	Not available

* Two radiator options are provided, based on allowable maximum Air temperature On radiator inlet (Air On) : Air On 43°C / Air On 52°C
- ATB(Ambient Temperature before Boiling) of generator set varies depending on the engine room ventilation design, even if the same radiator applied. Adequate selection of radiator options by means of the cooling test is highly recommended, and generator set makers are responsible for the selection.

◎ LUBRICATION SYSTEM

Force-feed lubrication by gear pump, lubricating oil cooling in cooling water circuit of engine.

○ Lub. Method	Fully forced pressure feed type
○ Oil pump	Gear type driven by crank-shaft gear
○ Oil filter	Full flow, cartridge type
○ Oil capacity	Max. 22 liters , Min. 13 liters
○ Lub oil pressure	Idle Speed : Min 100 kPa
	Governed Speed : Min 250 kPa
○ Maximum oil temperature	120℃
○ Angularity limit	Front down 10 deg , Front up 10 deg , Side to side 22.5 deg
○ Lubrication oil	Refer to Operation Manual

◎ FUEL SYSTEM

Bosch type in-line pump with integrated, electromagnetic actuator.

○ Injection pump	Bosch in-line "P" type
○ Governor	Electric type
○ Speed drop	G3 Class (ISO 8528)
○ Feed pump	Mechanical type in injpump.
○ Injection nozzle	Multi hole type
○ Opening pressure	28 MPa
○ Fuel filter	Full flow, cartridge type with water drain valve.
○ Maximum fuel inlet restriction	30 kPa
○ Maximum fuel return restriction	60 kPa
○ Fuel feed pump Capacity	315 liters / hr
○ Used fuel	Diesel fuel oil

◎ ELECTRICAL SYSTEM

○ Battery Charging Alternator	27.5V x 45A alternator
○ Voltage regulator	Built-in type IC regulator
○ Starting motor	24V x 7.0 kW
○ Battery Voltage	24V
○ Battery Capacity	2 x 200 Ah (recommended)
○ Starting aid (Option)	Block heater

◎ VALVE SYSTEM

○ Type	Overhead valve type	
○ Number of valve	Intake 1, exhaust 1 per cylinder	
○ Valve lashes at cold	Intake 0.25 mm , Exhaust 0.35 mm	
○ Valve timing		
	Opening	Close
-. Intake valve	24 deg. BTDC	36 deg. ABDC
-. Exhaust valve	63 deg. BBDC	27 deg. ATDC

◎ PERFORMANCE DATA

		Prime Power		Standby Power	
○ Governed Engine speed	rpm	1500	1800	1500	1800
○ Engine Idle Speed	rpm	800	800	800	800
○ Over speed limit	rpm	1650	1980	1650	1980
○ Gross Engine Power Output	kW	464	505	510	556
	PS	630	687	693	756
○ Break Mean effective pressure	MPa	2.53	2.30	2.78	2.53
○ Mean Piston Speed	m/s	7.1	8.5	7.1	8.5
○ Friction Power	kW	32	44	32	44
	PS	43.5	59.8	43.5	59.8
○ Specific fuel consumption					
25% load	liters/hr	30.3	35.2	32.3	37.4
50% load	liters/hr	55.1	62.3	60.9	68.1
75% load	liters/hr	83.4	92.9	91.1	101.0
100% load	liters/hr	115.1	127.1	127.8	139.6
○ Maximum Lube oil consumption	g/h	441	481	485	529
○ Fan Power	kW	16	24	16	24
○ Sound Pressure at 1m from the each side of Cylinder Block					
(without Fan)	dB(A)	97.65	100.33	97.65	100.33

The all data and the specific fuel consumption are based on ISO 3046/1, Standard reference conditions are in accordance with 298 K(25˚ Celsius) air temperature, 100kPa(1000mbar) air pressure, 60% relative humidity, 110m(361ft) altitude.

◎ Engine Data with Dry Type Exhaust Manifold

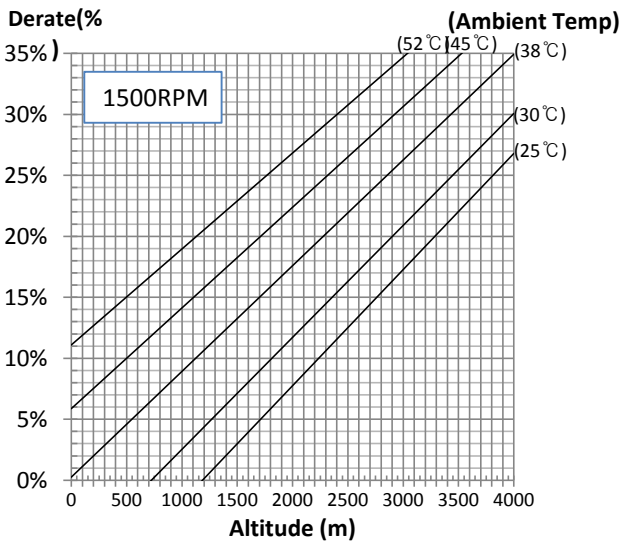
○ Intake Air Flow	m3/min	30.8	34.2	33.1	36.6
○ Exhaust gas temp. after turbo.	°C	536	539	561	567
○ Exhaust Gas Flow	m3/min	90	100	98	108
○ Heat Rejection to Exhaust	kW	426	470	473	517
○ Heat Rejection to Coolant	kW	204	225	226	247
○ Heat Rejetion to Intercooler	kW	104	115	115	126
○ Radiated Heat to Ambient	kW	43	48	48	52
○ Cooling water circulation	liters/min	590	660	590	660
○ Cooling fan air flow	m3/min	700	850	700	850

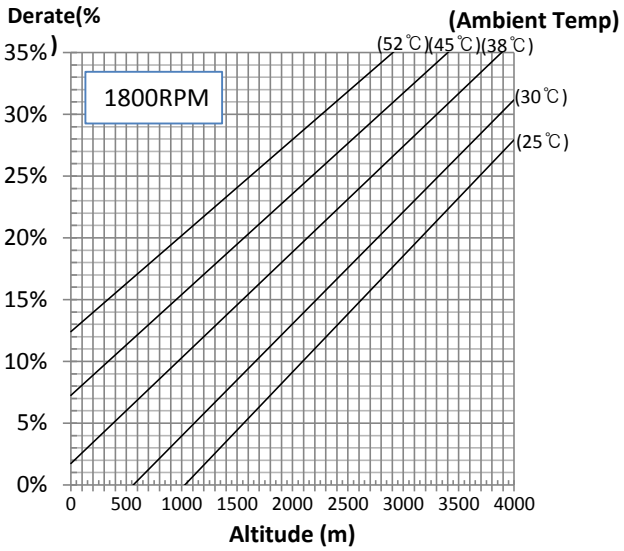
Printed in November 2013_Large Engine F & A Part_DP158LD

◎ DERATING FROM ISO 3046 STANDARD CONDITIONS

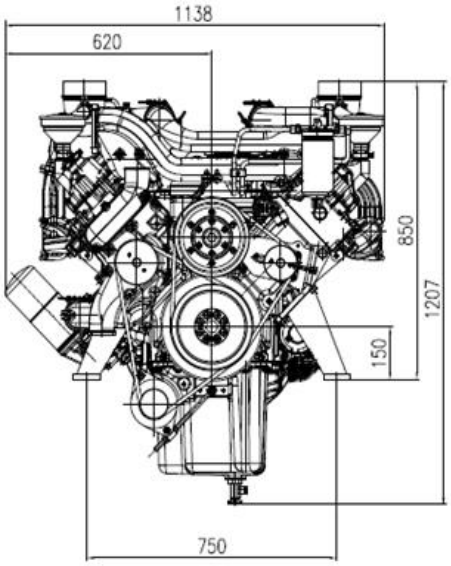
The maximum power is the STANDBY rating when assessing derate prameters.

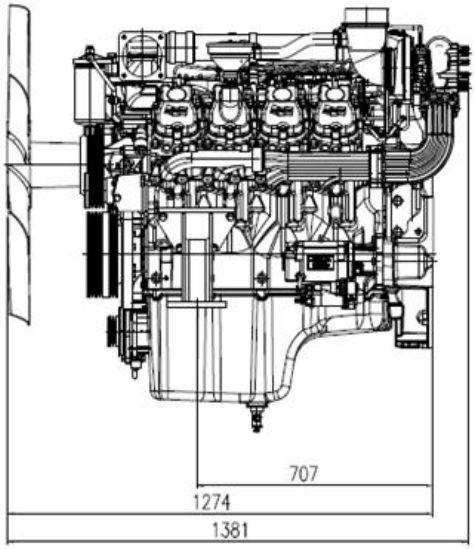
Ambient temperature is air inlet temperature.





◎ ENGINE DIMENSION





◆ CONVERSION TABLE

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PS = kW x 1.3596
psi = kg/cm2 x 14.2233
in3 = lit. x 61.02
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lb = kg x 2.20462
kW = kcal/sec x 0.239

lb/ft = N.m x 0.737
U.S. gal = lit. x 0.264
kW = 0.2388 kcal/s
lb/PS.h = g/kW.h x 0.00162
cfm = m^3/min x 35.336
MPa = kPa x 1000 = bar x 10

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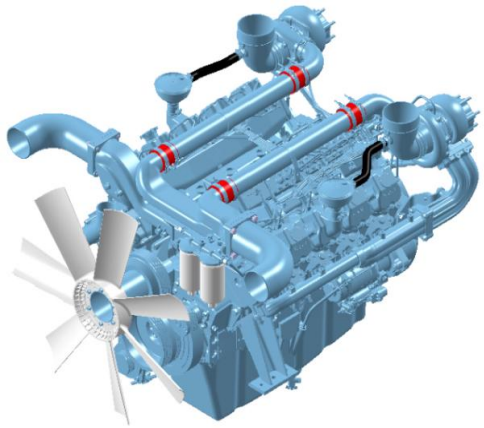
Web site : www.doosaninfracore.com

※ Specifications are subject to change without prior notice.

DOOSAN INFRACORE GENERATOR ENGINE

DP180LA



Ratings (kWm/PS)	Gross Engine Output - without Cooling Fan		Net Engine Output - with Cooling Fan	
	Standby	Prime	Standby	Prime
1500rpm(50Hz)	552/750	502/682	536/729	486/661
1800rpm(60Hz)	615/836	559/760	591/804	535/727

* 50Hz : DP180LAF, 60Hz : DP180LAS

Ratings Definitions

The power ratings of Emergency Standby and Prime are in accordance with ISO 8528.
Fuel Stop power in accordance with ISO 3046.
Electric power(kWe) should be estimated by considering generator efficiency, cooling fan power loss and power derating due to altitude and ambient temperature.

STANDBY POWER RATING is applicable for supplying emergency power for the duration of the utility power outage. No overload capability is available for this rating. A standby rated engine should be sized for a maximum of an 70% average load factor and 200 hours of operation per year. This includes less than 25 hours per year at the Standby Power rating.

PRIME POWER RATING is available for an unlimited of hours per year in variable load application. Variable load should not exceed a 70% average of the Prime Power rating during any operating period of 24 hours. The Total operating time at 100% Prime Power shall not exceed 500 hours per year. A 10% overload capability is available for a period of 1 hour within a 12 hour period of operation. Total operating time at the 10% overload power shall not exceed 25 hours per year.

◎ GENERAL ENGINE DATA

○ Engine Model	DP180LA
○ Engine Type	4-Cycle, V-type, 10-Cylinder, Turbo charged & intercooled (air to air)
○ Bore x stroke	128 x 142 mm
○ Displacement	18.273 liters
○ Compression ratio	15 : 1
○ Rotation	Counter clockwise viewed from Flywheel
○ Firing order	1-6-5-10-2-7-3-8-4-9
○ Injection timing	21˚±1˚ BTDC @ 1800 rpm, 19˚±1˚ BTDC @ 1500 rpm,
○ Dry weight	1,250 kg(with Fan)
○ Dimension (LxWxH)	1,594 x 1,389 x 1,223 mm
○ Fly wheel housing	SAE NO.1M
○ Fly wheel	Clutch NO.14M
○ Number of teeth on flywheel	160

◎ ENGINE MOUNTING

○ Maximum Bending Moment at Rear Face to Block	1,325 N.m

◎ EXHAUST SYSTEM

○ Maximum Back Pressure	5.9 kPa

◎ AIR INDUCTION SYSTEM

○ Maximum Intake Air Restriction	
. With Clean Filter Element	2.16 kPa
. With Dirty Filter Element	6.23 kPa
○ Max. static pressure after Radiator	0.125 kPa

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روبروی پالایشگاه نفت پارس، پلاک ۱۲

◎ COOLING SYSTEM

Water circulation by centrifugal pump on engine.	
○ Cooling method	Fresh water forced circulation
○ Coolant capacity	Engine Only : Approx. 21 lit, With Radiator(*Air On 43°C) : Approx 91 lit.
○ Coolant flow rate	660 liters / min @ 1800 rpm, 550 liters / min @ 1500 rpm
○ Pressure Cap	Max. 49 kPa
○ Water Temperature	
- Maximum for standby and Prime	103℃
- Before start of full load	40.0℃
○ Water pump	Centrifugal type driven by belt
○ Thermostat Type and Range	Wax – pellet type, Opening temp. 71°C , Full open temp. 85°C
○ Cooling fan	Blower type, plastic , 915 mm diameter, 7 blades
○ Max. external coolant system restriction	Not available

* Two radiator options are provided, based on allowable maximum Air temperature On radiator inlet (Air On) : Air On 43°C / Air On 52°C
- ATB(Ambient Temperature before Boiling) of generator set varies depending on the engine room ventilation design, even if the same radiator applied. Adequate selection of radiator options by means of the cooling test is highly recommended, and generator set makers are responsible for the selection.

