

## *ABOUT YANMAR*

Seiji Nabemoto  
General Manager, Mumbai Liaison Office  
YANMAR CO., LTD.



**YANMAR**

# **ALL ABOUT** **YANMAR**

*JSMEA Seminar, Mumbai*  
*SEP.2009*

## ***Founder's Spirit***


**"Grateful to serve for a better world"**

### ***Mission***


**We, the YANMAR GROUP,  
will strive to create new and  
meaningful value together in partnership  
with our worldwide customers.**

**We will be innovators and leaders in harnessing energy,  
while contributing to an environmentally  
sustainable society, through the delivery of unrivaled  
products and services.**


# YANMAR Products




**Construction Machine**




**Tractor**




**Co-Generation System**




**Gas Turbine**  
AT360S



**Industrial Diesel**  
4TNEseries




**High Speed Diesel**  
JHseries




**Medium Speed Diesel**  
EY26

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**Tug Boat**




**Power Boat**

Engines for







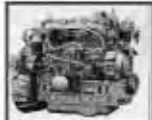







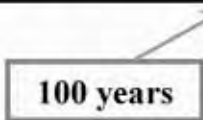


**Ferry**



**Ocean Going Vessel**

# History of YANMAR

	1912	1960	1990	2012
<p><b>Founder</b> Mr. M. Yamaoka</p> 	  	   	   	
 <p><b>Gold Diesel Medal</b> 1955</p>	 <p><b>Deming Prize</b> 1968</p>	 <p><b>100 years</b></p>		

# YANMAR Group Outline

\*Company Name : YANMAR Co.,Ltd.

Base:¥100/\$

\*Established : 1912

\*Capital : ¥6,300 million (approx. US\$63 million)

\*Turn Over : ¥548.2 billion (approx. US\$5.5 billion)  
(FY2008 Consolidated Sales Volume)

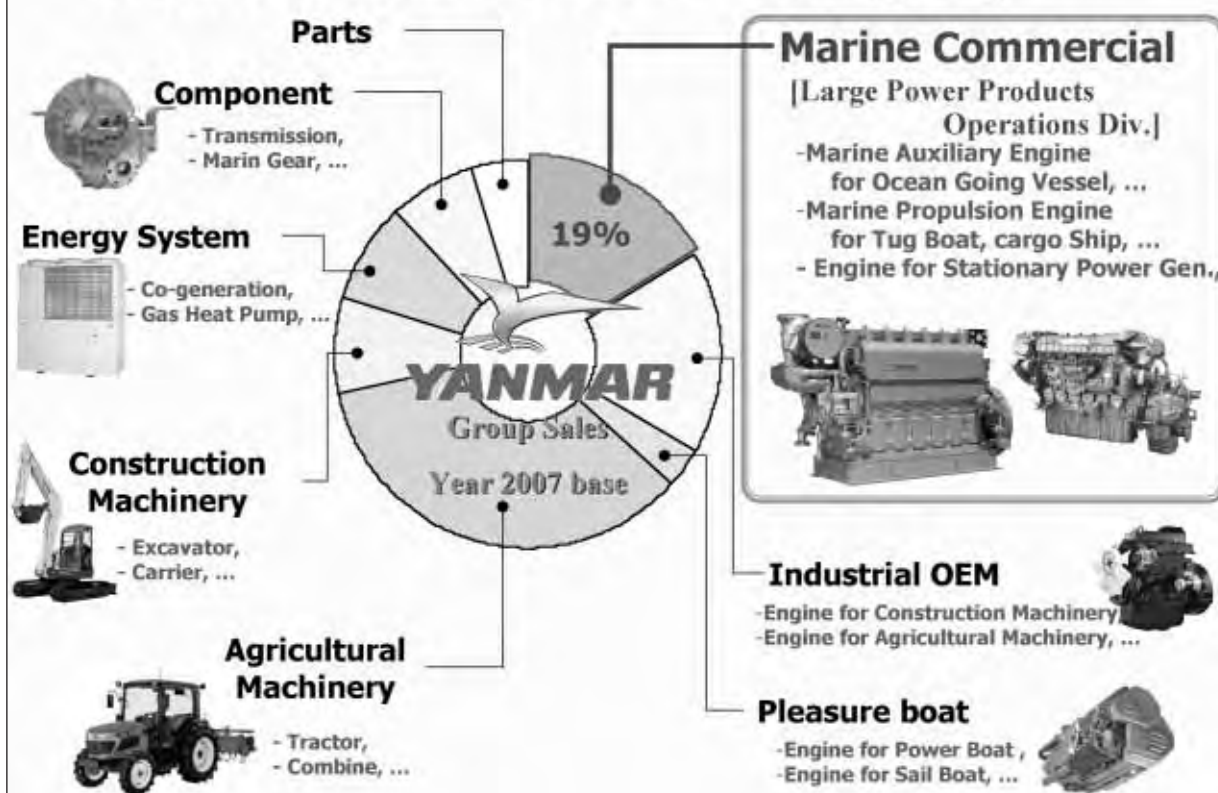
\*Employees : 15,116

\*Group Companies : 27 (Japan)  
23 (Overseas)

\*Overseas Distributors : 207



## YANMAR Business Category



# Global Operations

One Vision Unites R&D,  
Production and Sales Bases Across the World



## Major Plants in Japan

### BIWA Plant



**Small  
High Speed  
Diesel  
(Industrial)**

### TSUKAGUCHI Plant



**High Speed  
Marine  
Diesel**



### AMAGASAKI Plant



**Medium Speed  
Diesel  
& Gas Turbine**

# AMAGASAKI Plant

as of March 20, 2007



\*Location : AMAGASAKI, Hyogo pref.

\*Established : 1936

\*Site Area : 78,495m<sup>2</sup>

\*Building Area : 33,413m<sup>2</sup>

\*Total Floor : 45,544m<sup>2</sup>

\*Employees : 607

\*Production Equipment :  
Machine tools 257 units

# AMAGASAKI Plant

## Recognition



## Quality Assurance

**ISO9001**  
Quality Control  
No:912208



In 1992

## Environmental Management

**ISO14001**  
Environmental Management  
No:770250



In 1997

## **Marine Propulsion Engine**

**-YANMAR AMAGASAKI Plant-**

<i>Model</i>	<i>Bore x Stroke</i>	<i>Engine Output</i>
<b>6NY16</b>	<b>160 x 200mm</b>	<b>450-760ps</b>
<b>6RY17</b>	<b>165 x 219mm</b>	<b>850-1,000ps</b>
<b>6N18</b>	<b>180 x 280mm</b>	<b>600-1,000ps</b>
<b>6/8N21</b>	<b>210 x 290mm</b>	<b>900-1,800ps</b>
<b>6/8EY26</b>	<b>260 x 385mm</b>	<b>2,000-3,481ps</b>
<b>6/8N330</b>	<b>330 x 440mm</b>	<b>3,000-4,500ps</b>

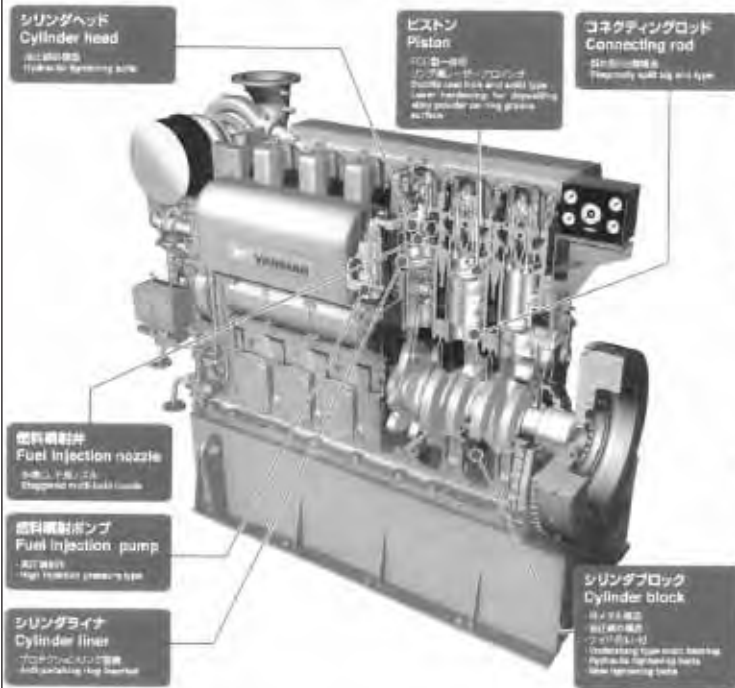
## **Marine Auxiliary Engine**

**-YANMAR AMAGASAKI Plant-**

<i>Model</i>	<i>Gen.Cap.(60HZ)</i>	<i>Gen.Cap.(50HZ)</i>
<b>6NY16L</b>	<b>240-400kWe</b>	<b>180-320kWe</b>
<b>6N165L</b>	<b>400-480kWe</b>	<b>320-400kWe</b>
<b>6EY18L</b>	<b>360-750kWe</b>	<b>360-750kWe</b>
<b>6/8N21L</b>	<b>560-1,270kWe</b>	<b>560-1,270kWe</b>
<b>6/8EY26L</b>	<b>1,300-2,300kWe</b>	<b>1,300-2,300kWe</b>
<b>6/8N330L</b>	<b>2,200-3,300kWe</b>	<b>2,200-3,300kWe</b>

# New Development 6EY18L

-YANMAR AMAGASAKI Plant-



\*Generator Capacity  
360-750 kWe

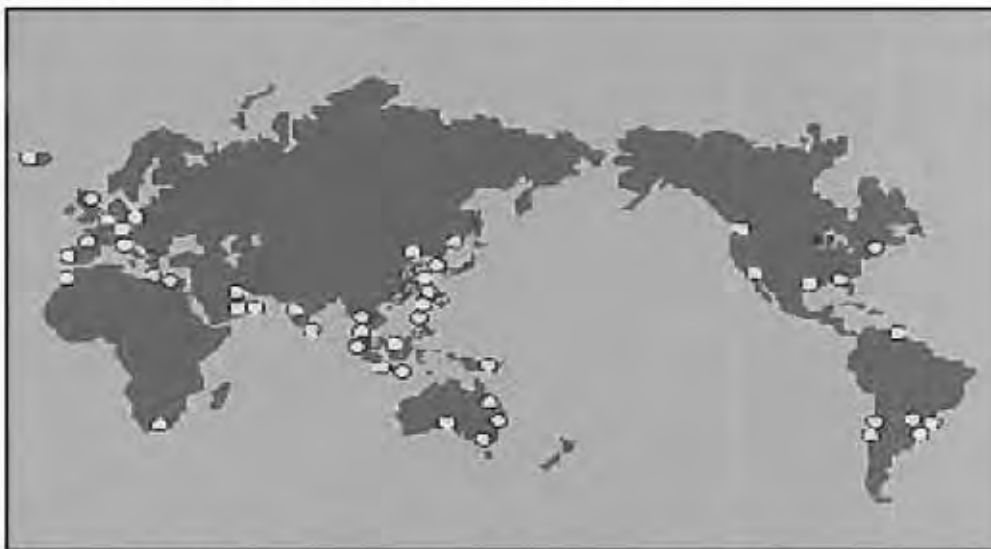
\*Raising L.C.V.  
-Service life of parts  
-Maintenance interval

\*Environmental Harmony  
-Low F.O.C  
-Low NOx emissions

\*We obtained certificate of IMO Tier-2 regulation on this engine model from NK in May '09, as first maker in Japan.

