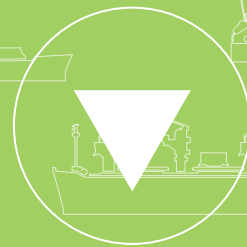


# SHIPBUILDING AND MARINE ENGINEERING IN JAPAN 2024



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SHIP SEARCH

### BY BUILDER

The Hakodate Dock Co., Ltd.	Mitsui E&S Shipbuilding Co., Ltd.	Shin Kurushima Dockyard Co., Ltd.
Hitachi Zosen Corporation	Naikai Zosen Corporation	Shin Kurushima Sanoyas Shipbuilding Co., Ltd.
Imabari Shipbuilding Co., Ltd.	Namura Shipbuilding Co., Ltd.	Shin Kurushima Toyohashi Shipbuilding Co., Ltd.
Japan Marine United Corporation	Niigata Shipbuilding & Repair, Inc.	Sumitomo Heavy Industries Marine & Engineering Co., Ltd.
Kawasaki Heavy Industries, Ltd.	Onomichi Dockyard Co., Ltd.	Tsuneishi Shipbuilding Co., Ltd.
Mitsubishi Shipbuilding Co., Ltd.	Oshima Shipbuilding Co., Ltd.	
MITSUI E&S Co., Ltd.	Sasaki Shipbuilding Co., Ltd.	

### BY SHIP TYPE

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Tankers/Aframax	Bulk Carriers/Panamax	Ro/Ro Ship	Technology Development Trends
Tankers/LPG	Bulk Carriers/Handymax	General Cargo Ships	
Tankers/Product Carriers	Bulk Carriers/Handysize	Ocean Research Ships and Training Ships	
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**2** LADY SAMOA IV

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**3** PENGHU

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**5** ENEOS ENDEAVOR

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**6** OLYMPUS

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**8** PENELOPE

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**9** CRYSTAL TRINITY

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**11** CRYSTAL OASIS

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**15** AXIS RIVER

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81 Shin Kurushima Sanoyas Shipbuilding manufacture LNG Fuel Tank

82 Proposal by KHI, YPT, J-ENG Adopted as NEDO's Green Innovative Fund Project

83 World's First AiP Granted to Kawasaki's 2.4 MW Class Dual Fuel Engine Using Hydrogen Gas as Fuel

84 Delivery of G95ME-C10.6 engine for Large Container Ships

85 Delivery of LNG-fuelled main engine S60MEC10.5-GI for car carriers

86 Received consecutive orders for methanol-fuelled main engine (ME-LGIM)

87 Entered service of hydraulic waste heat recovery system, THS2

88 HiZAS VDA Service

89 Received first order of High Pressure BOG Compressor for LNG fuelled vessel with ME-GI engine

90 Received consecutive orders of high-pressure LNG pump for LNG-fuelled main engine (ME-GI)

91 Liquefied Hydrogen Carrier -SUIISO FRONTIER- Receives Classification from Nippon Kaiji Kyokai

92 Dawn of Australia's Hydrogen Industry

93 Liquefied Hydrogen Carrier -SUIISO FRONTIER- Wins PM Award at Japan Industrial Technology Awards

94 HySTRA celebrates completion of world's first liquefied hydrogen vessel voyage in Japan

95 Kawasaki Obtains AiP for Large, 160,000 m³ Liquefied Hydrogen Carrier

96 Liquefied Hydrogen Carrier -SUIISO FRONTIER- Chosen for Ship of the Year 2021

97 Shin Kurushima Dockyard group obtains ClassNK's GDA for LNG-fueled chemical tanker and FGSS

# CURRENT STATUS OF JAPAN SHIPBUILDING INDUSTRY

## Current Status

In fiscal 2022, Japanese shipbuilders won contracts for 280 ships (11.74 million gross tons) for export, which plunged 17.9% from the previous year. The global economy showed signs of recovery as the COVID-19 pandemic was gradually subsiding. However, steel prices continued to rise sharply, advancing ship prices. Ship owners, as a consequence, maintained a wait-and-see stance. Meanwhile, they secured a backlog of orders for 498 ships (22.16 million gross tons), which surged 16.5%.

Future outlooks are still unclear due to Russia's invasion of Ukraine, which began in February 2022; the Chinese economy, which has not as fully recovered yet as expected from the damage it incurred from the nation's zero-COVID policy; the U.S. economy, which has become unstable since the Federal Reserve Board (FRB) began raising interest rates; and other factors. The shipping market, which was brisk in early fiscal 2023, has returned to normal now. In addition, not many contract negotiations were held in the first half of fiscal 2023 as steel prices remained high. In April-October, Japanese shipbuilders received orders for 130 ships (5.21 million gross tons), while their backlog of orders was expanded for 515 ships (22.33 million gross tons).

## Newbuilding Activities

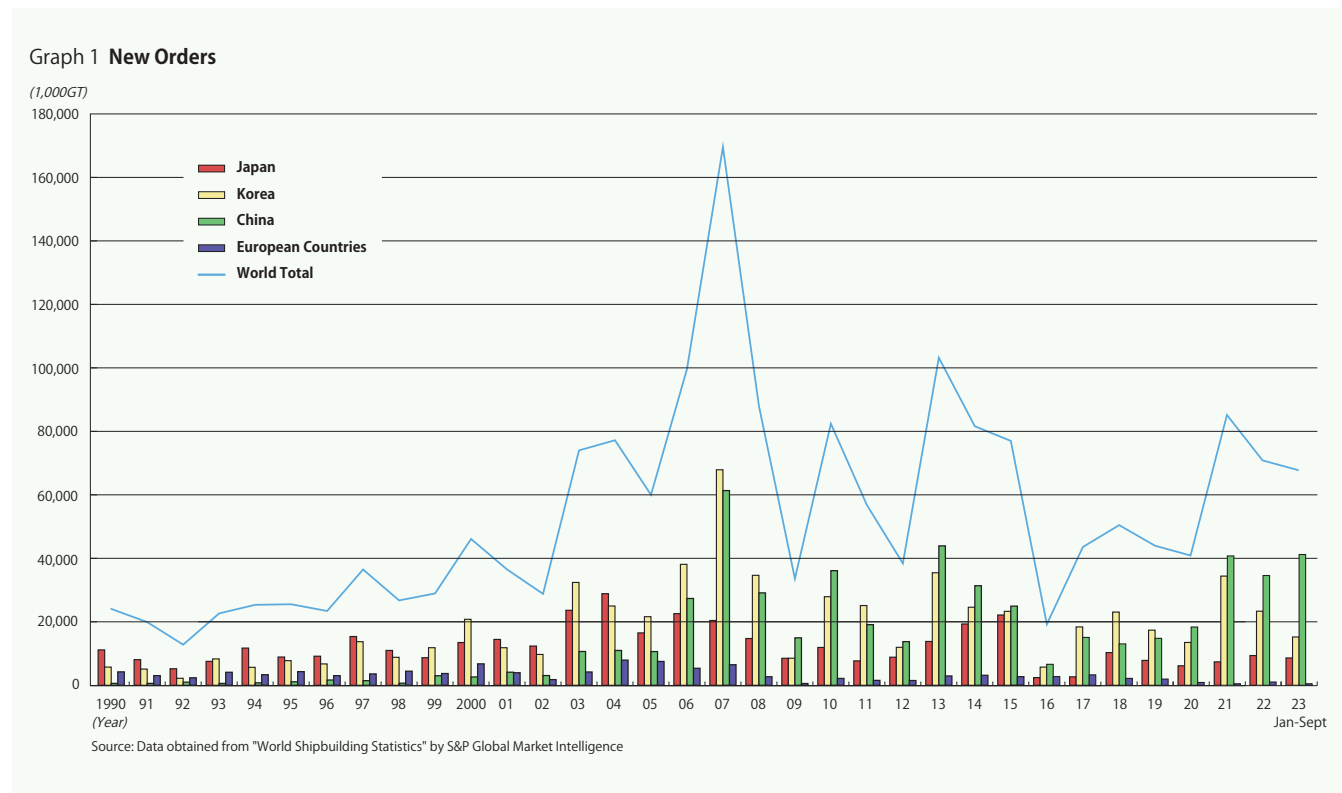
According to World Shipbuilding Statistics published by S&P Global Market Intelligence (Former IHS Markit Maritime & Trade) in the U.K., the status of newbuilding activities around the world was the following in new orders received, completed tonnage and newbuilding order backlog.

### 1. New Orders

In 2022, newbuilding orders worldwide totaled 2,270 vessels of 70,733,000 GT, down 16.8% on the year in Gross Tonnage. In Compensated Gross Tonnage (CGT), the total was 43,750,000, down 2.2% year on year.

Out of the global total of newly ordered gross tonnage, Japan had a share of 13.2%; South Korea, 32.9%; China, 48.8%; and European countries, 1.4%. The following is a breakdown by country or region:

Japan had received orders for 326 vessels of 9,310,000



# CURRENT STATUS OF JAPAN SHIPBUILDING INDUSTRY

GT (up 26.6% on 2021) or 5,083,000 CGT (up 34.5%); South Korea had received orders for 269 vessels of 23,282,000 GT (down 32.1%) or 14,920,000 CGT (down 14.4%); China had reported in new orders 797 vessels of 34,516,000 GT (down 15.0%) or 18,811,000 CGT (down 5.8%); and Europe had 289 vessels in new orders totaling 955,000 GT (up 161.9%) or 1,453,000 CGT (up 151.8%).

From January through September 2023, global

newbuilding orders were placed for 2,356 vessels of 67,623,000 GT, up 33.9% on the year, or 37,896,000 CGT, 20.3% more than in the same months of the preceding year.

The national or regional share of the total gross tonnage ordered during the nine months was 12.7% for Japan, 22.6% for South Korea, 60.8% for China, and 0.6% for European countries. Breaking it down, Japan had received orders for 307 vessels of 8,607,000 GT (up 48.7%

year on year) or 4,466,000 CGT (up 41.4%); South Korea, 187 vessels of 15,254,000 GT (down 19.9%) or 8,956,000 CGT (down 28.0%); China, 951 vessels of 41,132,000 GT (up 80.0%) or 21,315,000 CGT (up 64.2%); and Europe, 214 vessels of 396,000 GT (down 40.3%) or 643,000 CGT (down 39.9%).

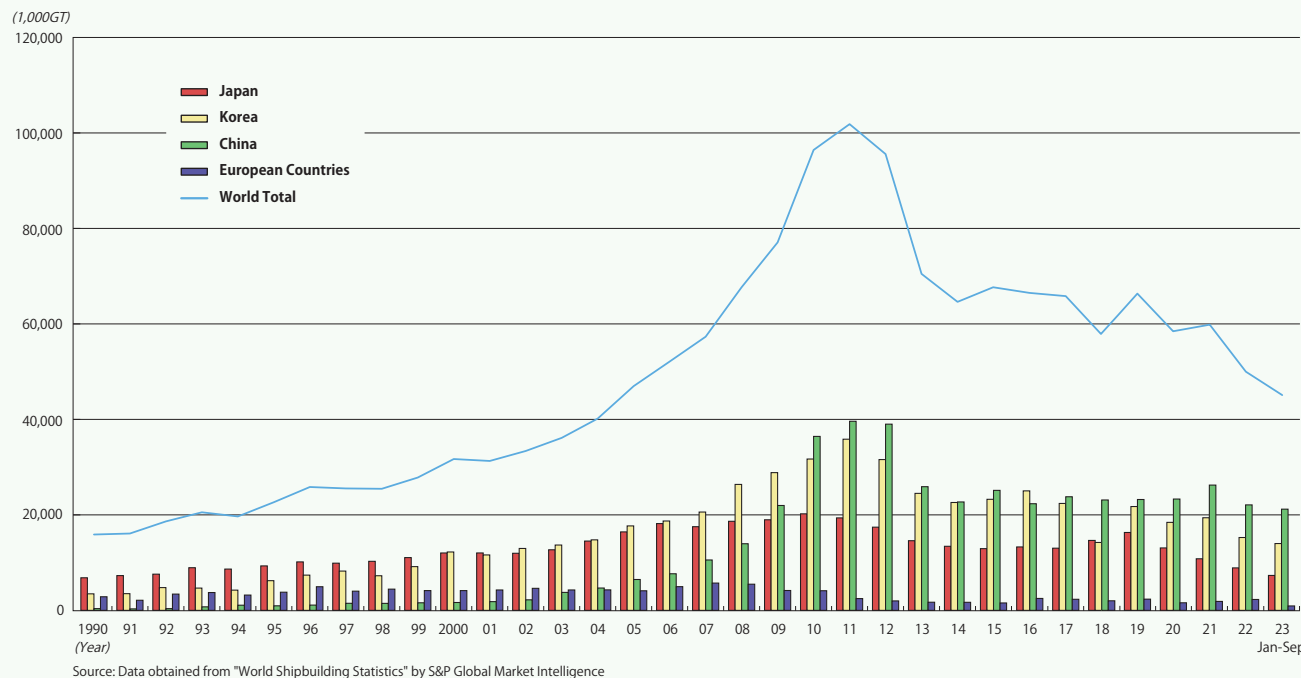
\* See Graph 1.

## 2. Newly Completed Tonnage

In 2022, there were 1,915 vessels of 50,016,000 GT completed worldwide, down 16.4% over the year before, or 27,302,000 CGT, down 16.9%. Of the global completed gross tonnage total in 2022, Japan completed 17.9%; South Korea, 30.4%; China, 44.1%; and Europe, 4.3%. In a breakdown by country or region, Japanese yards had completed 328 vessels of 8,962,000 GT (down 16.3% year on year) or 4,484,000 CGT (down 16.7%); South Korean yards, 193 vessels of 15,144,000 GT (down 21.6%) or 7,047,000 CGT (down 29.9%); Chinese yards, 701 vessels of 22,045,000 GT (down 15.5%) or 11,572,000 CGT (down 10.0%); and European yards, 137 vessels of 2,146,000 GT (up 21.2%) or 2,256,000 CGT (up 3.2%).

From January through September 2023, 1,641 vessels of 45,106,000 GT were completed in the world, up 21.2% on the year. In terms of CGT, the nine-month total was 23,991,000, up 21.6% year on year.

Graph 2 Completion



# CURRENT STATUS OF JAPAN SHIPBUILDING INDUSTRY

The national or regional share of the total gross tonnage completed during the nine months was 16.0% for Japan, 31.0% for the South Korea, 46.9% for China and 2.0% for European countries. More closely, Japanese yards had completed 263 vessels of 7,236,000 GT (up 5.1% year on year) or 3,690,000 CGT (up 9.3%); South Korean yards, 167 vessels of 13,964,000 GT (up 19.4%) or 6,738,000 CGT (up 23.5%); Chinese yards, 546 vessels of 21,164,000 GT (up 29.2%) or 10,550,000 CGT (up 26.1%); and European yards, 150 vessels of 886,000 GT (down 16.2%) or 1,131,000 CGT (down 3.5%).

\* See Graph 2.

## 3. Newbuilding Order Backlog

The global newbuilding order backlog at the end of December 2022 consisted of 5,201 vessels of 183,026,000 GT, 14.2% more than at the end of December 2021 on a gross tonnage basis, or 107,118,000 CGT, up 17.6%.

Of that backlog total at yearend 2022, Japan accounted for 11.4%; South Korea, 32.9%; China, 45.9%; and European countries, 4.1%. In detail, Japanese yards had on order 597 vessels of 20,807,000 GT (13.1% more than at the end of December 2021) or 10,464,000 CGT (up 16.7%); South Korean yards, 676 vessels of 60,301,000 GT (up 14.4%) or 34,525,000 CGT (up 27.6%); Chinese yards, 1,863 vessels of 84,035,000 GT (up 17.4%) or 43,946,000 CGT (up 19.4%); and European yards, 618

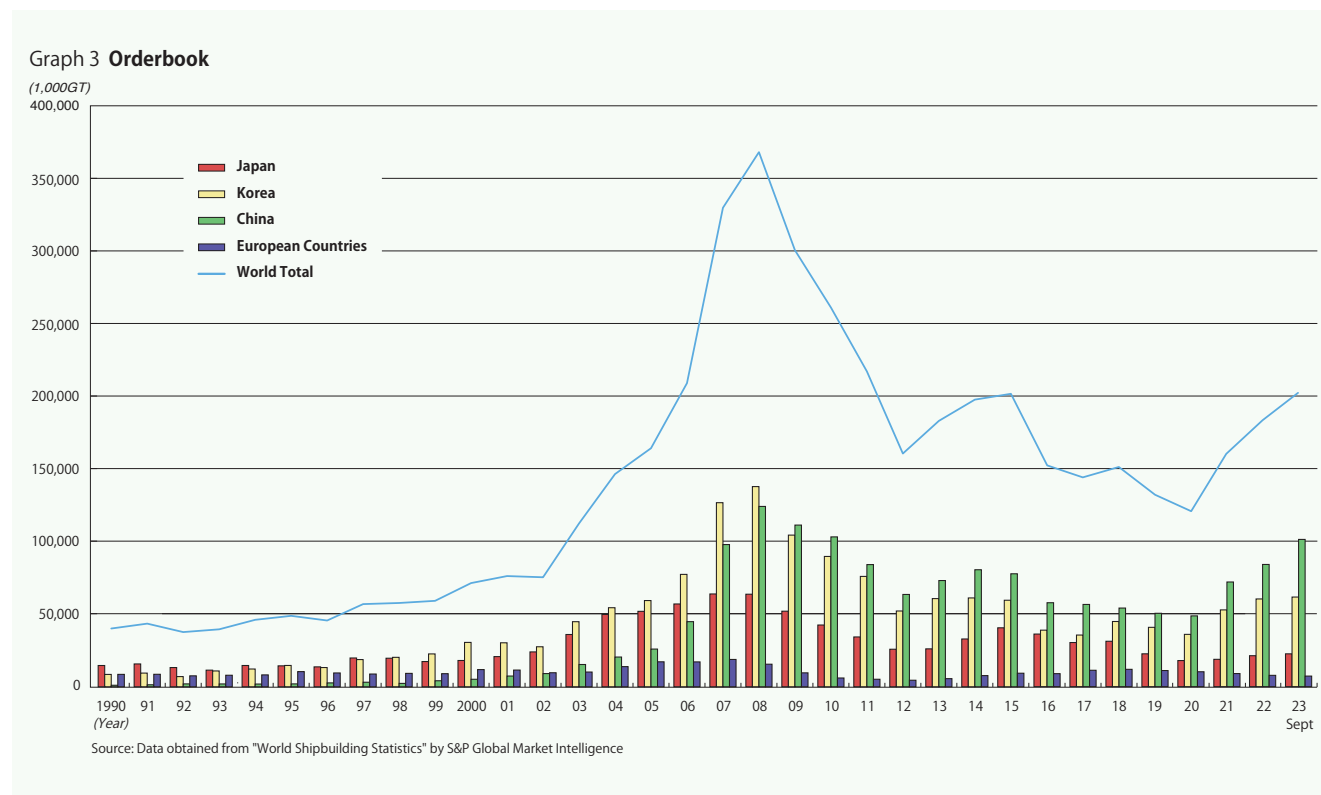
vessels of 7,488,000 GT (down 13.7%) or 8,511,000 CGT (down 9.5%).