◎ LUBRICATION SYSTEM

Force-feed lubrication by gear pump, lubricating oil cooling in cooling water circuit of engine.	
○ Lub. Method	Fully forced pressure feed type
○ Oil pump	Gear type driven by crank-shaft gear
○ Oil filter	Full flow, cartridge type
○ Oil capacity	Max. 34 liters , Min. 23 liters
○ Lub oil pressure	Idle Speed : Min 100 kPa
	Governed Speed : Min 250 kPa
○ Maximum oil temperature	120℃
○ Angularity limit	Front down 10 deg , Front up 10 deg , Side to side 22.5 deg
○ Lubrication oil	Refer to Operation Manual

◎ FUEL SYSTEM

Bosch type in-line pump with integrated, electromagnetic actuator.	
○ Injection pump	Bosch in-line "P" type
○ Governor	Electric type
○ Speed drop	G3 Class (ISO 8528)
○ Feed pump	Mechanical type in injpump.
○ Injection nozzle	Multi hole type
○ Opening pressure	28 MPa
○ Fuel filter	Full flow, cartridge type with water drain valve.
○ Maximum fuel inlet restriction	30 kPa
○ Maximum fuel return restriction	60 kPa
○ Fuel feed pump Capacity	630 liters / hr
○ Used fuel	Diesel fuel oil

◎ ELECTRICAL SYSTEM

○ Battery Charging Alternator	27.5V x 45A alternator
○ Voltage regulator	Built-in type IC regulator
○ Starting motor	24V x 7.0 kW
○ Battery Voltage	24V
○ Battery Capacity	2 x 200 Ah (recommended)
○ Starting aid (Option)	Block heater

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◎ VALVE SYSTEM

○ Type	Overhead valve type	
○ Number of valve	Intake 1, exhaust 1 per cylinder	
○ Valve lashes at cold	Intake 0.25 mm , Exhaust 0.35 mm	
○ Valve timing		
	Opening	Close
-. Intake valve	24 deg. BTDC	36 deg. ABDC
-. Exhaust valve	63 deg. BBDC	27 deg. ATDC

◎ PERFORMANCE DATA

		Prime Power		Standby Power	
○ Governed Engine speed	rpm	1500	1800	1500	1800
○ Engine Idle Speed	rpm	800	800	800	800
○ Over speed limit	rpm	1650	1980	1650	1980
○ Gross Engine Power Output	kW	502	559	552	615
	PS	682	760	750	836
○ Break Mean effective pressure	MPa	2.20	2.04	2.42	2.24
○ Mean Piston Speed	m/s	7.1	8.5	7.1	8.5
○ Friction Power	kW	40	55	40	55
	PS	54.4	74.8	54.4	74.8
○ Specific fuel consumption					
25% load	liters/hr	35.4	38.6	38.3	42.0
50% load	liters/hr	64.8	72.6	70.7	79.4
75% load	liters/hr	94.2	106.6	103.0	116.7
100% load	liters/hr	123.6	140.5	135.4	154.1
○ Maximum Lube oil consumption	g/h	477	532	525	585
○ Fan Power	kW	16	24	16	24
○ Sound Pressure at 1m from the each side of Cylinder Block					
(without Fan)	dB(A)	98.65	101.03	98.65	101.03

The all data and the specific fuel consumption are based on ISO 3046/1, Standard reference conditions are in accordance with 298 K(25˚ Celsius) air temperature, 100kPa(1000mbar) air pressure, 60% relative humidity, 110m(361ft) altitude.

◎ Engine Data with Dry Type Exhaust Manifold

○ Intake Air Flow	m3/min	30.9	40.1	33.2	43.0
○ Exhaust gas temp. after turbo.	°C	540	501	562	523
○ Exhaust Gas Flow	m3/min	96	118	106	130
○ Heat Rejection to Exhaust	kW	464	527	508	578
○ Heat Rejection to Coolant	kW	222	252	243	276
○ Heat Rejetion to Intercooler	kW	113	128	124	141
○ Radiated Heat to Ambient	kW	47	53	52	59
○ Cooling water circulation	liters/min	590	660	590	660
○ Cooling fan air flow	m3/min	700	850	700	850

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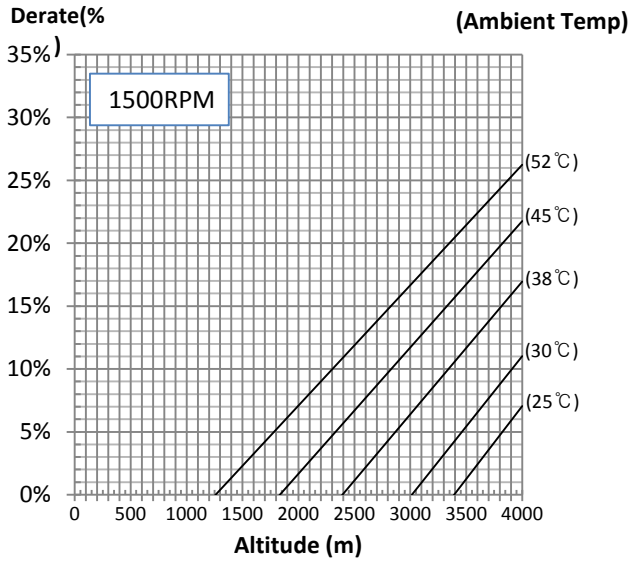
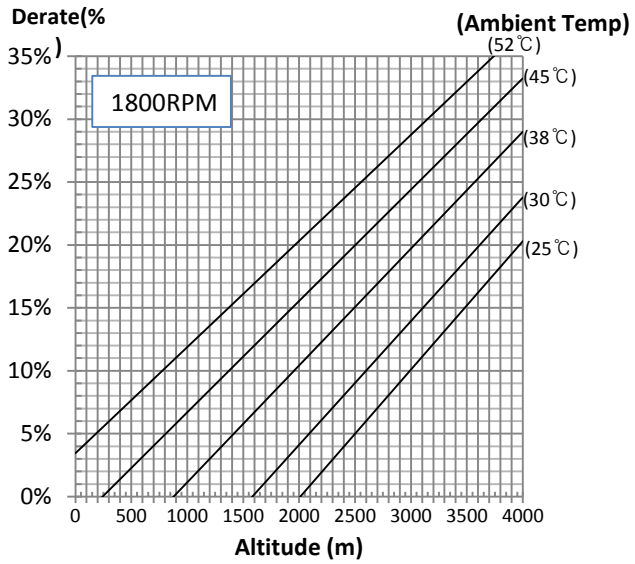
◎ DERATING FROM ISO 3046 STANDARD CONDITIONS

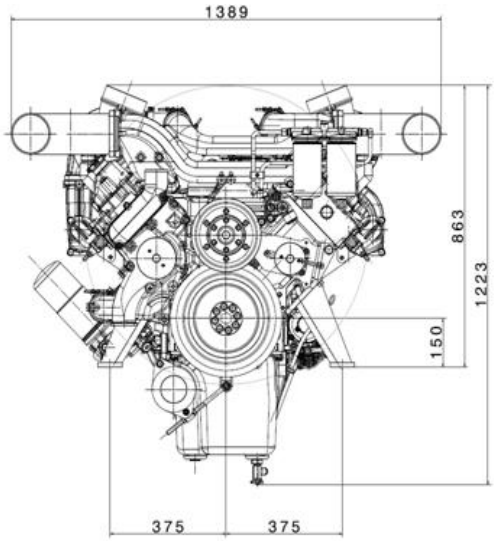
The maximum power is the STANDBY rating when assessing derate prameters.

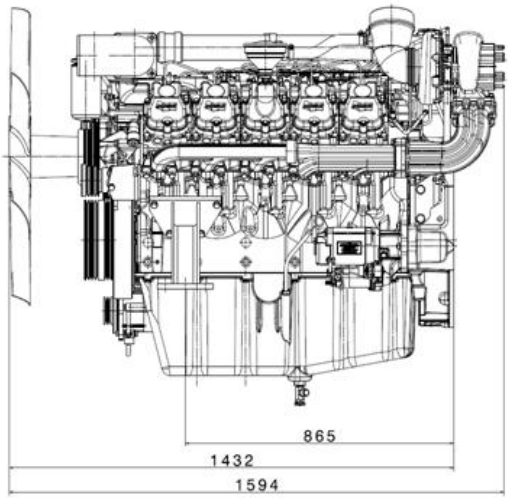
Ambient temperature is air inlet temperature.





◎ ENGINE DIMENSION





◆ CONVERSION TABLE

in. = mm x 0.0394
PS = kW x 1.3596
psi = kg/cm2 x 14.2233
in3 = lit. x 61.02
hp = PS x 0.98635
lb = kg x 2.20462
kW = kcal/sec x 0.239

lb/ft = N.m x 0.737
U.S. gal = lit. x 0.264
kW = 0.2388 kcal/s
lb/PS.h = g/kW.h x 0.00162
cfm = m^3/min x 35.336
MPa = kPa x 1000 = bar x 10

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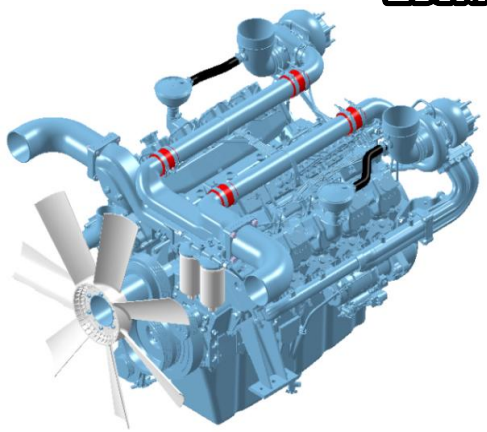
DOOSAN INFRACORE GENERATOR ENGINE

DP180LB



Ratings (kWm/PS)	Gross Engine Output - without Cooling Fan		Net Engine Output - with Cooling Fan	
	Standby	Prime	Standby	Prime
1500rpm(50Hz)	612/832	556/756	596/810	540/734
1800rpm(60Hz)	661/899	601/817	637/866	577/784

* 50Hz : DP180LBF, 60Hz : DP180LBS

Ratings Definitions

The power ratings of Emergency Standby and Prime are in accordance with ISO 8528.
Fuel Stop power in accordance with ISO 3046.
Electric power(kWe) should be estimated by considering generator efficiency, cooling fan power loss and power derating due to altitude and ambient temperature.

STANDBY POWER RATING is applicable for supplying emergency power for the duration of the utility power outage. No overload capability is available for this rating. A standby rated engine should be sized for a maximum of an 70% average load factor and 200 hours of operation per year. This includes less than 25 hours per year at the Standby Power rating.

PRIME POWER RATING is available for an unlimited of hours per year in variable load application. Variable load should not exceed a 70% average of the Prime Power rating during any operating period of 24 hours. The Total operating time at 100% Prime Power shall not exceed 500 hours per year. A 10% overload capability is available for a period of 1 hour within a 12 hour period of operation. Total operating time at the 10% overload power shall not exceed 25 hours per year.

◎ GENERAL ENGINE DATA

○ Engine Model	DP180LB
○ Engine Type	4-Cycle, V-type, 10-Cylinder, Turbo charged & intercooled (air to air)
○ Bore x stroke	128 x 142 mm
○ Displacement	18.273 liters
○ Compression ratio	15 : 1
○ Rotation	Counter clockwise viewed from Flywheel
○ Firing order	1-6-5-10-2-7-3-8-4-9
○ Injection timing	21˚±1˚ BTDC @ 1800 rpm, 19˚±1˚ BTDC @ 1500 rpm,
○ Dry weight	1,250 kg(with Fan)
○ Dimension (LxWxH)	1,594 x 1,389 x 1,223 mm
○ Fly wheel housing	SAE NO.1M
○ Fly wheel	Clutch NO.14M
○ Number of teeth on flywheel	160

◎ ENGINE MOUNTING

○ Maximum Bending Moment at Rear Face to Block	1,325 N.m

◎ EXHAUST SYSTEM

○ Maximum Back Pressure	5.9 kPa

◎ AIR INDUCTION SYSTEM

○ Maximum Intake Air Restriction	
. With Clean Filter Element	2.16 kPa
. With Dirty Filter Element	6.23 kPa
○ Max. static pressure after Radiator	0.125 kPa

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◎ COOLING SYSTEM

Water circulation by centrifugal pump on engine.

○ Cooling method	Fresh water forced circulation
○ Coolant capacity	Engine Only : Approx. 21 lit, With Radiator(*Air On 43°C) : Approx 91 lit.
○ Coolant flow rate	660 liters / min @ 1800 rpm, 550 liters / min @ 1500 rpm
○ Pressure Cap	Max. 49 kPa
○ Water Temperature	
- Maximum for standby and Prime	103℃
- Before start of full load	40.0℃
○ Water pump	Centrifugal type driven by belt
○ Thermostat Type and Range	Wax – pellet type, Opening temp. 71°C , Full open temp. 85°C
○ Cooling fan	Blower type, plastic , 915 mm diameter, 7 blades
○ Max. external coolant system restriction	Not available

* Two radiator options are provided, based on allowable maximum Air temperature On radiator inlet (Air On) : Air On 43°C / Air On 52°C
- ATB(Ambient Temperature before Boiling) of generator set varies depending on the engine room ventilation design, even if the same radiator applied. Adequate selection of radiator options by means of the cooling test is highly recommended, and generator set makers are responsible for the selection.

◎ LUBRICATION SYSTEM

Force-feed lubrication by gear pump, lubricating oil cooling in cooling water circuit of engine.

○ Lub. Method	Fully forced pressure feed type
○ Oil pump	Gear type driven by crank-shaft gear
○ Oil filter	Full flow, cartridge type
○ Oil capacity	Max. 34 liters , Min. 23 liters
○ Lub oil pressure	Idle Speed : Min 100 kPa
	Governed Speed : Min 250 kPa
○ Maximum oil temperature	120℃
○ Angularity limit	Front down 10 deg , Front up 10 deg , Side to side 22.5 deg
○ Lubrication oil	Refer to Operation Manual

◎ FUEL SYSTEM

Bosch type in-line pump with integrated, electromagnetic actuator.

○ Injection pump	Bosch in-line "P" type
○ Governor	Electric type
○ Speed drop	G3 Class (ISO 8528)
○ Feed pump	Mechanical type in injpump.
○ Injection nozzle	Multi hole type
○ Opening pressure	28 MPa
○ Fuel filter	Full flow, cartridge type with water drain valve.
○ Maximum fuel inlet restriction	30 kPa
○ Maximum fuel return restriction	60 kPa
○ Fuel feed pump Capacity	630 liters / hr
○ Used fuel	Diesel fuel oil

◎ ELECTRICAL SYSTEM

○ Battery Charging Alternator	27.5V x 45A alternator
○ Voltage regulator	Built-in type IC regulator
○ Starting motor	24V x 7.0 kW
○ Battery Voltage	24V
○ Battery Capacity	2 x 200 Ah (recommended)
○ Starting aid (Option)	Block heater

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روبروی پالایشگاه نفت پارس، پلاک ۱۲

◎ VALVE SYSTEM

○ Type	Overhead valve type	
○ Number of valve	Intake 1, exhaust 1 per cylinder	
○ Valve lashes at cold	Intake 0.25 mm , Exhaust 0.35 mm	
○ Valve timing		
	Opening	Close
-. Intake valve	24 deg. BTDC	36 deg. ABDC
-. Exhaust valve	63 deg. BBDC	27 deg. ATDC

◎ PERFORMANCE DATA

		Prime Power		Standby Power	
○ Governed Engine speed	rpm	1500	1800	1500	1800
○ Engine Idle Speed	rpm	800	800	800	800
○ Over speed limit	rpm	1650	1980	1650	1980
○ Gross Engine Power Output	kW	556	601	612	661
	PS	756	817	832	899
○ Break Mean effective pressure	MPa	2.44	2.19	2.68	2.41
○ Mean Piston Speed	m/s	7.1	8.5	7.1	8.5
○ Friction Power	kW	40	55	40	55
	PS	54.4	74.8	54.4	74.8
○ Specific fuel consumption					
25% load	liters/hr	38.6	41.2	41.9	44.9
50% load	liters/hr	71.2	77.7	77.7	85.0
75% load	liters/hr	103.8	114.2	113.6	125.2
100% load	liters/hr	136.4	150.7	149.5	165.3
○ Maximum Lube oil consumption	g/h	529	572	582	629
○ Fan Power	kW	16	24	16	24
○ Sound Pressure at 1m from the each side of Cylinder Block					
(without Fan)	dB(A)	98.65	101.03	98.65	101.03

The all data and the specific fuel consumption are based on ISO 3046/1, Standard reference conditions are in accordance with 298 K(25˚ Celsius) air temperature, 100kPa(1000mbar) air pressure, 60% relative humidity, 110m(361ft) altitude.