# After Service Network

-YANMAR AMAGASAKI Products-



**YANMAR Diesel Engines are used worldwide.**  
**Today, we have over 150 service stations in various countries.**



# ***YANMAR India Office***

**Personnel: Mr.Seiji Nabemoto/General Manager  
Mr.TV.Chendamarakshan/Regional  
Manager**

**Address: 603 Maithili Signet, Sector 30A,  
Opp Vashi Railway Station,  
Vashi, Navi Mumbai, India**

**Contact:(e-mail) seiji\_nabemoto@yanmar.co.jp  
tv.chenda@yanmarindia.com**

**(Tel) 022-4155-5333**

**(Fax) 022-4155-5310**



*Akasaka Diesels Limited Company Profile*

Yukihiro Komiya  
General Manager, New Business International Operation  
**AKASAKA DIESELS LIMITED**

# **AKASAKA DIESELS LIMITED**

Company Profile  
September 2009



**ClassNK**   
**ISO 9001** 

 Akasaka Diesels Limited

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- 11. AKASAKA WORLDWIDE SERVICE NETWORK

 Akasaka Diesels Limited

## COMPANY OUTLINE




- Company Name : AKASAKA DIESELS LIMITED
- Established : 1910
- Capital : 1,510 MN JPY (15,100,000 USD)
- Number of Employees : 398 (as of July, 2009)
- Net Sales : 17,315 MN JPY (173,150,000 USD)  
for the fiscal year of 2008
- Business Field : Manufacturing and sales of marine diesel engines, manufacturing and sales of various machinery and equipment

 Akasaka Diesels Limited

## HISTORY OF AKASAKA DIESELS



- *1910:* Otoshichi Akasaka, the founder of AKASAKA DIESELS, started engine repair business for fishing boat in Yaizu town.
- *1915:* AKASAKA DIESELS' first engine, a water injection 6 horsepower hot bulb engine, was successfully manufactured and operated.
- *1933:* AKASAKA DIESELS started manufacturing and developing 4 stroke, 25 horsepower diesel engine.
- *1942:* AKASAKA DIESELS merged Shunyo Foundry Company, as its own foundry.
- *1960:* AKASAKA DIESELS began manufacturing and sales of large 2stroke diesel engines under the license of MITSUBISHI HEAVY INDUSTRIES, LTD.
- *1980:* AKASAKA DIESELS diversified its business; started manufacturing of full mold cast metal, FA systems, construction machinery, industrial machines, and various test equipment.
- *1996:* AKASAKA DIESELS obtained ISO 9001 and quality assurance of NK.
- *and coming 2010:* Thanks to shipowners, shipyards and partners, AKASAKA DIESELS will mark its 100<sup>th</sup> anniversary of the founding!

 Akasaka Diesels Limited

# LOCATION OF FACTORY: YAIZU, SHIZUOKA



 Akasaka Diesels Limited

# FACTORIES OF AKASAKA DIESELS



## NAKAMINATO WORKS:

Constructed in 1920s  
Site Area: 30,765m<sup>2</sup>  
From 600 to 5,000  
horsepower class engines  
to be manufactured

## TOYODA WORKS:

Constructed in 1962  
Site Area: 82,779m<sup>2</sup>  
Up to 20,000 horsepower class  
engines to be manufactured



 Akasaka Diesels Limited

# AKASAKA TOTAL PRODUCTION



 Akasaka Diesels Limited

# QUALITY FIRST POLICY




Pursuing further quality of products, we have always been improving our quality control system.

Sometimes the trouble of marine engine could result in serious loss of property or perhaps human life. Therefore, the task of marine engine manufacturing itself cultivated our sense of responsibility over generations.

Our quality control system rigorously oversees every single stage of production because we never want to disappoint world's high expectations for "Made in Japan" product.



 Akasaka Diesels Limited

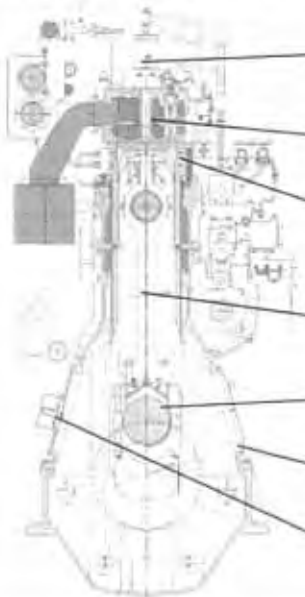
# AKASAKA DIESEL ENGINE 4 STROKE DIESEL ENGINES



- Turbo Charged diesel engine with 6 cylinders in-lined
- Two valves system for high reliability
- Cage type valves (Air intake, exhaust and starting air) for ease of maintenance
- Compatibility with heavy fuel oil

 Akasaka Diesels Limited

## FEATURES OF AKASAKA DIESEL ENGINE 4 STROKE DIESEL ENGINES



Equipped with...

- Caged, conical-seat intake, exhaust valve with rotator
- Cooling type fuel valve
- Anti polishing ring: less friction, less contamination, proper consumption of lubricating oil (AX33, A37~)
- Horizontally three-way-divided connecting rod
- Thick and strong crankshaft pin journal
- Engine block structure of less vibration and noise
- Wide-open crankcase window

AK33 Figure of A331

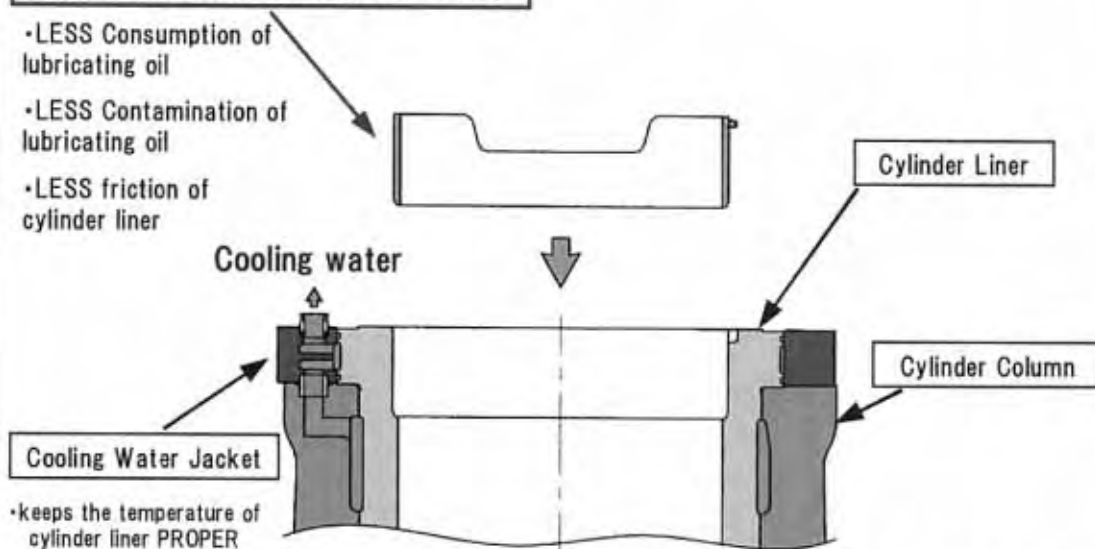
 Akasaka Diesels Limited



## FEATURES OF AKASAKA DIESEL ENGINE ANTI POLISHING RING (Example: A45)

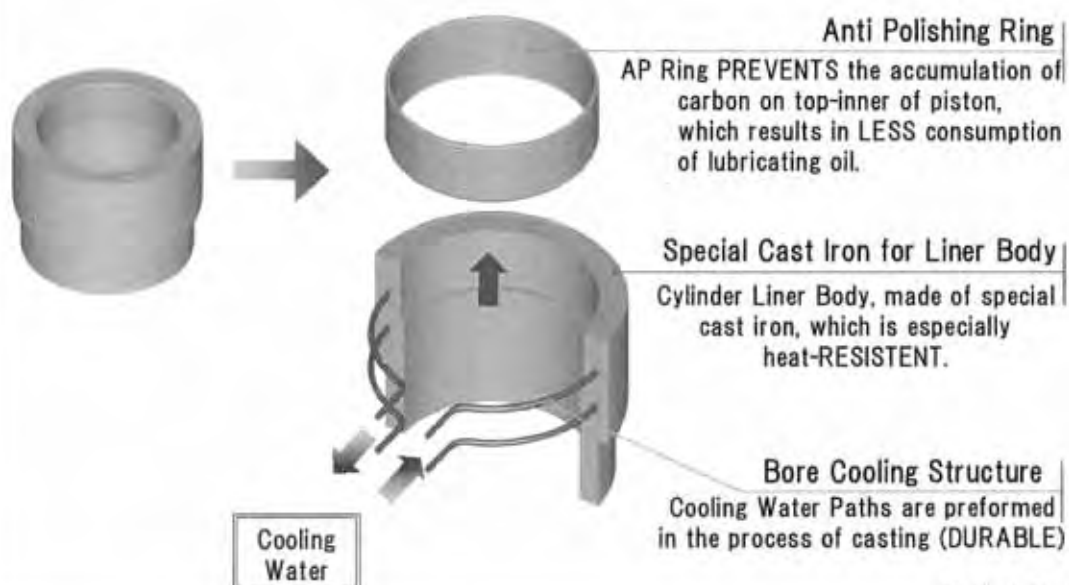
### Anti Polishing Ring (for A45)

