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HiMSEN Engine

Hyundai Innovative Marine & Stationary ENgine

IMO Tier II Programme 2011

2nd Edition

Marine & Offshore GenSets
Marine Propulsion System
Stationary GenSets

HYUNDAI HEAVY INDUSTRIES CO.,LTD. | ENGINE & MACHINERY

HiMSEN Engine Programme

2011

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HIMSEN

Hyundai Innovative Marine & Stationary ENgine

Key to Components

1 Common base frame
2 Resilient mounting
3 Engine block
4 Cylinder liner
5 Flywheel cover
6 Crank case cover
7 Cylinder head
8 Rocker arm
9 Camshaft
10 Piston
11 Connecting rod
12 Crankshaft
13 Counter weight
14 Lub.oil priming pump
15 Lub.oil pump
16 Lub.oil cooler
17 Lub.oil filter
18 Cooling water pump
19 Intake air duct
20 Turbocharger
21 Air cooler
22 Engine control panel
23 Fuel pump cover
24 Exhaust gas pipe
25 Alternator

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HiMSEN Engine

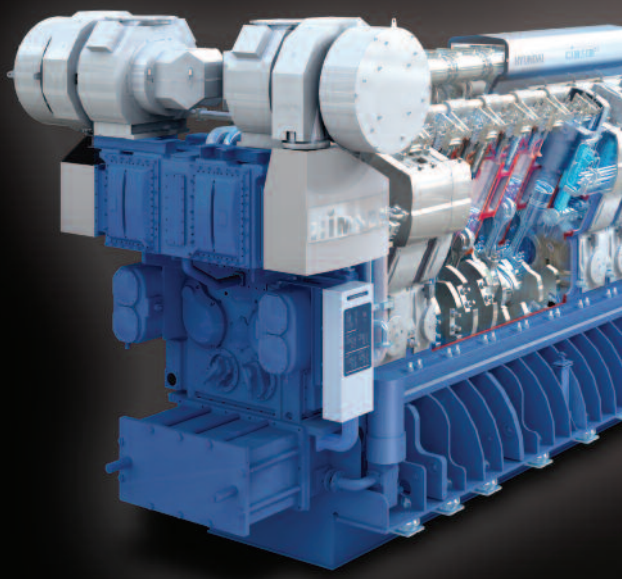
Hyundai Innovative Marine & Stationary ENgine

HiMSEN Family

Design Philosophy

Hyundai's HiMSEN Family have simple and smart design suitable for marine applications with high reliability and performance.
The key features are:

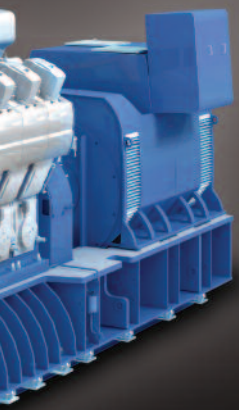
Heavy Fuel Engine with same fuel of main engine (Uni-Fuel concept).
Hence, the diesel fuel and heavy fuel oil of the viscosity of upto 700 cSt at 50°C is acceptable.



Earth-Friendly Engine

Economical and Ecological Engine with low fuel consumption, NOx emission, and Smoke, etc. , which is based on the below specific designs;
- Optimized Supercharging with Miller Cycle
- High Fuel Injection Pressure

Reliable and Practical Engine with simple, smart and robust structure.
- Number of engine components are minimized with Pipe-Free design
- Most of the components are directly accessible for easier maintenance
- 'Individual Part' maintenance concept is provided
- Feed System is fully modularized with direct accessibility



Earth-Friendly Engine

Main Features

Performance characteristics
- High output in the similar range engines
- Low fuel oil consumption
- Quick acceleration & load response

Maintenance
- Easier maintenance by modularized design
- Minimal number and kind of components

Earth-friendly engine
- Low NOx emissions
- Compliance with IMO NOx Tier II
- Low vibration & noise

Major Application

Marine
- Propulsion system
- Generating sets

Offshore
- Drill ship
- FPSO

Stationary
- Stationary diesel power plants
- Packaged power stations
- Gas engine power plants
- Pre-fabricated power plants
- Barge-mounted diesel power plants
- Emergency diesel generator (EDG) for nuclear power plants

Jack-up Platform/Drilling Rig

FPSO

Drill ship

Car Ferry & Passenger Vessel

Container ship

Diesel Power Plant

Emergency GenSets for
Nuclear Power Plant

General

This programme provides necessary information and recommendations for the application of HYUNDAI's HiMSEN engines.

'HiMSEN'® is the registered brand name of HYUNDAI's own design engine and the abbreviation of '***Hyundai Innovative Marine & Stationary ENgine***'.

Please note that all data and information prepared in this programme are for guidance only and subject to change without notice. Therefore, please contact Hyundai Heavy Industries Co., Ltd. before actual applications of the data. Hyundai Heavy Industries Co., Ltd. will always provide the data for the installation of specific project.

Engine Model Designation

18 H 32 / 40 _ V

No. of Cylinders
HYUNDAI's HiMSEN
Cylinder Bore in cm
Piston Stroke in cm
(empty): Fuel oil
G: Gas oil
(empty): In-line type
V: Vee type

Reference Condition

General definition of diesel engine rating is specified in accordance with ISO 3046/1:2002, ISO 15550:2002.
However the engine outputs are available within tropical conditions without de-rating.

Tropical Conditions

- Turbocharger air inlet pressure: 1,000 mbar
- Turbocharger air inlet temperature: 318 K (45 °C)
- Charge air coolant temperature: 309 K (36 °C)*

* Valid for central cooling system up to 36 °C normally, 38 °C specially.

Specific Fuel Oil Consumption (SFOC) & Heat Rate

The stated consumption figures refer to the following ISO reference conditions:

- Turbocharger air inlet pressure: 1,000 mbar
- Turbocharger air inlet temperature: 298 K (25 °C)
- Charge air coolant temperature: 298 K (25 °C)

- Lower calorific value of fuel 42,700 kJ/kg
- Without engine driven pumps
- Tolerance +5 %
- At 100 % load

Specific Lube Oil Consumption (SLOC)

The stated consumption is given with a tolerance of +25% depending on the operating conditions.

Engine Operation

Engine Power

The engine brake power is stated in kW. For conversion between kW and metric horsepower, please note that 1 bhp = 75 kg · m/s = 0.7355 kW.
Ratings are given according to ISO 3046/1:2002, ISO 15550:2002.

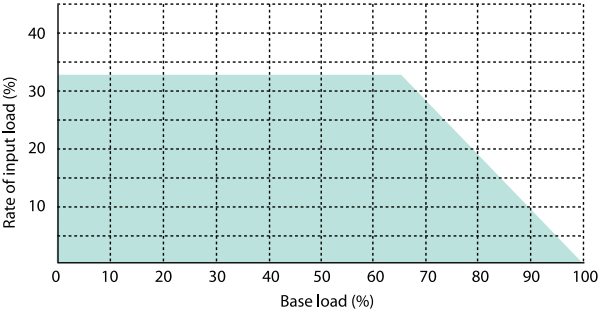
In case of HR(Higher Rating) version, no overload is permissible except for 10 % overload during official factory test.

Power Management of Gensets

When making power management system of multi-Gensets for marine application, a proper load balance is to be considered by shipyard.

In case of a failure of one engine, its output has to be made up for by the remaining engines or by reducing/switching off electric consumers.

No overload of remaining engine is allowed for such a case and the electric power scheme of the ship can be derived from the following load characteristics.



Continuous Load-Up

The quickest way to load-up from 0 % to 100 % load can be achieved by increasing the load continuously and gradually.

Step by Step Load-Up

Considering the time required for stabilizing the frequency deviation due to sudden load-up, it is recommended to load up from idle to full load by more than three steps IACS(especially for GenSets of 720rpm or 900rpm due to higher BMEP of over 24 bar).

HiMSEN GenSets fulfill the requirements of classification societies concerning the frequency deviation and recovery time when loading up by 3 steps from 0 % to 100 %.

Information for Fuel oil control by EU Directive 2005-33-EC and California Code of Regulations

All HiMSEN engines are suitable and developed for continuous operation on HFO as well as MDO/MGO. There is no lower limit for the sulfur content of fuel oil. In connection to the low viscosity of MGO, (Marine Gas Oil, DMA as defined in ISO 8217) the viscosity at engine inlet should be kept within the value of 2 ~ 14 cSt in order to avoid possible wear or sticking of fuel injection pump due to low lubricity and in order to maintain the suitable hydrodynamic film between fuel injection pump plunger and barrel.

- Recommended stable viscosity at engine inlet: Min. 3 cSt
- Recommended minimum viscosity at engine inlet: Min. 2 cSt

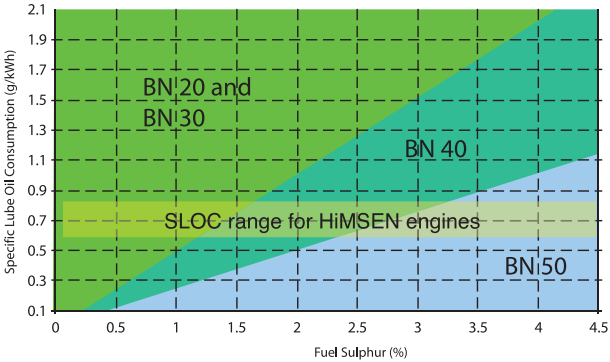
So, a proper cooling device (D.O cooler or chiller etc.) is to be considered, if needed, to keep the above mentioned viscosity (2 ~ 14 cSt) at engine inlet.

When the MGO is to be used only for temporary engine operation (e.g. in port), higher BN lube oil used for residual fuel (HFO) should not present any problems in case of short periods of running.
When engine is not operated continuously with low sulfur fuel such as MGO, lube oil should be chosen according to the highest sulfur contents of the fuel with normal operation.

Guideline for Lube Oil

Base Number (BN) must be carefully selected depending on fuel grade and sulfur contents.
Following are guidance values for initial filling.

Typical recommended BN depending on the fuel sulfur contents and SLOC (g/kWh)



Reference: CIMAC recommendation number 29/2008 'Guidelines for the lubrication of medium speed diesel engine'

IMO NOx EMISSION AND HiMSEN ENGINES

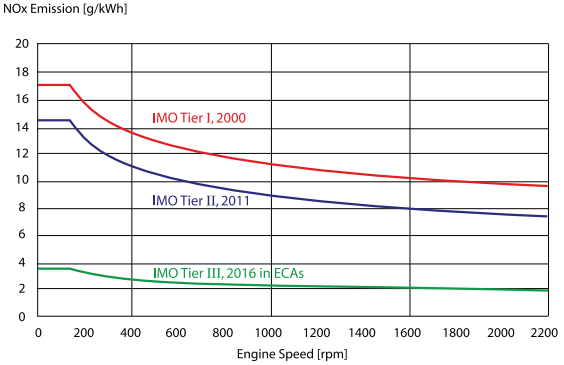
Annex VI of the MARPOL 73/78 convention entered into force 12 May 2005. All HiMSEN engines included in this booklet comply with the NOx Limits specified in the IMO regulation.

The exhaust emission regulations in Annex VI were referred to as IMO Tier I, MARPOL Annex VI regulations were amended at the MEPC (Marine Environment Protection Committee) in October 2008. These specify further NOx emission limits to be known as IMO Tier II and Tier III.

IMO Tier II regulations were entered into force on 1 January 2011 based on keel laying, according to a speed dependent function, with reduction of about 20 % in comparison with IMO Tier I (refer to chart).

Under IMO Tier III, the NOx emission limits for marine engines will become effective on 1 January 2016 based on keel laying, according to a speed dependent function, with reduction of 80 % in comparison with IMO Tier I when the ship is operated in a designated Emission Control Areas (so called ECAs).

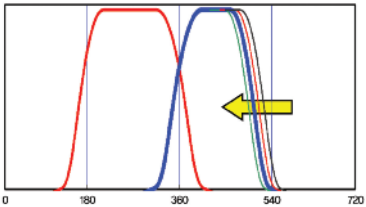
All types of HiMSEN engine are complied with the new upcoming NOx emission regulations, and do its best to satisfy further request if any from customers.



HYUNDAI ENVIRONMENTAL TECHNOLOGIES against IMO Tier II

HYUNDAI is introducing technologies to meet IMO Tier II regulation with internal engine measures only such as:

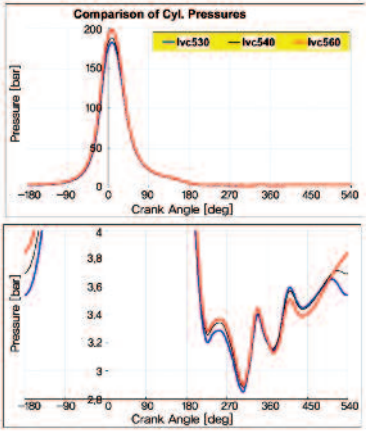
- Miller valve timing requiring increased charger air pressure by applying the high pressure ratio turbocharger
- Optimised combustion by applying the combustion control technologies with optimising the piston bowl shape and the fuel injection valve nozzle etc.



Various Intake Valve Closing Timing for 1-D Cycle Simulation

Miller valve timing

This technology is very useful to reduce the NOx emission by optimising the intake valve's closing timing especially, result in changing the effective compression and expan sion ratio. In order to apply this technology, the high pressure ratio turbocharger is required to increase the charge air pressure and new devel oped T/C with high pre ssure ratio is mounted on HiMSEN engine.