◎ Engine Data with Dry Type Exhaust Manifold

○ Intake Air Flow	m3/min	33.4	42.3	36.0	45.5
○ Exhaust gas temp. after turbo.	°C	563	517	587	540
○ Exhaust Gas Flow	m3/min	107	127	118	141
○ Heat Rejection to Exhaust	kW	512	565	561	620
○ Heat Rejection to Coolant	kW	245	270	268	297
○ Heat Rejetion to Intercooler	kW	125	138	137	151
○ Radiated Heat to Ambient	kW	52	57	57	63
○ Cooling water circulation	liters/min	590	660	590	660
○ Cooling fan air flow	m3/min	700	850	700	850

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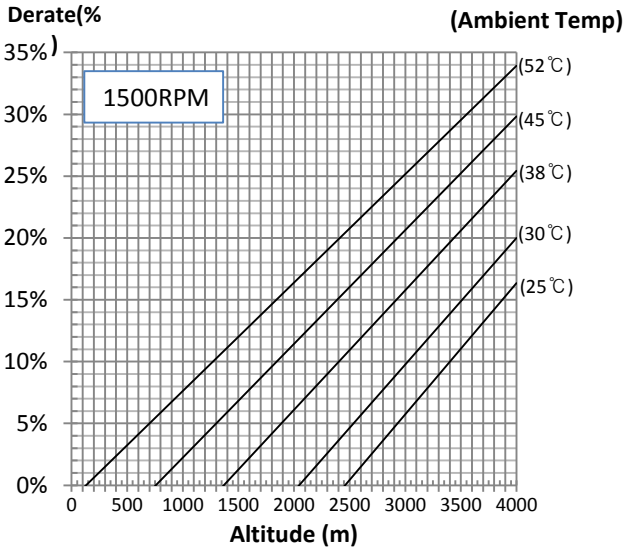
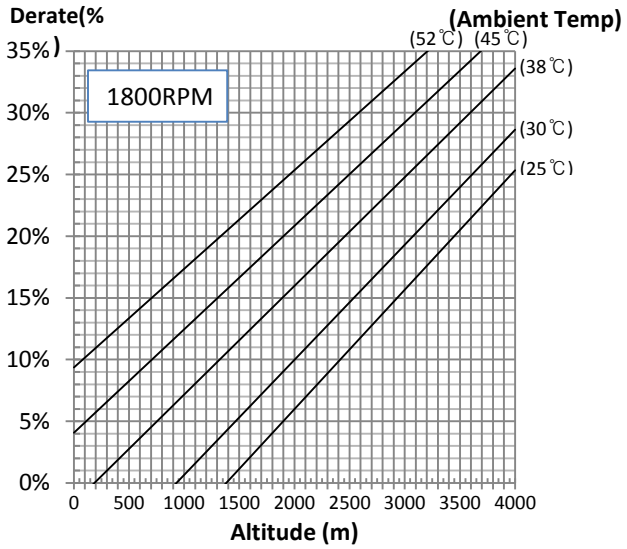
◎ DERATING FROM ISO 3046 STANDARD CONDITIONS

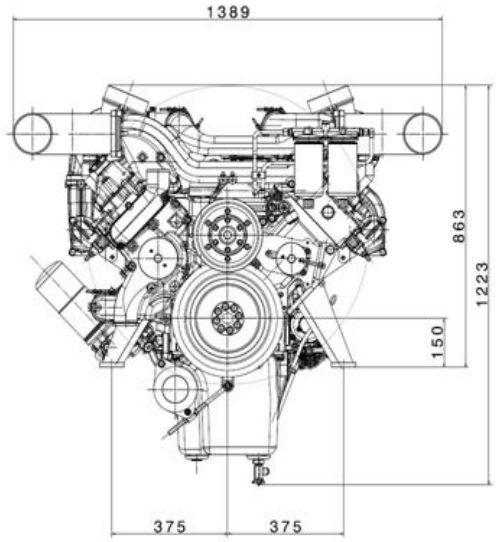
The maximum power is the STANDBY rating when assessing derate prameters.

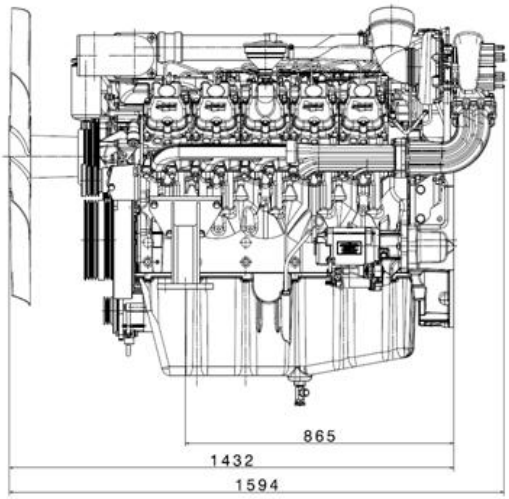
Ambient temperature is air inlet temperature.





◎ ENGINE DIMENSION





◆ CONVERSION TABLE

in. = mm x 0.0394
PS = kW x 1.3596
psi = kg/cm2 x 14.2233
in3 = lit. x 61.02
hp = PS x 0.98635
lb = kg x 2.20462
kW = kcal/sec x 0.239

lb/ft = N.m x 0.737
U.S. gal = lit. x 0.264
kW = 0.2388 kcal/s
lb/PS.h = g/kW.h x 0.00162
cfm = m^3/min x 35.336
MPa = kPa x 1000 = bar x 10

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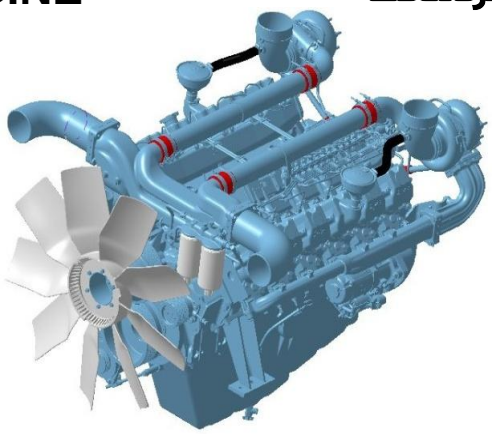
DOOSAN INFRACORE GENERATOR ENGINE

DP222LB



Ratings (kWm/PS)	Gross Engine Output - without Cooling Fan		Net Engine Output - with Cooling Fan	
	Standby	Prime	Standby	Prime
1500rpm(50Hz)	664/903	604/821	640/870	580/788
1800rpm(60Hz)	782/1063	711/967	744/1012	673/915

* 50Hz : DP222LBF, 60Hz : DP222LBS

Ratings Definitions

The power ratings of Emergency Standby and Prime are in accordance with ISO 8528.
Fuel Stop power in accordance with ISO 3046.
Electric power(kWe) should be estimated by considering generator efficiency, cooling fan power loss and power derating due to altitude and ambient temperature.

STANDBY POWER RATING is applicable for supplying emergency power for the duration of the utility power outage. No overload capability is available for this rating. A standby rated engine should be sized for a maximum of an 70% average load factor and 200 hours of operation per year. This includes less than 25 hours per year at the Standby Power rating.

PRIME POWER RATING is available for an unlimited of hours per year in variable load application. Variable load should not exceed a 70% average of the Prime Power rating during any operating period of 24 hours. The Total operating time at 100% Prime Power shall not exceed 500 hours per year. A 10% overload capability is available for a period of 1 hour within a 12 hour period of operation. Total operating time at the 10% overload power shall not exceed 25 hours per year.

◎ GENERAL ENGINE DATA

○ Engine Model	DP222LB
○ Engine Type	4-Cycle, V-type, 12-Cylinder, Turbo charged & intercooled (air to air)
○ Bore x stroke	128 x 142 mm
○ Displacement	21.927 liters
○ Compression ratio	15 : 1
○ Rotation	Counter clockwise viewed from Flywheel
○ Firing order	1-12-5-8-3-10-6-7-2-11-4-9
○ Injection timing	21˚±1˚ BTDC @ 1800 rpm, 19˚±1˚ BTDC @ 1500 rpm,
○ Dry weight	1,420 kg(with Fan)
○ Dimension (LxWxH)	1,738 x 1,389 x 1,258 mm
○ Fly wheel housing	SAE NO.1M
○ Fly wheel	Clutch NO.14M
○ Number of teeth on flywheel	160

◎ ENGINE MOUNTING

○ Maximum Bending Moment at Rear Face to Block	1,325 N.m

◎ EXHAUST SYSTEM

○ Maximum Back Pressure	5.9 kPa

◎ AIR INDUCTION SYSTEM

○ Maximum Intake Air Restriction	
. With Clean Filter Element	2.16 kPa
. With Dirty Filter Element	6.23 kPa
○ Max. static pressure after Radiator	0.125 kPa

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روبروی پالایشگاه نفت پارس، پلاک ۱۲

◎ COOLING SYSTEM

Water circulation by centrifugal pump on engine.

○ Cooling method	Fresh water forced circulation
○ Coolant capacity	Engine Only : Approx. 23 lit, With Radiator(*Air On 43°C) : Approx 114 lit.
○ Coolant flow rate	660 liters / min @ 1800 rpm, 550 liters / min @ 1500 rpm
○ Pressure Cap	Max. 49 kPa
○ Water Temperature	
- Maximum for standby and Prime	103℃
- Before start of full load	40.0℃
○ Water pump	Centrifugal type driven by belt
○ Thermostat Type and Range	Wax – pellet type, Opening temp. 71°C , Full open temp. 85°C
○ Cooling fan	Blower type, plastic , 915 mm diameter, 9 blades
○ Max. external coolant system restriction	Not available

* Two radiator options are provided, based on allowable maximum Air temperature On radiator inlet (Air On) : Air On 43°C / Air On 52°C
- ATB(Ambient Temperature before Boiling) of generator set varies depending on the engine room ventilation design, even if the same radiator applied. Adequate selection of radiator options by means of the cooling test is highly recommended, and generator set makers are responsible for the selection.

◎ LUBRICATION SYSTEM

Force-feed lubrication by gear pump, lubricating oil cooling in cooling water circuit of engine.

○ Lub. Method	Fully forced pressure feed type
○ Oil pump	Gear type driven by crank-shaft gear
○ Oil filter	Full flow, cartridge type
○ Oil capacity	Max. 40 liters , Min. 27 liters
○ Lub oil pressure	Idle Speed : Min 100 kPa
	Governed Speed : Min 250 kPa
○ Maximum oil temperature	120℃
○ Angularity limit	Front down 10 deg , Front up 10 deg , Side to side 22.5 deg
○ Lubrication oil	Refer to Operation Manual

◎ FUEL SYSTEM

Bosch type in-line pump with integrated, electromagnetic actuator.

○ Injection pump	Bosch in-line "P" type
○ Governor	Electric type
○ Speed drop	G3 Class (ISO 8528)
○ Feed pump	Mechanical type in injpump.
○ Injection nozzle	Multi hole type
○ Opening pressure	28 MPa
○ Fuel filter	Full flow, cartridge type with water drain valve.
○ Maximum fuel inlet restriction	30 kPa
○ Maximum fuel return restriction	60 kPa
○ Fuel feed pump Capacity	630 liters / hr
○ Used fuel	Diesel fuel oil

◎ ELECTRICAL SYSTEM

○ Battery Charging Alternator	27.5V x 45A alternator
○ Voltage regulator	Built-in type IC regulator
○ Starting motor	24V x 7.0 kW
○ Battery Voltage	24V
○ Battery Capacity	2 x 200 Ah (recommended)
○ Starting aid (Option)	Block heater

Printed in November 2013_Large Engine F & A Part_DP222LB

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◎ VALVE SYSTEM

○ Type	Overhead valve type	
○ Number of valve	Intake 1, exhaust 1 per cylinder	
○ Valve lashes at cold	Intake 0.25 mm , Exhaust 0.35 mm	
○ Valve timing		
	Opening	Close
-. Intake valve	24 deg. BTDC	36 deg. ABDC
-. Exhaust valve	63 deg. BBDC	27 deg. ATDC

◎ PERFORMANCE DATA

		Prime Power		Standby Power	
○ Governed Engine speed	rpm	1500	1800	1500	1800
○ Engine Idle Speed	rpm	800	800	800	800
○ Over speed limit	rpm	1650	1980	1650	1980
○ Gross Engine Power Output	kW	604	711	664	782
	PS	821	967	903	1063
○ Break Mean effective pressure	MPa	2.20	2.16	2.42	2.37
○ Mean Piston Speed	m/s	7.1	8.5	7.1	8.5
○ Friction Power	kW	48	66	48	66
	PS	65.3	89.7	65.3	89.7
○ Specific fuel consumption					
25% load	liters/hr	39.2	46.9	42.5	51.0
50% load	liters/hr	73.0	87.1	80.1	95.0
75% load	liters/hr	109.2	127.7	120.4	140.4
100% load	liters/hr	147.1	172.7	162.7	192.8
○ Maximum Lube oil consumption	g/h	575	677	632	744
○ Fan Power	kW	24	38	24	38
○ Sound Pressure at 1m from the each side of Cylinder Block					
(without Fan)	dB(A)	100.14	102.11	100.14	102.11

The all data and the specific fuel consumption are based on ISO 3046/1, Standard reference conditions are in accordance with 298 K(25˚ Celsius) air temperature, 100kPa(1000mbar) air pressure, 60% relative humidity, 110m(361ft) altitude.

◎ Engine Data with Dry Type Exhaust Manifold

○ Intake Air Flow	m3/min	39.2	52.1	42.2	56.0
○ Exhaust gas temp. after turbo.	°C	459	460	481	480
○ Exhaust Gas Flow	m3/min	93	115	101	124
○ Heat Rejection to Exhaust	kW	544	639	602	713
○ Heat Rejection to Coolant	kW	260	306	288	341
○ Heat Rejetion to Intercooler	kW	133	156	147	174
○ Radiated Heat to Ambient	kW	55	65	61	72
○ Cooling water circulation	liters/min	590	660	590	660
○ Cooling fan air flow	m3/min	860	1050	860	1050

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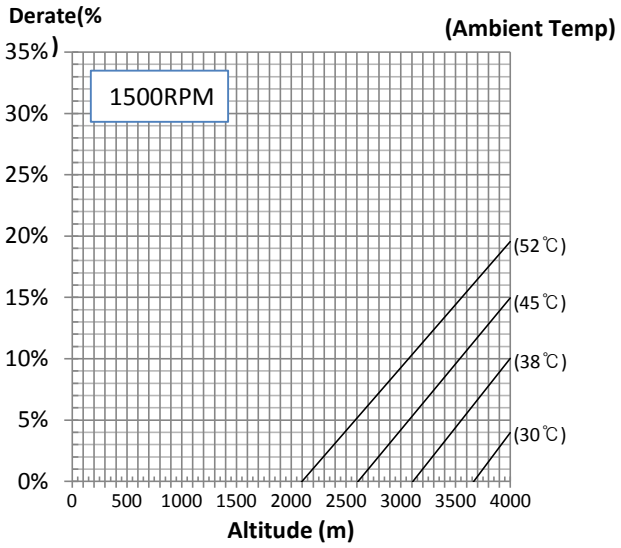
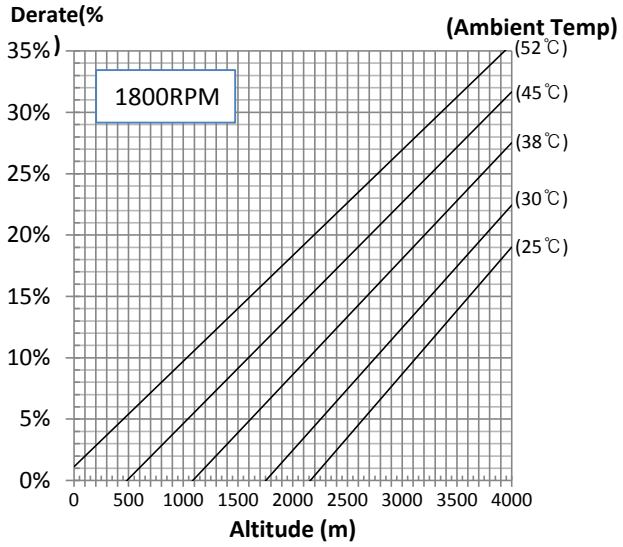
◎ DERATING FROM ISO 3046 STANDARD CONDITIONS

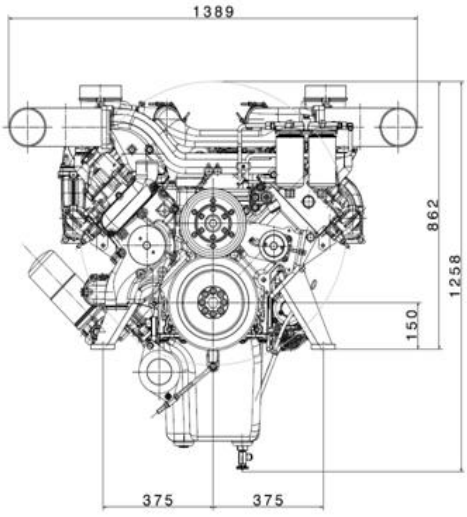
The maximum power is the STANDBY rating when assessing derate prameters.