- LESS Consumption of lubricating oil
- LESS Contamination of lubricating oil
- LESS friction of cylinder liner



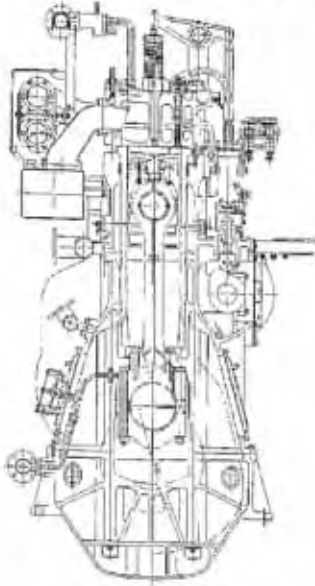
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## FEATURES OF AKASAKA DIESEL ENGINE ELEMENTAL TECHNOLOGY FOR CYLINDER LINER (Example: AX33)

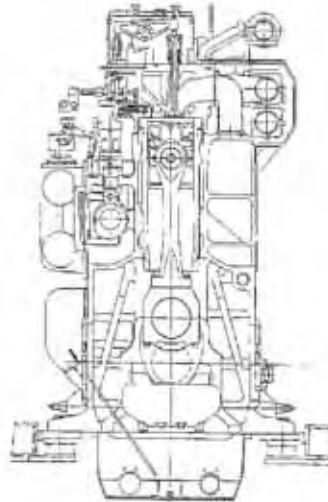


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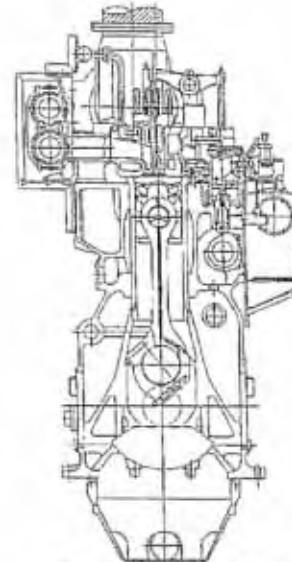
## FEATURES OF AKASAKA DIESEL ENGINE COMPARISON OF ENGINE STRUCTURE TO OTHER MAKERS' (Example: A31)



AKASAKA 's A31  
1,323kW/290min<sup>-1</sup>

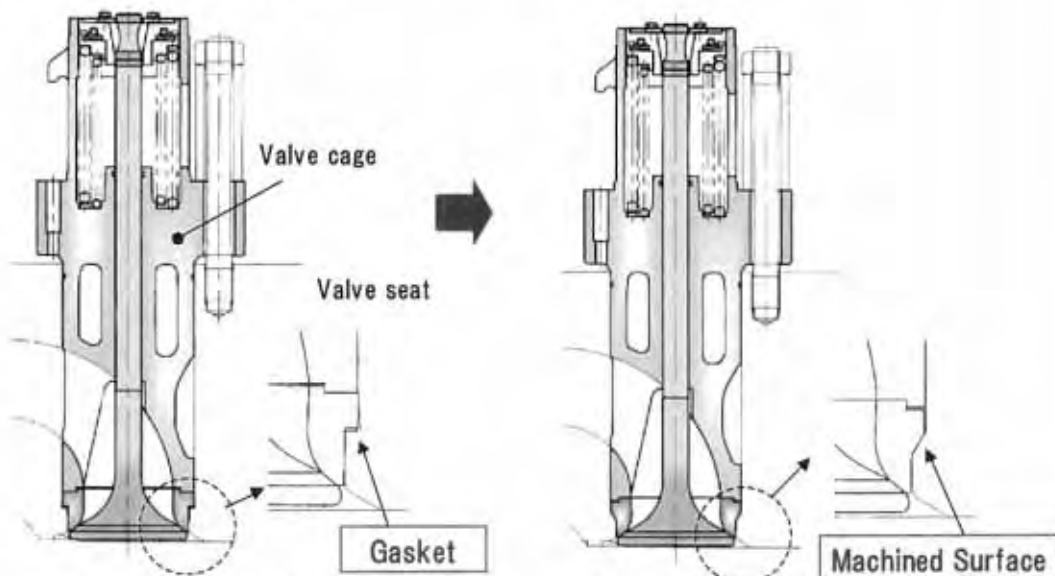


Company D, Y's DY28  
1,323kW/395min<sup>-1</sup>



Company N's 6M26H-T  
1,030kW/440min<sup>-1</sup>

## FEATURES OF AKASAKA DIESEL ENGINE CONICAL SEAT STRUCTURE OF CYLINDER LINER



Conventional Gasket-seat Type

Conical-seat type

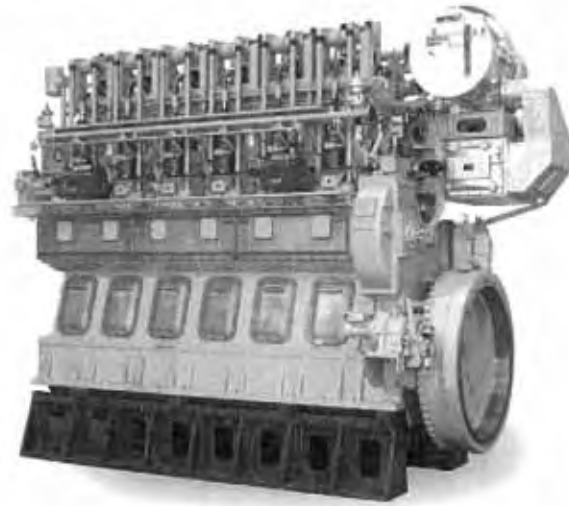
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# AKASAKA DIESEL ENGINE

## 4 STROKE DIESEL ENGINE

### Type A, AX

- TYPE A (210 - 320min-1)  
1,103 - 3,309 kW  
1,500 - 4,500 PS  
Direct reversing type
- TYPE AX33 (310min-1)  
1,618kW  
2,200PS




 Akasaka Diesels Limited

## SPECIFICATIONS OF

### Type A, AX

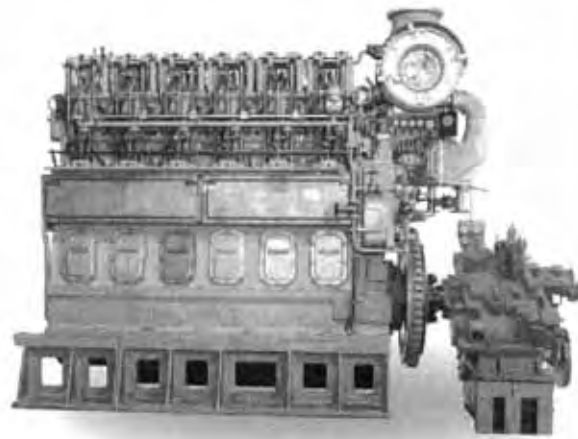
Model	Output(kW)	MCR(min-1)	Bore(mm)	Stroke(mm)	Length(mm)	Breadth(mm)	Height(mm)	Weight(kg)
A28	1,103	320	280	550	4,395	1,260	2,285	21,000
A28S	1,176	340	280	550	4,395	1,260	2,285	21,000
A31	1,323	290	310	600	4,890	1,400	2,470	27,000
A34C	1,618	280	340	620	4,880	1,510	2,745	36,000
A34S	1,765	280	340	660	4,880	1,510	2,745	36,500
A37	1,912	250	370	720	5,390	1,680	2,982	46,000
A38	2,059	240	380	740	5,390	1,680	3,030	46,500
A38S	2,206	250	380	740	5,390	1,680	3,030	46,500
A41	2,427	230	410	800	6,365	1,850	3,288	60,000
A41S	2,647	240	410	800	6,365	1,850	3,288	60,000
A45	2,942	210	450	880	7,000	2,050	3,600	79,000
A45S	3,309	220	450	880	7,000	2,050	3,600	91,000
AX33	1,618	310	330	620	4,928	1,400	2,615	31,500

 Akasaka Diesels Limited

# AKASAKA DIESEL ENGINE 4 STROKE DIESEL ENGINE

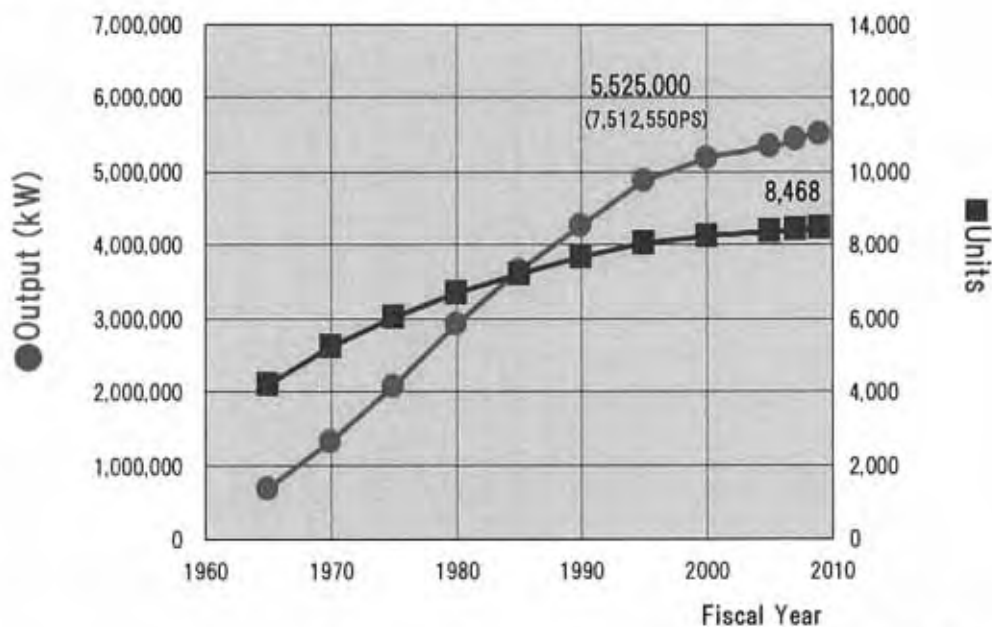
## Type T, K, E

- TYPE T (350 - 420min-1)  
625 - 882 kW  
850 - 1,200 PS
- TYPE K (410 - 380min-1)  
956 - 1,471kW  
1,300 - 2,000 PS
- TYPE E (450 - 470min-1)  
1,323 - 1,618kW  
1,800 - 2,200 PS