At the end of September 2023, the global newbuilding order backlog stood at 5,572 vessels of 201,945,000 GT, up 14.8% compared with the end of September 2022 on a gross tonnage basis, or 118,465,000 CGT, up 14.2%.

The national or regional share of this global total was 10.9% for Japan, 30.3% for South Korea, 50.1% for China and 3.4% for European countries. Breaking it

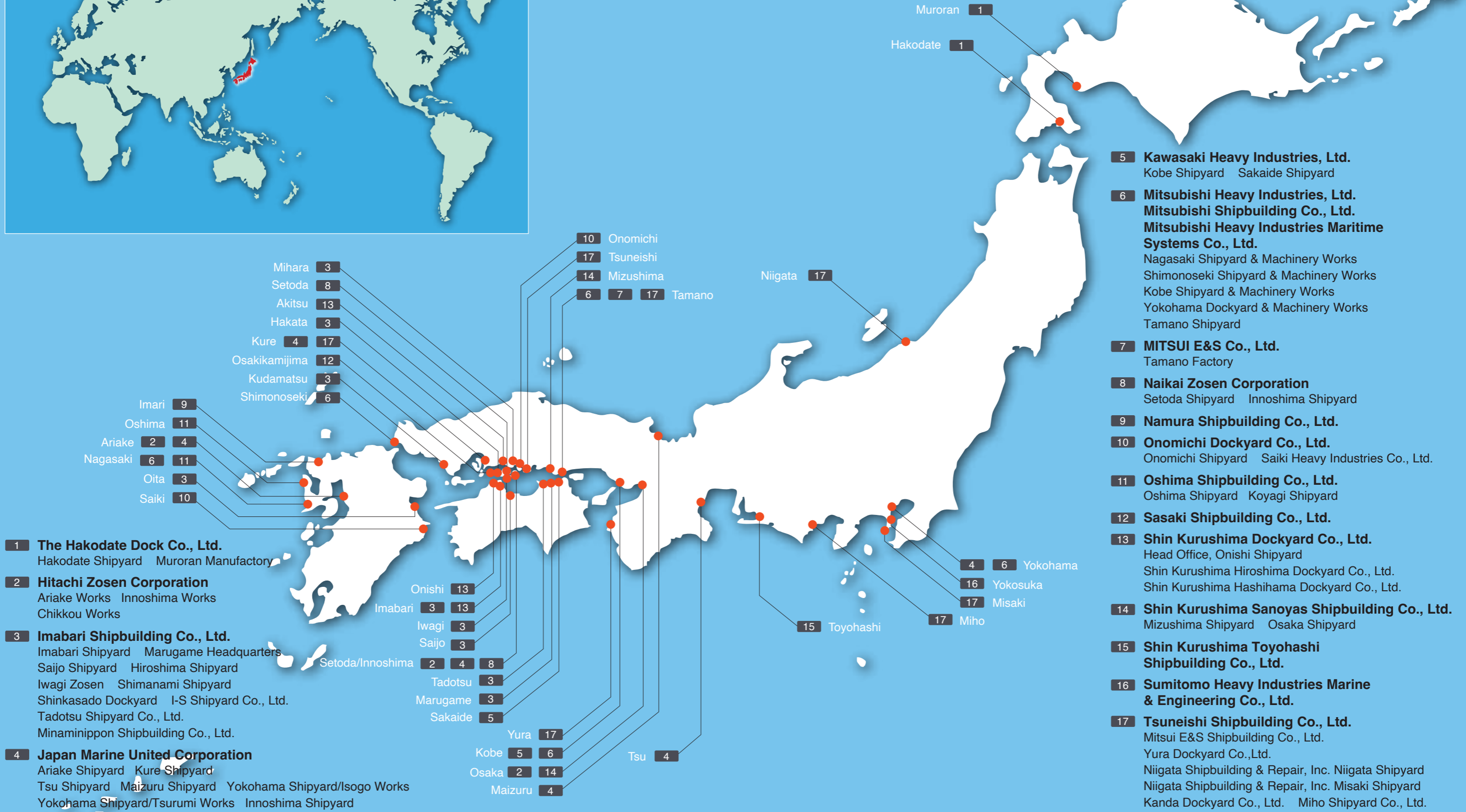
down, Japanese yards had 625 vessels on order for a total of 22,101,000 GT (up 13.7% on the end of September 2022) or 11,169,000 CGT (up 15.0%), South Korean yards, 689 vessels of 61,270,000 GT (up 2.8%) or 36,612,000 CGT (up 8.7%), Chinese yards, 2,159 vessels of 101,207,000 GT (up 29.4%) or 53,013,000 CGT (up 27.8%), and European yards, 602 vessels of 6,949,000 GT (down 15.8%) or 7,891,000 CGT (down 14.2%).

\* See Graph 3.





# LOCATION OF SHIPYARDS AND WORKS



**1 The Hakodate Dock Co., Ltd.**  
Hakodate Shipyard Murooran Manufactory

**2 Hitachi Zosen Corporation**  
Ariake Works Innoshima Works  
Chikkou Works

**3 Imabari Shipbuilding Co., Ltd.**  
Imabari Shipyard Marugame Headquarters  
Saijo Shipyard Hiroshima Shipyard  
Iwagi Zosen Shimanami Shipyard  
Shinkasado Dockyard I-S Shipyard Co., Ltd.  
Tadotsu Shipyard Co., Ltd.  
Minaminippon Shipbuilding Co., Ltd.

**4 Japan Marine United Corporation**  
Ariake Shipyard Kure Shipyard  
Tsu Shipyard Maizuru Shipyard Yokohama Shipyard/Isogo Works  
Yokohama Shipyard/Tsurumi Works Innoshima Shipyard

Mihara 3  
Setoda 8  
Akitsu 13  
Hakata 3  
Kure 4 17  
Osakikamijima 12  
Kudamatsu 3  
Shimonoseki 6

Imari 9  
Oshima 11  
Ariake 2 4  
Nagasaki 6 11  
Oita 3  
Saiki 10

Onishi 13  
Imabari 3 13  
Iwagi 3  
Saijo 3  
Setoda/Innoshima 2 4 8  
Tadotsu 3  
Marugame 3  
Sakaide 5

Yura 17  
Kobe 5 6  
Osaka 2 14  
Maizuru 4  
Tsu 4

10 Onomichi  
17 Tsuneishi  
14 Mizushima  
6 7 17 Tamano

Niigata 17

Murooran 1  
Hakodate 1

4 6 Yokohama  
16 Yokosuka  
17 Misaki  
17 Miho

15 Toyohashi

**5 Kawasaki Heavy Industries, Ltd.**  
Kobe Shipyard Sakaide Shipyard

**6 Mitsubishi Heavy Industries, Ltd.**  
**Mitsubishi Shipbuilding Co., Ltd.**  
**Mitsubishi Heavy Industries Maritime Systems Co., Ltd.**  
Nagasaki Shipyard & Machinery Works  
Shimonoseki Shipyard & Machinery Works  
Kobe Shipyard & Machinery Works  
Yokohama Dockyard & Machinery Works  
Tamano Shipyard

**7 MITSUI E&S Co., Ltd.**  
Tamano Factory

**8 Naikai Zosen Corporation**  
Setoda Shipyard Innoshima Shipyard

**9 Namura Shipbuilding Co., Ltd.**

**10 Onomichi Dockyard Co., Ltd.**  
Onomichi Shipyard Saiki Heavy Industries Co., Ltd.

**11 Oshima Shipbuilding Co., Ltd.**  
Oshima Shipyard Koyagi Shipyard

**12 Sasaki Shipbuilding Co., Ltd.**

**13 Shin Kurushima Dockyard Co., Ltd.**  
Head Office, Onishi Shipyard  
Shin Kurushima Hiroshima Dockyard Co., Ltd.  
Shin Kurushima Hashihama Dockyard Co., Ltd.

**14 Shin Kurushima Sanoyas Shipbuilding Co., Ltd.**  
Mizushima Shipyard Osaka Shipyard

**15 Shin Kurushima Toyohashi Shipbuilding Co., Ltd.**

**16 Sumitomo Heavy Industries Marine & Engineering Co., Ltd.**

**17 Tsuneishi Shipbuilding Co., Ltd.**  
Mitsui E&S Shipbuilding Co., Ltd.  
Yura Dockyard Co., Ltd.  
Niigata Shipbuilding & Repair, Inc. Niigata Shipyard  
Niigata Shipbuilding & Repair, Inc. Misaki Shipyard  
Kanda Dockyard Co., Ltd. Miho Shipyard Co., Ltd.

## SHIPBUILDING &amp; SHIPREPAIRING FACILITIES IN JAPAN

Company	Name of Shipyard	Facilities	G/T	LxB(m)
The Hakodate Dock Co., Ltd.	Hakodate Shipyard	Berth No.1	35,200	240.0 x 33.6
		R.Dock No.1	17,100	181.1 x 24.4
		R.Dock No.2	9,000	140.0 x 21.4
	Muran Manufactory	R.Dock No.3	120,000	330.0 x 58.0
		B.Dock	16,700	186.24 x 24.0
Imabari Shipbuilding Co., Ltd.	Imabari Shipyard	B.Dock No.2	37,000	217.0 x 43.0
	Marugame Headquarters	B.Dock No.1	53,200	270.0 x 45.0
		B.Dock No.2	115,000	370.0 x 57.0
		B.Dock No.3	250,000	610.0 x 80.0
	Saijo Shipyard	B.Dock No.1	250,000	420.0 x 89.0
	Hiroshima Shipyard	B.Dock No.1	156,000	378.0 x 59.0
		B.Dock No.2	165,000	382.0 x 56.0
	Iwagi Zosen Co., Ltd.	B.Dock No.1	43,000	215.0 x 38.0
	Shimanami Shipyard Co., Ltd.	Berth No.1	24,000	200.0 x 34.0
	Shin Kasado Dockyard Co., Ltd.	B.Dock No.5	49,000	255.0 x 50.0
		R.Dock No.3	42,000	227.0 x 37.0
	I-S Shipyard Co., Ltd.	B.Dock	4,000	212.0 x 36.0
	Tadotsu Shipyard Co., Ltd.	B.Dock No.1	115,000	380.0 x 60.0
Minaminippon Shipbuilding Co., Ltd.	B.Dock No.1	95,000	321.0 x 51.0	
	B.Dock No.2	95,000	295.0 x 51.0	
Japan Marine United Corporation	Ariake Shipyard	B.Dock No.1	-	620.0 x 85.0
		B.Dock No.2	-	420.0 x 85.0
	Kure Shipyard	B.Dock No.2	-	339.6 x 65.0
		B.Dock No.3	-	508.2 x 80.0
		R.Dock No.4	-	331.3 x 43.9
	Tsu Shipyard	B.Dock No.1	-	500.0 x 75.0
		R.Dock No.2	-	500.0 x 75.0
	Maizuru Shipyard	B.Dock No.3	-	245.6 x 35.8
		R.Dock No.2	-	258.0 x 36.4
	Yokohama Shipyard, Isogo Works	B.Dock	-	325.0 x 45.0
		R.Dock / B.Dock	-	417.0 x 56.0
		F.Dock "SAGAMI"	-	250.0 x 43.0
		F.Dock "NEGISHI"	-	175.0 x 36.0
	Yokohama Shipyard, Tsurumi Works	R.Dock No.1	-	177.7 x 35.0
		R.Dock No.3	-	90.0 x 20.0
		F.Dock	-	135.0 x 22.0
	Innoshima Shipyard	R.Dock No.1	-	175.0 x 25.1
		R.Dock No.2	-	282.5 x 46.5
R.Dock No.3		-	260.0 x 56.7	
Kawasaki Heavy Industries, Ltd.	Kobe Shipyard	Berth No.4	47,300	281.2 x 46.4
		F.Dock No.2	3,000	113.0 x 20.0
		F.Dock No.3	59,000	250.0 x 43.2
		R.Dock No.4	23,900	217.0 x 33.5
	Sakaide Shipyard	B.Dock No.1	121,000	380.0 x 62.0
		B.Dock No.3	170,000	420.0 x 75.0
		B.Dock No.2 & R.Dock No.2	125,000/270,000	450.0 x 72.0
Mitsubishi Shipbuilding Co., Ltd.	Shimonoseki Shipyard & Machinery Works	Berth No.2	26,000	185.96 x 53.15
		R.Dock No.2	26,000	210.0 x 35.0
		R.Dock No.3	2,000	83.0 x 16.3
		R.Dock No.4	500	55.7 x 10.5
	Nagasaki Shipyard & Machinery Works	Koyagi R.Dock	250,000	400.0 x 100.0
Mitsubishi Heavy Industries, Ltd.	Nagasaki Shipyard & Machinery Works	Berth No.1-2	46,900	324.0 x 56.0
		Dock No.1	117,000	375.0 x 56.0
		R.Dock No.2	165,000	350.0 x 56.0
		R.Dock No.3	57,500	276.6 x 38.8
	Kobe Shipyard & Machinery Works	Berth No.4	-	90.0 x 11.0
		Dock No.1	4,000	90.0 x 17.8
		Dock No.2	4,200	90.0 x 11.0
		Dock No.4	85,000	290.0 x 40.0
	Yokohama Dockyard & Machinery Works	R.Dock No.1	135,000	350.0 x 60.0
		R.Dock No.2	96,000	270.0 x 60.0
		R.Dock No.3	21,000	180.0 x 30.0
Mitsubishi Heavy Industries Maritime Systems Co., Ltd.	Tamano Shipyard	Berth No.2	60,000	276.3 x 49.9
		Berth No.5	38,500	256.7 x 43.2
		R.Dock No.1	39,400	170.0 x 40.0
		R.Dock No.3	27,700	206.8 x 30.3
Naikai Zosen Corporation	Setoda Shipyard	Berth No.1	30,000	192.0 x 50.0
		R.Dock No.1	44,500	230.0 x 36.0
		R.Dock No.2	5,000	119.0 x 19.0
	Innoshima Shipyard	Berth No.1	46,500	243.0 x 59.0
		Berth No.2	40,000	241.0 x 45.0
Namura Shipbuilding Co., Ltd.	Imari Shipyard & Works	B.Dock	161,000	450.0 x 70.0
Niigata Shipbuilding & Repair, Inc.	Niigata Shipyard	B.Dock No.1	7,500	125.0 x 25.0
		Berth No.4	500	111.0 x 14.0
		R.Dock No.2	1,500	135.0 x 17.5
	Misaki Shipyard	R.Dock No.1	2,700	70.0 x 23.0
		R.Dock No.2	500	49.0 x 23.0
Onomichi Dockyard Co., Ltd.	Onomichi Shipyard	B.Berth	69,500	264.5 x 43.0
		R.Dock No.5	32,000	215.0 x 34.0
		R.Dock No.6	21,000	185.3 x 30.0
	Saiki Heavy Industries Co., Ltd.	B.Berth	42,500	237.3 x 35.5
Oshima Shipbuilding Co., Ltd.	Oshima Shipyard	B.Dock	150,000	535.0 x 80.0
	Koyagi Shipyard	B.Dock	250,000	990.0 x 100.0
Sasaki Shipbuilding Co., Ltd.	Kinoe Shipyard	Berth No.1	9,700	135.0 x 26.0
Shin Kurushima Dockyard Co., Ltd.	Onishi Shipyard	B.Dock No.1	40,000 DWT	205.0 x 30.0
		B.Dock No.2	40,000 DWT	205.0 x 30.0
		B.Dock No.3	150,000 DWT	367.0 x 47.0
	Shin Kurushima Hiroshima Dockyard	B.Berth No.1	26,000 DWT	165.0 x 28.3
	Shin Kurushima Hashihama Dockyard	B.Berth No.1	13,000 DWT	128.0 x 20.0
R.Dock No.1		10,000 DWT	105.0 x 17.8	
R.Dock No.2		5,000 DWT	92.0 x 14.8	
Shin Kurushima Sanoyas Shipbuilding Co., Ltd.	Mizushima Shipyard	B.Dock & R.Dock	116,000 DWT	675.0 x 63.0
	Osaka Shipyard	R.Dock No.1	10,500	153.0 x 21.4
	R.Dock No.2	3,500	112.0 x 16.8	
Shin Kurushima Toyohashi Shipbuilding Co., Ltd.		B.Dock No.1	300,000 DWT	380.0 x 61.2
Sumitomo Heavy Industries Marine & Engineering Co., Ltd.	Yokosuka Shipyard	B.Dock	210,000	560.0 x 80.0
Tsuneishi Shipbuilding Co., Ltd.	Tsuneishi Factory	Berth No.1	-	241.0 x 41.5
		B.Dock	-	275.0 x 46.0
		R.Dock No.1	-	250.0 x 49.5
		R.Dock No.10	-	160.0 x 35.0
		R.Dock No.11	-	150.0 x 31.0
		R.Dock No.12	-	330.0 x 53.0
	Kanda Dockyard, Wakaba Works	F.Dock No.1	4,000	110.0 x 20.0
		F.Dock No.2	3,000	90.0 x 15.0
	Kanda Dockyard, Kawajiri Works	F.Dock No.3	25,000	181.0 x 31.0
	Miho Shipyard	Slipway No.1	-	110.0 x 22.0
		Slipway No.2	-	120.0 x 16.0
		Slipway No.3	-	125.0 x 22.0
		Slipway No.5	-	60.0 x 9.0
		Slipway No.6	-	60.0 x 9.0
		Dry Dock	-	95.0 x 16.0
	Yura Dockyard Co., Ltd.	Dry Dock	330,000 DWT	405.0 x 65.0
		Berth No.1	-	187
		Berth No.2	-	275
Berth No.3		-	185	
Berth No.4/5		-	395	