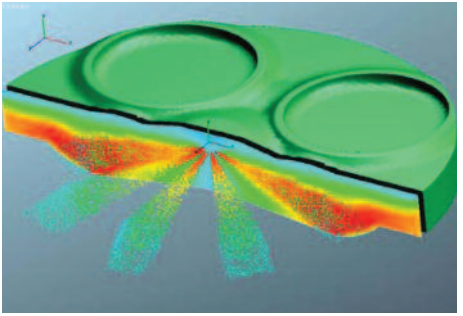


Combustion pressure depending on IVC timing from 1-D Cycle Simulation

Optimized combustion

The NOx emission can be reduced by the combustion control technologies with the optimum combination of the piston bowl shape and the fuel injection valve nozzle etc.

The piston bowl shape and the fule injection valve nozzle's specification are optimized to meet the IMO Tier II regulation, which are evaluated by 3-D combustion analysis and verified by the measurement at HiMSEN Techno Center.

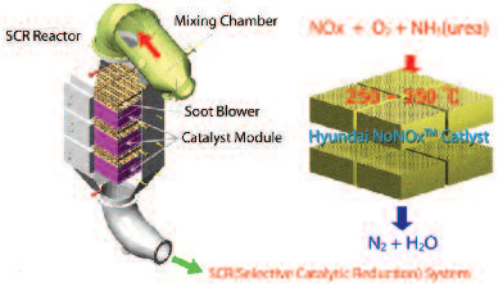


3-D Combustion Analysis

HYUNDAI ENVIRONMENTAL TECHNOLOGIES against IMO Tier III as one of solutions

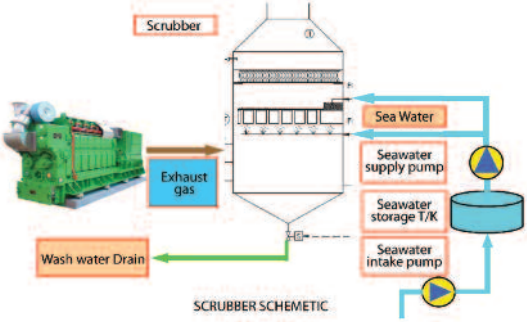
HD NoNOx™ SCR (SELECTIVE CATALYTIC REDUCTION) SYSTEM

HYUNDAI can offer NoNOx™ SCR technology that can reduce NOx emissions by 95 %, designed for Tier III limits. HYUNDAI is optimizing the whole installation, performance and engine in order to achieve low cost of production and give benefits to the customers.

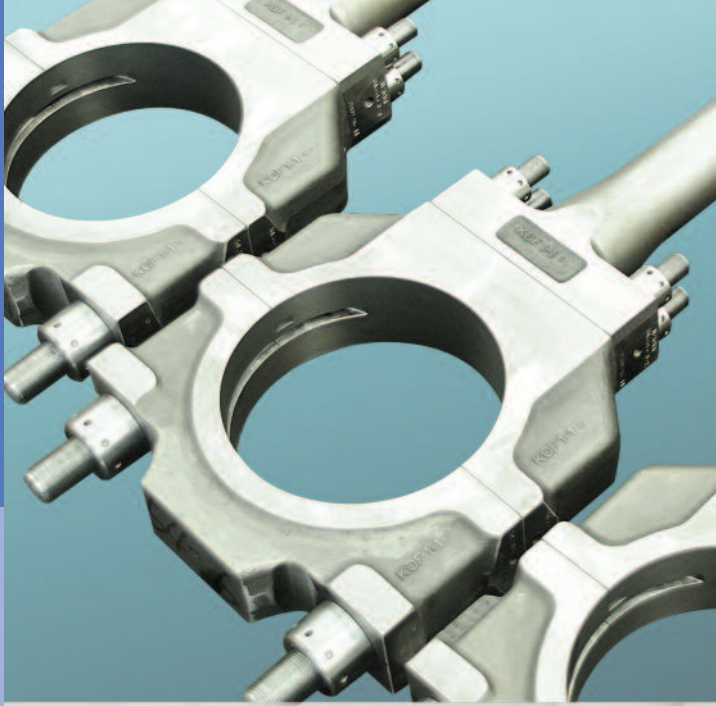


SCRUBBER

Exhaust gas scrubbing is an alternative solution to low sulphur content fuels for reducing SOx emissions. SCRUBBER has been developed by HYUNDAI for much better quality.



SCRUBBER SCHEMETIC



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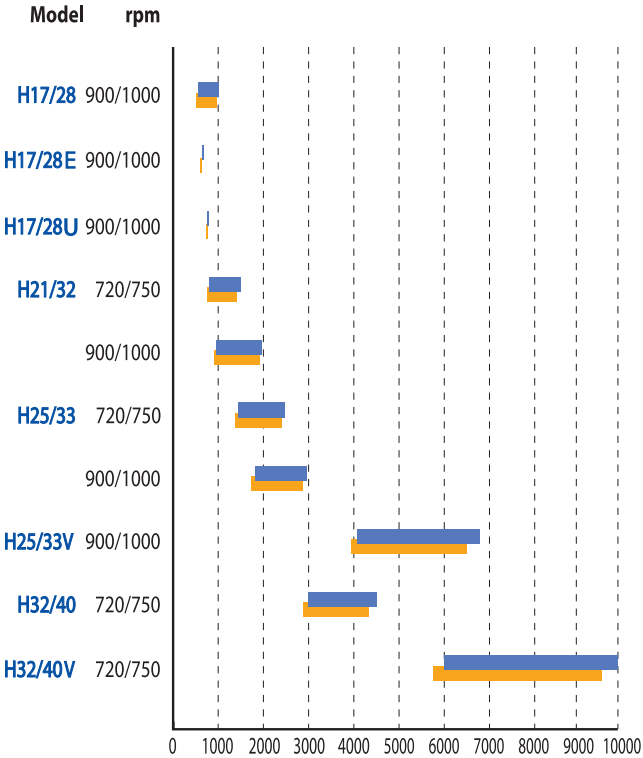
Marine & Offshore GenSets
for Tier II

Power Range

H17/28	575~1,000 kW
H17/28E	660 kW
H17/28U	805 kW
H21/32	800~1,980 kW
H25/33	1,440~2,970 kW
H25/33V	4,080~6,800 kW
H32/40	3,000~4,500 kW
H32/40V	6,000~10,000 kW

Marine & Offshore GenSets



Bore: 170 mm, Stroke: 280 mm

Main Data

Speed	900 rpm		1000 rpm	
Frequency	60 Hz		50 Hz	
	Eng. kW	Gen. kW	Eng. kW	Gen. kW
5H17/28	575	538	600	561
6H17/28	690	645	720	673
7H17/28	805	757	840	790
8H17/28	920	865	960	902

Based on alternator efficiency of 93.5~94%.

Specific Fuel Oil Consumption at Engine

Load	900 rpm	1000 rpm
100%	**188 g/kWh**	**188 g/kWh**

Main Data (for Higher Power Rating)

Speed	900 rpm		1000 rpm	
Frequency	60 Hz		50 Hz	
	Eng. kW	Gen. kW	Eng. kW	Gen. kW
6H17/28	750	701	750	701
7H17/28	875	823	875	823
8H17/28	1,000	940	1,000	940

Based on alternator efficiency of 93.5~94%.

Specific Fuel Oil Consumption at Engine (for Higher Power Rating)

Load	900 rpm	1000 rpm
100%	**191 g/kWh**	**191 g/kWh**

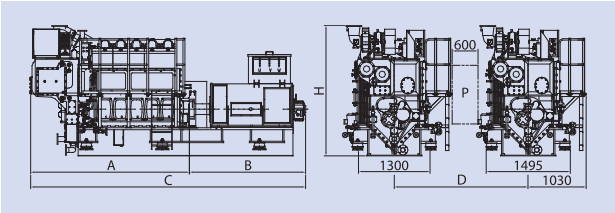
Specific Lubricating Oil Consumption

Lub. Oil: 0.6 g/kWh

Dimensions

900 rpm	Cyl.	Dimension(mm)				Dry Mass(ton)	
		A	B 1)	C 1)	H	Engine 2)	GenSet 1),3)
	5	2,791	2,200	4,991	2,314	7.7	13.6
	6	3,071	2,200	5,271	2,314	8.5	14.5
	7	3,351	2,200	5,551	2,314	9.4	15.6
	8	3,631	2,320	5,951	2,314	10.4	16.7

1000 rpm	Cyl.	Dimension(mm)				Dry Mass(ton)	
		A	B 1)	C 1)	H	Engine 2)	GenSet 1),3)
	5	2,791	2,200	4,991	2,314	7.7	13.6
	6	3,071	2,200	5,271	2,314	8.5	14.5
	7	3,351	2,200	5,551	2,314	9.4	15.6
	8	3,631	2,320	5,951	2,314	10.4	16.7



Remarks

1) Depending on alternator.
2) Without common base frame.
3) With common base frame & alternator (Maker: HHI-EES).

D: Min. distance between engines 2,552 mm (with gallery).
P: Free passage between the engines, width 600 mm and height 2,000 mm.
Note) All dimensions and weight are approximate value and subject to change without prior notice.

Bore: 170 mm, Stroke: 280 mm

Main Data

Speed	900 rpm		1000 rpm	
Frequency	60 Hz		50 Hz	
	Eng. kW	Gen. kW	Eng. kW	Gen. kW
6H17/28E	660	618	660	618
6H17/28U	805	750	805	750

Based on alternator efficiency of 93.2~94%.

Specific Fuel Oil Consumption at Engine

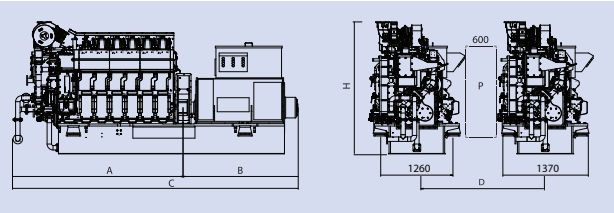
	Load	900 rpm	1000 rpm
6H17/28E	**100%**	**189 g/kWh**	**190 g/kWh**
6H17/28U	**100%**	**191 g/kWh**	**191 g/kWh**

Specific Lubricating Oil Consumption

Lub. Oil: 0.6 g/kWh

Dimensions

900 rpm	Cyl.	Dimension(mm)				Dry Mass(ton)	
		A	B 1)	C 1)	H	Engine 2)	GenSet 1),3)
	6H17/28E	2,774	1,939	4,713	2,323	6.9	13.0
	6H17/28U	2,774	2,069	4,843	2,393	7.1	13.8



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Note) All dimensions and weight are approximate value and subject to change without prior notice.

This type of engine is optimized as planning products.

1. Optimized capacity for front module (pump, cooler, filter, valve, etc) .
2. Only 6cyl. for pump cover.
3. Optimized design for crankshaft, engine module.
4. Reducing of weight, simplification, etc.

Bore: 210 mm, Stroke: 320 mm

Main Data

Speed	720 rpm		750 rpm		900 rpm		1000 rpm	
Frequency	60 Hz		50 Hz		60 Hz		50 Hz	
	Eng. kW	Gen. kW	Eng. kW	Gen. kW	Eng. kW	Gen. kW	Eng. kW	Gen. kW
5H21/32	800	752	800	752	960	910	-	-
6H21/32	960	902	960	902	1,200	1,140	1,200	1,140
7H21/32	1,120	1,064	1,120	1,064	1,400	1,330	1,400	1,330
8H21/32	1,280	1,216	1,280	1,216	1,600	1,520	1,600	1,520
9H21/32	1,440	1,368	1,440	1,368	1,800	1,710	1,800	1,710

Based on alternator efficiency of 94~95%.

Specific Fuel Oil Consumption at Engine

Load	720 rpm	750 rpm	900 rpm	1000 rpm
100%	**182 g/kWh**	**182 g/kWh**	**183 g/kWh**	**185 g/kWh**

Exceptionally, 5H21/32 × 900 rpm is 190 g/kWh

Main Data (for Higher Power Rating)

Speed	720 rpm		750 rpm		900 rpm		1000 rpm	
Frequency	60 Hz		50 Hz		60 Hz		50 Hz	
	Eng. kW	Gen. kW	Eng. kW	Gen. kW	Eng. kW	Gen. kW	Eng. kW	Gen. kW
6H21/32	1,050	987	1,050	987	1,320	1,254	1,320	1,254
7H21/32	1,225	1,164	1,225	1,164	1,540	1,463	1,540	1,463
8H21/32	1,400	1,330	1,400	1,330	1,760	1,672	1,760	1,672
9H21/32	1,575	1,496	1,575	1,496	1,980	1,881	1,980	1,881

Based on alternator efficiency of 94~95%.