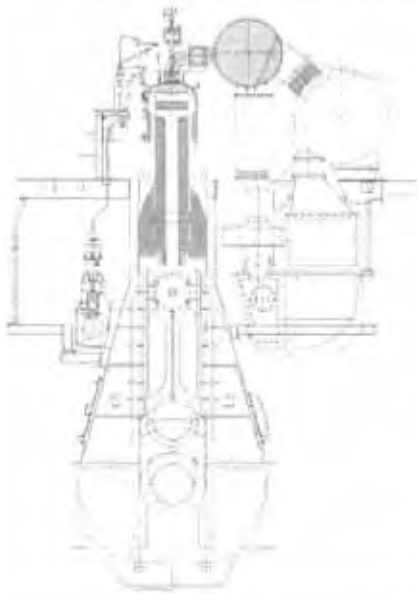
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# PRODUCTION RECORD OF AKASAKA 4 STROKE ENGINE



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# AKASAKA - MITSUBISHI UE DIESEL ENGINES



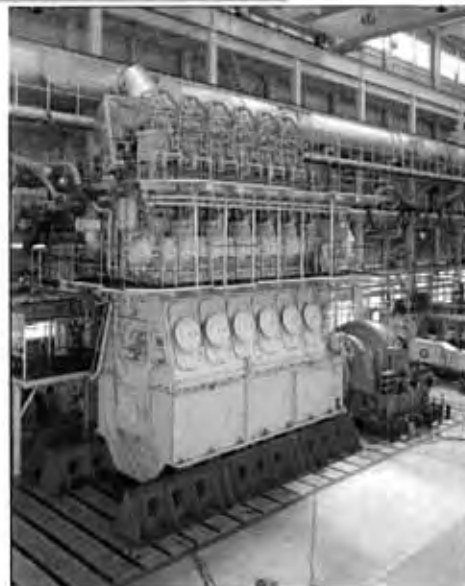
- Low Specific Fuel Consumption
- High Reliability
- Compatible with Low-quality Fuel
- Ease of Maintenance
- Space-Saving Design


 Akasaka Diesels Limited

# AKASAKA - MITSUBISHI UE DIESEL ENGINE

## Type LSE

- UEC45LSE (130min<sup>-1</sup>)  
6,225 - 9,960 kW  
8,450 - 13,520 PS
- UEC50LSE (124min<sup>-1</sup>)  
8,300 - 13,280 kW  
11,275 - 18,040 PS

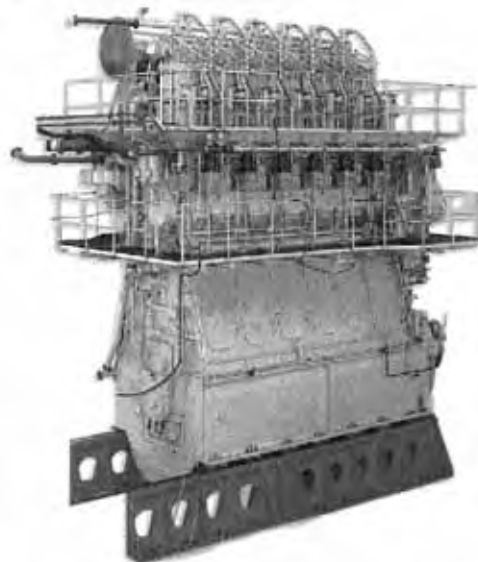


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# AKASAKA - MITSUBISHI UE DIESEL ENGINE

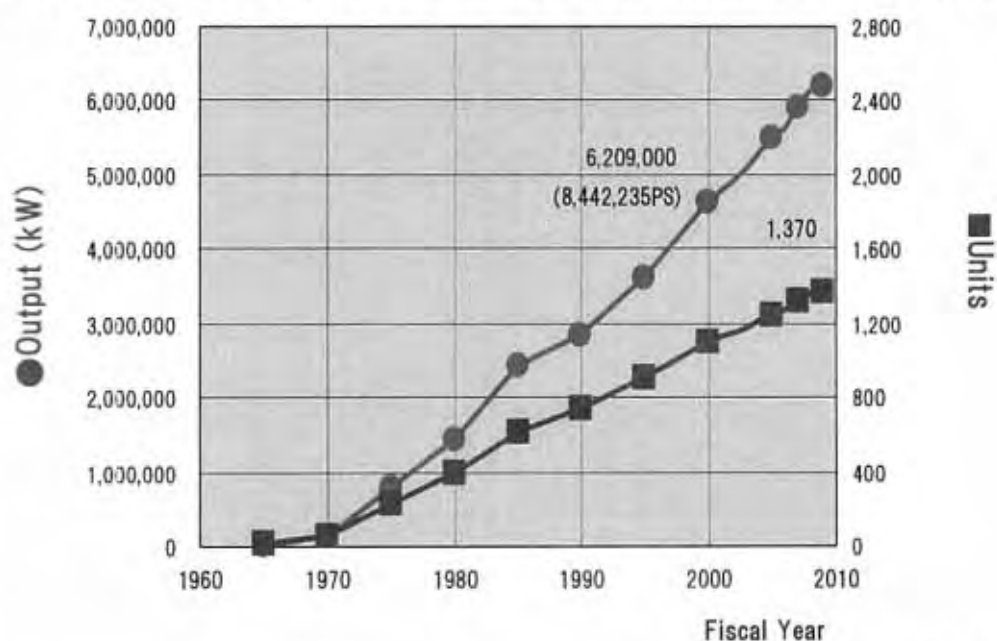
## Type LS II

- UEC33LS II (215min-1)  
2,830 - 4,530 kW / 3,850 - 6,160 PS
- UEC37LS II (186min-1)  
3,860 - 6,180 kW / 5,250 - 8,400 PS
- UEC43LS II (160min-1)  
5,250 - 8,400 kW / 7,150 - 11,440 PS
- UEC50LS II (127min-1)  
7,225 - 11,560 kW / 9,825 - 15,720 PS



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## PRODUCTION RECORDED OF AKASAKA-MITSUBISHI UE ENGINE



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# APPLICATION OF AKASAKA DIESEL ENGINES

Engine		Application								
Type	Output (kW)	BC	CT	FISH	LPG	OIL	CMNT	REF	CONT	TUG
LS II	2,830~ 16,360	◎	○	-	◎	○	○	◎	◎	-
LSE	6,225~ 13,280	◎	◎	-	◎	◎	-	◎	◎	-
A	1,103~ 3,309	◎	◎	◎	◎	◎	◎	◎	○	◎
E	1,323~ 1,618	○	-	◎	-	-	-	-	-	-
K	956~ 1,471	◎	◎	◎	◎	◎	◎	○	-	◎
T	625~882	◎	-	◎	-	○	-	-	-	○
U	1,838~ 2,427	-	-	◎	-	-	-	-	-	○
AX	1,618	◎	-	-	○	○	-	-	-	-

Akasaka Diesels Limited



# AKASAKA WORLDWIDE SERVICE NETWORK



Thank you very much for your kind attention.  
御清聴有難う御座いました。



*WHY SASAKURA?*  
*(SASAKURA's marine equipment)*

Yoshiaki Tokuda  
Manager  
SASAKURA ENGINEERING CO., LTD.

# WHY SASAKURA?

## Corporate profile

Trade Name	SASAKURA ENGINEERING CO., LTD.
Address	Head Office: Osaka, JAPAN
Founded	February 22, 1949
Capital	JPY2,220,000,000/JP (Equivalent to US\$ 22 million)
Representative Directors	Toshikazu Sasakura, President
Stock Exchange Listing	Second Section of the Osaka Securities Exchange (from December 7, 1994)



Head Office



Research and Development Center  
SASAKURA TECHNOPLAZA

## 3 Major Technology of SASAKURA.

WATER



HEAT

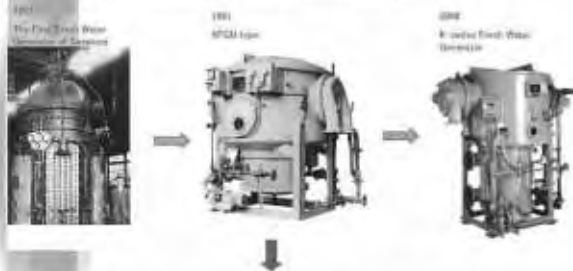


NOISE CONTRL.



## A history of shell & tube type Fresh Water Generator







Sasakura Engineering Co., Ltd. was founded by the 100 Technicians with the capital of ¥900,000 as a Japanese manufacturer of steamboilers, valves and heat exchangers.



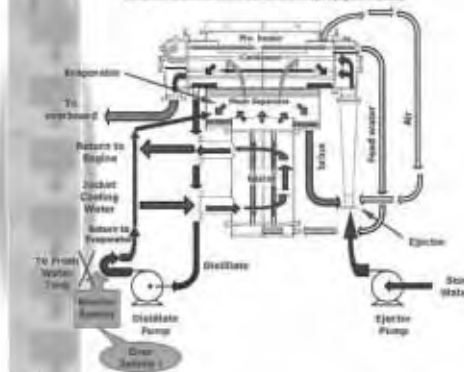
Total shipment number of Fresh Water Generator exceeded over 10,000 in 2006.

SASAKURA is the only maker in the world who has supplied more than 10,000 units of Fresh Water Generator.