## Notes:

\*Source: Japan Ship Exporters' Association

\*Berth - New Building Berth

\*B.Dock - New Building Dock

\*R.Dock - Repair Dock

\*F.Dock - Floating Dock

## MEMBER LIST

## MANUFACTURERS

**The Hakodate Dock Co., Ltd.**

<http://www.hakodate-dock.co.jp/en/index.html>

**Hitachi Zosen Corporation**

<https://www.hitachizosen.co.jp/english/>

**Imabari Shipbuilding Co., Ltd.**

<https://www.imazo.co.jp.e.ajw.hp.transer.com/>

**Japan Marine United Corporation**

<https://www.jmuc.co.jp/en/>

**Kawasaki Heavy Industries, Ltd.**

<https://global.kawasaki.com/en/>

**Mitsubishi Shipbuilding Co., Ltd.**

<https://www.mhi.com/group/mhimsb/>

**Mitsubishi Heavy Industries, Ltd.**

<https://www.mhi.com/>

**Mitsubishi Heavy Industries Marine Machinery & Equipment Co., Ltd.**

<https://www.mhi.com/group/mhimme/>

**MITSUI E&S Co., Ltd.**

<https://www.mes.co.jp/english/>

**Mitsui E&S Shipbuilding Co., Ltd.**

<https://www.tsuneishi.co.jp/mes-s/en/index.html>

**Naikai Zosen Corporation**

<https://www.naikaizosen.co.jp/>

**Namura Shipbuilding Co., Ltd.**

<https://www.namura.co.jp/en/index.html>

**Niigata Shipbuilding & Repair, Inc.**

<https://www.tsuneishi.co.jp/nsr/>

**Onomichi Dockyard Co., Ltd.**

<https://onozo.co.jp/en/>

**Oshima Shipbuilding Co., Ltd.**

<https://en.osy.co.jp/>

**Sasaki Shipbuilding Co., Ltd.**

<http://www.sasakizosen.com/index.html>

**Shin Kurushima Dockyard Co., Ltd.**

<https://www.skdy.co.jp/en/>

**Shin Kurushima Sanoyas Shipbuilding Co., Ltd.**

<https://www.sanoyas.skdy.co.jp/en/>

**Shin Kurushima Toyohashi Shipbuilding Co., Ltd.**

<https://www.toyozo.jp/english>

**Sumitomo Heavy Industries Marine & Engineering Co., Ltd.**

<https://www.shi.co.jp/me/english/index.html>

**Tsuneishi Shipbuilding Co., Ltd.**

<https://www.tsuneishi.co.jp/english/>

## TRADING HOUSES

**ITOCHU Corporation**

<https://www.itochu.co.jp/en/>

**JFE Shoji Corporation**

<https://www.jfe-shoji.co.jp/en/>

**Kanematsu Corporation**

<https://www.kanematsu.co.jp/en>

**Marubeni Corporation**

<https://www.marubeni.com/en/>

**MI LNG Company, Limited**

[https://mi-lng.co.jp/index\\_E.html](https://mi-lng.co.jp/index_E.html)

**Mitsubishi Corporation**

<https://www.mitsubishicorp.com/jp/en/>

**Mitsui & Co., Ltd.**

<https://www.mitsui.com/jp/en/index.html>

**Sojitz Corporation**

<https://www.sojitz.com/en/>

**Sumisho Marine Co., Ltd.**

<https://www.sumisho-marine.co.jp/en/>

**Sumitomo Corporation**

<https://www.sumitomocorp.com/en/jp>

**Toyota Tsusho Corporation**

<https://www.toyota-tsusho.com/english/>

# MINISTRY OF LAND, INFRASTRUCTURE, TRANSPORT AND TOURISM AND SHIPBUILDING-RELATED ORGANIZATIONS

---

## Ministry of Land, Infrastructure, Transport and Tourism (MLIT)

Shipbuilding and Ship Machinery Division, Maritime Bureau  
<https://www.mlit.go.jp/en/maritime/index.html>

## The Nippon Foundation

<https://www.nippon-foundation.or.jp/en/>

## The Shipbuilders' Association of Japan

<https://www.sajn.or.jp/e>

## The Cooperative Association of Japan Shipbuilders

<https://www.cajs.or.jp/english.html>

## Japan Ship Exporters' Association

<https://www.jsea.or.jp/en/>

## Japan Ship Machinery and Equipment Association (JSMEA)

[http://www.jsmea.or.jp/index\\_en.html](http://www.jsmea.or.jp/index_en.html)

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## Overseas Offices

### London

#### Japan Ship Centre (JETRO London)

##### Maritime & Market Research / Shipbuilding

Cheapside House, 138 Cheapside, London, EC2V 6BJ, UK

Telephone: +44-20-7421-8341

+44-20-7421-8343 (Maritime)

+44-20-7421-8340 (Market Research)

+44-20-7421-8346 (Shipbuilding)

### Houston

#### Offshore and Maritime, JETRO Houston

1221 McKinney Street, Suite 4141, Houston, Texas 77010, U.S.A.

Telephone: +1-713-234-6605

Facsimile: +1-713-759-9210

### Hong Kong

#### Ship Machinery Department, JETRO Hong Kong

Room 4001, 40/F., Hopewell Centre, 183 Queen's Road East, Wan Chai, Hong Kong, China.

Telephone: +852-2501-7291

Facsimile: +852-2868-1455

### Singapore

#### Ship Machinery Department, JETRO Singapore

16 Raffles Quay, #38-05, Hong Leong Building, Singapore 048581

Telephone: +65-6429-9520 (Shipbuilding Division / Ship Machinery Division)

Facsimile: +65-6224-1169 (Shipbuilding Division / Ship Machinery Division)

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# The Hakodate Dock Co., Ltd.

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<http://www.hakodate-dock.co.jp/en/index.html>

## SHIP LIST

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46

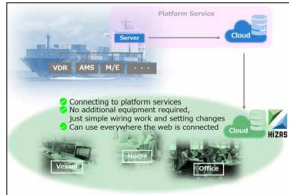
**BUNUN UNICORN**  
40,045 DWT Bulk Carrier

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# Hitachi Zosen Corporation

<https://www.hitachizosen.co.jp/english/>

## MACHINERY LIST



88

HiZAS VDA Service

# Imabari Shipbuilding Co., Ltd.

<https://www.imazo.co.jp/e.ajw.hp.transer.com/>

## SHIP LIST



4

### BASRA

310,000 DWT Crude Oil Tanker



58

### GT SELENE

3,600,000 C.F. TYPE  
WOODCHIP CARRIER



69

### SHURI

15,800 GT TYPE Ro/Ro Cargo  
Ship



40

### PORT KYOTO

64,000 DWT Bulk Carrier



61

### MAERSK NORESUND

2,020 TEU Containership



41

### NORD AEGEAN

64,000 DWT Bulk Carrier



62

### ONE INFINITY

24,000 TEU Containership



47

### PACIFIC PIONEER

38,000 DWT Bulk Carrier



63

### EVER FULL

11,000 TEU Containership



48

### LAKE GRASSMERE

40,000 DWT Bulk Carrier



67

### CENTURY HIGHWAY GREEN

7,000 CARS TYPE LNG  
Dual-fuelled Vehicles Carrier

# Japan Marine United Corporation

<https://www.jmuc.co.jp/en/>

## SHIP LIST



5

### ENEOS ENDEAVOR

311,000 DWT Crude Oil Tanker



64

### ONE INNOVATION

24,000 TEU Containership



6

### OLYMPUS

301,000 DWT Crude Oil Tanker



65

### WAN HAI 363

3,013 TEU Containership



23

### FRONTIER SPIRIT

181,000 DWT Bulk Carrier



24

### CAPE BROLGA

211,000 DWT Bulk Carrier



35

### NORD AQUARIUS

82,400 DWT Bulk Carrier

## MARINE DEVELOPMENT



78

### BLUE WIND

a Jack-Up Vessel (JUV)



# Kawasaki Heavy Industries, Ltd.

<https://global.kawasaki.com/en/>

## SHIP LIST



**9**  
**CRYSTAL TRINITY**  
84,000 m<sup>3</sup> LPG Carrier



**10**  
**CALLUNA GAS**  
84,000 m<sup>3</sup> LPG Carrier



**11**  
**CRYSTAL OASIS**  
84,000 m<sup>3</sup> LPG Carrier



**12**  
**LUPINUS PLANET**  
84,000 m<sup>3</sup> LPG Carrier



**13**  
**LANTANA PLANET**  
84,000 m<sup>3</sup> LPG Carrier



**14**  
**CAPTAIN MARKOS**  
84,000 m<sup>3</sup> LPG Carrier



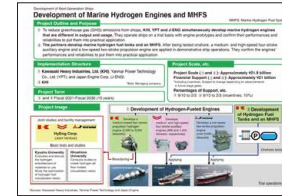
**15**  
**AXIS RIVER**  
86,700 m<sup>3</sup> LPG/NH<sub>3</sub> Carrier

## NAVIGATION AND SYSTEM

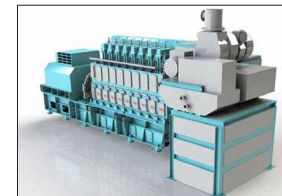


**79**  
KHI's Education, Training Program for KICS® Operators Certified by ClassNK

## MACHINERY LIST



**82**  
Proposal by KHI, YPT, J-ENG Adopted as NEDO's Green Innovative Fund Project



**83**  
World's First AiP Granted to Kawasaki's 2.4 MW Class Dual Fuel Engine Using Hydrogen Gas as Fuel

# Kawasaki Heavy Industries, Ltd.

<https://global.kawasaki.com/en/>

## TECNOLOGY DEVELOPMENT



91

Liquefied Hydrogen Carrier  
-SUISEI FRONTIER-  
Receives Classification from  
Nippon Kaiji Kyokai



96

Liquefied Hydrogen Carrier  
-SUISEI FRONTIER-  
Chosen for Ship of the Year  
2021



92

Dawn of Australia's  
Hydrogen Industry



93

Liquefied Hydrogen Carrier  
-SUISEI FRONTIER- Wins  
PM Award at Japan Industrial  
Technology Awards



94

HySTRA celebrates  
completion of world's first  
liquefied hydrogen vessel  
voyage in Japan



95

Kawasaki Obtains AiP for  
Large, 160,000 m<sup>3</sup>  
Liquefied Hydrogen Carrier

# Mitsubishi Shipbuilding Co., Ltd.

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<https://www.mhi.com/group/mhimsb/>

## SHIP LIST

---



1

### SUNFLOWER KURENAI

6,918 DWT Passenger/Car Ferry

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76

### OSHIMA MARU

Training Ship

---



77

### KAIKI

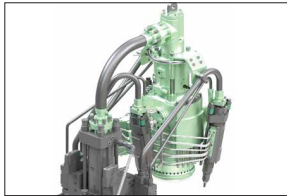
Environment Survey/Cleaning  
Ship

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# MITSUI E&S Co., Ltd.

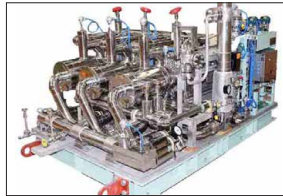
<https://www.mes.co.jp/english/>

## MACHINERY LIST



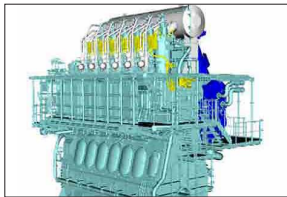
84

Delivery of G95ME-CI0.6 engine for Large Container Ships



90

Received consecutive orders of high-pressure LNG pump for LNG-fuelled main engine (ME-GI)



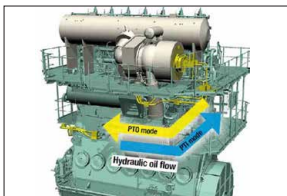
85

Delivery of LNG-fuelled main engine S60MECI0.5-GI for car carriers



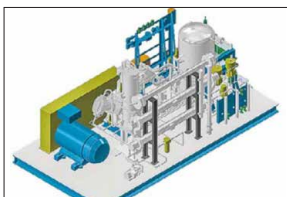
86

Received consecutive orders for methanol-fuelled main engine (ME-LGIM)



87

Entered service of hydraulic waste heat recovery system, THS2



89

Received first order of High Pressure BOG Compressor for LNG fuelled vessel with ME-GI engine

# Mitsui E&S Shipbuilding Co., Ltd.

<https://www.tsuneishi.co.jp/mes-s/en/index.html>

## NAVIGATION AND SYSTEM



80

Dynamic Positioning System

# Naikai Zosen Corporation

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<https://www.naikaizosen.co.jp/>

## SHIP LIST

---



2

### LADY SAMOA IV

1,200 GT Cargo and Passenger

---



3

### PENGHU

9,932 GT Ro/Ro Passenger Ferry

---



74

### AOMORI MARU

Fisheries Training Vessel

---

# Namura Shipbuilding Co., Ltd.

<https://www.namura.co.jp/en/index.html>

## SHIP LIST

---



7

### TAGA

312,306 DWT Crude Oil Carrier

---



25

### WORLD SEAFARER

182,344 DWT Bulk Carrier

---



26

### ENERGIA AZALEA

99,965 DWT Bulk Carrier

---

# Niigata Shipbuilding & Repair, Inc.

---

<https://www.tsuneishi.co.jp/nsr/>

## SHIP LIST

---



75

**HEIANMARU**

Sea research vessel

---



# Onomichi Dockyard Co., Ltd.

<https://onozo.co.jp/en/>

## SHIP LIST

---



18

### AYAME

49,998 MT Product/Chemical  
Tanker

---



53

### NORVIC SINGAPORE

39,738 MT Bulk Carrier

---



70

### MAPUTI

17,667 MT Tween Deck Cargo  
Vessel

---

# Oshima Shipbuilding Co., Ltd.

<https://en.osy.co.jp/>

## SHIP LIST



27

**KUROTAKISAN MARU III**  
89,999 DWT Bulk Carrier



32

**SHOHO MARU III**  
89,992 DWT Bulk Carrier



49

**BOHOL ISLAND**  
39,260 DWT Bulk Carrier



28

**TAHO EUDAIMONIA**  
84,460 DWT Bulk Carrier



33

**KAGURA**  
99,990 DWT Bulk Carrier



50

**FEDERAL PASSION**  
42,692 DWT Bulk Carrier



29

**CEMTEX EXCELLENCE**  
99,990 DWT Bulk Carrier



34

**SERENITY DIVA**  
87,396 DWT Bulk Carrier



51

**LILY GLORY**  
58,351 DWT Bulk Carrier



30

**SHOFU MARU**  
100,422 DWT Bulk Carrier



36

**WISDOM DIVA**  
82,216 DWT Bulk Carrier



52

**FEDERAL HAMILTON**  
34,763 DWT Bulk Carrier



31

**CLIMATE RESPECT**  
87,290 DWT Bulk Carrier



42

**RICH AZURE**  
64,452 DWT Bulk Carrier



59

**HACHINOHE MARU**  
60,288 DWT Wood Chip Carrier

# Oshima Shipbuilding Co., Ltd.

<https://en.osy.co.jp/>

## SHIP LIST



60

**DYNA FLORESTA**

52,804 DWT Wood Chip  
Carrier

# Sasaki Shipbuilding Co., Ltd.

<http://www.sasakizosen.com/index.html>

## SHIP LIST

---



16

**MARKO MARULIC**  
7,524 CBM LPG Carrier

---



17

**MORNING KATE**  
5,014 CBM LPG Carrier

---



71

**KIZUNA 21**  
8,015 DWT General Cargo Ship

---

# Shin Kurushima Dockyard Co., Ltd.

<https://www.skdy.co.jp/en/>

## SHIP LIST



**19**  
**YOT 01**  
5,469 DWT Oil Tanker



**20**  
**RISHIRI GALAXY**  
26,396 DWT Oil/Chemical Tanker



**21**  
**CHEMROAD ZENITH**  
35,777 DWT Oil/Chemical Tanker



**22**  
**KINSHU**  
4,999 DWT Oil/Chemical Tanker



**54**  
**TOSA HARMONY**  
39,911 DWT Bulk Carrier



**55**  
**NAGATO MARU**  
13,596 DWT Bulk Carrier



**56**  
**GREEN FAIRY**  
16,905 DWT Bulk Carrier



**72**  
**KYOWA EAGLE**  
11,917 DWT General Cargo Ship



**73**  
**KANOA**  
13,551 DWT General Cargo Ship

## TECNOLOGY DEVELOPMENT



**97**  
Shin Kurushima Dockyard group obtains ClassNK's GDA for LNG-fueled chemical tanker and FGSS

# Shin Kurushima Sanoyas Shipbuilding Co.,Ltd.

<https://www.sanoyas.skdy.co.jp/en/>

## SHIP LIST

---



37

**NORA SCHULTE**

81,957 DWT Bulk Carrier

---

## NAVIGATION AND SYSTEM

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81

**Shin Kurushima Sanoyas  
Shipbuilding manufacture  
LNG Fuel Tank**

---

# Shin Kurushima Toyohashi Shipbuilding Co., Ltd.

<https://www.toyozo.jp/english>

## SHIP LIST

---



43

### PEARL ETERNITY

63,810 DWT Bulk Carrier

---



68

### PLUMERIA LEADER

7,000 Unit Car Carrier

---

# Sumitomo Heavy Industries Marine & Engineering Co., Ltd.

<https://www.shi.co.jp/me/english/index.html>

## SHIP LIST



8

### PENELOPE

115,000 DWT Crude Oil Carrier



# Tsuneishi Shipbuilding Co., Ltd.

<https://www.tsuneishi.co.jp/english/>

## SHIP LIST



38

### PERSISTENCE DIVA

88,100 DWT WIDE  
KAMSARMAX



66

### SUSTAINABLE EARTH

1,091 TEU Containership



39

### DEFENDER

82,400 DWT KAMSARMAX



44

### ACRUX ORCHID

63,300 DWT TESS64 AEROLINE



45

### MARIMYR A

66,200 DWT TESS66 AEROLINE



57

### SALVIA ISLAND

42,200 DWT TESS42

## Passenger/Car Ferry

---

### SHIP LIST

---



1

#### SUNFLOWER KURENAI

Mitsubishi Shipbuilding Co, Ltd.