Specific Fuel Oil Consumption at Engine (for Higher Power Rating)

Load	720 rpm	750 rpm	900 rpm	1000 rpm
100%	**184 g/kWh**	**184 g/kWh**	**185 g/kWh**	**187 g/kWh**

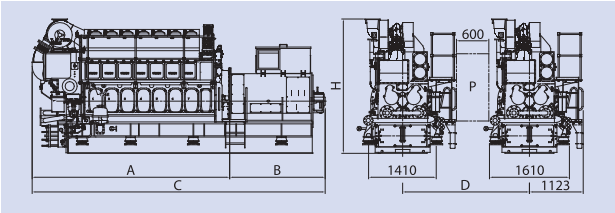
Specific Lubricating Oil Consumption

Lub. Oil: 0.6 g/kWh

Dimensions

720 / 750 rpm	Cyl.	Dimension(mm)				Dry Mass(ton)	
		A	B 1)	C 1)	H	Engine 2)	GenSet 1),3)
	5	3,405	1,926	5,331	2,712	14.0	22.4
	6	3,781	1,977	5,758	2,712	15.6	23.5
	7	4,111	1,977	6,088	2,781	17.1	26.5
	8	4,453	2,175	6,628	2,781	18.5	29.1
	9	4,783	2,265	7,048	2,911	19.9	31.7

900 / 1000 rpm	Cyl.	Dimension(mm)				Dry Mass(ton)	
		A	B 1)	C 1)	H	Engine 2)	GenSet 1),3)
	5	3,411	2,097	5,508	2,712	13.4	22.9
	6	3,781	1,977	5,758	2,781	15.1	26.1
	7	4,235	1,977	6,212	2,781	16.7	28.6
	8	4,453	2,175	6,628	2,911	18.4	29.1
	9	4,783	2,265	7,048	2,911	19.8	31.7



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P: Free passage between the engines, width 600 mm and height 2,000 mm.
Note) All dimensions and weight are approximate value and subject to change without prior notice.

Bore: 250 mm, Stroke: 330 mm

Main Data

Speed	720 rpm		750 rpm		900 rpm		1000 rpm	
Frequency	60 Hz		50 Hz		60 Hz		50 Hz	
	Eng. kW	Gen. kW	Eng. kW	Gen. kW	Eng. kW	Gen. kW	Eng. kW	Gen. kW
6H25/33	1,440	1,368	1,500	1,425	1,800	1,710	1,800	1,710
7H25/33	1,680	1,596	1,750	1,663	2,100	1,995	2,100	1,995
8H25/33	1,920	1,824	2,000	1,900	2,400	2,280	2,400	2,280
9H25/33	2,160	2,052	2,250	2,138	2,700	2,565	2,700	2,565

Based on alternator efficiency of 95%.

Specific Fuel Oil Consumption at Engine

Load	720 rpm	750 rpm	900 rpm	1000 rpm
100%	**180 g/kWh**	**180 g/kWh**	**181 g/kWh**	**181 g/kWh**

Main Data (for Higher Power Rating)

Speed	720 rpm		750 rpm		900 rpm		1000 rpm	
Frequency	60 Hz		50 Hz		60 Hz		50 Hz	
	Eng. kW	Gen. kW	Eng. kW	Gen. kW	Eng. kW	Gen. kW	Eng. kW	Gen. kW
6H25/33	1,560	1,482	1,650	1,568	1,890	1,796	1,980	1,881
7H25/33	1,820	1,729	1,925	1,829	2,205	2,095	2,310	2,195
8H25/33	2,080	1,976	2,200	2,090	2,520	2,394	2,640	2,508
9H25/33	2,340	2,223	2,475	2,351	2,835	2,693	2,970	2,822

Based on alternator efficiency of 95%.

Specific Fuel Oil Consumption at Engine (for Higher Power Rating)

Load	720 rpm	750 rpm	900 rpm	1000 rpm
100%	**182 g/kWh**	**182 g/kWh**	**183 g/kWh**	**183 g/kWh**

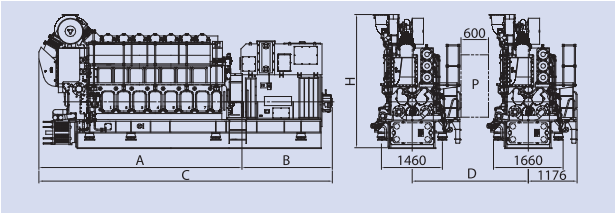
Specific Lubricating Oil Consumption

Lub. Oil: 0.6 g/kWh

Dimensions

720 / 750 rpm	Cyl.	Dimension(mm)				Dry Mass(ton)	
		A	B 1)	C 1)	H	Engine 2)	GenSet 1),3)
	6	4,414	2,262	6,676	2,961	20.2	29.8
	7	4,794	2,262	7,056	2,961	22.5	33.9
	8	5,311	2,262	7,573	3,241	24.1	39.5
	9	5,691	2,262	7,953	3,371	26.2	45.0

900 / 1000 rpm	Cyl.	Dimension(mm)				Dry Mass(ton)	
		A	B 1)	C 1)	H	Engine 2)	GenSet 1),3)
	6	4,414	2,262	6,676	2,961	20.2	29.8
	7	4,794	2,262	7,056	3,241	22.5	33.9
	8	5,311	2,340	7,651	3,371	24.1	39.5
	9	5,691	2,490	8,181	3,371	26.2	45.0



Remarks

1) Depending on alternator.
2) Without common base frame.
3) With common base frame & alternator (Maker: HHI-EES).

D: Min. distance between engines 2,844mm (with gallery).
P: Free passage between the engines, width 600 mm and height 2,000 mm.
Note) All dimensions and weight are approximate value and subject to change without prior notice.

Bore: 250 mm, Stroke: 330 mm

Main Data

Speed	900 rpm		1000 rpm	
Frequency	60 Hz		50 Hz	
	Eng. kW	Gen. kW	Eng. kW	Gen. kW
12H25/33V	4,080	3,917	4,080	3,917
14H25/33V	4,760	4,570	4,760	4,570
16H25/33V	5,440	5,222	5,440	5,222
18H25/33V	6,120	5,875	6,120	5,875
20H25/33V	6,800	6,528	6,800	6,528

Based on alternator efficiency of 96%.

Specific Fuel Oil Consumption at Engine

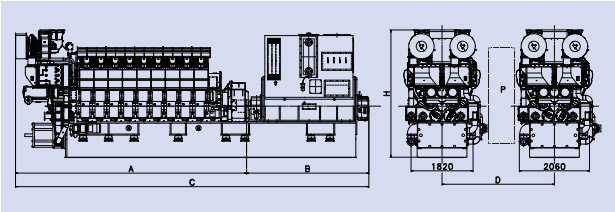
Load	900 rpm	1000 rpm
100%	**183 g/kWh**	**183 g/kWh**

Specific Lubricating Oil Consumption

Lub. Oil: 0.6 g/kWh

Dimensions

900 / 1000 rpm	Cyl.	Dimension(mm)				Dry Mass(ton)	
		A	B 1)	C 1)	H	Engine 2)	GenSet 1),3)
	12	5,524	3,334	8,858	3,750	33.5	58.2
	14	5,944	3,504	9,448	3,750	36.5	63.4
	16	6,364	3,682	10,046	3,750	39.5	69.6
	18	6,784	3,772	10,556	3,750	42.5	77.5
	20	7,204	3,727	10,931	3,750	45.5	79.5



Remarks

1) Depending on alternator.
2) Without common base frame.
3) With common base frame & alternator (Maker: HHI-EES).

D: Min. distance between engines 3,840 mm (with gallery).
P: Free passage between the engines, width 600 mm and height 2,000 mm.
Note) All dimensions and weight are approximate value and subject to change without prior notice.

Bore: 320 mm, Stroke: 400 mm

Main Data

Speed	720 rpm		750 rpm	
Frequency	60 Hz		50 Hz	
	Eng. kW	Gen. kW	Eng. kW	Gen. kW
6H32/40	3,000	2,880	3,000	2,880
7H32/40	3,500	3,360	3,500	3,360
8H32/40	4,000	3,840	4,000	3,840
9H32/40	4,500	4,320	4,500	4,320

Based on alternator efficiency of 96%.

Specific Fuel Oil Consumption at Engine

Load	720 rpm	750 rpm
100%	**179 g/kWh**	**181 g/kWh**

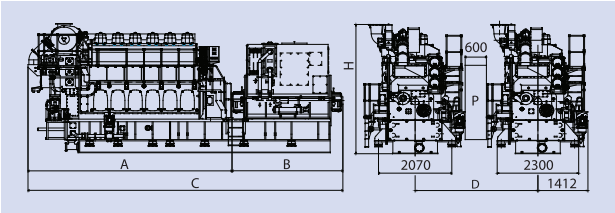
Specific Lubricating Oil Consumption

Lub. Oil: 0.7 g/kWh

Dimensions

720 rpm	Cyl.	Dimension(mm)				Dry Mass(ton)	
		A	B 1)	C 1)	H	Engine 2)	GenSet 1),3)
	6	5,760	3,130	8,890	3,959	33.7	68.6
	7	6,112	3,374	9,486	4,130	38.6	77.1
	8	6,602	3,594	10,196	4,130	41.5	82.0
	9	7,092	4,097	11,189	4,130	44.6	89.1

750 rpm	Cyl.	Dimension(mm)				Dry Mass(ton)	
		A	B 1)	C 1)	H	Engine 2)	GenSet 1),3)
	6	5,760	3,130	8,890	3,959	33.7	68.6
	7	6,112	3,374	9,486	4,130	38.6	77.1
	8	6,602	3,594	10,196	4,130	41.5	82.0
	9	7,092	4,097	11,189	4,130	44.6	89.1



Remarks

1) Depending on alternator.
2) Without common base frame.
3) With common base frame & alternator (Maker: HHI-EES).

D: Min. distance between engines 3,408 mm (with gallery).
P: Free passage between the engines, width 600 mm and height 2,000 mm.
Note) All dimensions and weight are approximate value and subject to change without prior notice.

Bore: 320 mm, Stroke: 400 mm

Main Data

Speed	720 rpm		750 rpm	
Frequency	60 Hz		50 Hz	
	Eng. kW	Gen. kW	Eng. kW	Gen. kW
12H32/40V	6,000	5,760	6,000	5,760
14H32/40V	7,000	6,720	7,000	6,720
16H32/40V	8,000	7,680	8,000	7,680
18H32/40V	9,000	8,640	9,000	8,640
20H32/40V	10,000	9,600	10,000	9,600

Based on alternator efficiency of 96%.

Specific Fuel Oil Consumption at 100 % Engine Load

Load	720 rpm	750 rpm
100%	**179 g/kWh**	**181 g/kWh**

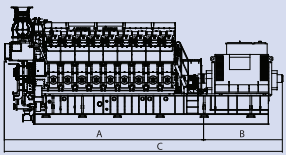
Specific Lubricating Oil Consumption

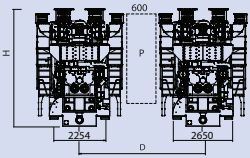
Lub. Oil: 0.7 g/kWh

Dimensions

720 rpm	Cyl.	Dimension(mm)				Dry Mass(ton)	
		A	B 1)	C 1)	H	Engine 2)	GenSet 1),3)
	12	6,624	3,760	10,384	4,723	56.0	108.8
	14	7,295	3,860	11,155	4,723	63.3	121.3
	16	7,914	3,479	11,393	4,723	69.1	130.9
	18	8,585	3,859	12,444	4,794	76.3	141.2
	20	9,344	3,659	13,003	4,794	84.0	153.9

750 rpm	Cyl.	Dimension(mm)				Dry Mass(ton)	
		A	B 1)	C 1)	H	Engine 2)	GenSet 1),3)
	12	6,624	3,760	10,384	4,723	56.0	108.8
	14	7,295	3,860	11,155	4,723	63.3	121.3
	16	7,914	3,479	11,393	4,723	69.1	130.9
	18	8,585	3,859	12,444	4,794	76.3	141.2
	20	9,344	3,659	13,003	4,794	84.0	153.9





Remarks

1) Depending on alternator.
2) Without common base frame.
3) With common base frame & alternator (Maker: HHI-EES).

D: Min. distance between engines 4,405 mm (with gallery).
P: Free passage between the engines, width 600 mm and height 2,000 mm.
Note) All dimensions and weight are approximate value and subject to change without prior notice.

HiMSEN...

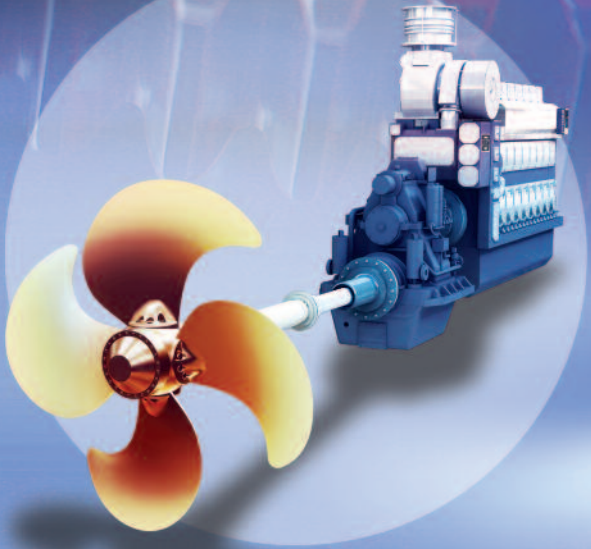
The best solution for all types of marine vessels and offshore applications with proven reliability, low emission, low operation cost, multi-fuel capability...

Our extensive R&D facilities enable HHI to provide the customers with high quality and excellent services in all phases of designing, production, assembly and commissioning of HiMSEN propulsion packaged system.

Marine Propulsion System

Power Range

H21/32P	1,200~1,800 kW
H25/33P	1,740~2,610 kW
H32/40P	2,880~4,320 kW / FPP 3,000~4,500 kW / CPP



Long Term Commitment...