## A kind of Fresh Water Generator

 Single Effect Fresh Water Generator CAP: 3-10000	 Plate Type Fresh Water Generator CAP: 3-4500	 Double/Triple-Effect Low Pressure Submerged Tube-Type Distilling Plant CAP: 40-20000
 Low-Pressure High-Pressure Distilling Plant CAP: 35-7000	 Low-Pressure Submerged Tube-Type Distilling Plant CAP: 35-7000	 Multi-stage Plate-Type Distilling Plant CAP: 100-100000

## FLOW DIAGRAM (Type KE)

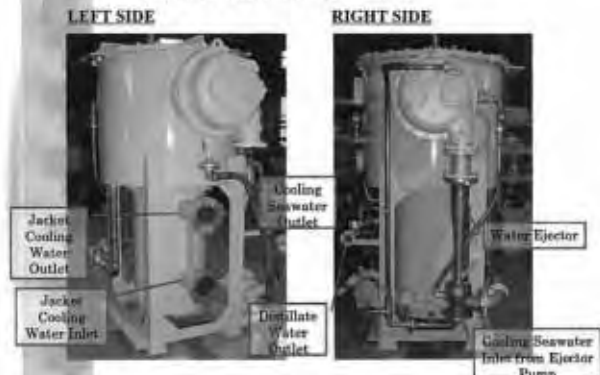


## NAME & FUNCTION OF COMPONENTS (Type KE)



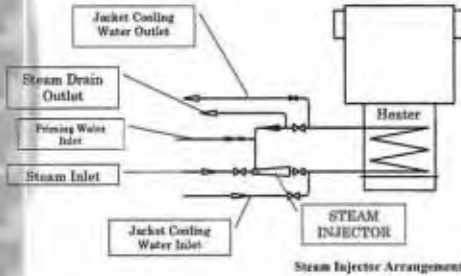
- Salinity Indicator**  
Indicates the salinity of distillate.
- Evaporator**  
Evaporates the feed water at a lower temperature.
- Distillate Pump**  
Discharges product water.
- Condenser**  
Condenses generated vapor into distillate.
- Water Ejector**  
Maintains vacuum in the Evaporator and discharges brine and cooling seawater overboard.
- Distillate Integrating Flowmeter**  
Indicates the integrated quantity of distillate produced.
- Heater**  
Is a heat exchanger that heats the feed water to generated vapor.

## LEFT & RIGHT SIDE VIEW



## 9 Steam Injector (Option)

The Fresh Water Generator can operate with steam through a steam injector when the diesel engine is not running or jacket cooling water is not available.



2004-011

## 10 Why K-Series (Tubular type)?

- ① EXPERIENCE
  - ⇒ SASAKURA will be the 60th anniversary in Feb. 2009.
  - We have improved quality with solving problems in the past.
- ② HIGH RELIABILITY
  - ⇒ Total shipment number is Almost 11,000 sets
  - Obtained ISO-9001, ISO-14001
- ③ EXCELLENT HEAT EXCHANGE
  - ⇒ Pre-heater Inside of Condenser
- ④ REASONABLE PRICE
  - ⇒ Reasonable price with good performance and long life.

2004-011

## 11 PLATE TYPE FRESH WATER GENERATOR, EX-Series

Characteristic of Heat exchanger

• Plate type (EX-Series)



EX-Series

2004-011



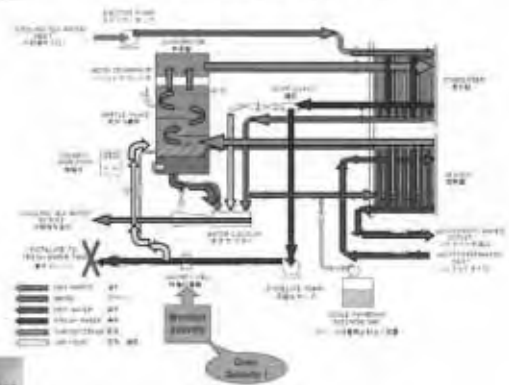
Easy to maintenance, cleaning, high coefficient of heat transfer.

• Shell & Tube type (K-Series)



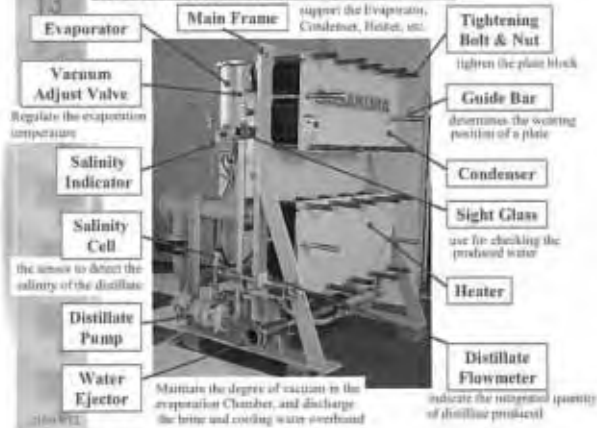
Scale does not adhere easily. Can stand high pressure.

## 12 FLOW DIAGRAM (Type EX)



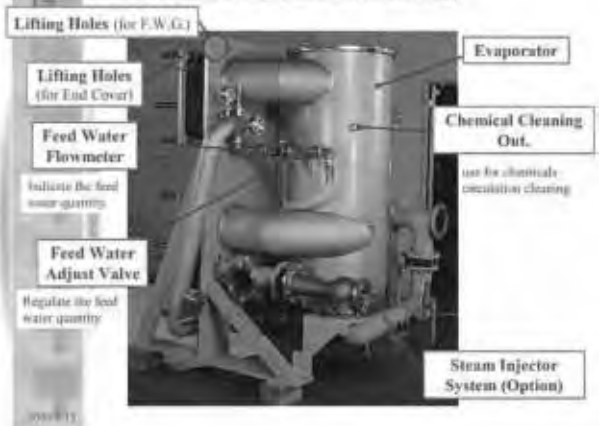
2004-011

## 13 NAME & FUNCTION OF COMPONENTS (EX-Series)



2004-011

## 14 NAME & FUNCTION OF COMPONENTS (EX-Series)



2004-011

## 15 Why EX-Series (Plate type)?

### Feature-①



AQUARIO

2004-011

### ① No Front Cover

- Easier disassembly and reassembly of plate heat exchanger section.
- Less number of plate. (About half of other maker's)
- No corrosion of frame, guide bar, end plate and bolts&nuts.
- Visual check of leakage from heat exchange section.
- Minimal installation and maintenance space.

## 16 Why EX-Series (Plate type)?

### Feature-②

### ② Special Designed Plate

- Double sealed gasket (No-contamination)
- Reduced clogging between plates

2004-011

17 Why EX-Series (Plate type)?  
Feature-③



SASAKURA Tubular  
Type F.W. Generator

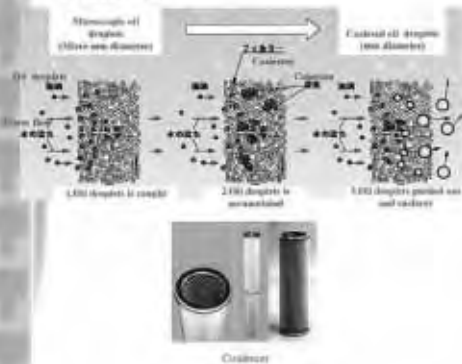


EX-Series  
"AQUARIO"

③ Others

- Compact installation space
- Easy maintenance

19 PRINCIPLE



18

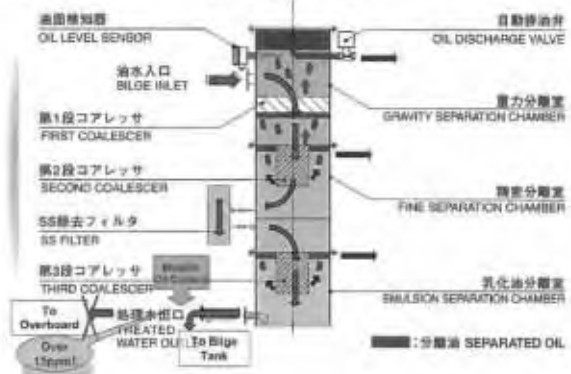
15ppm BILGE  
SEPARATOR

Type: SHT



SASAKURA  
ENGINEERING CO., LTD.

20 OPERATION AND FUNCTIONS  
INTERNAL VIEW



21

FEATURES



- Superb separation of high water containing emulsified oil
- Compact design (Arranged in single shell)
- Low running cost (No chemical required, No activated carbon for emulsified oil removal)
- Easy maintenance (Easy removal of SS filter & Coalescer cartridge)
- Automatic operation

22

SASAKURA  
SEWAGE TREATMENT PLANT



IMO決議MEPC.159 (55) に基づく型式承認取得品  
Type Approved under IMO Resolution MEPC.159 (55)

MED Type approved

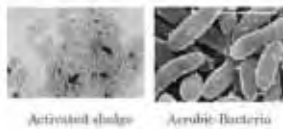


SASAKURA  
ENGINEERING CO., LTD.

23

PRINCIPLE

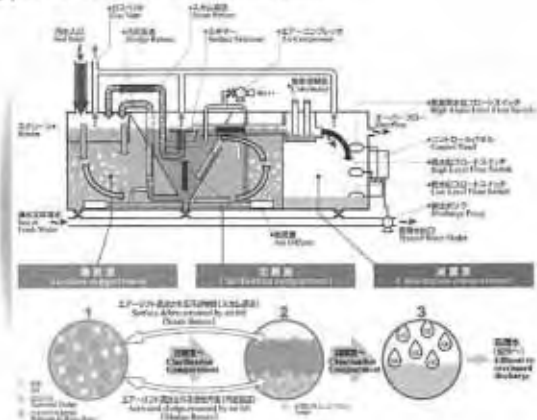
Principle of SASAKURA Sewage Treatment Plant is an activated sludge process type long-term aeration waste water treatment plant. It is a system that purify waste water by aerobic bacteria in activated sludge that digest a waste.



SEWAGE TREATMENT  
PLANT



24 OPERATION AND STRUCTURE



**FEATURES**



- 1.High reliability**  
Certified MEPC 150376 by DNV.
- 2.Complete treatment**  
Waste treatment highly resistant to load change and minimizing increase in sludge.
- 3.Easy maintenance**  
No filters area used in the treatment plant.
- 4.Easy operation**  
Completely automatic control.