---



2

#### LADY SAMOA IV

Naikai Zosen Corporation

---



3

#### PENGHU

Naikai Zosen Corporation

---

## Tankers/VLCCs

---

### SHIP LIST

---



4

**BASRA**

Imabari Shipbuilding Co., Ltd.



5

**ENEOS ENDEAVOR**Japan Marine United  
Corporation

6

**OLYMPUS**Japan Marine United  
Corporation

7

**TAGA**

Namura Shipbuilding Co., Ltd.

# Tankers/Aframax

---

## SHIP LIST

---



8

### PENELOPE

Sumitomo Heavy Industries  
Marine & Engineering Co., Ltd.

---

# Tankers/LPG

## SHIP LIST



9

### CRYSTAL TRINITY

Kawasaki Heavy Industries, Ltd.



14

### CAPTAIN MARKOS

Kawasaki Heavy Industries, Ltd.



10

### CALLUNA GAS

Kawasaki Heavy Industries, Ltd.



15

### AXIS RIVER

Kawasaki Heavy Industries, Ltd.



11

### CRYSTAL OASIS

Kawasaki Heavy Industries, Ltd.



16

### MARKO MARULIC

Sasaki Shipbuilding Co., Ltd.



12

### LUPINUS PLANET

Kawasaki Heavy Industries, Ltd.



17

### MORNING KATE

Sasaki Shipbuilding Co., Ltd.



13

### LANTANA PLANET

Kawasaki Heavy Industries, Ltd.

## Tankers/Product Carriers

---

### SHIP LIST

---



18

**AYAME**

Onomichi Dockyard Co., Ltd.

---



19

**YOT01**

Shin Kurushima Dockyard  
Co., Ltd.

---

## Tankers/Chemical Carriers

---

### SHIP LIST

---



20

**RISHIRI GALAXY**

Shin Kurushima Dockyard  
Co., Ltd.



21

**CHEMROAD ZENITH**

Shin Kurushima Dockyard  
Co., Ltd.



22

**KINSHU**

Shin Kurushima Dockyard  
Co., Ltd.

---

## Bulk Carriers/Capesize

---

### SHIP LIST

---



23

#### FRONTIER SPIRIT

Japan Marine United Corporation



24

#### CAPE BROLGA

Japan Marine United Corporation



25

#### WORLD SEAFARER

Namura Shipbuilding Co., Ltd.

---



## Bulk Carriers/Post-panamax

### SHIP LIST



26

**ENERGIA AZALEA**

Namura Shipbuilding Co., Ltd.



31

**CLIMATE RESPECT**

Oshima Shipbuilding Co., Ltd.



27

**KUROTAKISAN MARU III**

Oshima Shipbuilding Co., Ltd.



32

**SHOHO MARU III**

Oshima Shipbuilding Co., Ltd.



28

**TAHO EUDAIMONIA**

Oshima Shipbuilding Co., Ltd.



33

**KAGURA**

Oshima Shipbuilding Co., Ltd.



29

**CEMTEX EXCELLENCE**

Oshima Shipbuilding Co., Ltd.



34

**SERENITY DIVA**

Oshima Shipbuilding Co., Ltd.



30

**SHOFU MARU**

Oshima Shipbuilding Co., Ltd.

## Bulk Carriers/Panamax

---

### SHIP LIST

---



35

**NORD AQUARIUS**

Japan Marine United  
Corporation



36

**WISDOM DIVA**

Oshima Shipbuilding Co., Ltd.



37

**NORA SCHULTE**

Shin Kurushima Sanoyas  
Shipbuilding Co., Ltd.



38

**PERSISTENCE DIVA**

Tsuneishi Shipbuilding Co., Ltd.



39

**DEFENDER**

Tsuneishi Shipbuilding Co., Ltd.

## Bulk Carriers/Handymax

---

### SHIP LIST

---



40

**PORT KYOTO**

Imabari Shipbuilding Co., Ltd.



45

**MARIMYR A**

Tsuneishi Shipbuilding Co., Ltd.



41

**NORD AEGEAN**

Imabari Shipbuilding Co., Ltd.



42

**RICH AZURE**

Oshima Shipbuilding Co., Ltd.



43

**PEARL ETERNITY**Shin Kurushima Toyohashi  
Shipbuilding Co., Ltd.

44

**ACRUX ORCHID**

Tsuneishi Shipbuilding Co., Ltd.

# Bulk Carriers/Handysize

## SHIP LIST



46

### BUNUN UNICORN

The Hakodate Dock Co., Ltd.



51

### LILY GLORY

Oshima Shipbuilding Co., Ltd.



56

### GREEN FAIRY

Shin Kurushima Dockyard Co., Ltd.



47

### PACIFIC PIONEER

Imabari Shipbuilding Co., Ltd.



52

### FEDERAL HAMILTON

Oshima Shipbuilding Co., Ltd.



57

### SALVIA ISLAND

Tsuneishi Shipbuilding Co., Ltd.



48

### LAKE GRASSMERE

Imabari Shipbuilding Co., Ltd.



53

### NORVIC SINGAPORE

Onomichi Dockyard Co., Ltd.



49

### BOHOL ISLAND

Oshima Shipbuilding Co., Ltd.



54

### TOSA HARMONY

Shin Kurushima Dockyard Co., Ltd.



50

### FEDERAL PASSION

Oshima Shipbuilding Co., Ltd.



55

### NAGATO MARU

Shin Kurushima Dockyard Co., Ltd.

## Bulk Carriers/Log/Lumber/Chip

---

### SHIP LIST

---



58

#### GT SELENE

Imabari Shipbuilding Co., Ltd.

---



59

#### HACHINOHE MARU

Oshima Shipbuilding Co., Ltd.

---



60

#### DYNA FLORESTA

Oshima Shipbuilding Co., Ltd.

---

# Containerships

## SHIP LIST



61

**MAERSK NORESUND**  
Imabari Shipbuilding Co., Ltd.



66

**SUSTAINABLE EARTH**  
Tsuneishi Shipbuilding Co., Ltd.



62

**ONE INFINITY**  
Imabari Shipbuilding Co., Ltd.



63

**EVER FULL**  
Imabari Shipbuilding Co., Ltd.



64

**ONE INNOVATION**  
Japan Marine United  
Corporation



65

**WAN HAI 363**  
Japan Marine United  
Corporation

## PCCs/PCTCs

---

### SHIP LIST

---



67

#### **CENTURY HIGHWAY GREEN**

Imabari Shipbuilding Co., Ltd.

---



68

#### **PLUMERIA LEADER**

Shin Kurushima Toyohashi  
Shipbuilding Co., Ltd.

---

## Ro/Ro Ship

---

### SHIP LIST

---



69

**SHURI**

Imabari Shipbuilding Co., Ltd.

---



## General Cargo Ships

---

### SHIP LIST

---



70

**MAPUTI**

Onomichi Dockyard Co., Ltd.



71

**KIZUNA 21**

Sasaki Shipbuilding Co., Ltd.



72

**KYOWA EAGLE**

Shin Kurushima Dockyard Co., Ltd.



73

**KANOA**

Shin Kurushima Dockyard Co., Ltd.

## Ocean Research Ships and Training Ships

---

### SHIP LIST

---



74

**AOMORI MARU**

Naikai Zosen Corporation



75

**HEIANMARU**Niigata Shipbuilding & Repair,  
Inc.

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**OSHIMA MARU**

Mitsubishi Shipbuilding Co., Ltd.



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**KAIKI**

Mitsubishi Shipbuilding Co., Ltd.

# Marine Development

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## MARINE DEVELOPMENT

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78

### BLUE WIND

Japan Marine United  
Corporation

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# New Navigation and Systems

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## NAVIGATION AND SYSTEM

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79

### KHI's Education, Training Program for KICS® Operators Certified by ClassNK

Kawasaki Heavy Industries, Ltd.

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80

### Dynamic Positioning System

Mitsui E&S Shipbuilding Co., Ltd.

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81

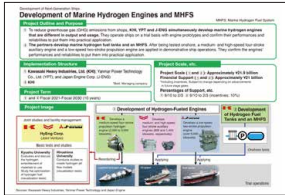
### Shin Kurushima Sanoyas Shipbuilding manufacture LNG Fuel Tank

Shin Kurushima Sanoyas Shipbuilding Co., Ltd.

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# Engines and Others

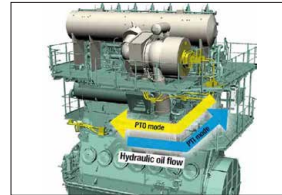
## MACHINERY LIST



82

**Proposal by KHI, YPT, J-ENG  
Adopted as NEDO's Green  
Innovative Fund Project**

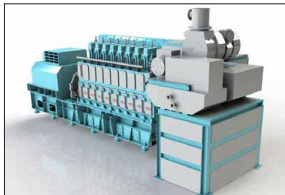
Kawasaki Heavy Industries, Ltd.



87

**Entered service of hydraulic waste  
heat recovery system, THS2**

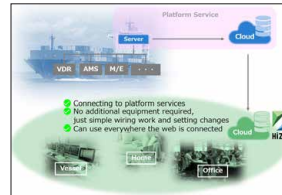
MITSUI E&S Co., Ltd.



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**World's First AiP Granted to  
Kawasaki's 2.4 MW Class Dual Fuel  
Engine Using Hydrogen Gas as Fuel**

Kawasaki Heavy Industries, Ltd.



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**HiZAS VDA Service**

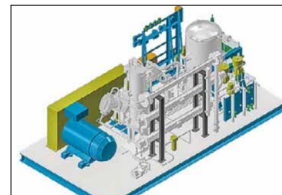
Hitachi Zosen Corporation



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**Delivery of G95ME-C10.6 engine for  
Large Container Ships**

MITSUI E&S Co., Ltd.



89

**Received first order of High  
Pressure BOG Compressor for LNG  
fuelled vessel with ME-GI engine**

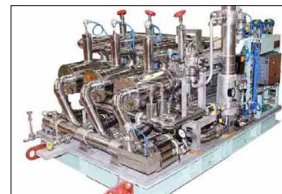
MITSUI E&S Co., Ltd.



85

**Delivery of LNG-fuelled main engine  
S60MEC10.5-GI for car carriers**

MITSUI E&S Co., Ltd.



90

**Received consecutive orders of  
high-pressure LNG pump for  
LNG-fuelled main engine (ME-GI)**

MITSUI E&S Co., Ltd.



86

**Received consecutive orders for  
methanol-fuelled main engine  
(ME-LGIM)**

MITSUI E&S Co., Ltd.

# Technology Development Trends

## TECNOLOGY DEVELOPMENT



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**Liquefied Hydrogen Carrier -SUISEI FRONTIER- Receives Classification from Nippon Kaiji Kyokai**

Kawasaki Heavy Industries, Ltd.



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**Liquefied Hydrogen Carrier -SUISEI FRONTIER- Chosen for Ship of the Year 2021**

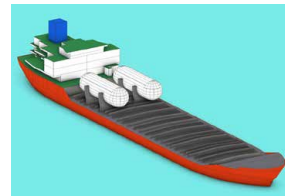
Kawasaki Heavy Industries, Ltd.



92

**Dawn of Australia's Hydrogen Industry**

Kawasaki Heavy Industries, Ltd.



97

**Shin Kurushima Dockyard group obtains ClassNK's GDA for LNG-fueled chemical tanker and FGSS**

Shin Kurushima Dockyard Co., Ltd.



93

**Liquefied Hydrogen Carrier -SUISEI FRONTIER- Wins PM Award at Japan Industrial Technology Awards**

Kawasaki Heavy Industries, Ltd.



94

**HySTRA celebrates completion of world's first liquefied hydrogen vessel voyage in Japan**

Kawasaki Heavy Industries, Ltd.



95

**Kawasaki Obtains AiP for Large, 160,000 m<sup>3</sup> Liquefied Hydrogen Carrier**

Kawasaki Heavy Industries, Ltd.

# SUNFLOWER KURENAI 6,918 DWT Passenger/Car Ferry **1**

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# SUNFLOWER KURENAI 6,918 DWT Passenger/Car Ferry 1

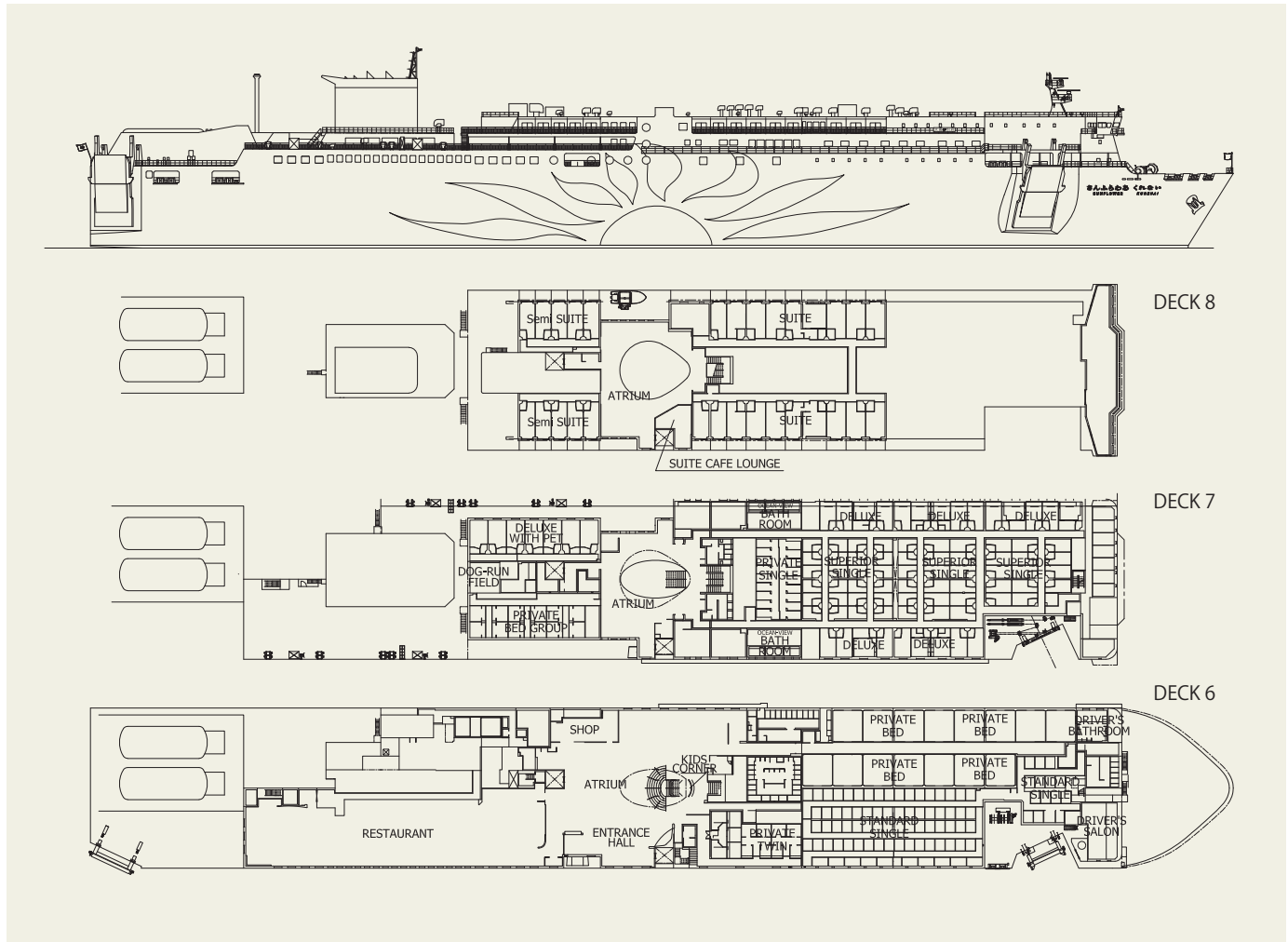
Contents By Builder By Ship Type

The SUNFLOWER KURENAI is Japan's first LNG-fueled ferry designed and built by Mitsubishi Shipbuilding Co., Ltd. and was delivered to the owner Mitsui O.S.K. Lines, Ltd. and the operator Ferry Sunflower Co., Ltd. (currently MOL Sunflower Ltd.) on December 16, 2022 to start its service in a domestic ferry route between Osaka (Osaka) and Beppu (Oita). The environmental performance and seaworthiness of the vessel are enhanced by advanced propulsion systems and equipment.

State of the art high-performance dual-fuel engines can run with both liquefied natural gas (LNG) and marine diesel oil. The use of LNG fuel is expected to achieve a 20% reduction in CO<sub>2</sub> emissions and close to zero emissions of sulfur oxides (SOx). The newly designed high performance hull form reduces the hull resistance, and the proximity twin-screw system incorporates shaft brackets to improve the propulsion efficiency. The shaft generators/motors controlled

by thyristors are driven by both main engines and electric diesel generators, to supply electricity for hotel services and propulsive power assistance. Public areas include enlarged bathing facilities, a more spacious restaurant, and a three-

deck-high atrium. Some cabins and public spaces are equipped with various barrier-free facilities so that every passenger can enjoy their onboard trip throughout its voyage.



## PRINCIPAL PARTICULARS

Length (o.a.) .....	199.9 m
Breadth (mld.).....	28.00 m
Depth (mld.).....	20.90 m
Draft (mld.).....	6.80 m
Gross tonnage.....	17,114
Deadweight.....	6,918 t
Main engine.....	Wartsila 16V31DF
Speed (service).....	22.5 knots
Complement.....	759
Classification .....	JG
Loading capacity (passenger).....	716
(car/vehicle).....	Car:100, 13mTruck:137
Builder .....	Mitsubishi Shipbuilding Co, Ltd.