To provide the market with reliable, cost effective and earth-friendly solution

Optimized Matching of HiMSEN Propulsion Package

- HiMSEN H21/32P, H25/33P and H32/40P engine
- C.P. /F.P. propeller with shafting
- Pitch and speed control
- Load control
- Reduction gear
- Shaft generator
- Auxiliary machinery

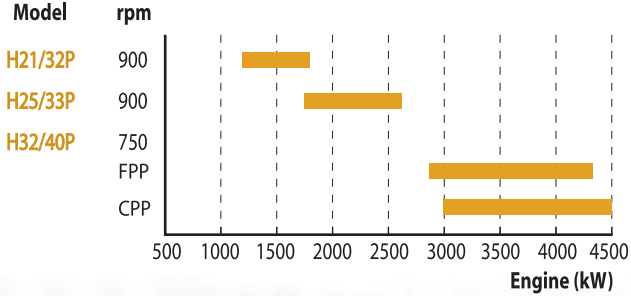
Application

- Controllable pitch propulsion
- Fixed pitch propulsion
- Azimuth thruster propulsion
- Pump drive

Excellent Performance of HiMSEN Propulsion Engine

- Improved transient operation with pulse charging turbocharger
- Invisible smoke with pulse charging turbocharger by part load matching
- Lower thermal load engine with lower exhaust gas temperature
- Low fuel consumption
- Low NOx emission

Marine Propulsion



Marine Propulsion System

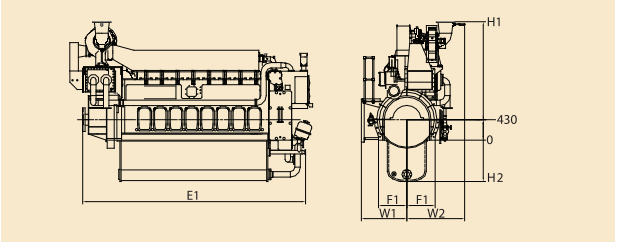
Bore: 210 mm, Stroke: 320 mm

Controllable Pitch Propeller

Permit high skew angles to minimize noise and vibration.

Fixed Pitch Propeller

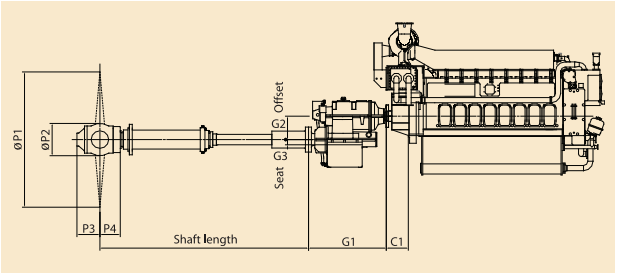
Guarantee optimum thrust, minimal noise and vibration level.



Dimensions

900 rpm	Cyl.	Rated Output at Engine(kW)	Engine dimension(mm) & dry weight(ton)						
			E1	H1	H2	F1	W1	W2	Dry Weight
	6	1,200	3,904	2,287	1,120	595	955	1,126	18.0
	8	1,600	4,634	2,541	1,300	595	955	1,214	21.0
	9	1,800	4,994	2,541	1,300	595	955	1,214	23.0

Specific Fuel Oil Consumption at 100 % Engine Load: 183 g/kWh



Marine Propulsion System

Bore: 210 mm, Stroke: 320 mm

Engine Type	CPP Package System	Gear ratio	Propeller speed	Propeller Diameter (without nozzle) P1(mm)		
	Type	(i:1)	(rpm)	Optim.	Min	Max
6H21/32P 900 rpm 1200 kW	ACG 52/450	3.22	279.5	2,300	2,200	2,400
	ACG 52/450	3.38	258.6	2,400	2,300	2,500
	ACG 56/450	3.76	239.4	2,500	2,400	2,600
	ACG 56/450	4.03	223.3	2,550	2,450	2,650
	ACG 56/450	4.17	215.8	2,600	2,500	2,700
8H21/32P 900 rpm 1600 kW	ACG 56/450	3.22	279.5	2,450	2,350	2,550
	ACG 56/450	3.48	258.6	2,550	2,450	2,650
	ACG 62/450	3.76	239.4	2,650	2,550	2,750
	ACG 62/525	3.95	227.8	2,750	2,650	2,850
	ACG 62/525	4.22	213.3	2,800	2,700	2,900
9H21/32P 900 rpm 1800 kW	ACG 62/525	3.16	284.8	2,450	2,350	2,550
	ACG 62/525	3.40	264.7	2,600	2,500	2,700
	ACG 62/525	3.66	245.9	2,700	2,600	2,800
	ACG 62/525	3.95	277.85	2,800	2,700	2,900
	ACG 62/525	4.22	213.27	2,900	2,800	3,000

Engine Type	Hub Dimension (mm)			Gear box & coupling dimension(mm) & dry weight(kg)				
	P2	P3	P4	G1	G2	G3	C1	Dry Weight
6H21/32P 900 rpm 1200 kW	520	367	327	1,493	450	100	396	3,284
	520	367	327	1,493	450	100	396	3,284
	560	410	228	1,493	450	100	396	3,284
	560	410	228	1,493	450	100	396	3,284
	560	410	228	1,493	450	100	396	3,284
8H21/32P 900 rpm 1600 kW	560	410	228	1,493	450	100	420	3,321
	560	410	228	1,493	450	100	420	3,321
	620	441	254	1,493	450	100	420	3,321
	620	441	254	1,727	525	105	420	4,521
	620	441	254	1,727	525	105	420	4,521
9H21/32P 900 rpm 1800 kW	620	441	254	1,727	525	105	470	4,582
	620	441	254	1,727	525	105	470	4,582
	620	441	254	1,727	525	105	470	4,582
	620	441	254	1,727	525	105	470	4,582
	620	441	254	1,727	525	105	470	4,582

Remarks: Typical ship parameters, Speed: 16.0 knots

Marine Propulsion System

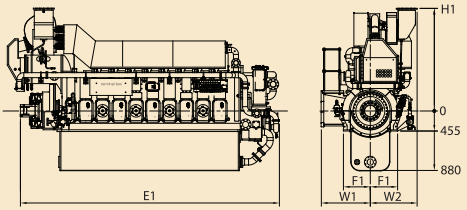
Bore: 250 mm, Stroke: 330 mm

Controllable Pitch Propeller

Permit high skew angles to minimize noise and vibration.

Fixed Pitch Propeller

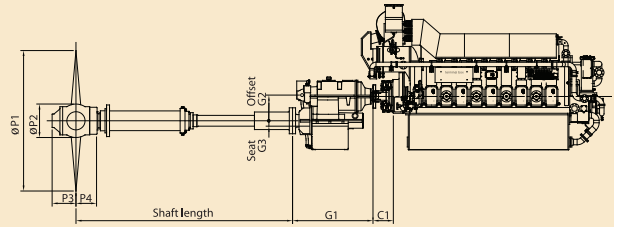
Guarantee optimum thrust, minimal noise and vibration level.



Dimensions

900 rpm	Cyl.	Rated Output at Engine(kW)	Engine dimension(mm) & dry weight(ton)					
			E1	H1	F1	W1	W2	Dry Weight
	6	1,740	3,830	1,924	610	1,035	1,073	23.0
	8	2,320	4,590	2,331	610	1,035	1,073	26.9
	9	2,610	4,970	2,331	610	1,035	1,073	29.3

Specific Fuel Oil Consumption at 100 % Engine Load: 181 g/kWh



Engine Type	CPP Package System	Gear ratio	Propeller speed	Propeller Diameter (without nozzle) P1(mm)		
	Type	(i:1)	(rpm)	Optim.	Min	Max
6H25/33P 900 rpm 1740 kW	ACG 56/450	3.15	286	2,450	2,350	2,550
	ACG 62/450	3.49	258	2,600	2,500	2,700
	ACG 62/450	3.65	247	2,650	2,550	2,750
	ACG 62/525	3.95	228	2,750	2,650	2,850
	ACG 62/525	4.22	213	2,850	2,750	2,950
8H25/33P 900 rpm 2320 kW	ACG 62/525	3.16	285	2,600	2,500	2,700
	ACG 68/525	3.40	265	2,700	2,600	2,800
	ACG 68/525	3.66	246	2,850	2,750	2,950
	ACG 68/600	3.95	228	2,950	2,850	3,050
	ACG 68/600	4.24	212	3,050	2,950	3,150
9H25/33P 900 rpm 2610 kW	ACG 68/525	3.16	285	2,650	2,550	2,750
	ACG 68/525	3.40	265	2,800	2,700	2,900
	ACG 68/600	3.65	247	2,900	2,800	3,000
	ACG 75/600	3.95	228	3,050	2,950	3,150
	ACG 75/600	4.24	212	3,150	3,050	3,250

Engine Type	Hub Dimension (mm)			Gear box & coupling dimension(mm) & dry weight(kg)				
	P2	P3	P4	G1	G2	G3	C1	Dry Weight
6H25/33P 900 rpm 1740 kW	560	410	228	1,493	450	100	470	3,382
	620	441	254	1,493	450	100	470	3,382
	620	441	254	1,493	450	100	470	3,382
	620	441	254	1,727	525	105	470	4,582
	620	441	254	1,727	525	105	470	4,582
8H25/33P 900 rpm 2320 kW	620	441	254	1,727	525	105	500	4,658
	695	530	442	1,727	525	105	500	4,658
	695	530	442	1,727	525	105	500	4,658
	695	530	442	1,970	600	200	500	6,858
	695	530	442	1,970	600	200	500	6,858
9H25/33P 900 rpm 2610 kW	695	530	442	1,727	525	105	500	4,658
	695	530	442	1,727	525	105	500	4,658
	695	530	442	1,970	600	200	500	6,858
	765	580	478	1,970	600	200	500	6,858
	765	580	478	1,970	600	200	500	6,858

Remarks: Typical ship parameters, Speed: 16.0 knots

Marine Propulsion System

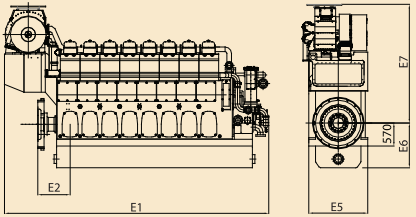
Bore: 320 mm, Stroke: 400 mm

Controllable Pitch Propeller

Permit high skew angles to minimize noise and vibration.

Fixed Pitch Propeller

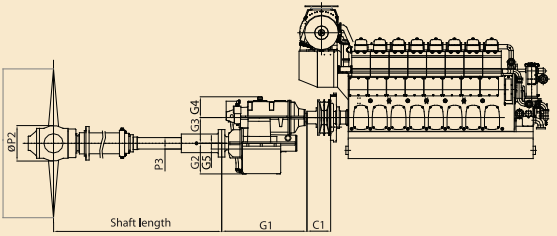
Guarantee optimum thrust, minimal noise and vibration level.



Dimensions

750 rpm	Cyl.	Engine dimension(mm) & dry weight(ton)					
		E1	E2	E5	E6	E7	Dry Weight
	6	5,515	800	1,460	1,110	3,295	35.7
	8	6,545	800	1,460	1,110	3,495	43.5
	9	7,085	800	1,460	1,110	3,495	46.6

Specific Fuel Oil Consumption at 100 % Engine Load: 181 g/kWh



Marine Propulsion System

Bore: 320 mm, Stroke: 400 mm

Engine Type Rated Output at Engine(kW)	CPP Package System		Gear ratio	Propeller speed	Propeller & Hub Dimension(mm)		
	Gear box model vertical offset	Hub model	n: 1	rpm	P1	P2	P3
6H32/40P **750 rpm** **2,880 kW / FPP** **3,000 kW / CPP**	ACG750	ECP85	4.65	155	3,900	865	280
8H32/40P **750 rpm** **3,840 kW / FPP** **4,000 kW / CPP**	ACG950	ECP105	5.33	135	4,400	1,065	330
9H32/40P **750 rpm** **4,320 kW / FPP** **4,500 kW / CPP**	ACG950	ECP105	5.76	125	4,800	1,065	330

Engine Type Rated Output at Engine(kW)	Gear box & coupling dimension(mm) & dry weight(kg)							Typical Vessel(DWT)
	G1	G2	G3	G4	G5	C1	Gear Dry weight	14 knots
6H32/40P **750 rpm** **2,880 kW / FPP** **3,000 kW / CPP**	2,710	850	750	540	220	622	13,000	7,000 ton Tanker
8H32/40P **750 rpm** **3,840 kW / FPP** **4,000 kW / CPP**	2,710	1,030	950	540	220	622	16,500	9,000 ton Tanker
9H32/40P **750 rpm** **4,320 kW / FPP** **4,500 kW / CPP**	2,710	1,030	950	540	220	690	16,500	10,000 ton Tanker