**Quality Control at Our Onoda factory**

Onoda factory manufactures Marine equipment

1. Inside of Fresh Water Generator



2. Quality check in Onoda



3. In the case of K-Series Fresh Water-Generator



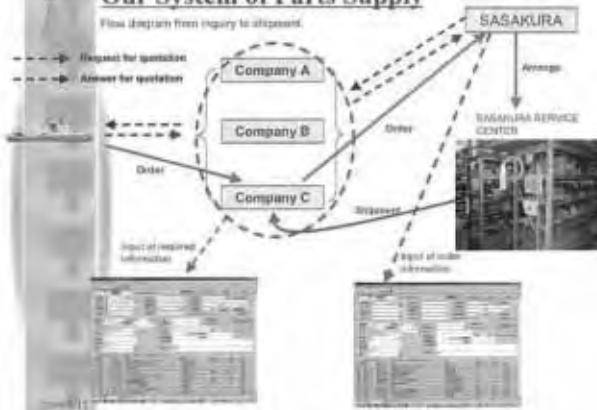
4. Completion and maintenance



In the case of K-Series Fresh Water-Generator

**Our System of Parts Supply**

Flow diagram from inquiry to shipment.



**Research and Development Center  
Named "Sasakura TechnoPlaza"**

Trial Run Area



Evaporating concentrator



Water Lab





*LAN-oriented Digital Telephone  
and Marine Clock Sysyem*

Makoto Miyahata  
Sales Department 2  
NIPPON HAKUYO ELECTRONICS, LTD.

## NIPPON HAKUYO electronics,ltd. is ...

Fig.1



Fig.2



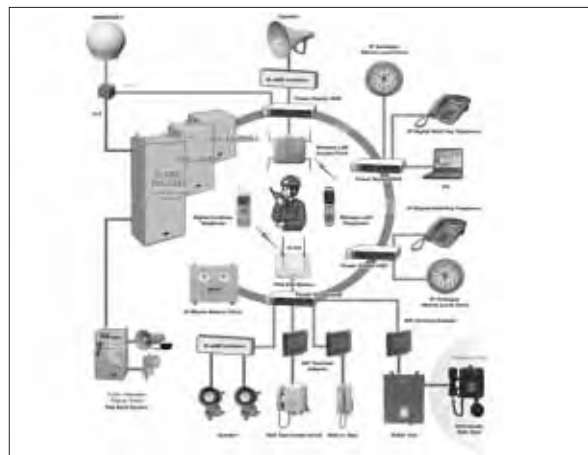
NIPPON HAKUYO electronics,ltd. was founded in the year 1981. Since then, we have been supplying a variety of marine-use electronic products to our customers, such as inter-communication equipments, fire detection/alarm equipments and satellite data acquisition/processing systems. We believe that our products always employ the most advanced and the most reliable technology.

## Introducing LAN Integrated Systems on board

Fig.3



Fig.4



Now we are in a new era of Digital Technology. In a ship-onboard communication environment as well, we can see miscellaneous digitized systems. We would like to give you a brief presentation on our LAN-oriented Digital Telephone System and Clock System.



## Our Digital Telephone Exchange: OAE-1200MX/8300 is ...

Fig.5



Fig.6



Marine Automatic Digital Telephone Exchange, model OAE-1200MX/8300 series, will create a digital communication system that will meet any kinds of conditions in internal and external communications on board.

## Capable of LAN Connection, as well as conventional wiring

Fig.7

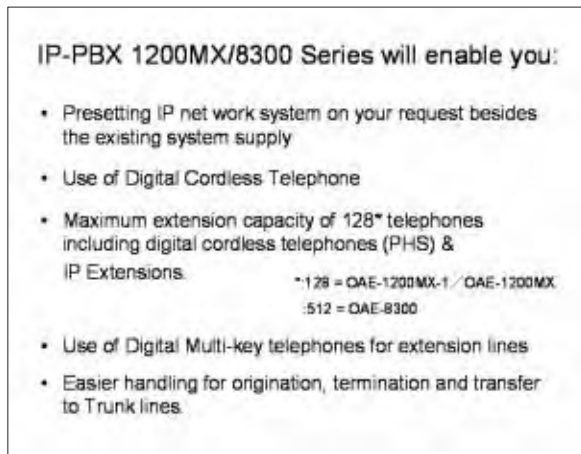


Fig.8



Based on the latest Voice communication system that features VoIP (Voice over Internet Protocol) and IP telephony, its flexible configuration will open the next door to the future communications on ship-onboard through LAN network, as well as conventional star wiring.

## Trunk Line Access - flexibly arranged as you like

Fig.9

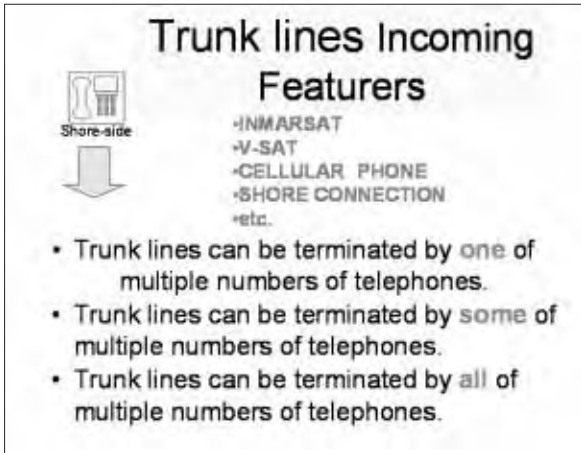
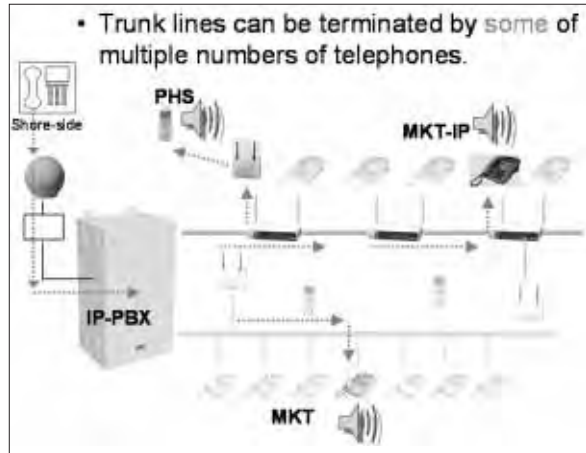


Fig.10



Incoming call from shore-side can be terminated via trunk line.

You can choose the receivable station by presetting.

## Digital Cordless Telephones - to catch up your mobility

Fig.11

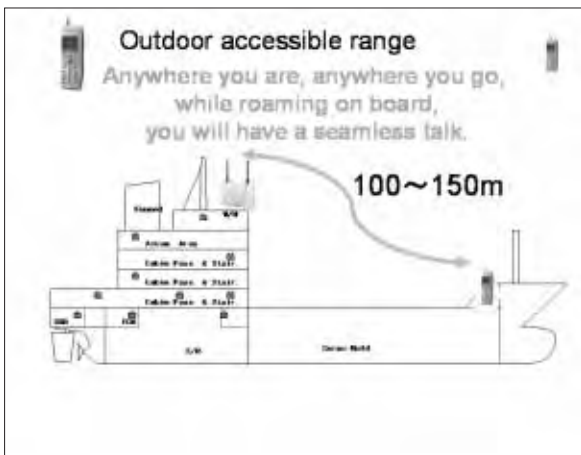
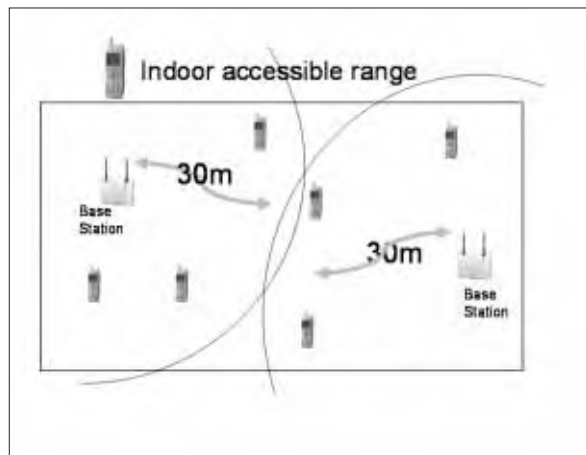


Fig.12



Digital communication enables you to use Digital Cordless Telephones such as PHS or WiFi phones.

They will catch you wherever you are on board.

\*Using weak electromagnetic waves that do not conflict with international law.

## Digital Telephones are ready to go on board

Fig.13



Fig.14



Digital Multi Key Telephones will assure you a clear conversation, and also they can be the multi-key station capable to preset the versatile functions.

Digital network will be full of miscellaneous new-generation devices which we dreamed of before.

## Digital Data: Easy Storage, Upload and Download = Easy Maintenance

Fig.15



Fig.16

**Specifications**

Models	OAE-1200MX-1	OAE-1200MX	OAE-8300M	OAE-8300L
Port capacity	84(128) Ports	132 Ports	256 Ports	384 Ports
Package slots	6	12	16	24
Analog external (Trunk) line 8L/8lg	64	64	128	192
Analog extension 16L or 8L/8lg	48	96	256	384
Digital extension 16L or 8L/8lg	96	96	192	288
Digital cordless ES	16(32)	32(32)	64(128)	96(192)
Digital cordless tel. (PHG)	128			512
IP extension	128			512
Max. power consumption	120VA	240VA	300VA	400VA
Power supply	AC100,115,230,240V 50/60Hz 1Φ			
	DC24V			
Dimensions (W x H x D) mm	485 x 560 x 230	485 x 670 x 310	590 x 1,215 x 280	800 x 1,205 x 280
Mass	Alt: 40kg	Alt: 60kg	Alt: 124kg	Alt: 163kg

Digitization makes program maintenance easier.

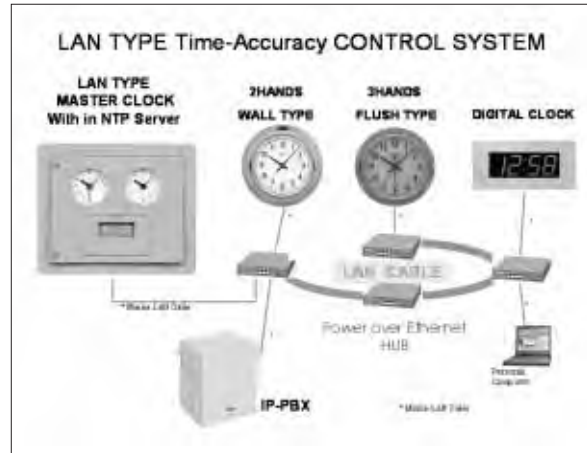
You can keep and transfer it with USB memory or via Web network.

## An advanced way of Time-accuracy Control on board

Fig.17



Fig.18



LAN type MASTER / SLAVE CLOCK establish time-accuracy control system on board.