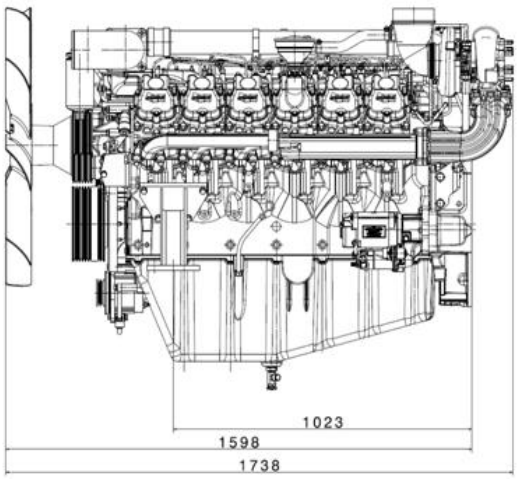
Ambient temperature is air inlet temperature.





◎ ENGINE DIMENSION





◆ CONVERSION TABLE

in. = mm x 0.0394
PS = kW x 1.3596
psi = kg/cm2 x 14.2233
in3 = lit. x 61.02
hp = PS x 0.98635
lb = kg x 2.20462
kW = kcal/sec x 0.239

lb/ft = N.m x 0.737
U.S. gal = lit. x 0.264
kW = 0.2388 kcal/s
lb/PS.h = g/kW.h x 0.00162
cfm = m^3/min x 35.336
MPa = kPa x 1000 = bar x 10

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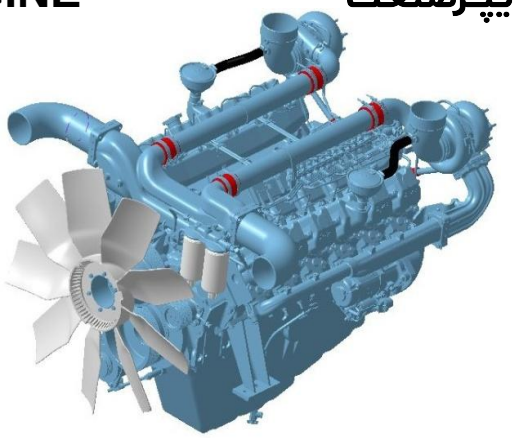
DOOSAN INFRACORE GENERATOR ENGINE

DP222LC



Ratings (kWm/PS)	Gross Engine Output - without Cooling Fan		Net Engine Output - with Cooling Fan	
	Standby	Prime	Standby	Prime
1500rpm(50Hz)	723/983	657/894	699/950	633/861
1800rpm(60Hz)	828/1126	753/1023	790/1074	715/972

* 50Hz : DP222LCF, 60Hz : DP222LCS

Ratings Definitions

The power ratings of Emergency Standby and Prime are in accordance with ISO 8528.
Fuel Stop power in accordance with ISO 3046.
Electric power(kWe) should be estimated by considering generator efficiency, cooling fan power loss and power derating due to altitude and ambient temperature.

STANDBY POWER RATING is applicable for supplying emergency power for the duration of the utility power outage. No overload capability is available for this rating. A standby rated engine should be sized for a maximum of an 70% average load factor and 200 hours of operation per year. This includes less than 25 hours per year at the Standby Power rating.

PRIME POWER RATING is available for an unlimited of hours per year in variable load application. Variable load should not exceed a 70% average of the Prime Power rating during any operating period of 24 hours. The Total operating time at 100% Prime Power shall not exceed 500 hours per year. A 10% overload capability is available for a period of 1 hour within a 12 hour period of operation. Total operating time at the 10% overload power shall not exceed 25 hours per year.

◎ GENERAL ENGINE DATA

○ Engine Model	DP222LC
○ Engine Type	4-Cycle, V-type, 12-Cylinder, Turbo charged & intercooled (air to air)
○ Bore x stroke	128 x 142 mm
○ Displacement	21.927 liters
○ Compression ratio	15 : 1
○ Rotation	Counter clockwise viewed from Flywheel
○ Firing order	1-12-5-8-3-10-6-7-2-11-4-9
○ Injection timing	21˚±1˚ BTDC @ 1800 rpm, 19˚±1˚ BTDC @ 1500 rpm,
○ Dry weight	1,420 kg(with Fan)
○ Dimension (LxWxH)	1,738 x 1,389 x 1,258 mm
○ Fly wheel housing	SAE NO.1M
○ Fly wheel	Clutch NO.14M
○ Number of teeth on flywheel	160

◎ ENGINE MOUNTING

○ Maximum Bending Moment at Rear Face to Block	1,325 N.m

◎ EXHAUST SYSTEM

○ Maximum Back Pressure	5.9 kPa

◎ AIR INDUCTION SYSTEM

○ Maximum Intake Air Restriction	
. With Clean Filter Element	2.16 kPa
. With Dirty Filter Element	6.23 kPa
○ Max. static pressure after Radiator	0.125 kPa

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◎ COOLING SYSTEM

Water circulation by centrifugal pump on engine.

○ Cooling method	Fresh water forced circulation
○ Coolant capacity	Engine Only : Approx. 23 lit, With Radiator(*Air On 43°C) : Approx 114 lit.
○ Coolant flow rate	660 liters / min @ 1800 rpm, 550 liters / min @ 1500 rpm
○ Pressure Cap	Max. 49 kPa
○ Water Temperature	
- Maximum for standby and Prime	103℃
- Before start of full load	40.0℃
○ Water pump	Centrifugal type driven by belt
○ Thermostat Type and Range	Wax – pellet type, Opening temp. 71°C , Full open temp. 85°C
○ Cooling fan	Blower type, plastic , 915 mm diameter, 9 blades
○ Max. external coolant system restriction	Not available

* Two radiator options are provided, based on allowable maximum Air temperature On radiator inlet (Air On) : Air On 43°C / Air On 52°C
- ATB(Ambient Temperature before Boiling) of generator set varies depending on the engine room ventilation design, even if the same radiator applied. Adequate selection of radiator options by means of the cooling test is highly recommended, and generator set makers are responsible for the selection.

◎ LUBRICATION SYSTEM

Force-feed lubrication by gear pump, lubricating oil cooling in cooling water circuit of engine.

○ Lub. Method	Fully forced pressure feed type
○ Oil pump	Gear type driven by crank-shaft gear
○ Oil filter	Full flow, cartridge type
○ Oil capacity	Max. 40 liters , Min. 27 liters
○ Lub oil pressure	Idle Speed : Min 100 kPa
	Governed Speed : Min 250 kPa
○ Maximum oil temperature	120℃
○ Angularity limit	Front down 10 deg , Front up 10 deg , Side to side 22.5 deg
○ Lubrication oil	Refer to Operation Manual

◎ FUEL SYSTEM

Bosch type in-line pump with integrated, electromagnetic actuator.

○ Injection pump	Bosch in-line "P" type
○ Governor	Electric type
○ Speed drop	G3 Class (ISO 8528)
○ Feed pump	Mechanical type in injpump.
○ Injection nozzle	Multi hole type
○ Opening pressure	28 MPa
○ Fuel filter	Full flow, cartridge type with water drain valve.
○ Maximum fuel inlet restriction	30 kPa
○ Maximum fuel return restriction	60 kPa
○ Fuel feed pump Capacity	630 liters / hr
○ Used fuel	Diesel fuel oil

◎ ELECTRICAL SYSTEM

○ Battery Charging Alternator	27.5V x 45A alternator
○ Voltage regulator	Built-in type IC regulator
○ Starting motor	24V x 7.0 kW
○ Battery Voltage	24V
○ Battery Capacity	2 x 200 Ah (recommended)
○ Starting aid (Option)	Block heater

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◎ VALVE SYSTEM

○ Type	Overhead valve type	
○ Number of valve	Intake 1, exhaust 1 per cylinder	
○ Valve lashes at cold	Intake 0.25 mm , Exhaust 0.35 mm	
○ Valve timing		
	Opening	Close
-. Intake valve	24 deg. BTDC	36 deg. ABDC
-. Exhaust valve	63 deg. BBDC	27 deg. ATDC

◎ PERFORMANCE DATA

		Prime Power		Standby Power	
○ Governed Engine speed	rpm	1500	1800	1500	1800
○ Engine Idle Speed	rpm	800	800	800	800
○ Over speed limit	rpm	1650	1980	1650	1980
○ Gross Engine Power Output	kW	657	753	723	828
	PS	894	1023	983	1126
○ Break Mean effective pressure	MPa	2.39	2.29	2.63	2.52
○ Mean Piston Speed	m/s	7.1	8.5	7.1	8.5
○ Friction Power	kW	48	66	48	66
	PS	65.3	89.7	65.3	89.7
○ Specific fuel consumption					
25% load	liters/hr	42.1	49.1	45.6	53.3
50% load	liters/hr	79.3	91.3	86.4	99.3
75% load	liters/hr	119.1	134.4	129.1	147.2
100% load	liters/hr	161.0	183.2	172.8	203.8
○ Maximum Lube oil consumption	g/h	626	716	688	788
○ Fan Power	kW	24	38	24	38
○ Sound Pressure at 1m from the each side of Cylinder Block					
(without Fan)	dB(A)	100.14	102.11	100.14	102.11

The all data and the specific fuel consumption are based on ISO 3046/1, Standard reference conditions are in accordance with 298 K(25˚ Celsius) air temperature, 100kPa(1000mbar) air pressure, 60% relative humidity, 110m(361ft) altitude.

◎ Engine Data with Dry Type Exhaust Manifold

○ Intake Air Flow	m3/min	41.8	54.4	45.0	58.6
○ Exhaust gas temp. after turbo.	°C	478	472	502	493
○ Exhaust Gas Flow	m3/min	100	120	108	130
○ Heat Rejection to Exhaust	kW	596	678	639	754
○ Heat Rejection to Coolant	kW	285	324	306	361
○ Heat Rejetion to Intercooler	kW	145	165	156	184
○ Radiated Heat to Ambient	kW	60	69	65	77
○ Cooling water circulation	liters/min	590	660	590	660
○ Cooling fan air flow	m3/min	860	1050	860	1050

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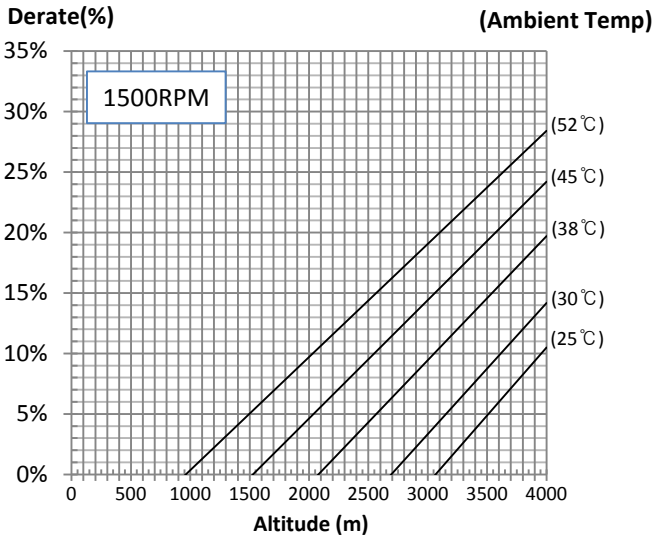
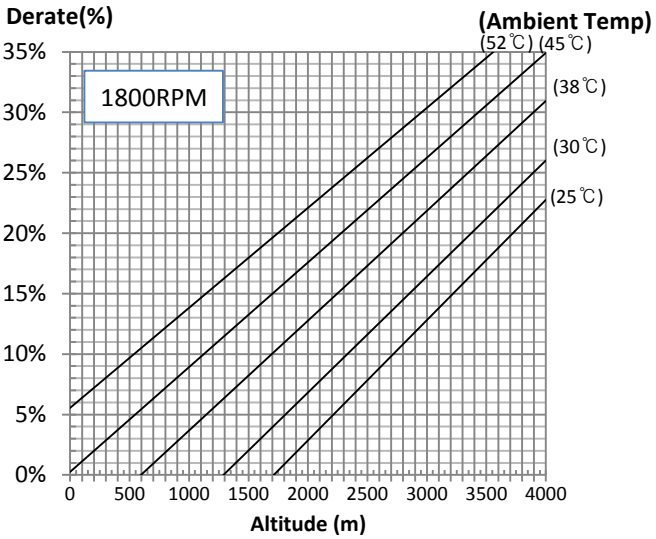
◎ DERATING FROM ISO 3046 STANDARD CONDITIONS

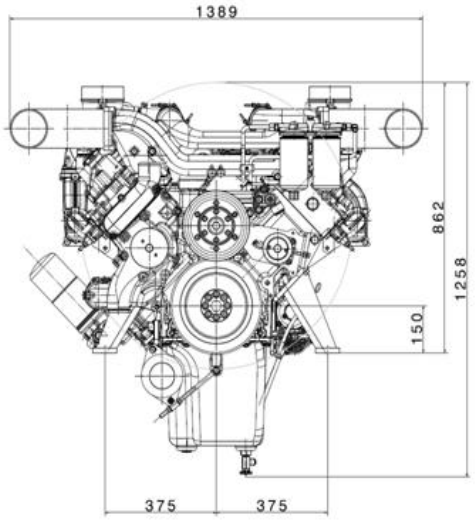
The maximum power is the STANDBY rating when assessing derate prameters.