Remarks: Typical ship parameters, Speed: 14.0 knots

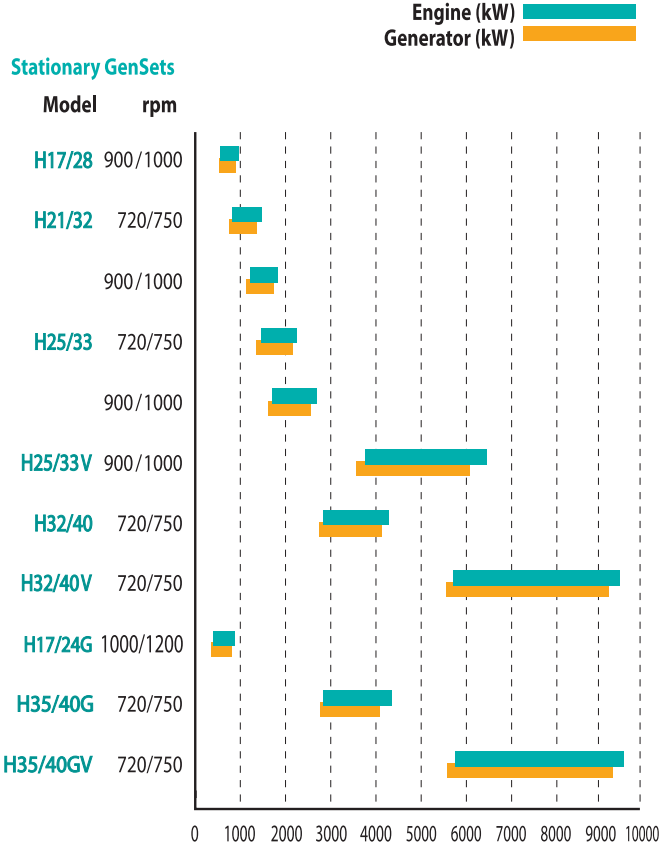
Stationary GenSets

Power Range

H17/28	575~960 kW
H21/32	800~1,800 kW
H25/33	1,440~2,700 kW
H25/33V	3,840~6,400 kW
H32/40	2,850~4,275 kW
H32/40V	5,700~9,500 kW
H17/24G	455~880 kW
H35/40G	2,880~4,320 kW
H35/40GV	5,760~9,600 kW

20 MW HiMSEN Engine Diesel Power Plant (9H25/33 x 8 Sets)

Stationary GenSets



Stationary GenSets

Bore: 170 mm, Stroke: 280 mm

Main Data

Speed	900 rpm		1000 rpm	
Frequency	60 Hz		50 Hz	
	Eng. kW	Gen. kW	Eng. kW	Gen. kW
5H17/28	575	538	600	561
6H17/28	690	645	720	673
7H17/28	805	757	840	790
8H17/28	920	865	960	902

Based on alternator efficiency of 93.5~94%.

Specific Fuel Oil Consumption at Engine

Load	900 rpm	1000 rpm
100%	**189 g/kWh**	**189 g/kWh**

Heat Rate

Load	Unit	900 rpm	1000 rpm
100%	**kJ/kWh$_m$**	**8,070**	
	kJ/kWh$_e$	**8,631**	

Based on alternator efficiency 93.5%.

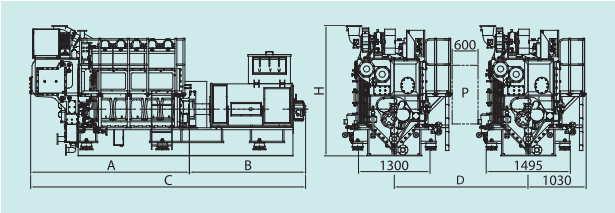
Specific Lubricating Oil Consumption

Lub. Oil: 0.6 g/kWh

Dimensions

900 rpm	Cyl.	Dimension(mm)				Dry Mass(ton)	
		A	B 1)	C 1)	H	Engine 2)	GenSet 1),3)
	5	2,791	2,200	4,991	2,314	7.7	13.6
	6	3,071	2,200	5,271	2,314	8.5	14.5
	7	3,351	2,200	5,551	2,314	9.4	15.6
	8	3,631	2,320	5,951	2,314	10.4	16.7

1000 rpm	Cyl.	Dimension(mm)				Dry Mass(ton)	
		A	B 1)	C 1)	H	Engine 2)	GenSet 1),3)
	5	2,791	2,200	4,991	2,314	7.7	13.6
	6	3,071	2,200	5,271	2,314	8.5	14.5
	7	3,351	2,200	5,551	2,314	9.4	15.6
	8	3,631	2,320	5,951	2,314	10.4	16.7



Remarks

1) Depending on alternator.
2) Without common base frame.
3) With common base frame & alternator (Maker: HHI-EES).

D: Min. distance between engines 2,552 mm (with gallery).
P: Free passage between the engines, width 600 mm and height 2,000 mm.
Note) All dimensions and weight are approximate value and subject to change without prior notice.

Stationary GenSets

HYUNDAI-HiMSEN

Bore: 210 mm, Stroke: 320 mm

Main Data

Speed	720 rpm		750 rpm		900 rpm		1000 rpm	
Frequency	60 Hz		50 Hz		60 Hz		50 Hz	
	Eng. kW	Gen. kW	Eng. kW	Gen. kW	Eng. kW	Gen. kW	Eng. kW	Gen. kW
5H21/32	800	752	800	752	960	910	-	-
6H21/32	960	902	960	902	1,200	1,140	1,200	1,140
7H21/32	1,120	1,064	1,120	1,064	1,400	1,330	1,400	1,330
8H21/32	1,280	1,216	1,280	1,216	1,600	1,520	1,600	1,520
9H21/32	1,440	1,368	1,440	1,368	1,800	1,710	1,800	1,710

Based on alternator efficiency of 94~95%.

Specific Fuel Oil Consumption at Engine

Load	720 rpm	750 rpm	900 rpm	1000 rpm
100%	**182 g/kWh**	**182 g/kWh**	**183 g/kWh**	**185 g/kWh**

Exceptionally, 5H21/32 × 900 rpm is 190 g/kWh.

Heat Rate

Load	Unit	720rpm	750 rpm	900rpm	1000 rpm
100%	**kJ/kWh$_m$**	**7,771**	**7,771**	**7,814**	**7,899**
	kJ/kWh$_e$	**8,267**	**8,267**	**8,313**	**8,404**

Based on alternator efficiency 94%.

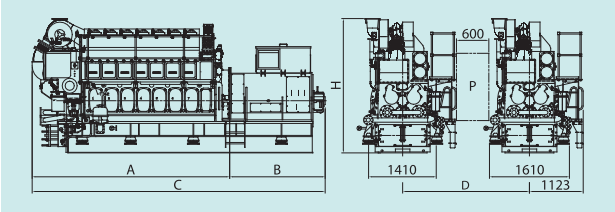
Specific Lubricating Oil Consumption

Lub. Oil: 0.6 g/kWh

Dimensions

720 / 750 rpm	Cyl.	Dimension(mm)				Dry Mass(ton)	
		A	B 1)	C 1)	H	Engine 2)	GenSet 1),3)
	5	3,405	1,926	5,331	2,712	14.0	22.4
	6	3,781	1,977	5,758	2,712	15.6	23.5
	7	4,111	1,977	6,088	2,781	17.1	26.5
	8	4,453	2,175	6,628	2,781	18.5	29.1
	9	4,783	2,265	7,048	2,911	19.9	31.7

900 / 1000 rpm	Cyl.	Dimension(mm)				Dry Mass(ton)	
		A	B 1)	C 1)	H	Engine 2)	GenSet 1),3)
	5	3,411	2,097	5,508	2,712	13.4	22.9
	6	3,781	1,977	5,758	2,781	15.1	26.1
	7	4,235	1,977	6,212	2,781	16.7	28.6
	8	4,453	2,175	6,628	2,911	18.4	29.1
	9	4,783	2,265	7,048	2,911	19.8	31.7



Remarks

1) Depending on alternator.
2) Without common base frame.
3) With common base frame & alternator (Maker: HHI-EES).

D: Min. distance between engines 2,613 mm (with gallery).
P: Free passage between the engines, width 600 mm and height 2,000 mm.
Note) All dimensions and weight are approximate value and subject to change without prior notice.

Stationary GenSets

Bore: 250 mm, Stroke: 330 mm

Main Data

Speed	720 rpm		750 rpm		900 rpm		1000 rpm	
Frequency	60 Hz		50 Hz		60 Hz		50 Hz	
	Eng. kW	Gen. kW	Eng. kW	Gen. kW	Eng. kW	Gen. kW	Eng. kW	Gen. kW
6H25/33	1,440	1,368	1,500	1,425	1,740	1,653	1,800	1,710
7H25/33	1,680	1,596	1,750	1,663	2,030	1,929	2,100	1,995
8H25/33	1,920	1,824	2,000	1,900	2,320	2,204	2,400	2,280
9H25/33	2,160	2,052	2,250	2,138	2,610	2,480	2,700	2,565

Based on alternator efficiency of 95%.

Specific Fuel Oil Consumption at Engine

Load	720 rpm	750 rpm	900 rpm	1000 rpm
100%	**180 g/kWh**	**180 g/kWh**	**181 g/kWh**	**181 g/kWh**

Heat Rate

Load	Unit	720 / 750 rpm	900 / 1000 rpm
100%	**kJ/kWh$_m$**	**7,686**	**7,729**
	kJ/kWh$_e$	**8,090**	**8,135**

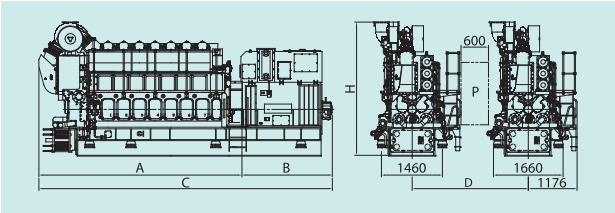
Specific Lubricating Oil Consumption

Lub. Oil: 0.6 g/kWh

Dimensions

720 / 750 rpm	Cyl.	Dimension(mm)				Dry Mass(ton)	
		A	B 1)	C 1)	H	Engine 2)	GenSet 1),3)
	6	4,414	2,262	6,676	2,961	20.2	29.8
	7	4,794	2,262	7,056	2,961	22.5	33.9
	8	5,311	2,262	7,573	3,241	24.1	39.5
	9	5,691	2,262	7,953	3,371	26.2	45.0

900 / 1000 rpm	Cyl.	Dimension(mm)				Dry Mass(ton)	
		A	B 1)	C 1)	H	Engine 2)	GenSet 1),3)
	6	4,414	2,262	6,676	2,961	20.2	29.8
	7	4,794	2,262	7,056	3,241	22.5	33.9
	8	5,311	2,340	7,651	3,371	24.1	39.5
	9	5,691	2,490	8,181	3,371	26.2	45.0



Remarks

1) Depending on alternator.
2) Without common base frame.
3) With common base frame & alternator (Maker: HHI-EES).

D: Min. distance between engines 2,844mm (with gallery).
P: Free passage between the engines, width 600 mm and height 2,000 mm.
Note) All dimensions and weight are approximate value and subject to change without prior notice.

Stationary GenSets

Bore: 250 mm, Stroke: 330 mm

Main Data

Speed	900 rpm		1000 rpm	
Frequency	60 Hz		50 Hz	
	Eng. kW	Gen. kW	Eng. kW	Gen. kW
12H25/33V	3,840	3,648	3,840	3,648
14H25/33V	4,480	4,256	4,480	4,256
16H25/33V	5,120	4,864	5,120	4,864
18H25/33V	5,760	5,472	5,760	5,472
20H25/33V	6,400	6,080	6,400	6,080

Based on alternator efficiency of 96%.

Specific Fuel Oil Consumption at Engine

Load	900 rpm	1000 rpm
100%	**183 g/kWh**	**183 g/kWh**

Heat Rate

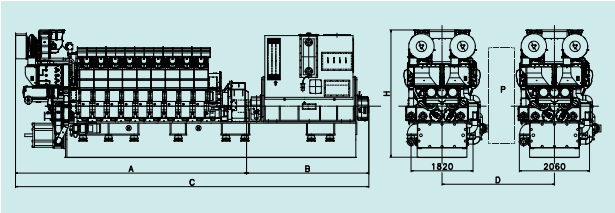
Load	Unit	900 rpm	1000 rpm
100%	**kJ/kWh$_m$**	**7,729**	
	kJ/kWh$_e$	**8,135**	

Specific Lubricating Oil Consumption

Lub. Oil: 0.6 g/kWh

Dimensions

900 / 1000 rpm	Cyl.	Dimension(mm)				Dry Mass(ton)	
		A	B 1)	C 1)	H	Engine 2)	GenSet 1),3)
	12	5,524	3,334	8,858	3,750	33.5	58.2
	14	5,944	3,504	9,448	3,750	36.5	63.4
	16	6,364	3,682	10,046	3,750	39.5	69.6
	18	6,784	3,772	10,556	3,750	42.5	77.5
	20	7,204	3,727	10,931	3,750	45.5	79.5



Remarks

1) Depending on alternator.
2) Without common base frame.
3) With common base frame & alternator (Maker: HHI-EES).

D: Min. distance between engines 3,840 mm (with gallery).
P: Free passage between the engines, width 600 mm and height 2,000 mm.
Note) All dimensions and weight are approximate value and subject to change without prior notice.

Stationary GenSets

Bore: 320 mm, Stroke: 400 mm

Main Data

Speed	720 rpm		750 rpm	
Frequency	60 Hz		50 Hz	
	Eng. kW	Gen. kW	Eng. kW	Gen. kW
6H32/40	2,850	2,750	2,850	2,750
7H32/40	3,325	3,209	3,325	3,209
8H32/40	3,800	3,667	3,800	3,667
9H32/40	4,275	4,125	4,275	4,125

1) Based on alternator efficiency of 96.5%.
2) In case of diesel oil (Distillate Fuels ISO 8217 DM Grade) operation continuously, 500 kW/cyl, is available.