## By way of LAN, Time-Accuracy and Power will be distributed

Fig.19

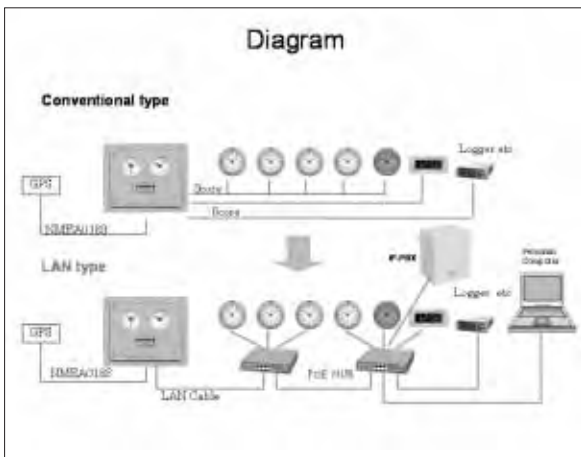
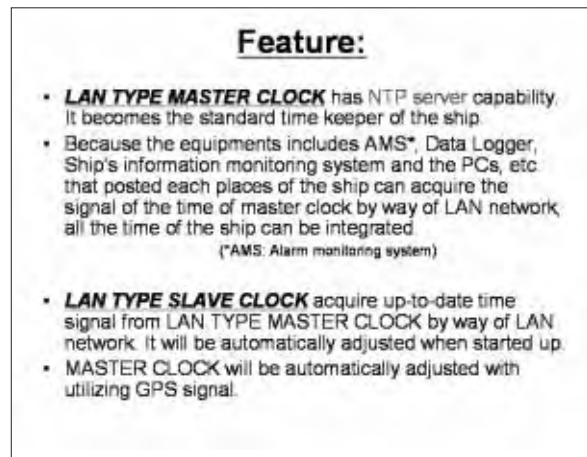


Fig.20



It will make the most of LAN cables existing on the vessel.

Power can be supplied via PoE Power Feed HUB.

All the time-accuracy on board will be controlled by way of LAN networks.

*Technology of DAIHATSU marine diesel engines*

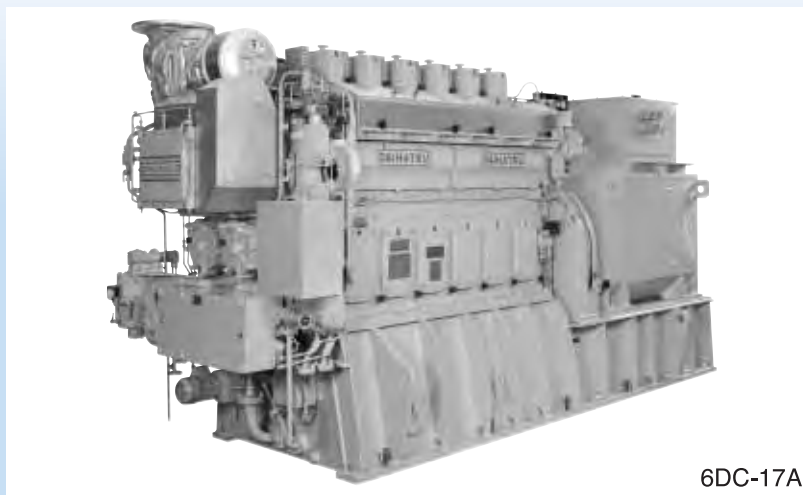
Kenichi Hanamoto  
Manager, Technical Department  
DAIHATSU DIESEL MFG. CO., LTD.

# DC-17A

DAIHATSU

## Marine Gensets Diesel Engine

- BORE: 170mm
- STROKE: 270mm
- No. of cylinder: 5,6
- Pme: 5DC; 2.13MPa. 6DC; 2.21MPa
- Piston speed: 8.10m/sec (at 900min<sup>-1</sup>)



6DC-17A

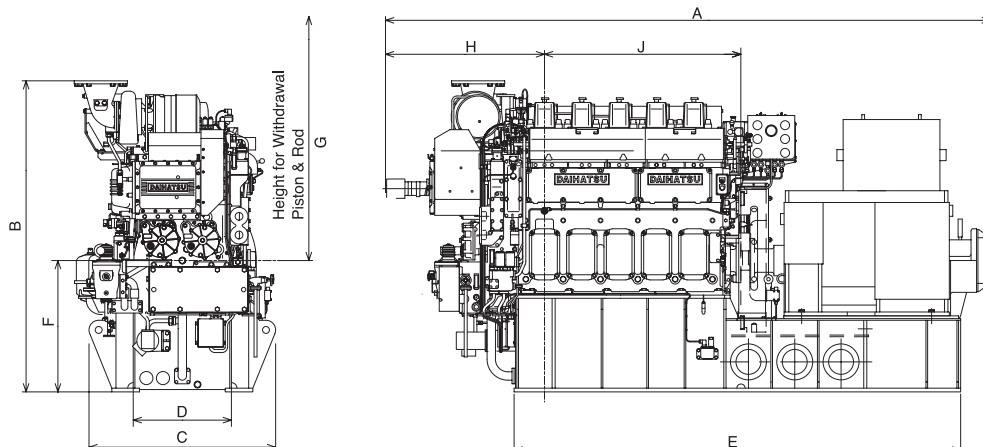
### PRINCIPAL PARTICULARS

Model	Output	Fuel oil Rev. (min <sup>-1</sup> )	H.O. 700 ~ 180mm <sup>2</sup> /s /50°C		Diesel oil	
			900	1000	900	1000
5DC-17A	Engine	kW	490		490	
	Generator	kW	450		450	
6DC-17A	Engine	kW	610		610	
	Generator	kW	560		560	

### DIMENSIONS & WEIGHTS

Model	Mark	(mm)								(ton)
		A	B	C	D	E	F	G	H	J
5DC-17A	4070	2250	1350	950	3230	950	1435	845	1420	10.0
6DC-17A	4510				3565				1690	11.0

※ Depending on alternator maker

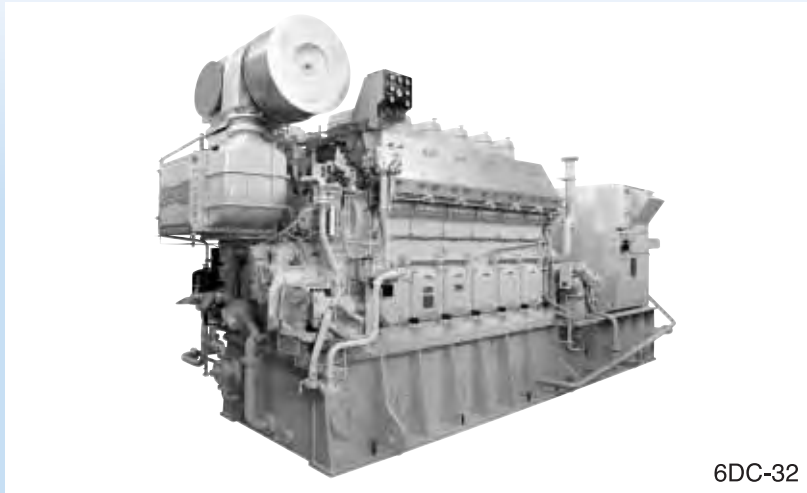


# DC-32

**DAIHATSU**

## Marine Gensets Diesel Engine

- BORE: 320mm
- STROKE: 400mm
- No. of cylinder: 6,8
- Pme: 6DC: 2.51MPa, 8DC: 2.49MPa
- Piston speed: 9.6m/sec (at 720min<sup>-1</sup>)



6DC-32

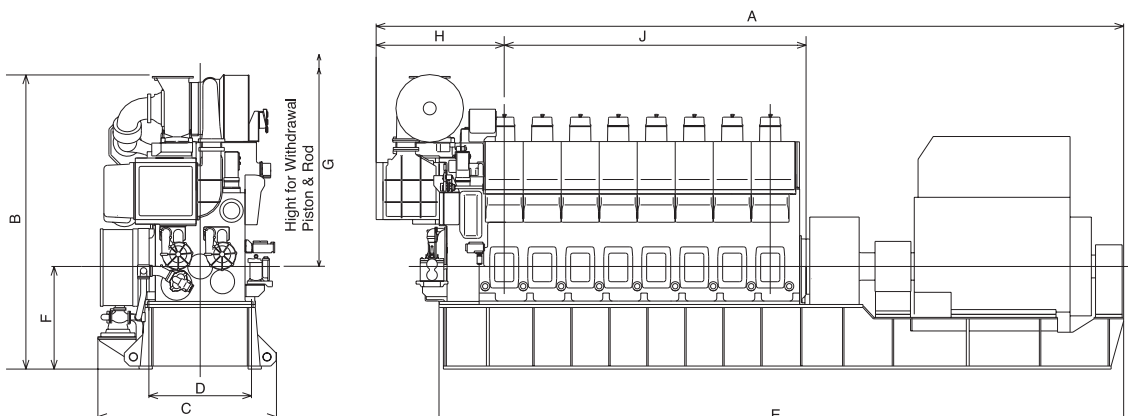
### PRINCIPAL PARTICULARS

Model	Output	Fuel oil Rev. (min <sup>-1</sup> )	H.O. 700 ~ 180mm <sup>2</sup> /s /50°C		Diesel oil	
			720	750	720	750
6DC-32	Engine	kW	2905		2905	
	Generator	kW	2760		2760	
8DC-32	Engine	kW	3844		3844	
	Generator	kW	3690		3690	

### DIMENSIONS & WEIGHTS

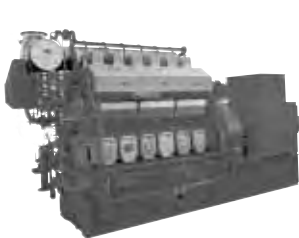
Model	Mark	(mm)								(ton)	
		A	B	C	D	E	F	G	H	J	Dry Weight Total *
6DC-32		8800	4310	2345	1350	7900	1350	2295	1685	3040	58.0
8DC-32		9835	4360			9008				4040	67.0