# LADY SAMOA IV 1,200 GT Cargo and Passenger 2

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# LADY SAMOA IV 1,200 GT Cargo and Passenger 2

Contents By Builder By Ship Type

## Features

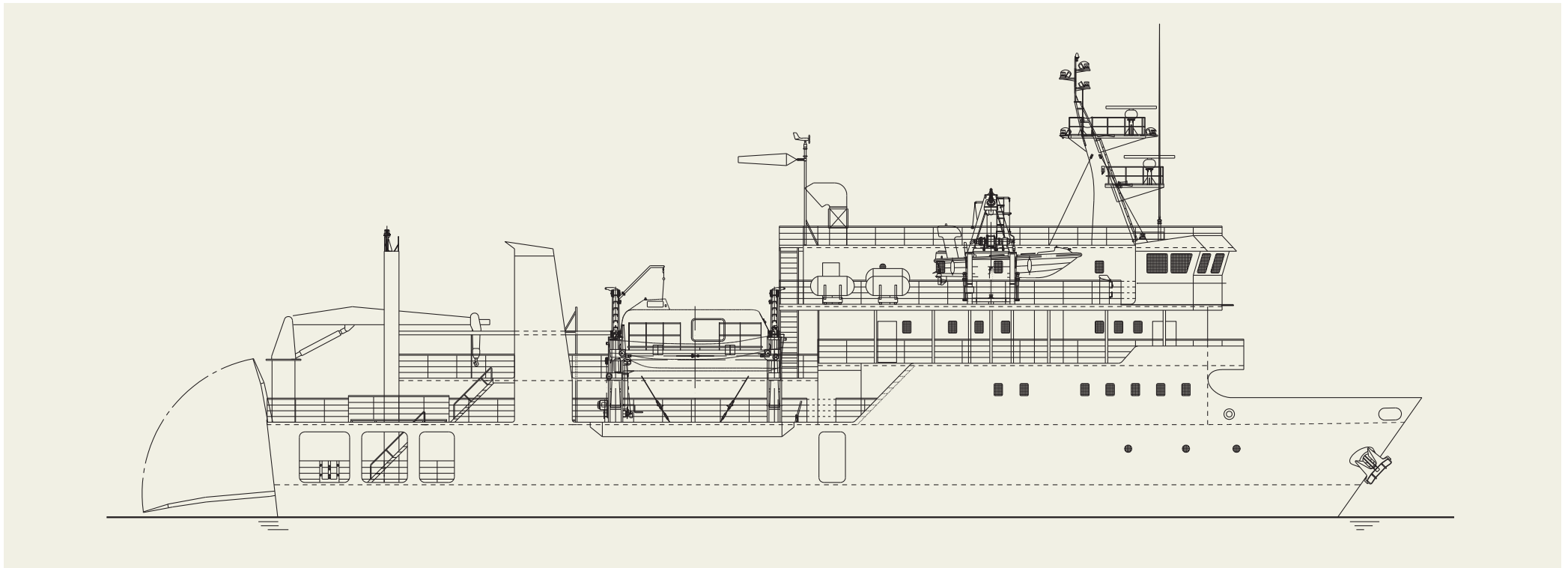
1. "LADY SAMOA IV " is designed and built as Inter-Island Ro-Ro Passenger Vessel. Cars and Trucks are loaded to vehicle deck from the stern ramp door.
2. The cargo on board are passengers, trucks, cars, containers, bulk cargoes, etc. deck crane for loading cargo is installed on the port side stern.
3. The vessel has total one (1) vehicle deck. The vehicle loading space and the bulk loading space are separated by a stern gate door in the cargo hold.
4. A solar panel is mounted above the awning deck, and

## PRINCIPAL PARTICULARS

Length (o.a.) .....	48.00 m
Breadth (mld.) .....	12.00 m
Depth (mld.) .....	3.80 m
Draft (mld.) .....	2.35 m
Gross tonnage .....	1,200 (International)

Deadweight.....	177 t
Main engine .....	YANMAR 6EY17W x 2
Speed (service).....	abt. 11.5 knots
Complement.....	297 persons
Classification .....	Class NK
Builder: .....	Naikai Zosen Corporation

5. The vessel has a hull form with good speed performance, which was new created through the water tank tests.
6. For good maneuverability in harbor, the bow thruster is provided.



# PENGHU 9,932 GT Ro/Ro Passenger Ferry 3

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**PENGHU** 9,932 GT Ro/Ro Passenger Ferry **3**

Contents By Builder By Ship Type

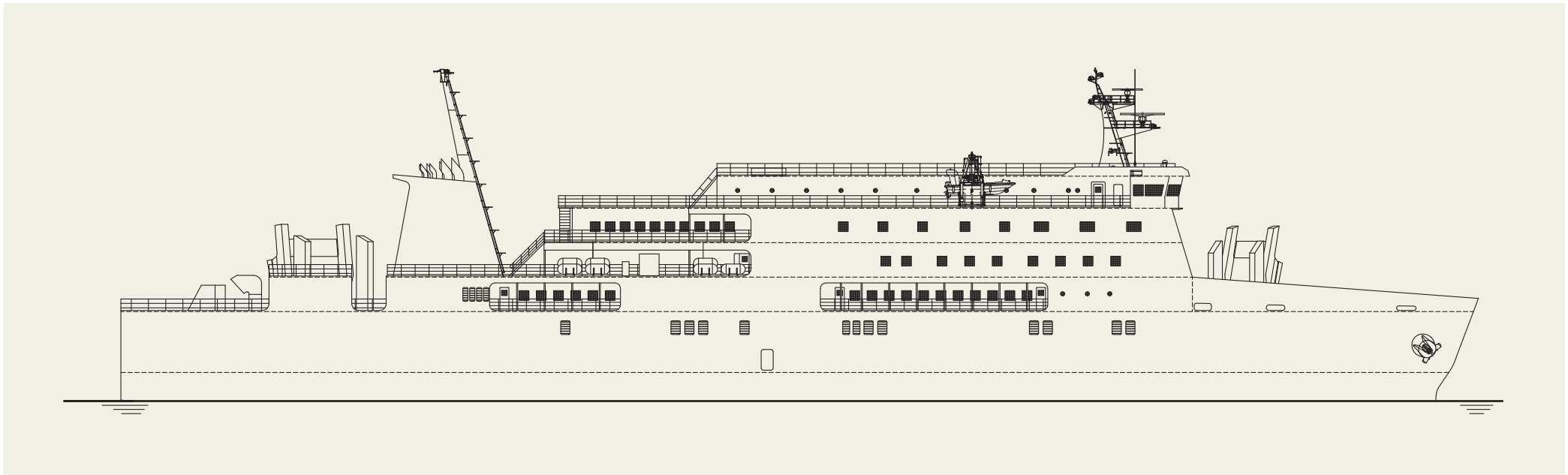
**Features**

1. "PENGHU" is a two-engine, two-shaft, shaft-bracket type RORO PASSENGER VESSEL.
2. The vessel has two decks, CAR-DECK can load passenger cars, and RORO-DECK can load trucks, passenger cars, and containers.
3. As a barrier-free equipment for the elderly and hand-capped, an elevator that can go directly from RO-RO-DECK to the lobby is available. Barrier-free toilets are located on each deck.

**PRINCIPAL PARTICULARS**

Length (o.a.) .....	119.99 m	Deadweight.....	2,211 t
Breadth (mld.).....	21.00 m	Main engine .....	DAIHATSU 8DKM-36e x 2
Depth (mld.).....	13.30 m	Speed (service).....	abt 19.3 knots
Draft (mld.).....	5.50 m	Complement.....	632 persons
Gross tonnage.....	9,932 (International)	Classification .....	CR Classification Society
		Builder: .....	Naikai Zosen Corporation

4. The vessel has a hull form with good speed performance, which was new created through the water tank tests.
5. For good maneuverability in harbor, the bow thruster is provided.



# BASRA 310,000 DWT Crude Oil Tanker 4

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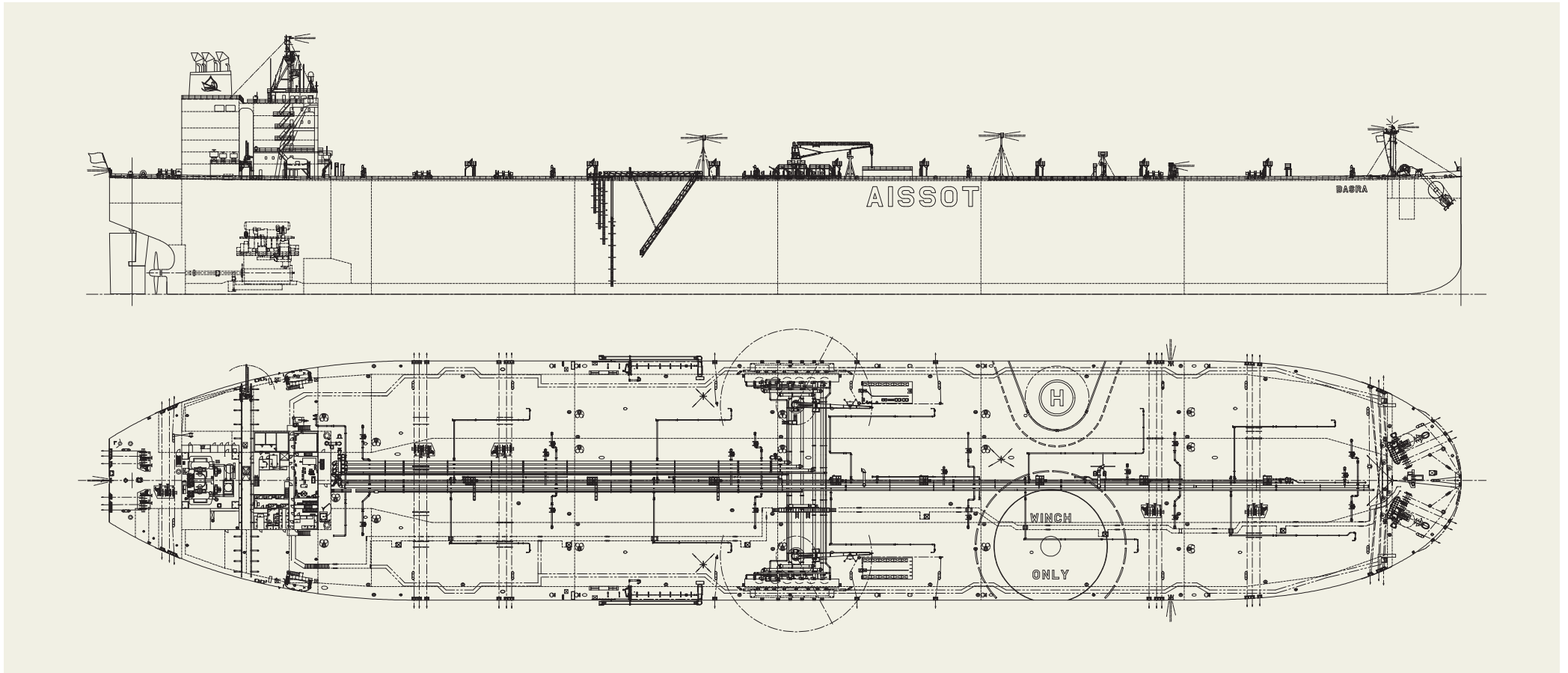


**BASRA** 310,000 DWT Crude Oil Tanker 4

Contents

By Builder

By Ship Type



**PRINCIPAL PARTICULARS**

Breadth (mld.).....	60 m	MCR (kw x rpm) .....	24,000 x 61
Depth (mld.).....	28.5 m	Speed (service).....	15.5 knots
Gross tonnage.....	160,087	Classification.....	ABS
Deadweight.....	312,965	Builder: .....	Imabari Shipbuilding Co., Ltd.

# ENEOS ENDEAVOR 311,000 DWT Crude Oil Tanker **5**

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# ENEOS ENDEAVOR 311,000 DWT Crude Oil Tanker 5

Contents By Builder By Ship Type

Japan Marine United Corporation (JMU) delivered "ENEOS ENDEAVOR", 311,000 DWT Crude Oil Tanker at its Ariake shipyard on 17th June 2022.

## Features

1. This is an eco-type Malacca max VLCC, which JMU has a lot of building record. Principal particulars have been optimized for transportation between Middle East and Japan passing through Malacca strait, while satisfying restrictions of domestic ports.
2. High propulsion performance was achieved by the application of lower resistance and high efficiency hull form, and optimized energy saving devices such as Super

Stream Duct®, SURF-BULB® and ALV-Fin®.

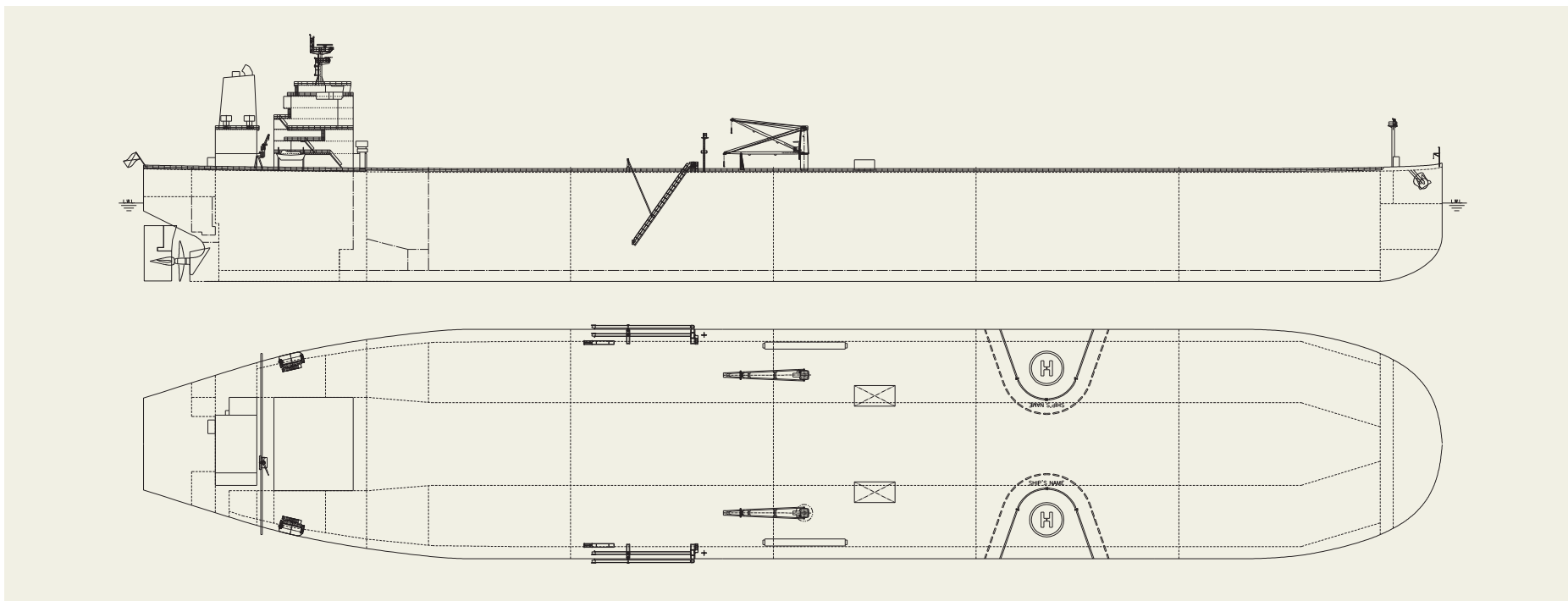
3. In addition, good sea performance was achieved by the application of the low wind resistance superstructure and unique bow shape called the "LEADGE-Bow®".

4. Furthermore, the fuel oil consumption was further improved by the application of new electronically controlled marine diesel engine, low friction paint and high efficiency propeller.

### PRINCIPAL PARTICULARS

Length (o.a.) .....	339.50 m
Breadth (mld.).....	60.00 m
Depth (mld.).....	28.50 m
Draft (mld.).....	21.05 m
Gross tonnage.....	160,725

Deadweight.....	312,137
Main engine.....	WinGD W7X82
Speed (service).....	15.5 knots
Complement.....	30
Classification.....	NK
Builder.....	JMU





# OLYMPUS 301,000 DWT Crude Oil Tanker 6

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# OLYMPUS 301,000 DWT Crude Oil Tanker 6

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Japan Marine United Corporation (JMU) delivered "OLYMPUS", 301,000 DWT Crude Oil Tanker at its Ariake shipyard on 20th January 2023.

## Features

1. This is the 1st vessel of the newly developed crude oil Tanker called "N-VLCC" continuing the lineage of the hugely popular G-VLCC. It has been designed to provide flexibility for worldwide trade by achieving both compact hull form and largest deadweight at shallow draft and developed drastically reducing fuel oil consumption together with CO<sub>2</sub> emissions compared with existing vessels.
2. High propulsion performance was achieved by the application of lower resistance and high efficiency hull form, and optimized energy saving devices such as Super Stream Duct®, SURF-BULB® and ALV-Fin®.

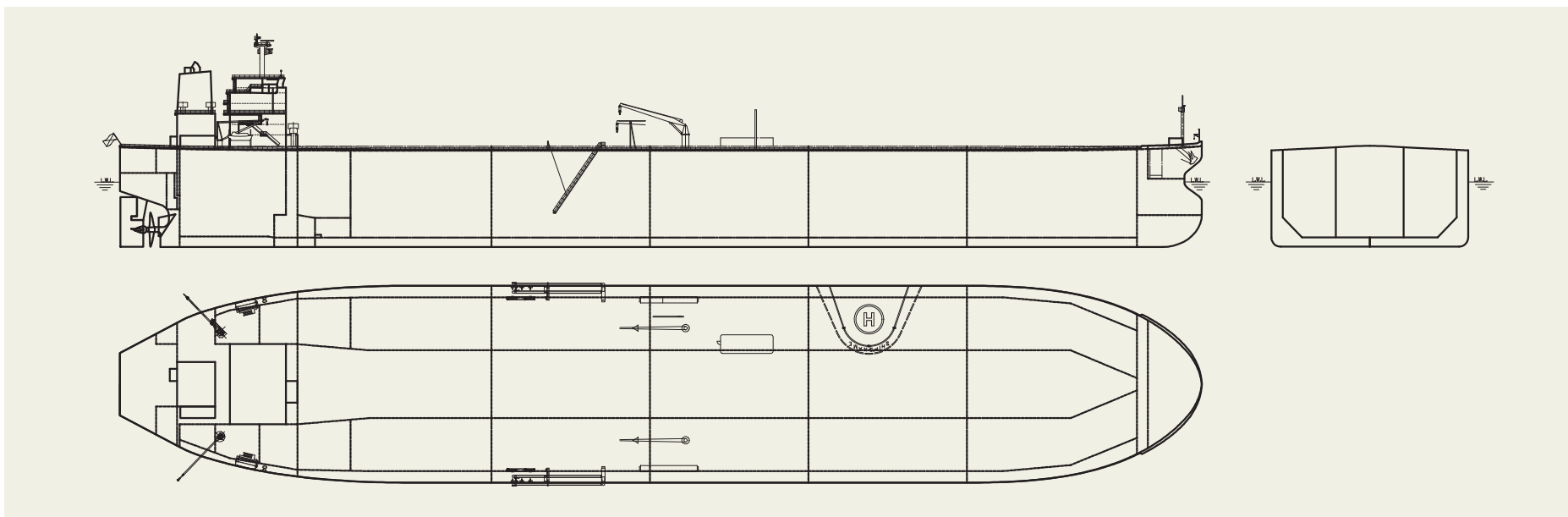
3. The unique bow shape, Ax-Bow®, can reduce the added resistance due to waves, and the well-refined shape of the superstructure can attain low wind resistance.
4. The Energy Efficiency Design Index (EEDI) of the subject vessel has achieved Phase 3 (30% reduction from the reference line) by application of an optimal hull shape

and latest energy saving technologies. This challenge will contribute to green environment by its eco-friendly performance.