Specific Fuel Oil Consumption at Engine

Load	720 rpm	750 rpm
100%	**178 g/kWh**	**180 g/kWh**

Heat Rate

Load	Unit	720 rpm	750 rpm
100%	**kJ/kWh$_m$**	**7,600**	**7,686**
	kJ/kWh$_e$	**7,876**	**7,965**

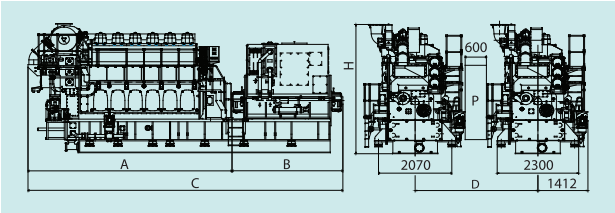
Specific Lubricating Oil Consumption

Lub. Oil: 0.7 g/kWh

Dimensions

720 rpm	Cyl.	Dimension(mm)				Dry Mass(ton)	
		A	B 1)	C 1)	H	Engine 2)	GenSet 1),3)
	6	5,760	3,130	8,890	3,959	33.7	68.6
	7	6,112	3,374	9,486	4,130	38.6	77.1
	8	6,602	3,594	10,196	4,130	41.5	82.0
	9	7,092	4,097	11,189	4,130	44.6	89.1

750 rpm	Cyl.	Dimension(mm)				Dry Mass(ton)	
		A	B 1)	C 1)	H	Engine 2)	GenSet 1),3)
	6	5,760	3,130	8,890	3,959	33.7	68.6
	7	6,112	3,374	9,486	4,130	38.6	77.1
	8	6,602	3,594	10,196	4,130	41.5	82.0
	9	7,092	4,097	11,189	4,130	44.6	89.1



Remarks

1) Depending on alternator.
2) Without common base frame.
3) With common base frame & alternator (Maker: HHI-EES).

D: Min. distance between engines 3,408 mm (with gallery).
P: Free passage between the engines, width 600 mm and height 2,000 mm.
Note) All dimensions and weight are approximate value and subject to change without prior notice.

Stationary GenSets

Bore: 320 mm, Stroke: 400 mm

Main Data

Speed	720 rpm		750 rpm	
Frequency	60 Hz		50 Hz	
	Eng. kW	Gen. kW	Eng. kW	Gen. kW
12H32/40V	5,700	5,529	5,700	5,529
14H32/40V	6,650	6,450	6,650	6,450
16H32/40V	7,600	7,372	7,600	7,372
18H32/40V	8,550	8,243	8,550	8,243
20H32/40V	9,500	9,215	9,500	9,215

1) Based on alternator efficiency of 97%.
2) In case of diesel oil (Distillate Fuels ISO 8217 DM Grade) operation continuously, 500 kW/cyl, is available.

Specific Fuel Oil Consumption at Engine

Load	720 rpm	750 rpm
100%	**179 g/kWh**	**181 g/kWh**

Heat Rate

Load	Unit	720 rpm	750 rpm
100%	**kJ/kWh$_m$**	**7,643**	**7,729**
	kJ/kWh$_e$	**7,880**	**7,968**

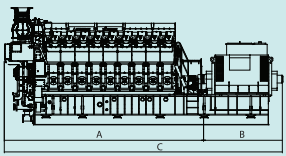
Specific Lubricating Oil Consumption

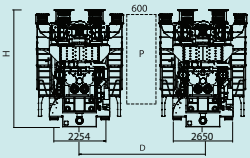
Lub. Oil: 0.7 g/kWh

Dimensions

720 rpm	Cyl.	Dimension(mm)				Dry Mass(ton)	
		A	B 1)	C 1)	H	Engine 2)	GenSet 1),3)
	12	6,624	3,760	10,384	4,723	56.0	108.8
	14	7,295	3,860	11,155	4,723	63.3	121.3
	16	7,914	3,479	11,393	4,723	69.1	130.9
	18	8,585	3,859	12,444	4,794	76.3	141.2
	20	9,344	3,659	13,003	4,794	84.0	153.9

750 rpm	Cyl.	Dimension(mm)				Dry Mass(ton)	
		A	B 1)	C 1)	H	Engine 2)	GenSet 1),3)
	12	6,624	3,760	10,384	4,723	56.0	108.8
	14	7,295	3,860	11,155	4,723	63.3	121.3
	16	7,914	3,479	11,393	4,723	69.1	130.9
	18	8,585	3,859	12,444	4,794	76.3	141.2
	20	9,344	3,659	13,003	4,794	84.0	153.9





Remarks

1) Depending on alternator.
2) Without common base frame.
3) With common base frame & alternator (Maker: HHI-EES).

D: Min. distance between engines 4,405 mm (with gallery).
P: Free passage between the engines, width 600 mm and height 2,000 mm.
Note) All dimensions and weight are approximate value and subject to change without prior notice.

Stationary GenSets

Bore: 170 mm, Stroke: 240 mm

Main Data

Speed	1000 rpm		1200 rpm	
Frequency	50 Hz		60 Hz	
	Eng. kW	Gen. kW	Eng. kW	Gen. kW
5H17/24G	455	428	550	517
6H17/24G	546	513	660	620
7H17/24G	637	599	770	724
8H17/24G	728	684	880	827

Based on alternator efficiency of 94%.

Heat Rate

Load	Unit	1000 rpm	1200 rpm
100%	kJ/kWh$_m$	8,746	
	kJ/kWh$_e$	9,305	

Fuel gas based on LNG, LCV 49,138 kJ/kg, Methane No. 73.

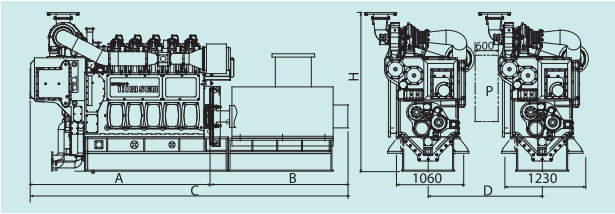
Specific Lubricating Oil Consumption

Lub. Oil: 0.3 g/kWh

Dimensions

1000 rpm	Cyl.	Dimension(mm)				Dry Mass(ton)	
		A	B 1)	C 1)	H	Engine 2)	GenSet 1),3)
	5	2,772	2,045	4,817	2,891	6.4	11.6
	6	3,052	2,045	5,097	2,891	7.2	13.4
	7	3,332	2,045	5,377	2,891	8.0	14.5
	8	3,612	2,045	5,657	2,958	8.8	15.6

1200 rpm	Cyl.	Dimension(mm)				Dry Mass(ton)	
		A	B 1)	C 1)	H	Engine 2)	GenSet 1),3)
	5	2,772	2,045	4,817	2,891	6.4	11.6
	6	3,052	2,045	5,097	2,891	7.2	13.4
	7	3,332	2,045	5,377	2,891	8.0	14.5
	8	3,612	2,045	5,657	2,958	8.8	15.6



Remarks

1) Depending on alternator.
2) Without common base frame.
3) With common base frame & alternator (Maker: HHI-EES).

D: Min. distance between engines 2,425 mm (with gallery).
P: Free passage between the engines, width 600 mm and height 2,000 mm.
Note) All dimensions and weight are approximate value and subject to change without prior notice.

Stationary GenSets

Bore: 350 mm, Stroke: 400 mm

Main Data

Speed	720 rpm		750 rpm	
Frequency	60 Hz		50 Hz	
	Eng. kW	Gen. kW	Eng. kW	Gen. kW
6H35/40G	2,880	2,765	2,880	2,765
7H35/40G	3,360	3,226	3,360	3,226
8H35/40G	3,840	3,686	3,840	3,686
9H35/40G	4,320	4,147	4,320	4,147

Based on alternator efficiency of 96%.

Heat Rate

Load	Unit	720 rpm	750 rpm
100%	kJ/kWh$_m$	7,370	
	kJ/kWh$_e$	7,676	

Fuel gas based on LNG, LCV 49,138 kJ/kg, Methane No. 73.

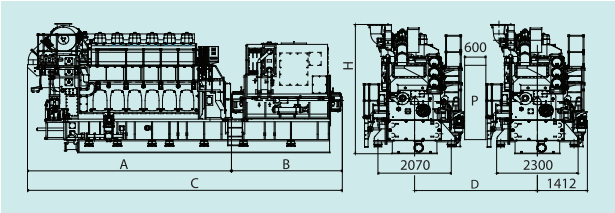
Specific Lubricating Oil Consumption

Lub. Oil: 0.4 g/kWh

Dimensions

720 rpm	Cyl.	Dimension(mm)				Dry Mass(ton)	
		A	B 1)	C 1)	H	Engine 2)	GenSet 1),3)
	6	5,760	3,130	9,900	3,759	33.7	68.6
	7	6,112	3,374	10,390	3,882	38.6	77.1
	8	6,602	3,594	11,175	4,132	41.5	82.0
	9	7,092	4,097	11,765	4,132	44.6	89.1

750 rpm	Cyl.	Dimension(mm)				Dry Mass(ton)	
		A	B 1)	C 1)	H	Engine 2)	GenSet 1),3)
	6	5,760	3,130	9,900	3,759	33.7	68.6
	7	6,112	3,374	10,390	3,882	38.6	77.1
	8	6,602	3,594	11,175	4,132	41.5	82.0
	9	7,092	4,097	11,765	4,132	44.6	89.1



Remarks

1) Depending on alternator.
2) Without common base frame.
3) With common base frame & alternator (Maker: HHI-EES).

D: Min. distance between engines 3,408 mm (with gallery).
P: Free passage between the engines, width 600 mm and height 2,000 mm.
Note) All dimensions and weight are approximate value and subject to change without prior notice.

Stationary GenSets

Bore: 350 mm, Stroke: 400 mm

Main Data

Speed	720 rpm		750 rpm	
Frequency	60 Hz		50 Hz	
	Eng. kW	Gen. kW	Eng. kW	Gen. kW
12H35/40GV	5,760	5,530	5,760	5,530
14H35/40GV	6,720	6,451	6,720	6,451
16H35/40GV	7,680	7,373	7,680	7,373
18H35/40GV	8,640	8,294	8,640	8,294
20H35/40GV	9,600	9,216	9,600	9,216

Based on alternator efficiency of 97%.

Heat Rate

Load	Unit	720 rpm	750 rpm
100%	**kJ/kWh$_m$**	**7,370**	
	kJ/kWh$_e$	**7,598**	

Fuel gas based on LNG, LCV 49,138 kJ/kg, Methane No. 73.

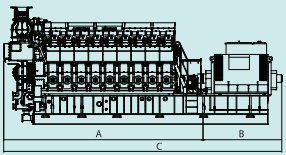
Specific Lubricating Oil Consumption

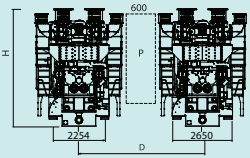
Lub. Oil: 0.4 g/kWh

Dimensions

720 rpm	Cyl.	Dimension(mm)				Dry Mass(ton)	
		A	B 1)	C 1)	H	Engine 2)	GenSet 1),3)
	12	6,624	3,760	10,384	4,723	56.0	108.8
	14	7,295	3,860	11,155	4,723	63.3	121.3
	16	7,914	3,479	11,393	4,723	69.1	130.9
	18	8,585	3,859	12,444	4,794	76.3	141.2
	20	9,344	3,659	13,003	4,794	84.0	153.9

750 rpm	Cyl.	Dimension(mm)				Dry Mass(ton)	
		A	B 1)	C 1)	H	Engine 2)	GenSet 1),3)
	12	6,624	3,760	10,384	4,723	56.0	108.8
	14	7,295	3,860	11,155	4,723	63.3	121.3
	16	7,914	3,479	11,393	4,723	69.1	130.9
	18	8,585	3,859	12,444	4,794	76.3	141.2
	20	9,344	3,659	13,003	4,794	84.0	153.9

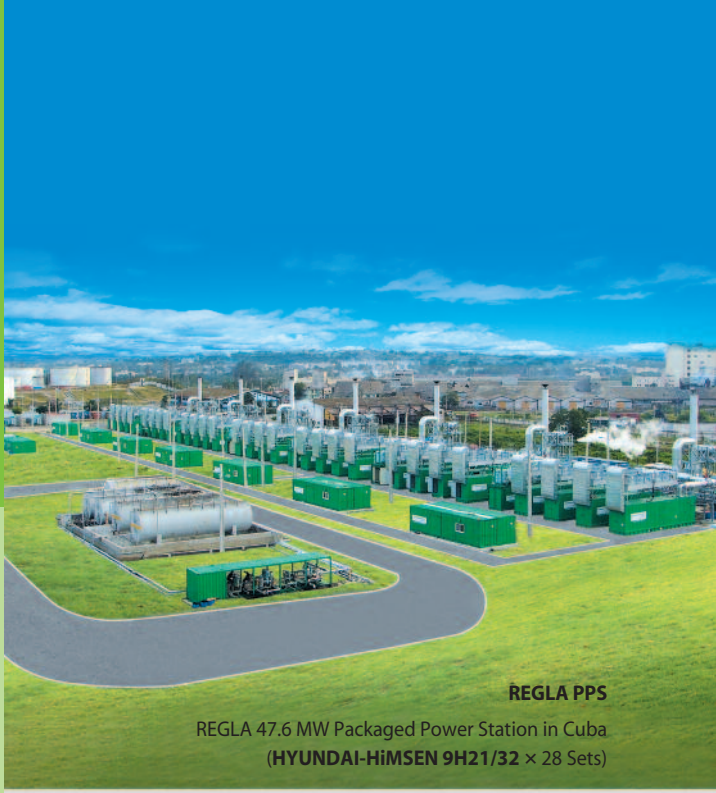




Remarks

1) Depending on alternator.
2) Without common base frame.
3) With common base frame & alternator (Maker: HHI-EES).