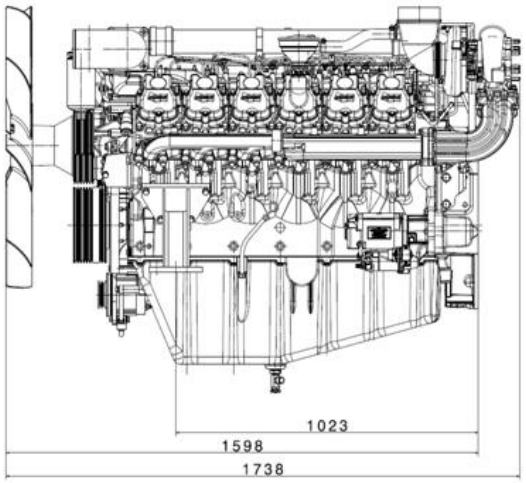
Ambient temperature is air cleaner inlet temperature.





◎ ENGINE DIMENSION





◆ CONVERSION TABLE

in. = mm x 0.0394
PS = kW x 1.3596
psi = kg/cm2 x 14.2233
in3 = lit. x 61.02
hp = PS x 0.98635
lb = kg x 2.20462
kW = kcal/sec x 0.239

lb/ft = N.m x 0.737
U.S. gal = lit. x 0.264
kW = 0.2388 kcal/s
lb/PS.h = g/kW.h x 0.00162
cfm = m^3/min x 35.336
MPa = kPa x 1000 = bar x 10

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DOOSAN INFRACORE GENERATOR ENGINE

P086TI

Ratings (kWm/PS)	Gross Engine Output		Net Engine Output	
	Standby	Prime	Standby	Prime
1500rpm(50Hz)	199/270	177/240	194/263	172/233
1800rpm(60Hz)	223/303	205/279	215/292	197/268

Ratings Definitions

The power ratings of Emergency Standby and Prime are in accordance with ISO 8528.
Fuel Stop power in accordance with ISO 3046.
STANDBY POWER RATING is applicable for supplying emergency power for the duration of the utility power outage. No overload capability is available for this rating. A standby rated engine should be sized for a maximum of an 80% average load factor and 200 hours of operation per year. This includes less than 25 hours per year at the Standby Power rating.

PRIME POWER RATING is available for an unlimited number of hours per year in variable load application. Variable load should not exceed a 70% average of the Prime Power rating during any operating period of 250 hours. The Total operating time at 100% Prime Power shall not exceed 500 hours per year. A 10% overload capability is available for a period of 1 hour withing a 12 hour period of operation. Total operating time at the 10% overload power shall not exceed 25 hous per year

◎ GENERAL ENGINE DATA	
○ Engine Model	P086TI
○ Engine Type	4-Cycle, In-line, 6-Cylinder Diesel, water cooled, Turbo charged & intercooled
○ Bore x stroke	111 x 139 mm
○ Displacement	8.071 liters
○ Compression ratio	16.4 : 1
○ Rotation	Counter clockwise viewed from Flywheel
○ Firing order	1-5-3-6-2-4
○ Injection timing	12˚±1˚ BTDC
○ Dry weight	790kg(with Fan)
○ Dimension (LxWxH)	1,242 x 923 x 1,095 mm
○ Fly wheel housing	SAE NO.1M
○ Fly wheel	Clutch NO.14M
○ Number of teeth on flywheel	146
◎ ENGINE MOUNTING	
Maximum Bending Moment at Rear Face to Block	1325 N・M
◎ EXHAUST SYSTEM	
Maximum Back Pressure	5.9 kPa
◎ AIR INDUCTION SYSTEM	
Maximum Intake Air Restriction	
. With Clean Filter Element	2.16 kPa
. With Dirty Filter Element	6.23 kPa
○ Max. static pressure after Radiator	0.125 kPa

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◎ COOLING SYSTEM

Water circulation by centrifugal pump on engine.

○ Cooling method	Fresh water forced circulation
○ Coolant capacity	Engine Only : Approx. 14 lit., With Radiator : Approx 44 lit.(standard)
○ Coolant flow rate	166 liters / min
○ Pressure Cap	Max. 49 kPa
○ Water Temperature	
- Maximum for standby and Prime	103℃
- Before start of full load	40.0℃
○ Water pump	Centrifugal type driven by belt
○ Thermostat Type and Range	Wax – pellet type, Opening temp. 71°C , Full open temp. 85°C
○ Cooling fan	Blower type, Plastic , 660 mm diameter, 7 blade
○ Max. external coolant system restriction	Not Available

◎ LUBRICATION SYSTEM

Force-feed lubrication by gear pump, lubricating oil cooling in cooling water circuit of engine.

○ Lub. Method	Fully forced pressure feed type
○ Oil pump	Gear type driven by crank-shaft gear
○ Oil filter	Full flow, cartridge type
○ Oil pan capacity	Max. 15.5 liters , Min. 12 liters
○ Lub oil pressure	Idle Speed : Min 100 kPa
	Governed Speed : Min 250 kPa
○ Maximum oil temperature	120℃
○ Angularity limit	Front down 15 deg , Front up 15 deg , Side to side 15 deg
○ Lubrication oil	Refer to Operation Manual

◎ FUEL SYSTEM

Bosch type in-line pump with integrated, electromagnetic actuator.

○ Injection pump	Doowon in-line "P" type (Licensed by ZEXEL)
○ Governor	Electric type (all speed control)
○ Speed drop	G3 Class (ISO 8528)
○ Feed pump	Mechanical type in injpump.
○ Injection nozzle	Multi hole type
○ Opening pressure	22.0 MPa
○ Fuel filter	Full flow, cartridge type with water drain valve.
○ Maximum fuel inlet restriction	10 kPa
○ Maximum fuel return restriction	60 kPa
○ Fuel feed pump Capacity	230 liters / hr
○ Used fuel	Diesel fuel oil

◎ ELECTRICAL SYSTEM

○ Battery Charging Alternator	28.5V x 45A alternator
○ Voltage regulator	Built-in type IC regulator
○ Starting motor	24V x 6.0 kW
○ Battery Voltage	24V
○ Battery Capacity	100 Ah (recommended)
○ Starting aid (Option)	Block heater

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◎ VALVE SYSTEM

○ Type	Overhead valve type	
○ Number of valve	Intake 1, exhaust 1 per cylinder	
○ Valve lashes at cold	Intake 0.3mm , Exhaust 0.3mm	
○ Valve timing		
	Opening	Close
-. Intake valve	16 deg. BTDC	36 deg. ABDC
-. Exhaust valve	46 deg. BBDC	14 deg. ATDC

◎ PERFORMANCE DATA

		Prime Power		Standby Power	
○ Governed Engine speed	rpm	1500	1800	1500	1800
○ Engine Idle Speed	rpm	800	800	800	800
○ Over speed limit	rpm	1650	1980	1650	1980
○ Gross Engine Power Output	kW	177	205	199	223
	ps	240	279	270	303
○ Break Mean effective pressure	Mpa	1.75	1.70	1.97	1.84
○ Mean Piston Speed	m/s	6.95	8.34	6.95	8.34
○ Friction Horsepower	kW	18	24	18	24
	ps	24.47	32.63	24.47	32.63
○ Specific fuel consumption					
25% load	liters/hr	11.3	13.8	12.7	15.2
50% load	liters/hr	21.1	25.1	23.7	27.7
75% load	liters/hr	31.7	37.7	35.5	41.6
100% load	liters/hr	43.1	50.6	48.4	56.8
○ Maximum Lube oil consumptio	g/h	168	195.3	189	212.1
○ Fan Power	kW	5	8	5	8
○ Exhaust Noise at 1m Horizontally from Centerline of Exhaust Pipe dista					
(without Fan)	dB(A)	98.3	100.7	98.3	100.7

The all data and the specific fuel consumption are based on ISO 3046/1, Standard reference conditions are in accordance with 298 K(25˚ Celsius) air temperature, 100kPa(1000mbar) air pressure, 60% relative humidity, 110m(361ft) altitude.

Operation At Elevated Temperature And Altitude: The engine may be operated at :

1800 rpm & 1500rpm up to 750~ 1000m and 30°C without power deration

For sustained operation above these conditions, derate by 3% per 304m , and 2% per 11 °C

Engine Data with Dry Type Exhaust Manifold

○ Intake Air Flow	m3/min	15.71	22.33	16.95	23.35
○ Exhaust gas temp. after turbo.	°C	-	509	580	524
○ Exhaust Gas Flow	m3/min	-	40.9	33.9	44.6
○ Heat Rejection to Exhaust	kW	151.9	178.3	170.6	200.2
○ Heat Rejection to Coolant	kW	66.0	77.5	74.2	87.0
○ Heat Rejetion to Intercooler	kW	35.2	41.3	39.5	46.4
○ Radiated Heat to Ambient	kW	15.4	18.1	17.3	20.3
○ Cooling water circulation	liters/min	130	150	130	150
○ Cooling fan air flow	m3/min	190	224	190	224

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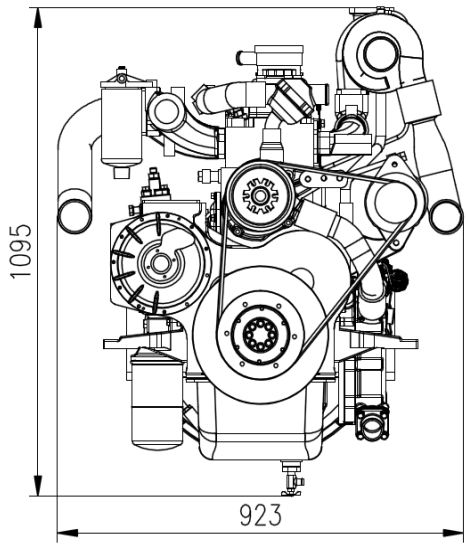
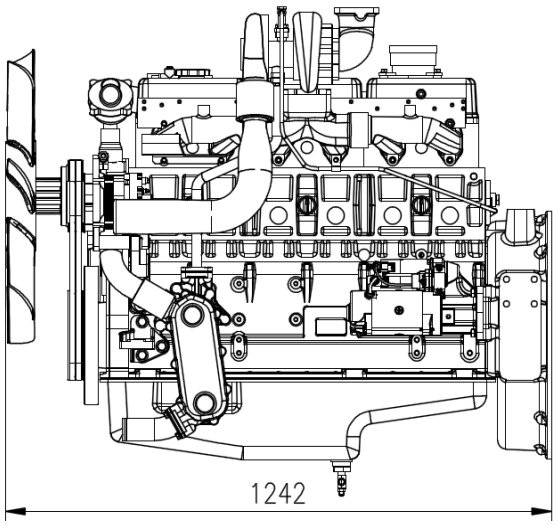
روبروی پالایشگاه نفت پارس، پلاک ۱۲

◆ ENGINE DIMENSION





◆ CONVERSION TABLE

in. = mm x 0.0394
PS = kW x 1.3596
psi = kg/cm2 x 14.2233
in3 = lit. x 61.02
hp = PS x 0.98635
lb = kg x 2.20462
kW = Kcal/sec x 0.239

lb/ft = N.m x 0.737
U.S. gal = lit. x 0.264
kW = 0.2388 kcal/s
lb/PS.h = g/kW.h x 0.00162
cfm = m^3/min x 35.336
Mpa = Pa x 1000 = bar x 10

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DOOSAN INFRACORE GENERATOR ENGINE

P086TI-1

Ratings (kWm/PS)	Gross Engine Output		Net Engine Output	
	Standby	Prime	Standby	Prime
1500rpm(50Hz)	164/223	149/203	159/216	144/196
1800rpm(60Hz)	191/260	174/237	183/249	166/226

Ratings Definitions

The power ratings of Emergency Standby and Prime are in accordance with ISO 8528.
Fuel Stop power in accordance with ISO 3046.
STANDBY POWER RATING is applicable for supplying emergency power for the duration of the utility power outage. No overload capability is available for this rating. A standby rated engine should be sized for a maximum of an 80% average load factor and 200 hours of operation per year. This includes less than 25 hours per year at the Standby Power rating.

PRIME POWER RATING is available for an unlimited number of hours per year in variable load application. Variable load should not exceed a 70% average of the Prime Power rating during any operating period of 250 hours. The Total operating time at 100% Prime Power shall not exceed 500 hours per year. A 10% overload capability is available for a period of 1 hour withing a 12 hour period of operation. Total operating time at the 10% overload power shall not exceed 25 hous per year

◎ GENERAL ENGINE DATA	
○ Engine Model	P086TI-1
○ Engine Type	4-Cycle, In-line, 6-Cylinder Diesel, water cooled, Turbo charged & intercooled
○ Bore x stroke	111 x 139 mm
○ Displacement	8.071 liters
○ Compression ratio	16.4 : 1
○ Rotation	Counter clockwise viewed from Flywheel
○ Firing order	1-5-3-6-2-4
○ Injection timing	12˚±1˚ BTDC
○ Dry weight	790kg(with Fan)
○ Dimension (LxWxH)	1,242 x 923 x 1,095 mm
○ Fly wheel housing	SAE NO.1M
○ Fly wheel	Clutch NO.14M
○ Number of teeth on flywheel	146
◎ ENGINE MOUNTING	
Maximum Bending Moment at Rear Face to Block	1325 N・M
◎ EXHAUST SYSTEM	
Maximum Back Pressure	5.9 kPa
◎ AIR INDUCTION SYSTEM	
Maximum Intake Air Restriction	
. With Clean Filter Element	2.16 kPa
. With Dirty Filter Element	6.23 kPa
○ Max. static pressure after Radiator	0.125 kPa

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روبروی پالایشگاه نفت پارس، پلاک ۱۲

◎ COOLING SYSTEM

Water circulation by centrifugal pump on engine.

○ Cooling method	Fresh water forced circulation
○ Coolant capacity	Engine Only : Approx. 14 lit., With Radiator : Approx 44 lit.(standard)
○ Coolant flow rate	166 liters / min
○ Pressure Cap	Max. 49 kPa
○ Water Temperature	
- Maximum for standby and Prime	103℃
- Before start of full load	40.0℃
○ Water pump	Centrifugal type driven by belt
○ Thermostat Type and Range	Wax – pellet type, Opening temp. 71°C , Full open temp. 85°C
○ Cooling fan	Blower type, Plastic , 660 mm diameter, 7 blade
○ Max. external coolant system restriction	Not Available

◎ LUBRICATION SYSTEM

Force-feed lubrication by gear pump, lubricating oil cooling in cooling water circuit of engine.

○ Lub. Method	Fully forced pressure feed type
○ Oil pump	Gear type driven by crank-shaft gear
○ Oil filter	Full flow, cartridge type
○ Oil pan capacity	Max. 15.5 liters , Min. 12 liters
○ Lub oil pressure	Idle Speed : Min 100 kPa
	Governed Speed : Min 250 kPa
○ Maximum oil temperature	120℃
○ Angularity limit	Front down 15 deg , Front up 15 deg , Side to side 15 deg
○ Lubrication oil	Refer to Operation Manual

◎ FUEL SYSTEM

Bosch type in-line pump with integrated, electromagnetic actuator.