5. Furthermore, the fuel oil consumption was further improved by the application of new electronically controlled MAN-B&W G-type engine, and a high efficiency propeller.

### PRINCIPAL PARTICULARS

Length (o.a.).....	333.00 m	Deadweight.....	301,850
Breadth (mld.).....	60.00 m	Main engine.....	MAN-B&W 6G80ME-C10.5-HPSCR
Depth (mld.).....	29.35 m	Speed (service).....	14.5 knots
Draft (mld.).....	21.55 m	Complement.....	30
Gross tonnage.....	157,208	Classification.....	ABS
		Builder.....	JMU



# TAGA 312,306 DWT Crude Oil Carrier 7

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## PRINCIPAL PARTICULARS

Length (o.a.) .....	338.92 m	Gross tonnage .....	160,453	Complement .....	34 + 10
Breadth (mld.) .....	60.00 m	Deadweight .....	312,306 t	Classification .....	Nippon Kaiji Kyokai (NK)
Draft (mld.) .....	21.05 m	Main engine .....	WinGD 7X82-B	Builder .....	Namura Shipbuilding Co., Ltd.

# PENELOPE 115,000 DWT Crude Oil Carrier 8

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[By Builder](#)
[By Ship Type](#)


## Features

1. Optimized Hull form for high propulsive efficiency
2. Sumitomo Stern System (Duct, Propeller and Rudder) for high propulsive efficiency and good maneuverability
3. SOx scrubber for SOx emissions removal
4. Aero shaped superstructure for wind drag reduction
5. Straight lined mooring arrangement for safer SPM operation

## PRINCIPAL PARTICULARS

Length (b.p.) .....	239.67 m	Deadweight.....	115,000 MT
Breadth (mld.).....	44.00 m	Main engine.....	Mitsui-MAN B&W 6G60ME-C 10.5
Depth (mld.) .....	21.55 m	MCR (kw × rpm).....	10,300 kW × 75.9 rpm
Gross tonnage.....	60,000	Classification.....	LR
		Builder .....	Sumitomo Heavy Industries Marine & Engineering Co., Ltd.

# CRYSTAL TRINITY 84,000 m<sup>3</sup> LPG Carrier 9

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# CRYSTAL TRINITY 84,000 m<sup>3</sup> LPG Carrier 9

Contents By Builder By Ship Type

January 26, 2022 — Kawasaki Heavy Industries, Ltd. announced it has delivered the 84,000 m<sup>3</sup> capacity Liquefied Petroleum Gas (LPG) carrier CRYSTAL TRINITY (HN:1750) for KUMIAI NAVIGATION (PTE) LTD. This is the 65th LPG carrier built by the company.

This vessel is a dual-fuel LPG carrier using LPG and low-sulfur fuel oil, and Kawasaki's second 84,000 m<sup>3</sup> LPG carrier adopting a dual-fuel main engine.

In recent years, in order to effectively reduce emissions of greenhouse gases from international shipping, more vessels are adopting liquefied gases as an alternative to heavy fuel oil on a global scale. This very large LPG carrier is powered by LPG, which reduces greenhouse gas emissions and is expected to significantly reduce environmental impact. It is the fruit of the Kawasaki Group's accumulated knowledge in building LPG and Liquefied Natural Gas (LNG) carriers, and LNG-fueled vessels.

Kawasaki plans to develop and build more LPG-fueled LPG carriers and other commercial vessels that meet environmental standards, as well as to develop and offer other eco-friendly marine technologies, to contribute to the establishment of a low-carbon/decarbonized society. These products include vessels for transporting liquefied hydrogen, considered to be the next-generation energy source.

## Features

1. This LPG carrier operates using both LPG and low-sulfur fuel oil. Use of LPG as fuel greatly reduces emission volumes of sulfur oxides (SO<sub>x</sub>), CO<sub>2</sub> and other pollutants compared with use of marine fuel oil. In this way, the new vessel will meet SO<sub>x</sub> emission standards\*<sup>1</sup> which were strengthened in January 2020, and EEDI\*<sup>2</sup> Phase 3 regulations which will further strengthen CO<sub>2</sub> emission

standards in 2022.

2. In order to satisfy restrictions on NO<sub>x</sub> Tier III controls\*<sup>3</sup> emissions which is implemented by the International Maritime Organization (IMO), the main engine and generator are equipped with a Selective Catalytic Reduction (SCR) System, An exhaust gas purification system to reduce NO<sub>x</sub>, which allows the ship to navigate in Emission Control Area (ECA).
3. Installation of LPG fuel tanks on the ship's upper deck makes it possible to load fuel-use LPG separate from the ship's cargo LPG. Moreover, a piping system connecting the LPG fuel tanks and LPG cargo tanks enables transferring of extra LPG to the LPG fuel tanks if necessary.
4. This vessel adopts the Kawasaki Rudder Bulb System with Fins (RBS-F) and the Semi-Duct System with contra Fins (SDS-F) contribute to reducing fuel consumption.

### Remarks

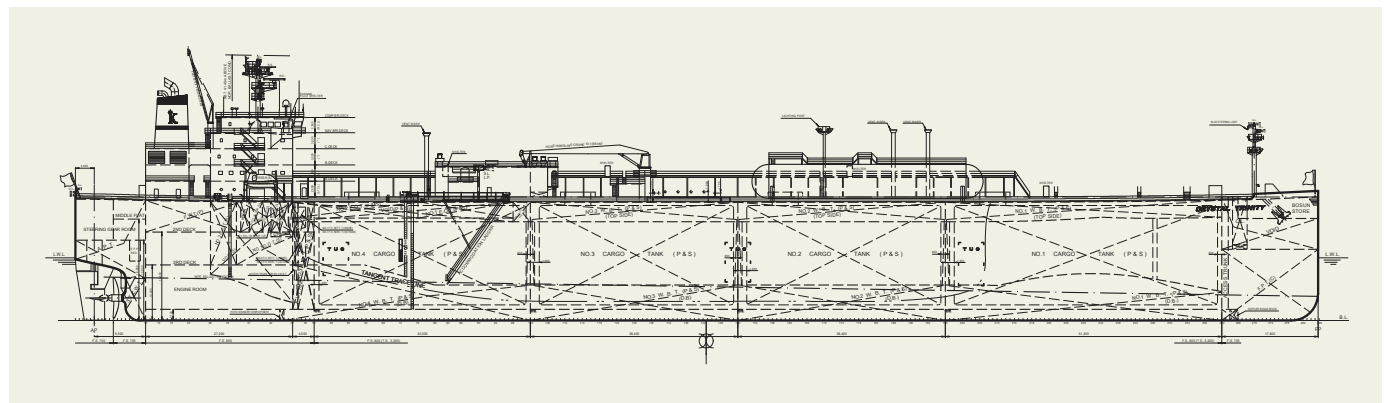
\*<sup>1</sup> SO<sub>x</sub> emission standards: Since January 2015, SO<sub>x</sub> emission restrictions in North American and European Emission Control Areas (ECAs) have limited sulfur content in fuels to 0.1% or less. Starting in January 2020, regulations have required ships operating in all other parts of the world to use fuel with sulfur content levels of 0.5% or less, or alternatively use equipment to reduce SO<sub>x</sub> in exhaust gases to an equivalent level.

\*<sup>2</sup> Energy Efficiency Design Index: Compulsory international regulations requiring energy-efficiency compliance in newly built ships based on EEDI values, which specify CO<sub>2</sub> emissions in grams for transporting one ton of cargo for one mile. EEDI regulation values apply in increasingly strict phases based on the construction-contract conclusion date and finished-ship delivery date. Phase 3 regulations (30% CO<sub>2</sub> emissions reduction compared with baseline levels) will be introduced for certain ship types including large LPG carriers and LNG carriers contracted to be built in 2022 or later.

\*<sup>3</sup> The Tier III controls apply only to the specified ships while operating in Emission Control Areas (ECA), requiring 80% NO<sub>x</sub> emissions reduction compared with Tier I controls.

## PRINCIPAL PARTICULARS

Length (o.a.)	229.90 m
Length (b.p.)	226.50 m
Breadth (mld.)	37.20 m
Depth (mld.)	21.90 m
Draft (mld.)	11.60 m
Gross tonnage	49,943
Deadweight	55,068 t
Main engine	KAWASAKI-MAN B&W 7S60ME-C10.5-LGIP
Complement	29 persons
Classification	Nippon Kaiji Kyokai (ClassNK)
Loading capacity (tank)	84,222.2 m <sup>3</sup>
Builder	Kawasaki Heavy Industries, Ltd.



# CALLUNA GAS 84,000 m<sup>3</sup> LPG Carrier 10

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[By Ship Type](#)



# CALLUNA GAS 84,000 m<sup>3</sup> LPG Carrier 10

Contents By Builder By Ship Type

## LPG-fueled LPG carrier CALLUNA GAS Delivered

February 28, 2022 — Kawasaki Heavy Industries, Ltd. announced today it has delivered the 84,000 m<sup>3</sup> capacity Liquefied Petroleum Gas (LPG) carrier CALLUNA GAS (HN:1751) for IINO KAIUN KAISHA, LTD. This is the 66th LPG carrier built by the company.

This vessel is a dual-fuel LPG carrier using LPG and low-sulfur fuel oil, and their third 84,000 m<sup>3</sup> LPG carrier adopting a dual-fuel main engine.

In recent years, in order to effectively reduce emissions of greenhouse gases from international shipping, more vessels are adopting liquefied gases as an alternative to heavy fuel oil on a global scale. This very large LPG carrier is powered by LPG, which reduces greenhouse gas emissions and is expected to significantly reduce environmental impact. It is the fruit of the Kawasaki Group's accumulated knowledge in building LPG and Liquefied Natural Gas (LNG) carriers, and LNG-fueled vessels.

Kawasaki plans to develop and build more LPG-fueled LPG carriers and other commercial vessels that meet environmental standards, as well as to develop and offer other eco-friendly marine technologies, to contribute to the establishment of a low-carbon/decarbonized society. These products include vessels for transporting liquefied hydrogen, considered to be the next-generation energy source.

## Features

1. This LPG carrier operates using both LPG and low-sulfur fuel oil. Use of LPG as fuel greatly reduces emission volumes of sulfur oxides (SOx), CO<sub>2</sub> and other pollutants compared with use of marine fuel oil. In this way, the new vessel will meet SOx emission standards\*<sup>1</sup> which were strengthened in January 2020, and EEDI\*<sup>2</sup> Phase 3

regulations which will further strengthen CO<sub>2</sub> emission standards in 2022.

2. In order to satisfy restrictions on NOx Tier III controls\*<sup>3</sup> emissions which is implemented by the International Maritime Organization (IMO), the main engine and generator are equipped with a Selective catalytic reduction (SCR) System, An exhaust gas purification system to reduce NOx, which allows the ship to navigate in Emission Control Area (ECA).
3. Installation of LPG fuel tanks on the ship's upper deck makes it possible to load fuel-use LPG separate from the ship's cargo LPG. Moreover, a piping system connecting the LPG fuel tanks and LPG cargo tanks enables transferring of extra LPG to the LPG fuel tanks if necessary.
4. This vessel adopts the Kawasaki Rudder Bulb System with Fins (RBS-F) and the Semi-Duct System with contra Fins (SDS-F) contribute to reducing fuel consumption.

## Remarks

\*<sup>1</sup> SOx emission standards: Since January 2015, SOx emission restrictions in North American and European emission control areas (ECAs) have limited sulfur content in fuels to 0.1% or less. Starting in January 2020, regulations have required ships operating in all other parts of the world to use fuel with sulfur content levels of 0.5% or less, or alternatively use equipment to

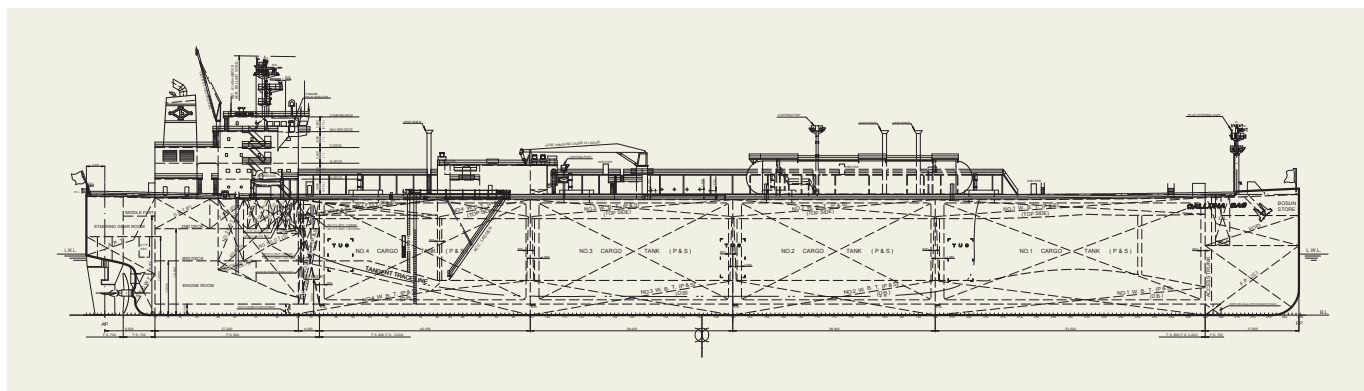
reduce SOx in exhaust gases to an equivalent level.

\*<sup>2</sup> Energy Efficiency Design Index: Compulsory international regulations requiring energy-efficiency compliance in newly built ships based on EEDI values, which specify CO<sub>2</sub> emissions in grams for transporting one ton of cargo for one mile. EEDI regulation values apply in increasingly strict phases based on the construction-contract conclusion date and finished-ship delivery date. Phase 3 regulations (30% CO<sub>2</sub> emissions reduction compared with baseline levels) will be introduced for certain ship types including large LPG carriers and LNG carriers contracted to be built in 2022 or later.

\*<sup>3</sup> The Tier III controls apply only to the specified ships while operating in Emission Control Areas (ECA), requiring 80% NOx emissions reduction compared with Tier I controls.

## PRINCIPAL PARTICULARS

Length (o.a.)	229.90 m
Length (b.p.)	226.50 m
Breadth (mld.)	37.20 m
Depth (mld.)	21.90 m
Draft (mld.)	11.60 m
Gross tonnage	49,943
Deadweight	55,086 t
Main engine	KAWASAKI-MAN B&W 7S60ME-C10.5-LGIP
Complement	30 persons
Classification	Nippon Kaiji Kyokai (ClassNK)
Loading capacity (tank)	84,174.8 m <sup>3</sup>
Builder	Kawasaki Heavy Industries, Ltd.





# CRYSTAL OASIS 84,000 m<sup>3</sup> LPG Carrier 11

[Contents](#)[By Builder](#)[By Ship Type](#)

## LPG-fueled LPG carrier CRYSTAL OASIS Delivered

June 29, 2022 — Kawasaki Heavy Industries, Ltd. announced today it has delivered the 84,000 m<sup>3</sup> capacity

Liquefied Petroleum Gas (LPG) carrier CRYSTAL OASIS (HN:1752) for KUMIAI NAVIGATION (PTE) LTD. This is the 67th LPG carrier built by the company.

This vessel is a dual-fuel LPG carrier using LPG and low-sulfur fuel oil, and their fourth 84,000 m<sup>3</sup> LPG carrier adopting a dual-fuel main engine.

# CRYSTAL OASIS 84,000 m<sup>3</sup> LPG Carrier 11

In recent years, in order to effectively reduce emissions of greenhouse gases from international shipping, more vessels are adopting liquefied gases as an alternative to heavy fuel oil on a global scale. This very large LPG carrier is powered by LPG, which reduces greenhouse gas emissions and is expected to significantly reduce environmental impact. It is the fruit of the Kawasaki Group's accumulated knowledge in building LPG and Liquefied Natural Gas (LNG) carriers, and LNG-fueled vessels.

Kawasaki plans to develop and build more LPG-fueled LPG carriers, LPG/NH<sub>3</sub> carrier, and other commercial vessels that meet environmental standards, as well as to develop and offer other eco-friendly marine technologies, to contribute to the establishment of a low-carbon/decarbonized society. These products include vessels for transporting liquefied hydrogen, considered to be the next-generation energy source.

## Features

1. This LPG carrier operates using both LPG and low-sulfur fuel oil. Use of LPG as fuel greatly reduces emission volumes of sulfur oxides (SO<sub>x</sub>), CO<sub>2</sub> and other pollutants compared with use of marine fuel oil. In this way, the new vessel will meet SO<sub>x</sub> emission standards\*<sup>1</sup> which were strengthened in January 2020, and EEDI\*<sup>2</sup> Phase 3 regulations which will further strengthen CO<sub>2</sub> emission standards.
2. In order to satisfy restrictions on NO<sub>x</sub> Tier III controls\*<sup>3</sup> emissions which is implemented by the International Maritime Organization (IMO), the main engine and generator are equipped with a Selective catalytic reduction (SCR) System, An exhaust gas purification system to re-

duce NO<sub>x</sub>, which allows the ship to navigate in Emission Control Area (ECA).

3. Installation of LPG fuel tanks on the ship's upper deck makes it possible to load fuel-use LPG separate from the ship's cargo LPG. Moreover, a piping system connecting the LPG fuel tanks and LPG cargo tanks enables transferring of extra LPG to the LPG fuel tanks if necessary.
4. This Vessel has successfully achieved very flexible and practical design through the combination of shallow draft hull form and high compatibility with terminals and their land facility as the result of complying with OCIMF Mooring Equipment Guidance 4th Edition and ExxonMobil Criteria MESQAC 2017 as practical as possible.
5. This vessel adopts the Kawasaki Rudder Bulb System with Fins (RBS-F) and the Semi-Duct System with contra Fins (SDS-F) which contribute to reducing fuel consumption.