D: Min. distance between engines 4,405 mm (with gallery).
P: Free passage between the engines, width 600 mm and height 2,000 mm.
Note) All dimensions and weight are approximate value and subject to change without prior notice.



REGLA PPS

REGLA 47.6 MW Packaged Power Station in Cuba
(**HYUNDAI-HiMSEN 9H21/32** × 28 Sets)

Features

- Base load operation
- Diesel oil / Heavy fuel oil / Nature gas use
- Compact 40-feet container size
- Mobile type (option)
- Environmentally comfortable
- Low cost of operating and maintenance

Application

- Captive power
- Construction site
- Isolated area
- Rental business
- Pumping station
- Independent power producer

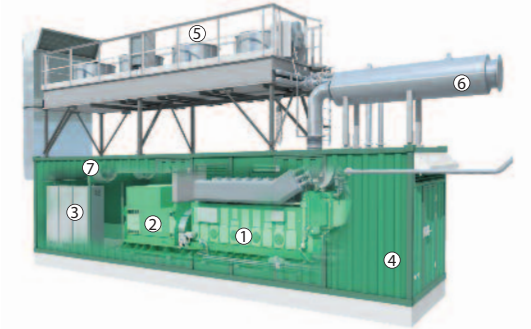
General Specifications

Engine Model	6H17/28	8H17/28	6H21/32	8H21/32	9H21/32
Engine (kW)	690/720	920/960	1,200	1,600	1,800
Generator (kW)	645/673	865/902	1,140	1,520	1,710
Total Weight (ton)	24	30	42	48	50
Dimension (W × H × L)	2.4 m × 3.4 m × 12 m (Container Size)				
Cooling Method	Radiator / Cooling Tower				
Speed	900 rpm / 1,000 rpm				
Fuel	Diesel oil / Heavy fuel oil				

General Specifications

Engine Model	5H17/24G	6H17/24G	7H17/24G	8H17/24G	9H17/24G
Engine (kW)	455/550	546/660	637/770	728/880	819/990
Generator (kW)	428/817	513/620	599/723	684/827	770/930
Total Weight (ton)	22	24	25	26	28
Dimension (W × H × L)	2.4 m × 2.9 m × 12 m (Container Size)				
Cooling Method	Radiator / Cooling Tower				
Speed	1,000 rpm / 1,200 rpm				
Fuel	Natural Gas				

※ The MCR will be based on ISO condition.



① Engine
② Generator
③ Control panel
④ Enclosure
⑤ Radiator
⑥ Exhaust gas silencer
⑦ Ventilation air exhaust fan

Approval Status of Quality Management System

Product or Service Ranges	Certifying Agency
Design and Manufacture of Two-stroke Diesel Engines, Four-stroke Diesel Engines, Marine Propellers, Pumps & Valves, Press, Conveyor, Robots for Industrial Purposes, Steam Turbine, Gas Turbine, Diesel Power Plants and Engine Components including Turbochargers, Crankshafts, Cylinder Liners, Forged Steel, Shafting	ISO 9001:2000, KS A 9001:2001 ISO 14001:2004, KS A 14001:2004 OHSAS 18001:1999 (DNV)
Nuclear Diesel Generator (Class 1E), Pump and Butterfly Valve	Qualification Approval (KEPIC)
Forging Shop	Works Approval (ABS, BV, CCS, DNV, GL, KR, LR, NK, RINA)
Casting Shop	
Propeller	
Semi built-up Crankshaft	
Solid Crankshaft (TR Forging Crankshaft)	
Welding Workshop & Overlay Welding on Cylinder Cover	Works Approval (GL)

Engine *Hi*-service system setup

Our target is to provide quickest and most precious technical support and parts supply towards the customers.
We do utmost to minimize the trouble and inconvenience from the ship owners which might be occurred due to the damage caused by the accident.

Easy Access to Engine CS Department

Regardless of the guarantee period whether it is over or not, HHI will make it a rule to support the clients with immediate service in the order of the receipt by e-mail or through homepage. But, considering its seriousness of the damage or the schedule of the vessel, the provision timing of our technical support including repair may be adjusted.

Genuine Spare Parts Purchase Guide

HHI's authorized sales agents will supply the clients with the original genuine spare parts at the competitive condition in aspect of price, delivery time and quality etc. Please do not hesitate to contact our sales agent with the inquiry or questionnaire.

Technical Support

After the guarantee period is expired or in case that the free support is limited even during the guarantee period due to special reason, we also provide the technical support including supervision, reconditioning, conversion, retrofit of alpha cylinder lubricator and technical consultancy etc.

Global Service Network

HHI is very proud of its well organized global service network which is efficiently and systematically designed to meet every requirement of the clients. HHI°Øs direct service centers are established at Rotterdam, Singapore, Dubai, Panama and Havana in Cuba.

HYUNDAI

HIMSEN

Hyundai Innovative Marine & Stationary ENgine

Engine CS Department

Management Board
K.H. Kim, *Senior Vice President*
Phone: +82 52 202 0252
E-mail: kimkh@hhi.co.kr

J.H. Chung, *Senior Vice President*
Phone: +82 52 202 0741
E-mail: authhi@hhi.co.kr

Department Head
S.G. Cha, *General Manager*
Phone: +82 52 202 7411
E-mail: enginecs@hhi.co.kr

HiMSEN & Global Patrol Service Team

S.L. Choi, *Team Leader*
Phone: +82 52 202 7313
E-mail: slchoi@hhi.co.kr

MAN Service Team

A.M. Kim, *Team Leader*
Phone: +82 52 202 7418
E-mail: amkim@hhi.co.kr

Power Plant Service Team

H.J. Song, *Team Leader*
Phone: +82 52 202 7583
E-mail: hjdpp@hhi.co.kr

Wartsila Service Team

K.U. Song, *Team Leader*
Phone: +82 52 202 7412
E-mail: kusong@hhi.co.kr

Parts & Technical Service Team

H.L. Oh, *Team Leader*
Phone: +82 52 202 9457
E-mail: hloh@hhi.co.kr

CS Planning Team

J.H. Jung, *Team Leader*
Phone: +82 52 202 7586
E-mail: kevin@hhi.co.kr

Singapore

Country Code: +65

7 Temasek Blvd.
#41-02 Suntec Tower
One Singapore 038987,
Singapore
J.H. Ahn, *DGM*

Phone: +65 6 337 2366
Telefax: +65 6 337 8966
E-mail: engineas@hhisgp.com

Mobile: +65 9732 4593

Netherlands

Country Code: +31

Folkert Elsingastraat 7
3067NW, Rotterdam,
The Netherlands
J.S. Lee, *GM*
J.B. Cha, *Manager*
B.K. Kang, *Manager*

Phone: +31 10 212 1567
Telefax: +31 10 212 5134
E-mail: jsyi@hhi.co.kr
Mobile: +31 6 5184 6737
Mobile: +31 6 2013 6371
Mobile: +31 6 5183 2818

Cuba

Country Code: +53

Calle 17A No.67 e/174 y190,
Cubanacan, Playa,
Ciudad De La Habana, Cuba
I.K. Ryu, *GM*

Phone: +53-7204-3011
E-mail: ikryu@hhi.co.kr

Mobile: +53 5 286 7712

UAE(Dubai)

Country Code: +971

Level 2, Unit 205, Emaar Square
Building 4, Sheikh Zayed Road
P.O. Box 252458, Dubai, U.A.E
K.S. Jang, *GM*

Phone: +971 4 425 7995
Telefax: +971 4 425 7996
E-mail: j007@hhi.co.kr
Mobile: +971 50 652 9492

Panama

Country Code: +507

Ave. Samuel Lewis, EDIF.
HSBC, Piso 12, Obarrio,
Panama City, Rep of Panama
B.O. Cheong, *Senior Vice President*
H.W. Ahn, *DGM*

Phone: +507 213 7657
Telefax: +507 213 7660
E-mail: yeoyu21@hhi.co.kr
Mobile: +507 6673 0040

Authorized Repairer

Korea	Country Code: +82
D.S.K Co., Ltd. 141-61 Namhang-dong 3(sam)-ga, Yeongdo-gu, Busan, Korea Jong-Seok, Hwang, *President*	Phone: +82 51 417 7800 Telefax: +82 51 417 7833 E-mail: dsk@dskworld.com
Hyundai Tech 1556-8, Samsan-dong, Nam-gu, Ulsan, Korea Bong-Kil, Kim, *President*	Phone: +82 52 260 3731 Telefax: +82 52 260 3735 E-mail: bkkim@hotmail.com
DECCO Co., Ltd. 792, Daedae-ri Ungchon-myeon, Ulju-gun, Ulsan, Korea Dong-Jun, Lee, *President*	Phone: +82 52 225 0330 Telefax: +82 52 225 0348 E-mail: dongjin@decco.co.kr
HOHYUN 808 Apartment Factory, 812-1, Hyomun-dong, Buk-gu, Ulsan, Korea Sang-Yoon, Lee, *President*	Phone: +82 52 288 6398 Telefax: +82 52 289 6397 E-mail: nmcoltd@hanmail.net
BaekSan Tech Co., Ltd. 2F, 231-6, Daebock-ri, Ungchon-myeon, ulju-kyn, Ulsan, Korea Doo-Young, Kim, *President*	Phone: +82 52 221 0717 Telefax: +82 52 221 0716 E-mail: bs@baeksantech.com
Sun Jin Jong Hap Co., Ltd. #40, Daepyeong-dong 2-ga , Yeongdo-gu, Busan, Korea Young-Chul Kim, *President*	Phone: +82 51 414 7300 Telefax: +82 51 414 8870 E-mail: sjjh@sunjinjonghap.com

O-Sung Entec Co., Ltd.
201 Chung Hae Bldg.,
1213-15, Choryang 1-dong,
Dong-gu, Busan, Korea
Chang-Bae Kim, *President*

Phone: +82 51 442 2913
Telefax: +82 51 442 2914
E-mail: osentec@hanmail.net

Hwa San Co., Ltd.
1263-9, Mugeo-dong ,
Nam-gu, Ulsan, Korea
Jea-Koung Lee, *President*

Phone: +82 52 247 7155
Telefax: +82 52 247 7125
E-mail: hwasan01@korea.com

Sunwoo Engineering Co., Ltd.
609-1, SeokSan-li, Dong-myeon,
Yangsan-Si, KyungSangNam-Do,
626-821, Korea
Jong-Gill Jeong, *President*

Phone: +82 55 365 7333
Telefax: +82 55 365 7334
E-mail: youna3921@nate.com

KOL
5-16, Cheong-hak,
Yeongdo-Gu, Busan, Korea
Sung Ki, Hwang

Phone: +51 413 8121
Telefax: +51 413 8126
E-mail: eng@korol.co.kr

CS Engineering
678-17 Jeonha-dong
Dong-gu, Ulsan, Korea
Cha Su, Jang

Phone: +82 52 232 9997
Telefax: +82 52 232 9997
E-mail: hana9997@hanmail.net

Marine Tech
61-5 Ungnam-dong,
Changwon-Si, Kyungnam, Korea
B.H. Eom

Phone: +82 55 274 0411~2
Telefax: +82 55 274 0413
E-mail: tskim@martech.co.kr

Authorized Repairer / Asia

Singapore — Country Code: +65

Welmet Dongjin Eng.
No.53 Gul Circle,
Singapore 629584
Steve Ho W. K, *MD*

Phone: +65 6897 8511
Telefax: +65 6897 9528
Mobile: +65 9666 3188 / 9297 9727
E-mail: steve.ho@welmet.com.sg

A-Marine & Engineering Pte Ltd.
11 Tuas View Close
Singapore 637487
Yong Yeow Eddie Tan, *MD*

Phone: +65 6863 1639
Telefax: +65 6863 0541
E-mail: amarine@singnet.com.sg

VIKI Engineering Pte Ltd.
101 Cecil Street #20-10,
Tong Eng Bldg.
Singapore 069533
Sung-Wan Ryu, *MD*

Phone: +65 6 220 7366
Telefax: +65 6 220 0260
Mobile: +65 9 732 1506
E-mail: vikieng@hotmail.com

Goltens Singapore Pte Ltd.
No.6A Benoi Road
Singapore 629881
Tom Boyle, *MD*

Phone: +65 6 861 5220
Telefax: +65 6 861 1037
Mobile:+65 9 732 1506
E-mail: singapore@goltens.com

China — Country Code: +86

Goltens Shanghai Co., Ltd.
Block No.5,
No.533 Yuanzhong Road ,
Nanhui Industrial Zone,
Nanhui District,
Shanghai 201300, China

Phone: +86 21 5818 6628
Telefax: +86 21 5818 6633
E-mail: shanghai@goltens.com

Taiwan — Country Code: +886

Jing Ming Engineering Enterprises Co., Ltd.
43, Lane 9,Shin Sheng Road,
Chien Chen Dist.,
Kaohsiung 806, Taiwan
Yung-Sen Pao, *President*