○ Injection pump	Doowon in-line "P" type (Licensed by ZEXEL)
○ Governor	Electric type (all speed control)
○ Speed drop	G3 Class (ISO 8528)
○ Feed pump	Mechanical type in injpump.
○ Injection nozzle	Multi hole type
○ Opening pressure	22.0 MPa
○ Fuel filter	Full flow, cartridge type with water drain valve.
○ Maximum fuel inlet restriction	10 kPa
○ Maximum fuel return restriction	60 kPa
○ Fuel feed pump Capacity	230 liters / hr
○ Used fuel	Diesel fuel oil

◎ ELECTRICAL SYSTEM

○ Battery Charging Alternator	28.5V x 45A alternator
○ Voltage regulator	Built-in type IC regulator
○ Starting motor	24V x 6.0 kW
○ Battery Voltage	24V
○ Battery Capacity	100 Ah (recommended)
○ Starting aid (Option)	Block heater

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روبروی پالایشگاه نفت پارس، پلاک ۱۲

◎ VALVE SYSTEM

○ Type	Overhead valve type	
○ Number of valve	Intake 1, exhaust 1 per cylinder	
○ Valve lashes at cold	Intake 0.3mm , Exhaust 0.3mm	
○ Valve timing		
	Opening	Close
-. Intake valve	16 deg. BTDC	36 deg. ABDC
-. Exhaust valve	46 deg. BBDC	14 deg. ATDC

◎ PERFORMANCE DATA

		Prime Power		Standby Power	
○ Governed Engine speed	rpm	1500	1800	1500	1800
○ Engine Idle Speed	rpm	800	800	800	800
○ Over speed limit	rpm	1650	1980	1650	1980
○ Gross Engine Power Output	kW	149	174	164	191
	ps	203	237	223	260
○ Break Mean effective pressure	Mpa	1.48	1.44	1.63	1.58
○ Mean Piston Speed	m/s	6.95	8.34	6.95	8.34
○ Friction Horsepower	kW	18	24	18	24
	ps	24.47	32.63	24.47	32.63
○ Specific fuel consumption					
25% load	liters/hr	10.1	12.2	10.9	13.3
50% load	liters/hr	18.7	22.1	20.3	24.0
75% load	liters/hr	26.7	31.6	29.2	34.7
100% load	liters/hr	35.4	42.4	39.0	46.7
○ Maximum Lube oil consumptio	g/h	142.1	165.9	156.1	182
○ Fan Power	kW	5	8	5	8
○ Exhaust Noise at 1m Horizontally from Centerline of Exhaust Pipe dista					
(without Fan)	dB(A)	98.3	100.7	98.3	100.7

The all data and the specific fuel consumption are based on ISO 3046/1, Standard reference conditions are in accordance with 298 K(25˚ Celsius) air temperature, 100kPa(1000mbar) air pressure, 60% relative humidity, 110m(361ft) altitude.

Operation At Elevated Temperature And Altitude: The engine may be operated at :

1800 rpm & 1500rpm up to 750~ 1000m and 30°C without power deration

For sustained operation above these conditions, derate by 3% per 304m , and 2% per 11 °C

Engine Data with Dry Type Exhaust Manifold

○ Intake Air Flow	m3/min	14.18	20.55	15.01	21.53
○ Exhaust gas temp. after turbo.	°C	-	-	-	500
○ Exhaust Gas Flow	m3/min	-	-	-	38.8
○ Heat Rejection to Exhaust	kW	124.7	149.4	137.4	164.6
○ Heat Rejection to Coolant	kW	54.2	65.0	59.8	71.6
○ Heat Rejetion to Intercooler	kW	28.9	34.6	31.9	38.2
○ Radiated Heat to Ambient	kW	12.7	15.2	13.9	16.7
○ Cooling water circulation	liters/min	130	150	130	150
○ Cooling fan air flow	m3/min	190	224	190	224

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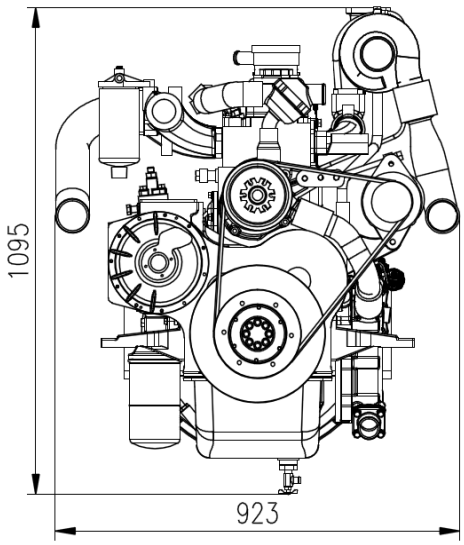
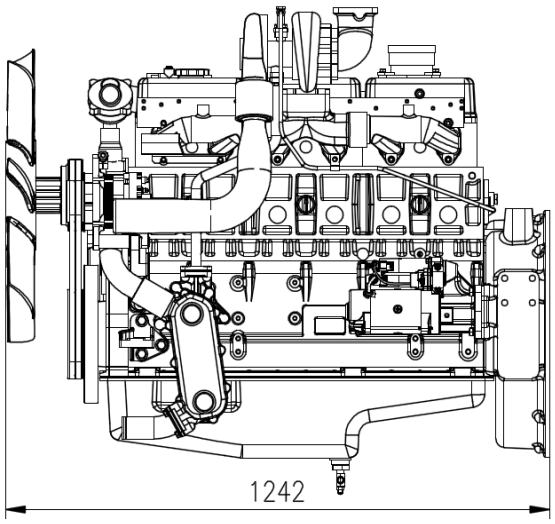
روبروی پالایشگاه نفت پارس، پلاک ۱۲

◆ ENGINE DIMENSION





◆ CONVERSION TABLE

in. = mm x 0.0394
PS = kW x 1.3596
psi = kg/cm2 x 14.2233
in3 = lit. x 61.02
hp = PS x 0.98635
lb = kg x 2.20462
kW = Kcal/sec x 0.239

lb/ft = N.m x 0.737
U.S. gal = lit. x 0.264
kW = 0.2388 kcal/s
lb/PS.h = g/kW.h x 0.00162
cfm = m^3/min x 35.336
Mpa = Pa x 1000 = bar x 10

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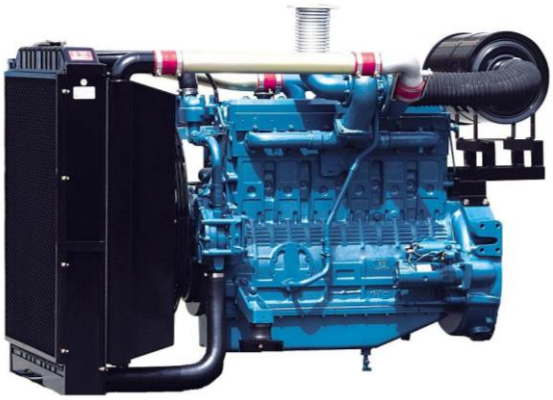
DOOSAN INFRACORE GENERATOR ENGINE

P126TI

Ratings (kWm/PS)	Gross Engine Output		Net Engine Output	
	Standby	Prime	Standby	Prime
1500rpm(50Hz)	272/370	241/328	265/360	234/318
1800rpm(60Hz)	298/405	278/378	287/390	267/363



Ratings Definitions

The power ratings of Emergency Standby and Prime are in accordance with ISO 8528.
Fuel Stop power in accordance with ISO 3046.
STANDBY POWER RATING is applicable for supplying emergency power for the duration of the utility power outage. No overload capability is available for this rating. A standby rated engine should be sized for a maximum of an 80% average load factor and 200 hours of operation per year. This includes less than 25 hours per year at the Standby Power rating.

PRIME POWER RATING is available for an unlimited number of hours per year in variable load application. Variable load should not exceed a 70% average of the Prime Power rating during any operating period of 250 hours. The Total operating time at 100% Prime Power shall not exceed 500 hours per year. A 10% overload capability is available for a period of 1 hour withing a 12 hour period of operation. Total operating time at the 10% overload power shall not exceed 25 hous per year

◎ GENERAL ENGINE DATA	
○ Engine Model	P126TI
○ Engine Type	4-Cycle, In-line, 6-Cylinder Diesel, water cooled, Turbo charged & intercooled
○ Bore x stroke	123 x 155 mm
○ Displacement	11.051 liters
○ Compression ratio	17.1 : 1
○ Rotation	Counter clockwise viewed from Flywheel
○ Firing order	1-5-3-6-2-4
○ Injection timing	16˚±1˚ BTDC
○ Dry weight	910kg(with Fan)
○ Dimension (LxWxH)	1,384 x 1,109 x 1,195 mm
○ Fly wheel housing	SAE NO.1M
○ Fly wheel	Clutch NO.14M
○ Number of teeth on flywheel	152
◎ ENGINE MOUNTING	
Maximum Bending Moment at Rear Face to Block	1325 N・M
◎ EXHAUST SYSTEM	
Maximum Back Pressure	5.9 kPa
◎ AIR INDUCTION SYSTEM	
Maximum Intake Air Restriction	
. With Clean Filter Element	2.16 kPa
. With Dirty Filter Element	6.23 kPa
○ Max. static pressure after Radiator	0.125 kPa

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روبروی پالایشگاه نفت پارس، پلاک ۱۲

◎ COOLING SYSTEM

Water circulation by centrifugal pump on engine.

○ Cooling method	Fresh water forced circulation
○ Coolant capacity	Engine Only : Approx. 19 lit., With Radiator : Approx. 51 lit. (standard)
○ Coolant flow rate	liters / min
○ Pressure Cap	Max. 49 kPa
○ Water Temperature	
- Maximum for standby and Prime	103℃
- Before start of full load	40.0℃
○ Water pump	Centrifugal type driven by Gear
○ Thermostat Type and Range	Wax – pellet type, Opening temp. 71°C , Full open temp. 85°C
○ Cooling fan	Blower type, Plastic , 755 mm diameter, 7 blade
○ Max. external coolant system restriction	Not available

◎ LUBRICATION SYSTEM

Force-feed lubrication by gear pump, lubricating oil cooling in cooling water circuit of engine.

○ Lub. Method	Fully forced pressure feed type
○ Oil pump	Gear type driven by crank-shaft gear
○ Oil filter	Full flow, cartridge type
○ Oil capacity	Max. 23 liters , Min. 20 liters
○ Lub oil pressure	Idle Speed : Min 100 kPa
	Governed Speed : Min 250 kPa
○ Maximum oil temperature	120℃
○ Angularity limit	Front down 10 deg , Front up 10 deg , Side to side 22.5 deg
○ Lubrication oil	Refer to Operation Manual

◎ FUEL SYSTEM

Bosch type in-line pump with integrated, electromagnetic actuator.

○ Injection pump	Zexel in-line "P" type
○ Governor	Electric type (all speed control)
○ Speed drop	G3 Class (ISO 8528)
○ Feed pump	Mechanical type in injpump.
○ Injection nozzle	Multi hole type
○ Opening pressure	21.1 MPa
○ Fuel filter	Full flow, cartridge type with water drain valve.
○ Maximum fuel inlet restriction	10 kPa
○ Maximum fuel return restriction	60 kPa
○ Fuel feed pump Capacity	230 liters / hr
○ Used fuel	Diesel fuel oil

◎ ELECTRICAL SYSTEM

○ Battery Charging Alternator	28.5V x 45A alternator
○ Voltage regulator	Built-in type IC regulator
○ Starting motor	24V x 4.5 kW
○ Battery Voltage	24V
○ Battery Capacity	150 Ah (recommended)
○ Starting aid (Option)	Block heater

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روبروی پالایشگاه نفت پارس، پلاک ۱۲

◎ VALVE SYSTEM

○ Type	Overhead valve type	
○ Number of valve	Intake 1, exhaust 1 per cylinder	
○ Valve lashes at cold	Intake 0.3mm , Exhaust 0.3mm	
○ Valve timing		
	Opening	Close
-. Intake valve	18 deg. BTDC	34 deg. ABDC
-. Exhaust valve	46 deg. BBDC	14 deg. ATDC

◎ PERFORMANCE DATA

		Prime Power		Standby Power	
○ Governed Engine speed	rpm	1500	1800	1500	1800
○ Engine Idle Speed	rpm	800	800	800	800
○ Over speed limit	rpm	1650	1980	1650	1980
○ Gross Engine Power Output	kW	241	278	272	298
	ps	328	378	370	405
○ Break Mean effective pressure	Mpa	1.75	1.68	1.97	1.80
○ Mean Piston Speed	m/s	7.75	9.3	7.75	9.3
○ Friction Horsepower	kW	24	33	24	33
	ps	32.63	44.87	32.63	44.87
○ Specific fuel consumption					
25% load	liters/hr	16.4	20.3	18.3	21.5
50% load	liters/hr	30.0	36.2	33.4	38.7
75% load	liters/hr	43.6	52.3	49.1	56.3
100% load	liters/hr	58.1	70.3	66.2	76.5
○ Maximum Lube oil consumptio	g/h	229.6	264.6	259	283.5
○ Fan Power	kW	7	11	7	11
○ Exhaust Noise at 1m Horizontally from Centerline of Exhaust Pipe dista					
(without Fan)	dB(A)	96.5	97.5	96.5	97.5

The all data and the specific fuel consumption are based on ISO 3046/1, Standard reference conditions are in accordance with 298 K(25° Celsius) air temperature, 100kPa(1000mbar) air pressure, 60% relative humidity, 110m(361ft) altitude.

Operation At Elevated Temperature And Altitude: The engine may be operated at :

1800 rpm & 1500rpm up to 750~ 1000m and 30°C without power deration

For sustained operation above these conditions, derate by 3% per 304m , and 2% per 11 °C

Engine Data with Dry Type Exhaust Manifold

○ Intake Air Flow	m3/min	19.35	26.53	21.09	27.68
○ Exhaust gas temp. after turbo.	°C	560	510	593	540
○ Exhaust Gas Flow	m3/min	42.9	58.1	49.7	67.3
○ Heat Rejection to Exhaust	kW	204.7	247.7	233.3	269.6
○ Heat Rejection to Coolant	kW	89.0	107.7	101.4	117.2
○ Heat Rejetion to Intercooler	kW	47.5	57.4	54.1	62.5
○ Radiated Heat to Ambient	kW	20.8	25.1	23.7	27.3
○ Cooling water circulation	liters/min	265	320	265	320
○ Cooling fan air flow	m3/min	370	433	370	433

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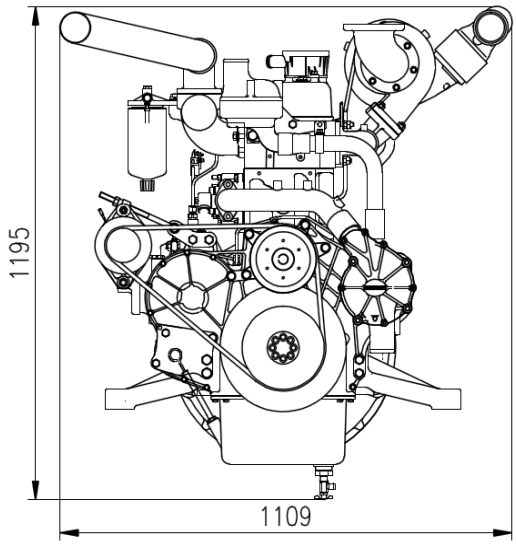
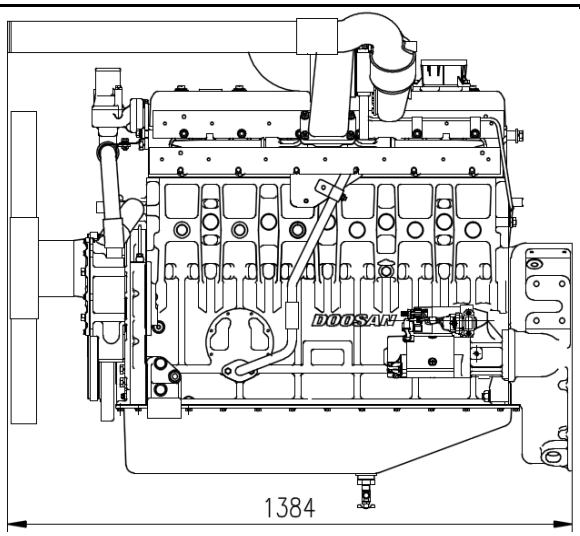
◆ ENGINE DIMENSION