## Remarks

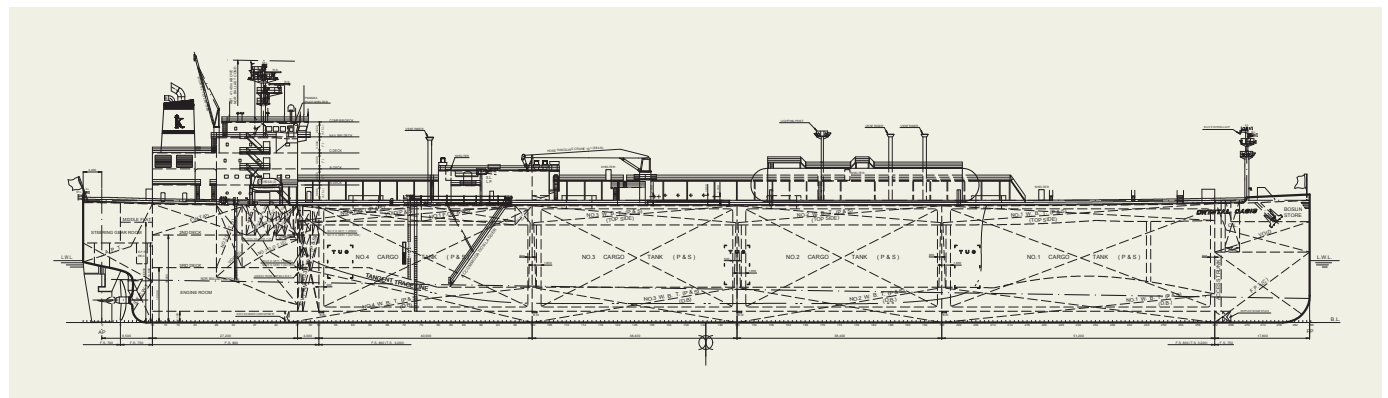
\*<sup>1</sup> SO<sub>x</sub> emission standards: Since January 2015, SO<sub>x</sub> emission restrictions in North American and European emission control areas (ECAs) have limited sulfur content in fuels to 0.1% or less. Starting in January 2020, regulations have required ships operating in all other parts of the world to use fuel with sulfur content levels of 0.5% or less, or alternatively use equipment to reduce SO<sub>x</sub> in exhaust gases to an equivalent level.

\*<sup>2</sup> Energy Efficiency Design Index: Compulsory international regulations requiring energy-efficiency compliance in newly built ships based on EEDI values, which specify CO<sub>2</sub> emissions in grams for transporting one ton of cargo for one mile. EEDI regulation values apply in increasingly strict phases based on the construction-contract conclusion date and finished-ship delivery date. Phase 3 regulations (30% CO<sub>2</sub> emissions reduction compared with baseline levels) will be introduced for certain ship types including large LPG carriers and LNG carriers contracted to be built in 2022 or later.

\*<sup>3</sup> The Tier III controls apply only to the specified ships while operating in Emission Control Areas (ECA), requiring 80% NO<sub>x</sub> emissions reduction compared with Tier I controls.

## PRINCIPAL PARTICULARS

Length (o.a.)	229.90 m
Length (b.p.)	226.50 m
Breadth (mld.)	37.20 m
Depth (mld.)	21.90 m
Draft (mld.)	11.60 m
Gross tonnage	49,943
Deadweight	55,090 t
Main engine	KAWASAKI-MAN B&W 7S60ME-C10.5-LGIP
Complement	29 persons
Classification	Nippon Kaiji Kyokai (ClassNK)
Loading capacity (tank)	84,244.3 m <sup>3</sup>
Builder	Kawasaki Heavy Industries, Ltd.



# LUPINUS PLANET 84,000 m<sup>3</sup> LPG Carrier 12

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# LUPINUS PLANET 84,000 m<sup>3</sup> LPG Carrier 12

Contents By Builder By Ship Type

Kawasaki Heavy Industries, Ltd. announced it has delivered the 84,000 m<sup>3</sup> capacity Liquefied Petroleum Gas (LPG) carrier LUPINUS PLANET (HN:1753) for Nippon Yusen Kabushiki Kaisha. This is the 68th LPG carrier built by the company. This vessel is a dual-fuel LPG carrier using LPG and low-sulfur fuel oil, and their fifth 84,000 m<sup>3</sup> LPG carrier adopting a dual-fuel main engine.

In recent years, in order to effectively reduce emissions of greenhouse gases from international shipping, more vessels are adopting liquefied gases as an alternative to heavy fuel oil on a global scale. This very large LPG carrier is powered by LPG, which reduces greenhouse gas emissions and is expected to significantly reduce environmental impact. It is the fruit of the Kawasaki Group's accumulated knowledge in building LPG and Liquefied Natural Gas (LNG) carriers, and LNG-fueled vessels.

Kawasaki plans to develop and build more LPG-fueled LPG carriers, LPG/NH<sub>3</sub> carrier, and other commercial vessels that meet environmental standards, as well as to develop and offer other eco-friendly marine technologies, to contribute to the establishment of a low-carbon/decarbonized society. These products include vessels for transporting liquefied hydrogen, considered to be the next-generation energy source.

## Features

1. This LPG carrier operates using both LPG and low-sulfur fuel oil. Use of LPG as fuel greatly reduces emission volumes of sulfur oxides (SO<sub>x</sub>), CO<sub>2</sub> and other pollutants compared with use of marine fuel oil. In this way, the new vessel will meet SO<sub>x</sub> emission standards\*<sup>1</sup> which were strengthened in January 2020, and EEDI\*<sup>2</sup> Phase 3 regulations which will further strengthen CO<sub>2</sub> emission

standards.

2. In order to satisfy restrictions on NO<sub>x</sub> Tier III controls\*<sup>3</sup> emissions which is implemented by the International Maritime Organization (IMO), the main engine and generator are equipped with a Selective catalytic reduction (SCR) System, An exhaust gas purification system to reduce NO<sub>x</sub>, which allows the ship to navigate in Emission Control Area (ECA).
3. Installation of LPG fuel tanks on the ship's upper deck makes it possible to load fuel-use LPG separate from the ship's cargo LPG. Moreover, a piping system connecting the LPG fuel tanks and LPG cargo tanks enables transferring of extra LPG to the LPG fuel tanks if necessary.
4. This vessel adopts the Kawasaki Rudder Bulb System with Fins (RBS-F) and the Semi-Duct System with contra Fins (SDS-F) which contribute to reducing fuel consumption.

## Remarks

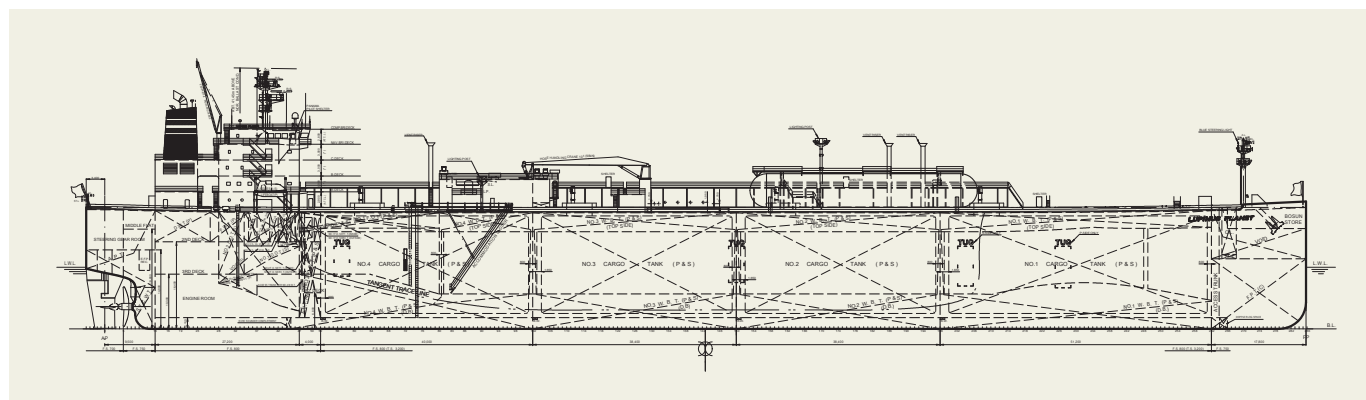
\*<sup>1</sup> SO<sub>x</sub> emission standards: Since January 2015, SO<sub>x</sub> emission restrictions in North American and European emission control areas (ECAs) have limited sulfur content in fuels to 0.1% or less. Starting in January 2020, regulations have required ships operating in all other parts of the world to use fuel with sulfur content levels of 0.5% or less, or alternatively use equipment to reduce SO<sub>x</sub> in exhaust gases to an equivalent level.

\*<sup>2</sup> Energy Efficiency Design Index: Compulsory international regulations requiring energy-efficiency compliance in newly built ships based on EEDI values, which specify CO<sub>2</sub> emissions in grams for transporting one ton of cargo for one mile. EEDI regulation values apply in increasingly strict phases based on the construction-contract conclusion date and finished-ship delivery date. Phase 3 regulations (30% CO<sub>2</sub> emissions reduction compared with baseline levels) will be introduced for certain ship types including large LPG carriers and LNG carriers contracted to be built in 2022 or later.

\*<sup>3</sup> The Tier III controls apply only to the specified ships while operating in Emission Control Areas (ECA), requiring 80% NO<sub>x</sub> emissions reduction compared with Tier I controls.

## PRINCIPAL PARTICULARS

Length (o.a.)	229.90 m
Length (b.p.)	226.50 m
Breadth (mld.)	37.20 m
Depth (mld.)	21.90 m
Draft (mld.)	11.60 m
Gross tonnage	49,943
Deadweight	55,091 t
Main engine	KAWASAKI-MAN B&W 7S60ME-C10.5-LGIP
Complement	30 persons
Classification	Nippon Kaiji Kyokai (ClassNK)
Loading capacity (tank)	84,171.8 m <sup>3</sup>
Builder	Kawasaki Heavy Industries, Ltd.



# LANTANA PLANET 84,000 m<sup>3</sup> LPG Carrier 13

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[By Ship Type](#)



# LANTANA PLANET 84,000 m<sup>3</sup> LPG Carrier 13

Contents By Builder By Ship Type

## LPG-fueled LPG carrier LANTANA PLANET Delivered

January 23, 2023 — Kawasaki Heavy Industries, Ltd. announced today it has delivered the 84,000 m<sup>3</sup> capacity Liquefied Petroleum Gas (LPG) carrier LANTANA PLANET (HN:1754) for Nippon Yusen Kabushiki Kaisha. This is the 69th LPG carrier built by the company.

This vessel is a dual-fuel LPG carrier using LPG and low-sulfur fuel oil, and their fourth 84,000 m<sup>3</sup> LPG carrier adopting a dual-fuel main engine.

In recent years, in order to effectively reduce emissions of greenhouse gases from international shipping, more vessels are adopting liquefied gases as an alternative to heavy fuel oil on a global scale. This very large LPG carrier is powered by LPG, which reduces greenhouse gas emissions and is expected to significantly reduce environmental impact. It is the fruit of the Kawasaki Group's accumulated knowledge in building LPG and Liquefied Natural Gas (LNG) carriers, and LNG-fueled vessels.

Kawasaki plans to develop and build more LPG-fueled LPG carriers, LPG/NH<sub>3</sub> carrier, and other commercial vessels that meet environmental standards, as well as to develop and offer other eco-friendly marine technologies, to contribute to the establishment of a low-carbon/decarbonized society. These products include vessels for transporting liquefied hydrogen, considered to be the next-generation energy source.

## Features

1. This LPG carrier operates using both LPG and low-sulfur fuel oil. Use of LPG as fuel greatly reduces emission volumes of sulfur oxides (SO<sub>x</sub>), CO<sub>2</sub> and other pollutants compared with use of marine fuel oil. In this way, the new vessel will meet SO<sub>x</sub> emission standards\*<sup>1</sup> which

were strengthened in January 2020, and EEDI\*<sup>2</sup> Phase 3 regulations which will further strengthen CO<sub>2</sub> emission standards.

2. In order to satisfy restrictions on NO<sub>x</sub> Tier III controls\*<sup>3</sup> emissions which is implemented by the International Maritime Organization (IMO), the main engine and generator are equipped with a Selective catalytic reduction (SCR) System, An exhaust gas purification system to reduce NO<sub>x</sub>, which allows the ship to navigate in Emission Control Area (ECA).
3. Installation of LPG fuel tanks on the ship's upper deck makes it possible to load fuel-use LPG separate from the ship's cargo LPG. Moreover, a piping system connecting the LPG fuel tanks and LPG cargo tanks enables transferring of extra LPG to the LPG fuel tanks if necessary.
4. This vessel adopts the Kawasaki Rudder Bulb System with Fins (RBS-F) and the Semi-Duct System with contra Fins (SDS-F) which contribute to reducing fuel consumption.

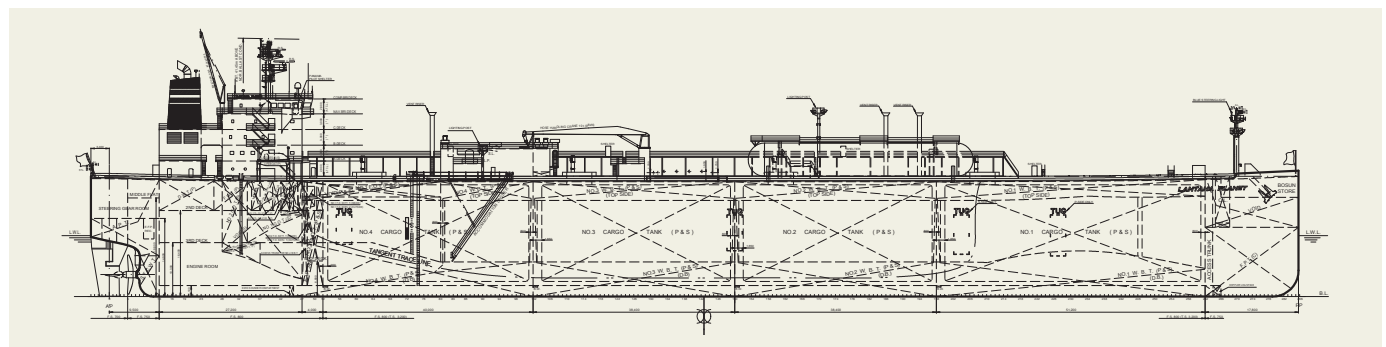
## Remarks

\*<sup>1</sup> SO<sub>x</sub> emission standards: Since January 2015, SO<sub>x</sub> emission restrictions in SO<sub>x</sub> emission standards: Since January 2015, SO<sub>x</sub> emission restrictions in North American and European emission control areas (ECAs) have limited sulfur content in fuels to 0.1% or less. Starting in January 2020, regulations have required ships operating in all other parts of the world to use fuel

with sulfur content levels of 0.5% or less, or alternatively use equipment to reduce SO<sub>x</sub> in exhaust gases to an equivalent level.  
 \*<sup>2</sup> Energy Efficiency Design Index: Compulsory international regulations requiring energy-efficiency compliance in newly built ships based on EEDI values, which specify CO<sub>2</sub> emissions in grams for transporting one ton of cargo for one mile. EEDI regulation values apply in increasingly strict phases based on the construction-contract conclusion date and finished-ship delivery date. Phase 3 regulations (30% CO<sub>2</sub> emissions reduction compared with baseline levels) will be introduced for certain ship types including large LPG carriers and LNG carriers contracted to be built in 2022 or later.  
 \*<sup>3</sup> The Tier III controls apply only to the specified ships while operating in Emission Control Areas (ECA), requiring 80% NO<sub>x</sub> emissions reduction compared with Tier I controls.

## PRINCIPAL PARTICULARS

Length (o.a.)	229.90 m
Length (b.p.)	226.50 m
Breadth (mld.)	37.20 m
Depth (mld.)	21.90 m
Draft (mld.)	11.60 m
Gross tonnage	49,943
Deadweight	55,153 t
Main engine	KAWASAKI-MAN B&W 7S60ME-C10.5-LGIP
Complement	30 persons
Classification	Nippon Kaiji Kyokai (ClassNK)
Loading capacity (tank)	84,169.8 m <sup>3</sup>
Builder	Kawasaki Heavy Industries, Ltd.



# CAPTAIN MARKOS 84,000 m<sup>3</sup> LPG Carrier 14

[Contents](#)[By Builder](#)[By Ship Type](#)

**LPG-fueled LPG carrier CAPTAIN MARKOS Delivered**  
March 31, 2023 — Kawasaki Heavy Industries, Ltd. announced today it has delivered the 84,000 m<sup>3</sup> capacity

Liquefied Petroleum Gas (LPG) carrier CAPTAIN MARKOS (HN:1755). This is the 70th LPG carrier built by the company. This vessel is a dual-fuel LPG carrier using LPG and low-sul-

fur fuel oil, and their seventh 84,000 m<sup>3</sup> LPG carrier adopting a dual-fuel main engine. In recent years, in order to effectively reduce emissions

# CAPTAIN MARKOS 84,000 m<sup>3</sup> LPG Carrier 14

Contents By Builder By Ship Type

of greenhouse gases from international shipping, more vessels are adopting liquefied gases as an alternative to heavy fuel oil on a global scale. This very large LPG carrier is powered by LPG, which reduces greenhouse gas emissions and is expected to significantly reduce environmental impact. It is the fruit of the Kawasaki Group's accumulated knowledge in building LPG and Liquefied Natural Gas (LNG) carriers, and LNG-fueled vessels.

Kawasaki plans to develop and build more LPG-fueled LPG carriers, LPG/NH<sub>3</sub> carrier, and other commercial vessels that meet environmental standards, as well as to develop and offer other eco-friendly marine technologies, to contribute to the establishment of a low-carbon/decarbonized society. These products include vessels for transporting liquefied hydrogen, considered to be the next-generation energy source.