※ Depending on alternator maker



## DK series Output Range(kW)

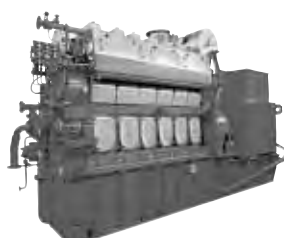
Type	min-1	500	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500	6000	6500	7000	H.F.O kW
DK-20	720/750	5   610   829PS	6   800   1088PS	8   1065   1448PS												
	900	5   800   1088PS	6   1040   1414PS	8   1360   1849PS												
DK-26	720/750		5   1280   1741PS	6   1710   2325PS												
DK-28	720/750				6   1990   2706PS	8   2635   3583PS										
DK-36	600							6   3310   4500PS		8   4413   6000PS				12   6325   8600PS		



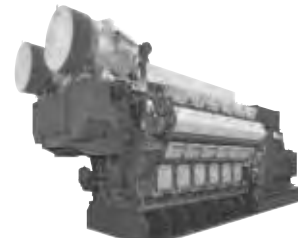
**DK-20** 5DK-20 6DK-20 8DK-20



**DK-26** 5DK-26 6DK-26

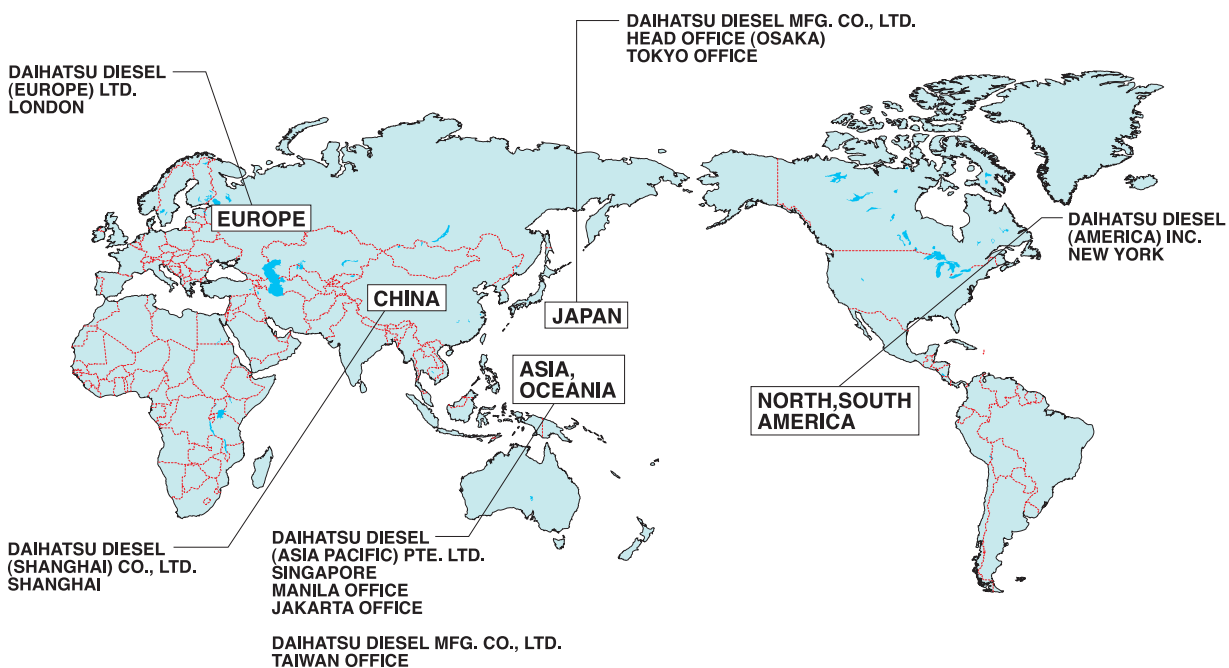


**DK-28** 6DK-28 8DK-28



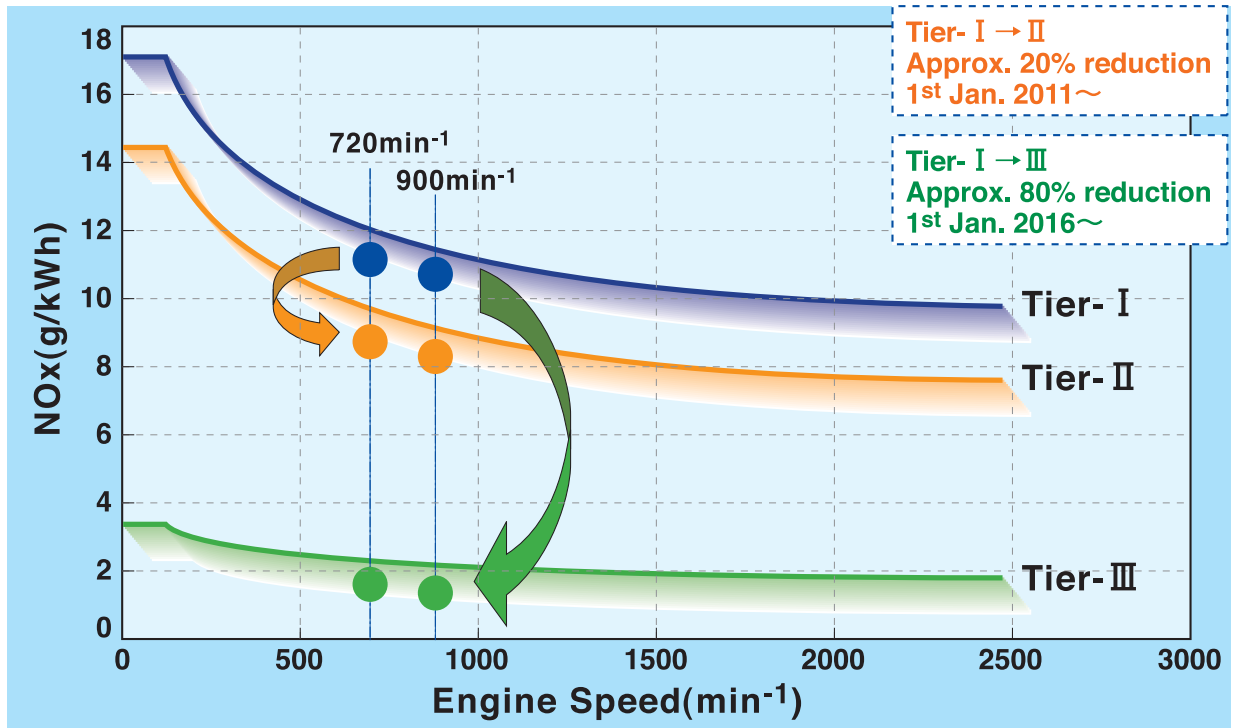
**DK-36** 6DK-36 8DK-36 12DK-36

## NETWORK





## IMO NOx Regulation



Tier- I → II  
Approx. 20% reduction  
1st Jan. 2011~

Tier- I → III  
Approx. 80% reduction  
1st Jan. 2016~

### Technologies against IMO Tier- II Regulation

1. Optimized Comp. Ratio, Combustion Chamber, Fuel injection system (Plunger lead, Nozzle spec)
2. Appropriate Injection timing retard
3. Optimized Intake valve timing
4. High pressure ratio T/C
5. Increased I/C capacity, optimized auxiliary parts

◇ Possible to deal with the NOx limitation by only engine modification.



Monitoring room

Check of NOx analyzer



Inspectors

### How to comply Tier- III ?

DAIHATSU DIESEL is participating the National Project "Development of Super Clean Marine Diesel"

Target : NOx 80% less than IMO Tier- I (for Tier-III)

Object : Development of SCR which is suitable for medium speed 4 cycle marine diesel engines.

Term : 2007~2010 (3.5 years)

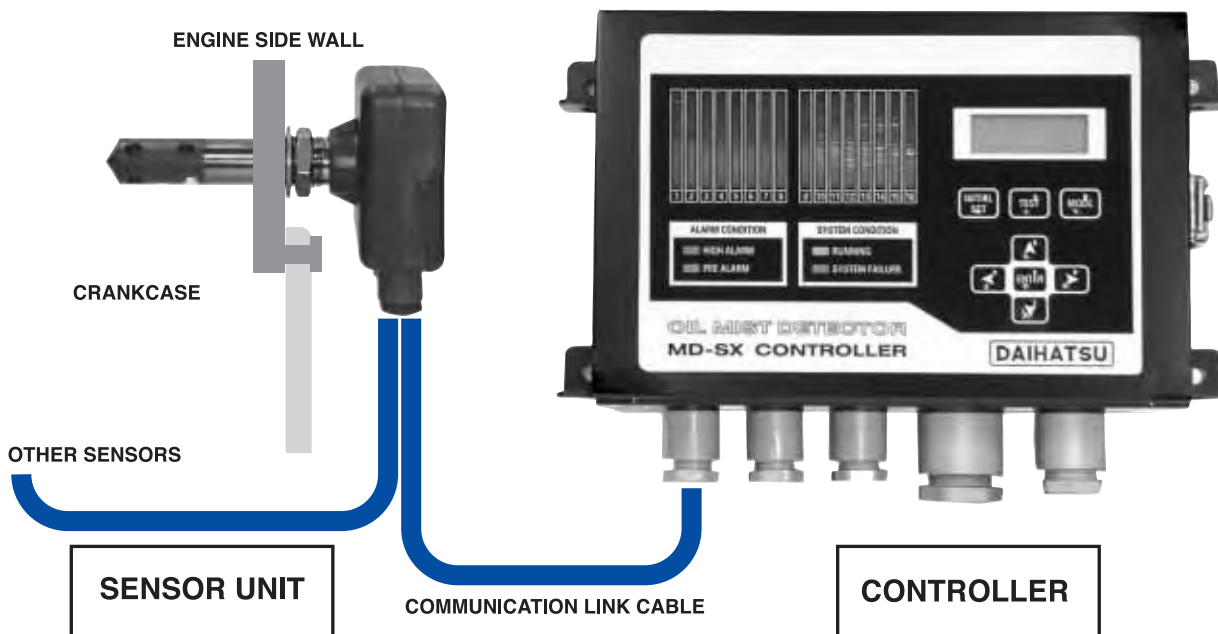


Sampling of fuel

**DAIHATSU Oil Mist Detector**

**MD-SX**  
(Sensor Type)

The Oil Mist Detector Monitors your engine to detect major engine failure.



■ One controller can monitor two engines.