◆ CONVERSION TABLE

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PS = kW x 1.3596
psi = kg/cm2 x 14.2233
in3 = lit. x 61.02
hp = PS x 0.98635
lb = kg x 2.20462
kW = Kcal/sec x 0.239

lb/ft = N.m x 0.737
U.S. gal = lit. x 0.264
kW = 0.2388 kcal/s
lb/PS.h = g/kW.h x 0.00162
cfm = m^3/min x 35.336
Mpa = Pa x 1000 = bar x 10

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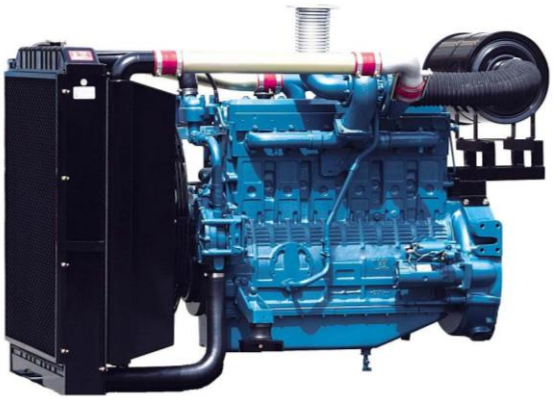
DOOSAN INFRACORE GENERATOR ENGINE

P126TI-II

Ratings (kWm/PS)	Gross Engine Output		Net Engine Output	
	Standby	Prime	Standby	Prime
1500rpm(50Hz)	294/400	265/360	287/390	258/350
1800rpm(60Hz)	342/465	307/418	331/450	296/403



Ratings Definitions

The power ratings of Emergency Standby and Prime are in accordance with ISO 8528.
Fuel Stop power in accordance with ISO 3046.
STANDBY POWER RATING is applicable for supplying emergency power for the duration of the utility power outage. No overload capability is available for this rating. A standby rated engine should be sized for a maximum of an 80% average load factor and 200 hours of operation per year. This includes less than 25 hours per year at the Standby Power rating.

PRIME POWER RATING is available for an unlimited number of hours per year in variable load application. Variable load should not exceed a 70% average of the Prime Power rating during any operating period of 250 hours. The Total operating time at 100% Prime Power shall not exceed 500 hours per year. A 10% overload capability is available for a period of 1 hour withing a 12 hour period of operation. Total operating time at the 10% overload power shall not exceed 25 hous per year

◎ GENERAL ENGINE DATA	
○ Engine Model	P126TI-II
○ Engine Type	4-Cycle, In-line, 6-Cylinder Diesel, water cooled, Turbo charged & intercooled
○ Bore x stroke	123 x 155 mm
○ Displacement	11.051 liters
○ Compression ratio	17.1 : 1
○ Rotation	Counter clockwise viewed from Flywheel
○ Firing order	1-5-3-6-2-4
○ Injection timing	16˚±1˚ BTDC
○ Dry weight	780kg(with Fan)
○ Dimension (LxWxH)	1,384 x 1,109 x 1,195 mm
○ Fly wheel housing	SAE NO.1M
○ Fly wheel	Clutch NO.14M
○ Number of teeth on flywheel	152
◎ ENGINE MOUNTING	
Maximum Bending Moment at Rear Face to Block	1325 N・M
◎ EXHAUST SYSTEM	
Maximum Back Pressure	5.9 kPa
◎ AIR INDUCTION SYSTEM	
Maximum Intake Air Restriction	
. With Clean Filter Element	2.16 kPa
. With Dirty Filter Element	6.23 kPa
○ Max. static pressure after Radiator	0.125 kPa

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◎ COOLING SYSTEM

Water circulation by centrifugal pump on engine.

○ Cooling method	Fresh water forced circulation
○ Coolant capacity	Engine Only : Approx. 19 lit., With Radiator : Approx. 51 lit.(standard)
○ Coolant flow	liters / min
○ Pressure Cap	Max. 49 kPa
○ Water Temperature	
- Maximum for standby and Prime	103℃
- Before start of full load	40.0℃
○ Water pump	Centrifugal type driven by Gear
○ Thermostat Type and Range	Wax – pellet type, Opening temp. 71°C , Full open temp. 85°C
○ Cooling fan	Blower type, Plastic , 755 mm diameter, 7 blade
○ Max. external coolant system restriction	Not Available

◎ LUBRICATION SYSTEM

Force-feed lubrication by gear pump, lubricating oil cooling in cooling water circuit of engine.

○ Lub. Method	Fully forced pressure feed type
○ Oil pump	Gear type driven by crank-shaft gear
○ Oil filter	Full flow, cartridge type
○ Oil capacity	Max. 23 liters , Min. 20 liters
○ Lub oil pressure	Idle Speed : Min 100 kPa
	Governed Speed : Min 250 kPa
○ Maximum oil temperature	120℃
○ Angularity limit	Front down 10 deg , Front up 10 deg , Side to side 22.5 deg
○ Lubrication oil	Refer to Operation Manual

◎ FUEL SYSTEM

Bosch type in-line pump with integrated, electromagnetic actuator.

○ Injection pump	Zexel in-line "P" type
○ Governor	Electric type (all speed control)
○ Speed drop	G3 Class (ISO 8528)
○ Feed pump	Mechanical type in injpump.
○ Injection nozzle	Multi hole type
○ Opening pressure	21.1 MPa
○ Fuel filter	Full flow, cartridge type with water drain valve.
○ Maximum fuel inlet restriction	10 kPa
○ Maximum fuel return restriction	60 kPa
○ Fuel feed pump Capacity	230 liters / hr
○ Used fuel	Diesel fuel oil

◎ ELECTRICAL SYSTEM

○ Battery Charging Alternator	28.5V x 45A alternator
○ Voltage regulator	Built-in type IC regulator
○ Starting motor	24V x 6.0 kW
○ Battery Voltage	24V
○ Battery Capacity	150 Ah (recommended)
○ Starting aid (Option)	Block heater

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◎ VALVE SYSTEM

○ Type	Overhead valve type	
○ Number of valve	Intake 1, exhaust 1 per cylinder	
○ Valve lashes at cold	Intake 0.3mm , Exhaust 0.3mm	
○ Valve timing		
	Opening	Close
-. Intake valve	18 deg. BTDC	34 deg. ABDC
-. Exhaust valve	46 deg. BBDC	14 deg. ATDC

◎ PERFORMANCE DATA

		Prime Power		Standby Power	
○ Governed Engine speed	rpm	1500	1800	1500	1800
○ Engine Idle Speed	rpm	800	800	800	800
○ Over speed limit	rpm	1650	1980	1650	1980
○ Gross Engine Power Output	kW	265	307	294	342
	ps	360	418	400	465
○ Break Mean effective pressure	Mpa	1.92	1.86	2.13	2.06
○ Mean Piston Speed	m/s	7.75	9.3	7.75	9.3
○ Friction Horsepower	kW	24	33	24	33
	ps	32.63	44.87	32.63	44.87
○ Specific fuel consumption					
25% load	liters/hr	16.9	20.6	18.3	22.2
50% load	liters/hr	31.3	37.0	34.9	41.4
75% load	liters/hr	47.0	56.0	51.6	61.5
100% load	liters/hr	63.1	73.8	77.6	89.5
○ Maximum Lube oil consumptio	g/h	252	292.6	280	325.5
○ Fan Power	kW	7	11	7	11
○ Exhaust Noise at 1m Horizontally from Centerline of Exhaust Pipe dista					
(without Fan)	dB(A)	97.1	98.3	97.1	98.3

The all data and the specific fuel consumption are based on ISO 3046/1, Standard reference conditions are in accordance with 298 K(25° Celsius) air temperature, 100kPa(1000mbar) air pressure, 60% relative humidity, 110m(361ft) altitude.

Operation At Elevated Temperature And Altitude: The engine may be operated at :

1800 rpm & 1500rpm up to 750~ 1000m and 30°C without power deration

For sustained operation above these conditions, derate by 3% per 304m , and 2% per 11 °C

Engine Data with Dry Type Exhaust Manifold

○ Intake Air Flow	m3/min	20.68	28.23	22.33	30.22
○ Exhaust gas temp. after turbo.	°C	590	500	650	580
○ Exhaust Gas Flow	m3/min	47.4	61.6	51.2	64.2
○ Heat Rejection to Exhaust	kW	222.4	260.1	273.5	315.4
○ Heat Rejection to Coolant	kW	96.7	113.1	118.9	137.1
○ Heat Rejetion to Intercooler	kW	51.6	60.3	63.4	73.1
○ Radiated Heat to Ambient	kW	22.6	26.4	27.7	32.0
○ Cooling water circulation	liters/min	265	320	265	320
○ Cooling fan air flow	m3/min	450	530	450	530

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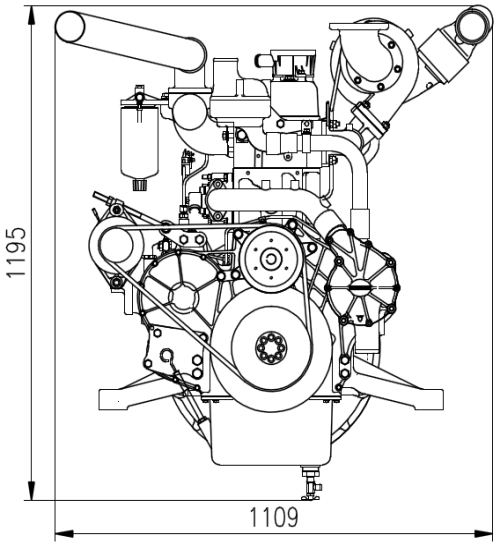
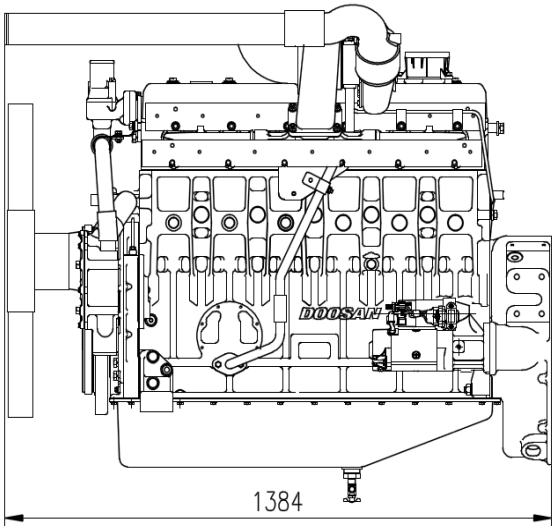
◆ ENGINE DIMENSION





◆ CONVERSION TABLE

in. = mm x 0.0394
PS = kW x 1.3596
psi = kg/cm2 x 14.2233
in3 = lit. x 61.02
hp = PS x 0.98635
lb = kg x 2.20462
kW = Kcal/sec x 0.239

lb/ft = N.m x 0.737
U.S. gal = lit. x 0.264
kW = 0.2388 kcal/s
lb/PS.h = g/kW.h x 0.00162
cfm = m^3/min x 35.336
Mpa = Pa x 1000 = bar x 10

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DOOSAN INFRACORE GENERATOR ENGINE

P158LE

Ratings (kWm/PS)	Gross Engine Output		Net Engine Output	
	Standby	Prime	Standby	Prime
1500rpm(50Hz)	414/563	363/494	400/544	349/475
1800rpm(60Hz)	458/623	402/547	435/592	379/516

Ratings Definitions

The power ratings of Emergency Standby and Prime are in accordance with ISO 8528.
Fuel Stop power in accordance with ISO 3046.
STANDBY POWER RATING is applicable for supplying emergency power for the duration of the utility power outage. No overload capability is available for this rating. A standby rated engine should be sized for a maximum of an 70% average load factor and 200 hours of operation per year. This includes less than 25 hours per year at the Standby Power rating.

PRIME POWER RATING is available for an unlimited number of hours per year in variable load application. Variable load should not exceed a 70% average of the Prime Power rating during any operating period of 250 hours. The Total operating time at 100% Prime Power shall not exceed 500 hours per year. A 10% overload capability is available for a period of 1 hour withing a 12 hour period of operation. Total operating time at the 10% overload power shall not exceed 25 hous per year

◎ GENERAL ENGINE DATA	
○ Engine Model	P158LE
○ Engine Type	4-Cycle, V-type, 8-Cylinder, Turbo charged & intercooled (air to air)
○ Bore x stroke	128 x 142 mm
○ Displacement	14.618 liters
○ Compression ratio	15 : 1
○ Rotation	Counter clockwise viewed from Flywheel
○ Firing order	1-5-7-2-6-3-4-8
○ Injection timing	16˚±1˚ BTDC
○ Dry weight	950 kg (with fan)
○ Dimension (LxWxH)	1,389 x 1,389 x 1,216 mm
○ Fly wheel housing	SAE NO.1M
○ Fly wheel	Clutch NO.14M
○ Number of teeth on flywheel	160
◎ ENGINE MOUNTING	
Maximum Bending Moment at Rear Face to Block	1,325 N.m
◎ EXHAUST SYSTEM	
Maximum Back Pressure	5.9 kPa
◎ AIR INDUCTION SYSTEM	
Maximum Intake Air Restriction	
. With Clean Filter Element	2.16 kPa
. With Dirty Filter Element	6.23 kPa
○ Max. static pressure after Radiator	0.125 kPa

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◎ COOLING SYSTEM

Water circulation by centrifugal pump on engine.

○ Cooling method	Fresh water forced circulation
○ Coolant capacity	Engine Only : Approx. 20 lit, With Radiator(standard) : Approx 80 lit.
○ Coolant flow rate	600 liters / min
○ Pressure Cap	Max. 49 kPa
○ Water Temperature	
- Maximum for standby and Prime	103℃
- Before start of full load	40.0℃
○ Water pump	Centrifugal type driven by belt
○ Thermostat Type and Range	Wax – pellet type, Opening temp. 71°C , Full open temp. 85°C
○ Cooling fan	Blower type, plastic , 915 mm diameter, 7 blade
○ Max. external coolant system restriction	Not available

◎ LUBRICATION SYSTEM

Force-feed lubrication by gear pump, lubricating oil cooling in cooling water circuit of engine.

○ Lub. Method	Fully forced pressure feed type
○ Oil pump	Gear type driven by crank-shaft gear
○ Oil filter	Full flow, cartridge type
○ Oil capacity	Max. 21 liters , Min. 17 liters
○ Lub oil pressure	Idle Speed : Min 100 kPa
	Governed Speed : Min 250 kPa
○ Maximum oil temperature	120℃
○ Angularity limit	Front down 10 deg , Front up 10 deg , Side to side 22.5 deg
○ Lubrication oil	Refer to Operation Manual

◎ FUEL SYSTEM

Bosch type in-line pump with integrated, electromagnetic actuator.