Phone: +886 7 815 4256
Telefax: +886 7 815 4259
E-mail: jm7976@ms14.hinet.net

Philippines — Country Code: +63

Fil Sung Tech.
223-225 Mangosteen Road,
FTI Comples, Taguig City,
Philippines
Ik-Hyo Jeon, *President*

Phone: +63 2 837 7594
Telefax: +63 2 837 7596
E-mail: filsung@gmail.com

Authorized Repairer / Middle East, Europe

UAE(Dubai) — Country Code: +971

Goltens Service Co., Ltd.
P.O. BOX 2811, Dubai, U.A.E
Jan Erik Granholdt
Phone: +971 4 324 1642
Telefax: +971 4 324 1019
E-mail: dubai@goltens.com

Nico international U.A.E.
Al Quoz Industrial Area
P.O. Box - 12068 Dubai, U.A.E
S Tariq Anis
Phone: +971 4 338 2135
Telefax: +971 4 338 1832
E-mail: nicouae@nicouae.com

Netherlands — Country Code: +31

Wetering Rotterdam
Bunschotenweg 134,
3089 KC Rotterdam,
The Netherlands
Mr. J.van Woerkom
Phone: +31 10 4943 940
Telefax: +31 10 4297 587
E-mail:
info@weteringrotterdam.com

Rugova Diesel Repair B.V.
Keizerlaan 38
3233 VT Oostvoorne
The Netherlands
M. Daghrir
Phone: +31 181 40 2359
Telefax: +31 181 40 2688
E-mail:
rugovadieselrepair@yahoo.com

Goltens Rotterdam B.V.
Lorentzweg 29
3208 LT Spijkenisse
The Netherlands
Phone: +31 181 465 100
Telefax: +31 181 465 109
E-mail: rotterdamr@goltens.com

Maarten Jeronimus, MD
NICOVERKEN
Algerastraat 20
3125 BS Schiedam
The Netherlands
Frans van Krugten, *MD*
Phone: +31 10 238 0999
Telefax: +31 10 238 0990
E-mail: shiprepair@nicoverken.nl

USA — Country Code: +1

Engineering & Machinery Consultants, Inc.

8015 Sports Haven Dr,
Humble, TX 77346, , U.S.A
Mr. Jong, Lee

Phone: +1 281 900 0901
Telefax: +1 281 947 9744
E-mail: emc.jong@hotmail.com

Nicaragua — Country Code: +505

Service De Ingenieria Electrica HANUMUL

Reparto Bolonia, Rotonda Plaza
Espana 2c oeste,1c norte,1c oeste,
2c norte, Managua, Nicaragua
Jin Kook, Kim (Juan Kim)

Phone: +505 276 1943
Mobile: +505 948 3189
Telefax: +505 2266 1029
E-mail: juankimnica@gmail.com

Cooperative Repairer / Asia, Middle East, Europe

LOGSHIP Limited — Country Code: +86

Rm312, 3F, Huadu Tower,
No.828, Zhangyang Road,
Shanghai, China, 200122
Mr. Keun oh, Park

Phone: +86 21 6156 1999
Telefax: +86 21 5156 1900
E-mail: lancer@logship.co.kr

China(Shanghai) — Country Code: +86

Pacific Marine
No.25 Lane 372, North Yong-
Chun Rd. Da Tuan Town,
Nan Hui Area, Shanghai, China
Wu Jiang Wei

Phone: +86 21 5808 6906
Telefax: +86 21 5808 6906
E-mail:
pacificmarine@vip.163.com

Star Power Co., Ltd.
RM912 Hyunyoon International
Bldg.#1100 Wuzhong road,
Shanghai China, 201103
Jong Hwan Oh, PhD.

Phone: +86 21 5422 4157
Telefax: +86 21 5422 4156
E-mail: hwankong@gmail.com

Vietnam — Country Code: +84

CORONA T.S Co., Ltd.
89 Vanh Dai Trong,
Binh Tri Dong B Ward,
Binh Tan dist,
Ho Chi Minh city, Vietnam.
L.K. Vi

Phone: +84 8 2539499
Telefax: +84 8 7526945
E-mail: lkv@corona.com.vn

Germany — Country Code: +49

Turbo-Technik Reparatur-Werft GmbH & Co.
Hannoversche Strabe 11
D-26384 Wilhelmshaven
Germany
Martin M. Dassler

Phone: +49 4421 3078 0
Telefax: +49 4421 3050 86
E-mail: info@turbotechnik.com

Turkey — Country Code: +90

GANI
Gumussuyu Mh. Kutlu Sk.
No;8 34437 Taksim, Istanbul
Turkey
Umit Sandikci

Phone: +90 212 293 44 77
Telefax: +90 212 293 44 78
E-mail: umit@gani.com.tr

Italy — Country Code: +39

F.T. Technical Marine srl
via Torrione San Martino 55/A
80129 Napoli (Italy) T
Antonio Trani, *MD*

Phone: +39 081 5562817
elefax: +39 081 2204933
E-mail:
technicalmarine@hotmail.it

Jobson Italy
Via delle Pianazze 150/A
La Spezia, Italy
Alessandro Bardi

Phone: +39 0187 984201
Telefax: +39 0187 984196
E-mail: jobale@jobsonitalia.com

Denmark — Country Code: +45

P.J. Diesel Engineering
Skudehavnsvej 14
DK-2100 Copenhagen O
Denmark
Martin Rasmussen

Phone: +45 3929 1553
Telefax: +45 3927 1054
E-mail: admin@pjdiesel.dk

Spain — Country Code: +34

MINDASA,MECANIZACION INDUSTRIAL
Polígono Industrial de Guarnizo,
Parcela 18, Guarnizo, Cantabria,
Spain
Francisco Cascales, *GM*

Phone: +34 942558600
Telefax: +34 942558360
E-mail: mindasa@mindasa.es

Cooperative Repairer / North America, South America

Greece — Country Code: +30

MEK Ltd.
120, Dimokratis Ave
Keratsini,187 56
Greece
Stratos Fragkou

Phone: +30 210 40 00 042
Telefax: +30 210 40 05 100
E-mail: mekepe@hol.gr

Canada — Country Code: +1

Marine Tech Industries Ltd.
12628 82nd Avenue
Surrey, BC V3W 3G1
Canada
Andrew Jakubow, *GM*

Phone: +1 604 507 0880
Telefax: +1 604 507 0881
E-mail: andrew@marine-tech.com

Mount Royal/Walsh Inc.
2101 Aird Avenue
Montreal, Quebec H1V2W3
Canada
Alan Brigden

Phone: +1 514 255 3301
Telefax: +1 514 255 8851
E-mail: mrw@mrw-group.com

Argentina — Country Code: +54

Turbogen
LUGONES 1855 – Zip code (1430)
Buenos. Aires – Argentina
Pascual Mario Ruffa

Phone: +54 11 4521 5667
Telefax: +54 11 4521 8283
E-mail:
turbogenruffa@arnet.com.ar

Cooperative Repairer / South America, Africa, Oceania

Brazil — Country Code: +55

Metalock do Brasil Ltd.
Rua Visconde do
Rio Branco 22
11013-030 Santos SP, Brazil
Paul Edward Barton, *MD*

Phone: +55 13 3226 4686
Telefax: +55 13 3226 4680
E-mail: santos@metalock.com.br

GenPower
Av. das Américas, 7899
Rio de Janeiro,
CEP 22793-081, RJ – Brazil
Arnaldo Fleischman

Phone: +55 21 3450 5454
Telefax: +55 21 3325 5592
E-mail:
afleischman@genpowerenergy.com

H.E.POWER
R.7 De Abril No. 277 Andar 6,
Sl.A Centro-sao Paulo-SP-Brazil

Phone: +55 11 3258 3361
Telefax: +55 11 3258 7721
E-mail: johncris1020@yahoo.co.kr

South Africa — Country Code: +27

Dormac Marine & Engineering
1 Belfast Road, Bayhead,
Durban, South Africa
PO Box 12568, Jacobs, 4026
Gary K. Pulford, *Manager*

Phone: +27 31 274 1500
Telefax: +27 31 205 5027
E-mail: garyp@dormac.net

Australia — Country Code: +61

MTQ Engine Systems(Aust.) Pte Ltd.
67 Bellrick Street Acacia Ridge
QLD 4110, Australia
Rodney Iliff

Phone: +61 3 9315 1633
Telefax: +61 3 9315 3984
E-mail:
eception.brisbane@mtqes.com.au

Spare Parts Sales Agent

Korea — Country Code: +82

Dong Jin Intec Co., Ltd.
1144-10, Choryang 3-dong,
Dong-gu, Busan, Korea
Kyu-Sik Kim, *President*
Phone: +82 51 664 1000
Telefax: +82 51 462 7907
E-mail: kskim@dintec.co.kr

Cape Line Ltd.
103-1, Namsan-dong,
kumjeong-gu, Busan, Korea
Jong-Sun Kim, *President*
Phone: +82 51 582 9090
Telefax: +82 51 582 9091
E-mail: spares@capeline.co.kr

DAE HWA Engineering Service Co., Ltd.
160-20, Sinjeong 5-dong,
Nam-gu, Ulsan, Korea
Cheol-Jin Yoon, *President*
Phone: +82 52 258 6230
Telefax: +82 52 258 6233
E-mail: contact@dawhwaeng.com

Jinsan Marine Management Co., Ltd.
1396, Maeam-dong ,
Nam-gu, Ulsan, Korea
Wang-Soo Lee, *President*
Phone: +82 52 228 7850
Telefax: +82 52 228 7895
E-mail: engine@jinsankorea.co.kr

Ocean Marine Services Co., Ltd.
Ocean Bldg, 139, Maeam-dong,
Nam-Gu, Ulsan, Korea
Jong-Moon Kim, *President*
Phone: +82 52 226 0700
Telefax: +82 52 265 9991
E-mail: ocean@oceanma.com

J.O. Engineering Co., Ltd.
171-7, Samsan –Dong,
Nam-gu, Ulsan, Korea
Jong-Ok Lee, *President*
Phone: +82 52 257 9940
Telefax: +82 52 257 9943
E-mail: joleetrd@unitel.co.kr

Netherlands — Country Code: +31 — Depot

Hyundai Engin(Europe) Service Center B.V.
Folkert Elsingastraat 7,
3067NW, Rotterdam,
The Netherlands
Jae-Sik Kim, *Senior Vice President*
Phone: +31 10 44 73 457
Telefax: +31 10 20 26 674
E-mail: service@hhiengine.nl

Philippines — Country Code: +63

Fil Sung Tech.
223-225 Mangosteen Road,
FTI Comples, Taguig City,
Philippines
Ik-Hyo Jeon, President

Phone: +63 2 837 7594
Telefax: +63 2 837 7596
E-mail: filsung@gmail.com

India — Country Code: +91

Rai & Sons Pvt., Ltd.
9-A, Connaught Place,
New Delhi 110 001, India
Lakshman Rai, *Director*

Phone: +91 11 2332 1270
Telefax: +91 11 2332 7598
E-mail: pkroy@rai-group.com

Republica Dominicana — Country Code: +1

ESD Engineering & Service, S.A.
Av. Romulo Bethancourt
No. 1516, Edificio Phalys, Local H,
Bella Vista, Santo Domingo,
Republica Dominicana
Semi Choi, *President*

Phone: +1 809 533 6650
Telefax: +1 809 533 5267
E-mail: semichoi@esdes.co.kr
adreschoi@esdes.co.kr

Cuba — country code: +53

AMPELOS LATINAMERICA, S.A.
ZELCOM S.A. (Zana Especializada de
Logistic y Comercio)
Sector Oeste, Nave D, Almacen 1
Carretera de Berroa Km 1,
Munlcipio Habana del Este, Ciudad Habana, Cuba
Mr. Dong-Woo Kim

Phone: +53 7 95 9617
Telefax: +53 7 95 9618
E-mail: ampelos@ampelos.co.kr

El Salvador — Country Code: +503

MAQSA
Blvd. del Ejecito Nacional y 54 Av.
Nte, San Salvador, El Salvador,
C.P. 125
Alexander Pagles, *Directing Manager*

Phone: +503 2293 1666
Telefax: +503 2239 5637
E-mail:
alexander.pagels@grupolaeisz.com

HHI-EMD Direct Service Center

Authorized Repairer

Cooperative Repairer

Spare Parts Depot

Parts Sales Agent

www.hhi.co.kr
www.hyundai-engine.com

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HYUNDAI
HEAVY INDUSTRIES CO.,LTD.
ENGINE & MACHINERY

A01-081-10 July 2011
Contents subject to change without prior notice.

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HYUNDAI

HEAVY INDUSTRIES CO.,LTD.

ENGINE & MACHINERY

1000 Bangeojinsunhwan-doro,
Dong-gu, Ulsan, Korea

Engine Sales Department(Domestic)
Tel.: 82-52-202-7291~9
Fax: 82-52-202-7300
E-mail: k110@hhi.co.kr

Engine Sales Department(Export)
Tel.: 82-52-202-7281~9
Fax: 82-52-202-7427
E-mail: k150@hhi.co.kr

Engine Power Plant Sales Department
Tel.: 82-52-202-7301
Fax: 82-52-202-7202
E-mail: k120hhi@hhi.co.kr