○ Injection pump	Bosch in-line "P" type
○ Governor	Electric type
○ Speed drop	G3 Class (ISO 8528)
○ Feed pump	Mechanical type in injpump.
○ Injection nozzle	Multi hole type
○ Opening pressure	27.9 MPa
○ Fuel filter	Full flow, cartridge type with water drain valve.
○ Maximum fuel inlet restriction	10 kPa
○ Maximum fuel return restriction	60 kPa
○ Fuel feed pump Capacity	315 liters / hr
○ Used fuel	Diesel fuel oil

◎ ELECTRICAL SYSTEM

○ Battery Charging Alternator	28.5V x 45A alternator
○ Voltage regulator	Built-in type IC regulator
○ Starting motor	24V x 4.5 kW
○ Battery Voltage	24V
○ Battery Capacity	2 x 100 Ah (recommended)

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◎ VALVE SYSTEM

○ Type	Overhead valve type	
○ Number of valve	Intake 1, exhaust 1 per cylinder	
○ Valve lashes at cold	Intake 0.25 mm , Exhaust 0.35 mm	
○ Valve timing		
	Opening	Close
-. Intake valve	24 deg. BTDC	36 deg. ABDC
-. Exhaust valve	63 deg. BBDC	27 deg. ATDC

◎ PERFORMANCE DATA

		Prime Power		Standby Power	
○ Governed Engine speed	rpm	1500	1800	1500	1800
○ Engine Idle Speed	rpm	800	800	800	800
○ Over speed limit	rpm	1650	1980	1650	1980
○ Gross Engine Power Output	kW	363	402	414	458
	PS	494	547	563	623
○ Break Mean effective pressure	MPa	1.99	1.84	2.27	2.09
○ Mean Piston Speed	m/s	7.1	8.5	7.1	8.5
○ Friction Horsepower	kW	32	44	32	44
	PS	43.5	59.8	43.5	59.8
○ Specific fuel consumption					
25% load	liters/hr	23.7	28.0	26.5	30.5
50% load	liters/hr	43.9	50.6	49.6	57.6
75% load	liters/hr	65.1	74.7	74.8	85.9
100% load	liters/hr	89.3	102.5	102.9	118.6
○ Maximum Lube oil consumptio	g/h	346	383	394	436
○ Fan Power	kW	14	23	14	23
○ Exhaust Noise at 1m Horizontally from Centerline of Exhaust Pipe distance					
(without Fan)	dB(A)	98.3	98.5	98.3	98.5

The all data and the specific fuel consumption are based on ISO 3046/1, Standard reference conditions are in accordance with 298 K(25˚ Celsius) air temperature, 100kPa(1000mbar) air pressure, 60% relative humidity, 110m(361ft) altitude.

Operation At Elevated Temperature And Altitude: The engine may be operated at :

1800 rpm & 1500rpm up to 750~ 1000m and 30°C without power deration

For sustained operation above these conditions, derate by 3% per 304m , and 2% per 11 °C

Engine Data with Dry Type Exhaust Manifold

○ Intake Air Flow	m3/min	26.2	33.7	29.1	36.9
○ Exhaust gas temp. after turbo.	°C	580	606	-	-
○ Exhaust Gas Flow	m3/min	78.3	91.3	-	-
○ Heat Rejection to Exhaust	kW	314.7	361.2	362.6	417.9
○ Heat Rejection to Coolant	kW	136.8	157.0	157.7	181.7
○ Heat Rejetion to Intercooler	kW	73.0	83.8	84.1	96.9
○ Radiated Heat to Ambient	kW	31.9	36.6	36.8	42.4
○ Cooling water circulation	liters/min	535	600	535	600
○ Cooling fan air flow	m3/min	522	618	522	618

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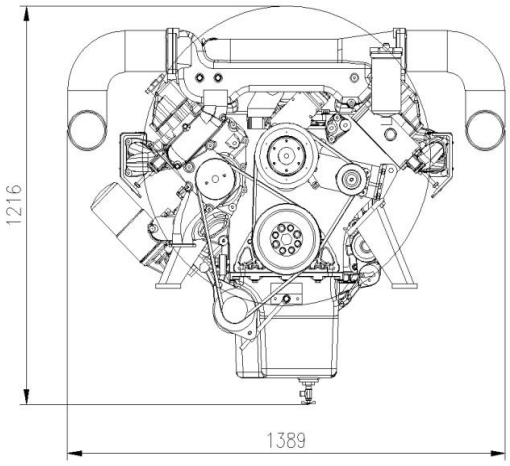
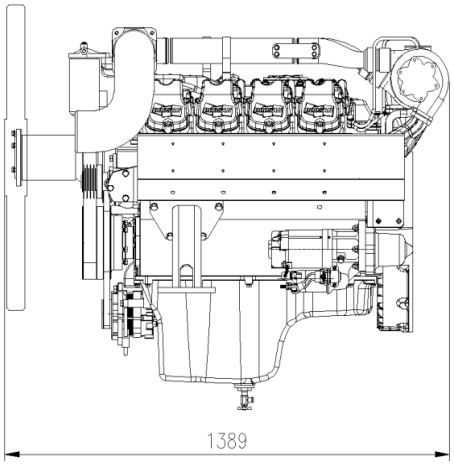
◆ ENGINE DIMENSION





◆ CONVERSION TABLE

in. = mm x 0.0394
PS = kW x 1.3596
psi = kg/cm2 x 14.2233
in3 = lit. x 61.02
hp = PS x 0.98635
lb = kg x 2.20462
kW = kcal/sec x 0.239

lb/ft = N.m x 0.737
U.S. gal = lit. x 0.264
kW = 0.2388 kcal/s
lb/PS.h = g/kW.h x 0.00162
cfm = m^3/min x 35.336
MPa = kPa x 1000 = bar x 10

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DOOSAN INFRACORE GENERATOR ENGINE

P158LE-1

Ratings (kWm/PS)	Gross Engine Output		Net Engine Output	
	Standby	Prime	Standby	Prime
1500rpm(50Hz)	362/492	327/444	348/473	313/425
1800rpm(60Hz)	402/546	366/498	379/515	343/467

Ratings Definitions

The power ratings of Emergency Standby and Prime are in accordance with ISO 8528.
Fuel Stop power in accordance with ISO 3046.
STANDBY POWER RATING is applicable for supplying emergency power for the duration of the utility power outage. No overload capability is available for this rating. A standby rated engine should be sized for a maximum of an 70% average load factor and 200 hours of operation per year. This includes less than 25 hours per year at the Standby Power rating.

PRIME POWER RATING is available for an unlimited number of hours per year in variable load application. Variable load should not exceed a 70% average of the Prime Power rating during any operating period of 250 hours. The Total operating time at 100% Prime Power shall not exceed 500 hours per year. A 10% overload capability is available for a period of 1 hour withing a 12 hour period of operation. Total operating time at the 10% overload power shall not exceed 25 hous per year

◎ GENERAL ENGINE DATA	
○ Engine Model	P158LE-1
○ Engine Type	4-Cycle, V-type, 8-Cylinder, Turbo charged & intercooled (air to air)
○ Bore x stroke	128 x 142 mm
○ Displacement	14.618 liters
○ Compression ratio	15 : 1
○ Rotation	Counter clockwise viewed from Flywheel
○ Firing order	1-5-7-2-6-3-4-8
○ Injection timing	16˚±1˚ BTDC
○ Dry weight	950 kg (with fan)
○ Dimension (LxWxH)	1,389 x 1,389 x 1,216 mm
○ Fly wheel housing	SAE NO.1M
○ Fly wheel	Clutch NO.14M
○ Number of teeth on flywheel	160
◎ ENGINE MOUNTING	
Maximum Bending Moment at Rear Face to Block	1,325 N.m
◎ EXHAUST SYSTEM	
Maximum Back Pressure	5.9 kPa
◎ AIR INDUCTION SYSTEM	
Maximum Intake Air Restriction	
. With Clean Filter Element	2.16 kPa
. With Dirty Filter Element	6.23 kPa
○ Max. static pressure after Radiator	0.125 kPa

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روبروی پالایشگاه نفت پارس، پلاک ۱۲

◎ COOLING SYSTEM

Water circulation by centrifugal pump on engine.	
○ Cooling method	Fresh water forced circulation
○ Coolant capacity	Engine Only : Approx. 20 lit, With Radiator(standard) : Approx 80 lit.
○ Coolant flow rate	600 liters / min
○ Pressure Cap	Max. 49 kPa
○ Water Temperature	
- Maximum for standby and Prime	103℃
- Before start of full load	40.0℃
○ Water pump	Centrifugal type driven by belt
○ Thermostat Type and Range	Wax – pellet type, Opening temp. 71°C , Full open temp. 85°C
○ Cooling fan	Blower type, plastic , 915 mm diameter, 7 blade
○ Max. external coolant system restriction	Not available

◎ LUBRICATION SYSTEM

Force-feed lubrication by gear pump, lubricating oil cooling in cooling water circuit of engine.	
○ Lub. Method	Fully forced pressure feed type
○ Oil pump	Gear type driven by crank-shaft gear
○ Oil filter	Full flow, cartridge type
○ Oil capacity	Max. 21 liters , Min. 17 liters
○ Lub oil pressure	Idle Speed : Min 100 kPa
	Governed Speed : Min 250 kPa
○ Maximum oil temperature	120℃
○ Angularity limit	Front down 10 deg , Front up 10 deg , Side to side 22.5 deg
○ Lubrication oil	Refer to Operation Manual

◎ FUEL SYSTEM

Bosch type in-line pump with integrated, electromagnetic actuator.	
○ Injection pump	Bosch in-line "P" type
○ Governor	Electric type
○ Speed drop	G3 Class (ISO 8528)
○ Feed pump	Mechanical type in injpump.
○ Injection nozzle	Multi hole type
○ Opening pressure	27.9 MPa
○ Fuel filter	Full flow, cartridge type with water drain valve.
○ Maximum fuel inlet restriction	10 kPa
○ Maximum fuel return restriction	60 kPa
○ Fuel feed pump Capacity	315 liters / hr
○ Used fuel	Diesel fuel oil

◎ ELECTRICAL SYSTEM

○ Battery Charging Alternator	28.5V x 45A alternator
○ Voltage regulator	Built-in type IC regulator
○ Starting motor	24V x 4.5 kW
○ Battery Voltage	24V
○ Battery Capacity	2 x 100 Ah (recommended)
○ Starting aid (Option)	Block heater, Air heater

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تهران، کیلومتر۲۱ بزرگراه لشگری (جاده مخصوص کرج)
روبروی پالایشگاه نفت پارس، پلاک ۱۲

◎ VALVE SYSTEM

○ Type	Overhead valve type	
○ Number of valve	Intake 1, exhaust 1 per cylinder	
○ Valve lashes at cold	Intake 0.25 mm , Exhaust 0.35 mm	
○ Valve timing		
	Opening	Close
-. Intake valve	24 deg. BTDC	36 deg. ABDC
-. Exhaust valve	63 deg. BBDC	27 deg. ATDC

◎ PERFORMANCE DATA

		Prime Power		Standby Power	
○ Governed Engine speed	rpm	1500	1800	1500	1800
○ Engine Idle Speed	rpm	800	800	800	800
○ Over speed limit	rpm	1650	1980	1650	1980
○ Gross Engine Power Output	kW	327	366	362	402
	PS	444	498	492	546
○ Break Mean effective pressure	MPa	1.79	1.67	1.98	1.83
○ Mean Piston Speed	m/s	7.1	8.5	7.1	8.5
○ Friction Horsepower	kW	32	44	32	44
	PS	43.5	59.8	43.5	59.8
○ Specific fuel consumption					
25% load	liters/hr	21.0	25.2	23.1	27.3
50% load	liters/hr	40.0	46.5	43.7	50.3
75% load	liters/hr	58.4	67.5	64.7	74.2
100% load	liters/hr	78.7	91.3	88.3	101.0
○ Maximum Lube oil consumptio	g/h	311	349	344	382
○ Fan Power	kW	14	23	14	23
○ Exhaust Noise at 1m Horizontally from Centerline of Exhaust Pipe distance					
(without Fan)	dB(A)	98.3	98.5	98.3	98.5

The all data and the specific fuel consumption are based on ISO 3046/1, Standard reference conditions are in accordance with 298 K(25˚ Celsius) air temperature, 100kPa(1000mbar) air pressure, 60% relative humidity, 110m(361ft) altitude.

Operation At Elevated Temperature And Altitude: The engine may be operated at :

1800 rpm & 1500rpm up to 750~ 1000m and 30°C without power deration

For sustained operation above these conditions, derate by 3% per 304m , and 2% per 11 °C

Engine Data with Dry Type Exhaust Manifold

○ Intake Air Flow	m3/min	24.2	31.6	26.1	33.7
○ Exhaust gas temp. after turbo.	°C	520	500	-	-
○ Exhaust Gas Flow	m3/min	59.5	73.5	-	-
○ Heat Rejection to Exhaust	kW	277.3	321.7	311.2	355.9
○ Heat Rejection to Coolant	kW	120.6	139.9	135.3	154.7
○ Heat Rejetion to Intercooler	kW	64.3	74.6	72.2	82.5
○ Radiated Heat to Ambient	kW	28.1	32.6	31.6	36.1
○ Cooling water circulation	liters/min	535	600	535	600
○ Cooling fan air flow	m3/min	522	618	522	618

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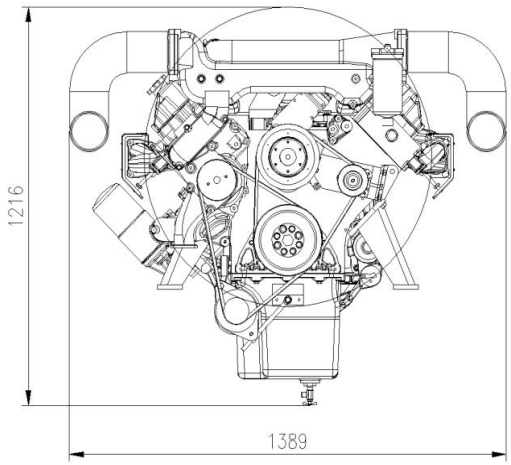
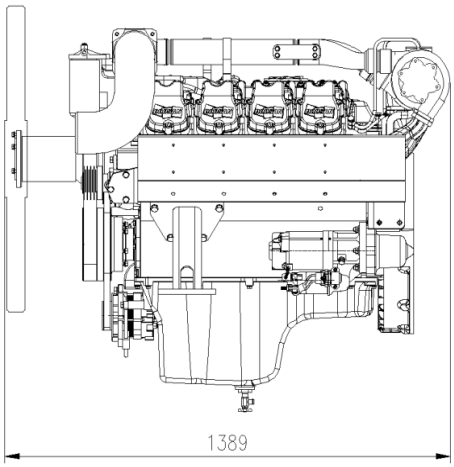
◆ ENGINE DIMENSION





◆ CONVERSION TABLE

in. = mm x 0.0394
PS = kW x 1.3596
psi = kg/cm2 x 14.2233
in3 = lit. x 61.02
hp = PS x 0.98635
lb = kg x 2.20462
kW = kcal/sec x 0.239
lb/ft = N.m x 0.737
U.S. gal = lit. x 0.264
kW = 0.2388 kcal/s
lb/PS.h = g/kW.h x 0.00162
cfm = m^3/min x 35.336
MPa = kPa x 1000 = bar x 10

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※ Speccifications are subject to change without prior notice

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