## Features

1. This LPG carrier operates using both LPG and low-sulfur fuel oil. Use of LPG as fuel greatly reduces emission volumes of sulfur oxides (SO<sub>x</sub>), CO<sub>2</sub> and other pollutants compared with use of marine fuel oil. In this way, the new vessel will meet SO<sub>x</sub> emission standards\*<sup>1</sup> which were strengthened in January 2020, and EEDI\*<sup>2</sup> Phase 3 regulations which will further strengthen CO<sub>2</sub> emission standards.
2. In order to satisfy restrictions on NO<sub>x</sub> Tier III controls\*<sup>3</sup> emissions which is implemented by the International Maritime Organization (IMO), the main engine and generator are equipped with a Selective catalytic reduction (SCR) System, An exhaust gas purification system to reduce NO<sub>x</sub>, which allows the ship to navigate in Emission

Control Area (ECA).

3. Installation of LPG fuel tanks on the ship's upper deck makes it possible to load fuel-use LPG separate from the ship's cargo LPG. Moreover, a piping system connecting the LPG fuel tanks and LPG cargo tanks enables transferring of extra LPG to the LPG fuel tanks if necessary.
4. This vessel adopts the Kawasaki Rudder Bulb System with Fins (RBS-F) and the Semi-Duct System with contra Fins (SDS-F) which contribute to reducing fuel consumption.

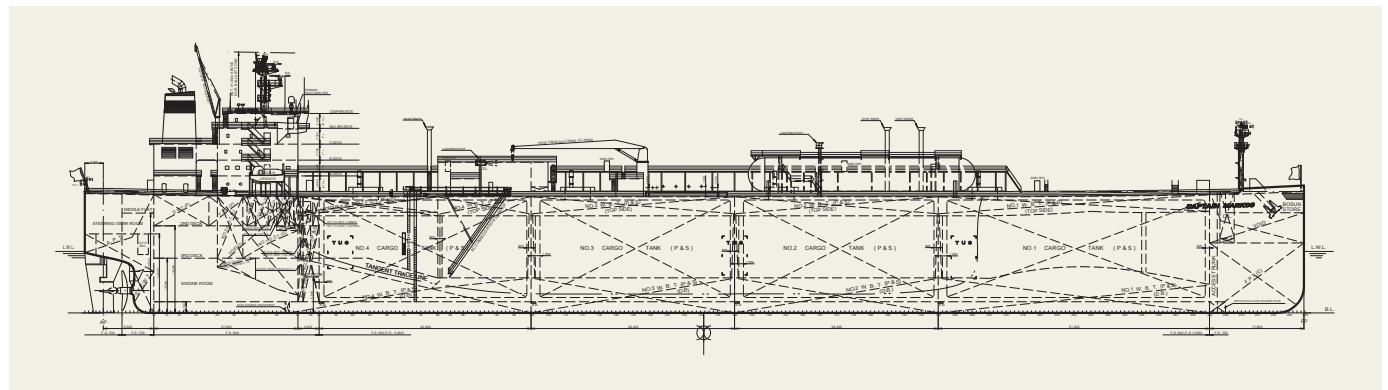
## Remarks

- \*<sup>1</sup> SO<sub>x</sub> emission standards: Since January 2015, SO<sub>x</sub> emission restrictions in North American and European emission control areas (ECAs) have limited sulfur content in fuels to 0.1% or less. Starting in January 2020, regulations have required ships operating in all other parts of the world to use fuel with sulfur content levels of 0.5% or less, or alternatively use equipment to reduce SO<sub>x</sub> in exhaust gases to an equivalent level.
- \*<sup>2</sup> Energy Efficiency Design Index: Compulsory international regulations requiring energy-efficiency compliance in newly built ships based on EEDI values, which specify CO<sub>2</sub> emissions in grams for transporting one ton of cargo for one mile. EEDI regulation values apply in increasingly strict phases based on the construction-contract conclusion date and finished-ship delivery date. Phase 3 regulations (30% CO<sub>2</sub> emissions reduction compared with baseline levels) will be introduced for certain ship types including large LPG carriers and LNG carriers contracted to be built in 2022 or later.
- \*<sup>3</sup> The Tier III controls apply only to the specified ships while operating in Emission Control Areas (ECA), requiring 80% NO<sub>x</sub> emissions reduction compared with Tier I controls.

- \*<sup>4</sup> Exhaust Gas Recirculation System (EGR): This device reduces NO<sub>x</sub> emissions by cleaning a portion of the main engine's exhaust gas with fresh water and returning it to the main engine as combustion air, thereby lowering the oxygen concentration and combustion temperature of the combustion air and suppressing the oxidation reaction of nitrogen at high temperatures. In addition, the washing water used to clean exhaust gases removes soot and oil and is treated harmlessly and discharged overboard.
- \*<sup>5</sup> Selective Catalytic Reduction (SCR): When urea water is sprayed on the hot exhaust gas of a power generation engine, it is broken down into ammonia, which reacts with NO<sub>x</sub> in the exhaust gas via a titanium/vanadium catalyst to reduce NO<sub>x</sub> emissions by reducing to nitrogen and water.

## PRINCIPAL PARTICULARS

Length (o.a.) .....	229.90 m
Length (b.p.) .....	226.50 m
Breadth (mld.) .....	37.20 m
Depth (mld.) .....	21.90 m
Draft (mld.) .....	11.60 m
Gross tonnage .....	49,976
Deadweight .....	55,206 t
Main engine .....	KAWASAKI-MAN B&W 7S60ME-C10.5-LGIP
Complement .....	29 persons
Classification .....	American Bureau of Shipping (ABS)
Loading capacity (tank) .....	84,273.7 m <sup>3</sup>
Builder .....	Kawasaki Heavy Industries, Ltd.





# AXIS RIVER 86,700 m<sup>3</sup> LPG/NH<sub>3</sub> Carrier 15

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## Delivery of the LPG-powered “AXIS RIVER” LPG/NH<sub>3</sub> Carrier

June 30, 2023 — Kawasaki Heavy Industries, Ltd. announced today its delivery of the “AXIS RIVER” (HN:1756), an 86,700 m<sup>3</sup> Liquefied Petroleum Gas (LPG) and ammonia (NH<sub>3</sub>) carrier powered by LPG.

The “AXIS RIVER” - an LPG-powered LPG/NH<sub>3</sub> carrier

The “AXIS RIVER” is the first of Kawasaki’s newest-design 86,700 m<sup>3</sup> capacity, LPG-fueled LPG/NH<sub>3</sub> carrier, with the increased cargo capacity from the existing 84,000 m<sup>3</sup> LPG Carrier as well as ammonia loading capability. As for LPG-powered vessels, Kawasaki has completed eight vessels to date, and the “AXIS RIVER” is its seventy-first LPG carrier in total..

This latest LPG/NH<sub>3</sub> carrier has a capability of simultaneous transportation of LPG, which is already widely used as a low-carbon-emission energy source, and ammonia, which may be expected to be utilized as a new fuel in the low- and zero-carbon-emission societies. Furthermore, this vessel is designed to increase cargo tank capacity, with

# AXIS RIVER 86,700 m<sup>3</sup> LPG/NH<sub>3</sub> Carrier 15

Contents By Builder By Ship Type

keeping its principal dimensions like LOA and beam similar to conventional-type vessels so that the carrier can be berthed at major LPG terminals around the world. In consideration of the strengthening of environmental regulations around the world and action plans for the Sustainable Development Goals (SDGs), Kawasaki will continue to develop and provide customers with environmental-friendly ship technologies with a focus on LPG carriers and LPG/NH<sub>3</sub> carriers powered by LPG, as well as other types merchant vessels in comply with the latest environmental regulations,— including liquefied hydrogen carriers, the cargo of which is expected to be a fuel that is gaining popularity as a next-generation energy source. In this way, Kawasaki will contribute toward the realization of low- and zero-carbon-emission societies.

## Features

1. This carrier is equipped with the Kawasaki-MAN B&W 6G60ME-C10.5-LGIP, a Kawasaki-made, electronically controlled, LPG-injection marine diesel engine (ME-LGIP engine). By utilizing LPG as fuel, it is possible to significantly reduce sulfur oxide (SO<sub>x</sub>) and CO<sub>2</sub> emissions in exhaust gases compared with ships running on conventional marine fuel oil, enabling compliance with SO<sub>x</sub> emission standards\*<sup>1</sup> and EEDI phase 3 regulations.\*<sup>2</sup>
2. The propulsion system is compliant with nitrogen oxide (NO<sub>x</sub>) Tier III requirements\*<sup>3</sup> and utilizes EGR\*<sup>4</sup> and SCR\*<sup>5</sup> equipment. Thanks to this system, the vessel is able to travel in NO<sub>x</sub> emission control areas (ECAs) even when operating on conventional low-sulfur fuel.
3. Fuel consumption amounts are reduced through the inclusion of the Kawasaki RBS-F (Rudder Bulb System with Fins), the Kawasaki SDS-F (Semi-Duct System with contra

- Fins), and energy-saving fins around the propeller.
4. The concept design for a system that utilizes ammonia as fuel on this vessel has been approved by Nippon Kaiji Kyokai (ClassNK). Therefore, it is possible to modify ship design specifications to enable the use of ammonia as fuel in the future.

## Remarks

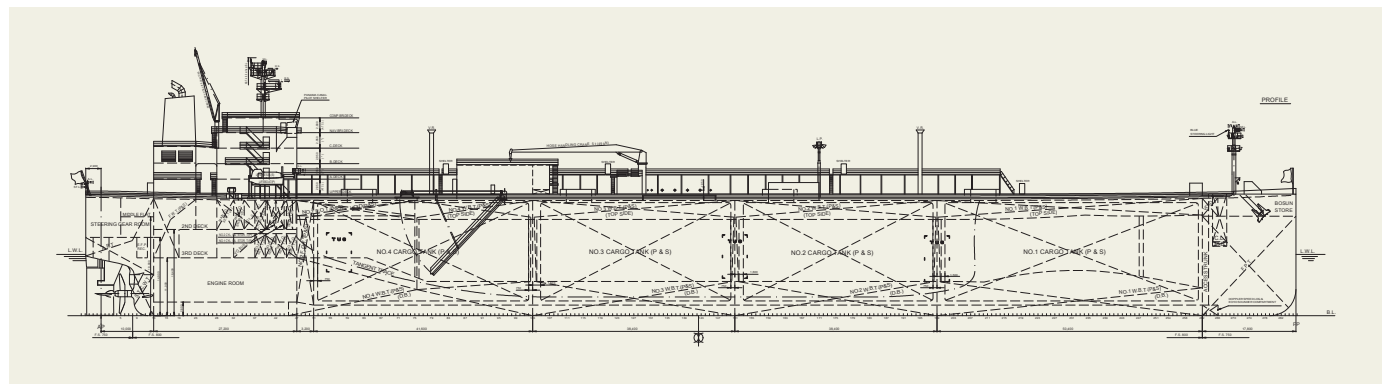
- \*1 SO<sub>x</sub> emission standards: Since January 2015, International Maritime Organization (IMO) SO<sub>x</sub> emission restrictions in North American and European ECAs have limited sulfur content in fuels to 0.1% or less. Starting in January 2020, regulations have required ships operating in all other parts of the world to use fuel with sulfur content levels of 0.5% or less, or alternatively use equipment to reduce SO<sub>x</sub> in exhaust gases to an equivalent level.
- \*2 Energy Efficiency Design Index: Compulsory international regulations requiring energy-efficiency compliance in newly built ships based on EEDI values, which specify CO<sub>2</sub> emissions in grams for transporting one ton of cargo for one mile. EEDI regulation values apply in increasingly strict phases based on the construction-contract conclusion date and finished-ship delivery date. Phase 3 regulations (30% CO<sub>2</sub> emissions reduction compared with baseline levels) apply for certain ship types, including large LPG carriers and LNG (liquefied natural gas) carriers, contracted to be built in 2022 or later.
- \*3 NO<sub>x</sub> emission standards: The IMO regulates ship NO<sub>x</sub> emissions. Tier III regulations, which were enacted in 2016, specify controls for North American and European ECAs only, and stipulate an 80% NO<sub>x</sub> reduction over the Tier I value.
- \*4 Exhaust gas recirculation: An EGR system cleans a portion of exhaust gases using wash water and

recirculates them as air for use in the combustion process within the propulsion system. This reduces oxygen concentrations in combustion air and lowers combustion temperature, mitigating the oxidation reaction of nitrogen at high temperatures to reduce resulting NO<sub>x</sub> emissions. The water used to clean the exhaust gases is treated to remove soot, oils and other contaminants, rendering it safe before its release into the sea outside the vessel.

\*5 Selective catalytic reduction: The SCR system sprays urea water into high-temperature exhaust gases from the generator, decomposing the ammonia contained therein. By using this together with catalysts such as titanium and vanadium, it is possible to trigger a reaction with the NO<sub>x</sub> in exhaust gases, converting them into nitrogen and water and thus reducing NO<sub>x</sub> emissions.

## PRINCIPAL PARTICULARS

Length (o.a.)	229.90 m
Length (b.p.)	227.00 m
Breadth (mld.)	37.20 m
Depth (mld.)	21.90 m
Draft (mld.)	11.65 m
Gross tonnage	49,542
Deadweight	56,503 t
Main engine	KAWASAKI-MAN B&W 6G60ME-C10.5-LGIP
Complement	35 persons
Classification	Nippon Kaiji Kyokai (ClassNK)
Loading capacity (tank)	86,919.1 m <sup>3</sup>
Builder	Kawasaki Heavy Industries, Ltd.



# MARKO MARULIC 7,524 CBM LPG Carrier 16

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# MARKO MARULIC 7,524 CBM LPG Carrier 16

Contents By Builder By Ship Type

This is the first LPG carrier propelled by a dual-type LPG-fueled main engine built in Japan as a smaller ship than 11,000m<sup>3</sup> cargo loading capacity, and has two pressurized cargo tanks with total designed capacity of 7,500m<sup>3</sup>, and one LPG-fuel tank of 450m<sup>3</sup> capacity. The cargo tank is durable up to 17.65 bar as well as minus 10 degC.

The carrier is equipped with Sasaki patent stern fins in the front of the propeller. The stern fins control water flow before the propeller, resulting in improved propulsion performance and fuel reduction.

To achieve environmental load reduction and less pollutant emissions, the carrier has been designed to conform with requirements of EEDI III and BV's Clean Ship regulations, and is compliant with the class notation AUT-UMS of BV, which allows ship M0 operation and alleviates the work

## PRINCIPAL PARTICULARS

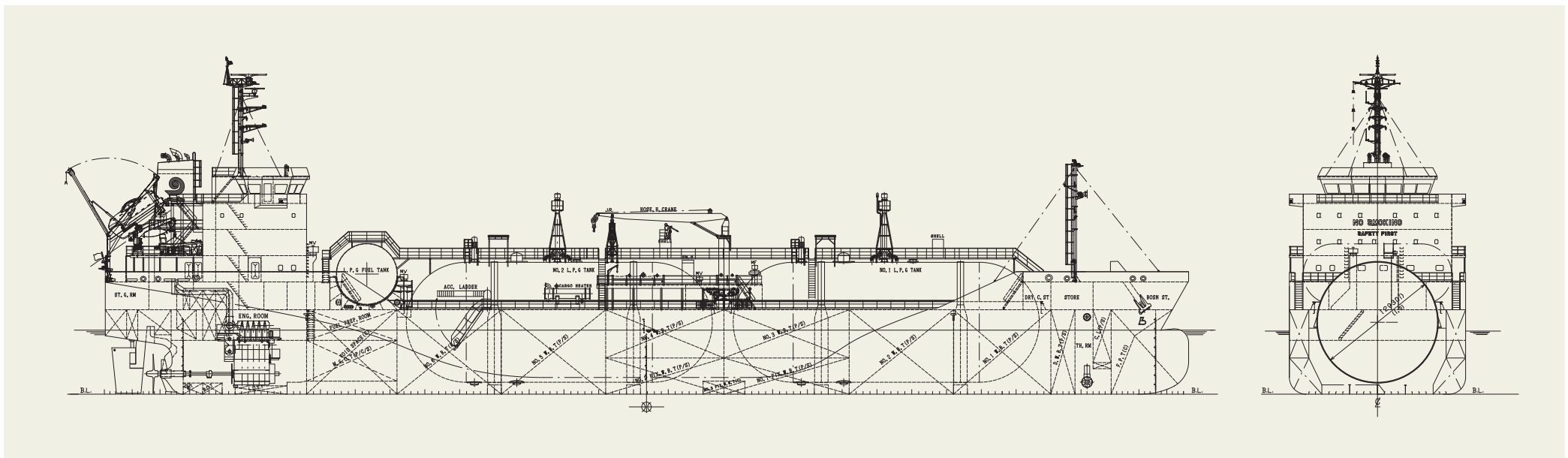
Length (o.a.)	116.82 m
Length (b.p.)	110.90 m
Breadth (mld.)	19.00 m
Depth (mld.)	.9.10 m
Draft (mld.)	.6.80 m
Gross tonnage	.6,515
Deadweight	.7,261 tons
Main engine	HITACHI-MAN B&W 5S35ME-C9.7 LGIP

MCR (kw x rpm)	3,000 x 148
NOR (kw x rpm)	2,700 x 138
Speed (max. trial)	14.71 knots
(service)	13.00 knots
Complement	.20 persons
Classification	BV
Cargo pump	450 m <sup>3</sup> /h × 110 m × 180 kW × 2 sets
Loading capacity (tank)	7,524 m <sup>3</sup>
Builder	Sasaki Shipbuilding Co., Ltd.

load of the crew.

Moreover, the Croatia-registered carrier has been provided with a format of IHM-EU for the Ship Recycling Regulation (EU-SRR). According to the regulations, ships above 500GT

and flying the flag of an EU/EEA member state, or third-party flagged vessels calling at European ports, must carry a IHM certificate on board.



# MORNING KATE 5,014 CBM LPG Carrier 17

[Contents](#)

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# MORNING KATE 5,014 CBM LPG Carrier 17

Contents By Builder By Ship Type

This vessel is designed as the 5,000cbm type LPG carrier with two cylindrical full-pressurized cargo tanks capable of loading liquefied petroleum gasses. The energy-saving hull form with stern fins is designed to produce economic propulsion.

One stream line balanced hanging rudder (C type) is adopted and steering gear is of electro-hydraulic system, consisting of two rams, two cylinders with two hydraulic pump units.

The engine room is divided into some compartments in order to reduce the noise and vibration. All cabins are made as private room.

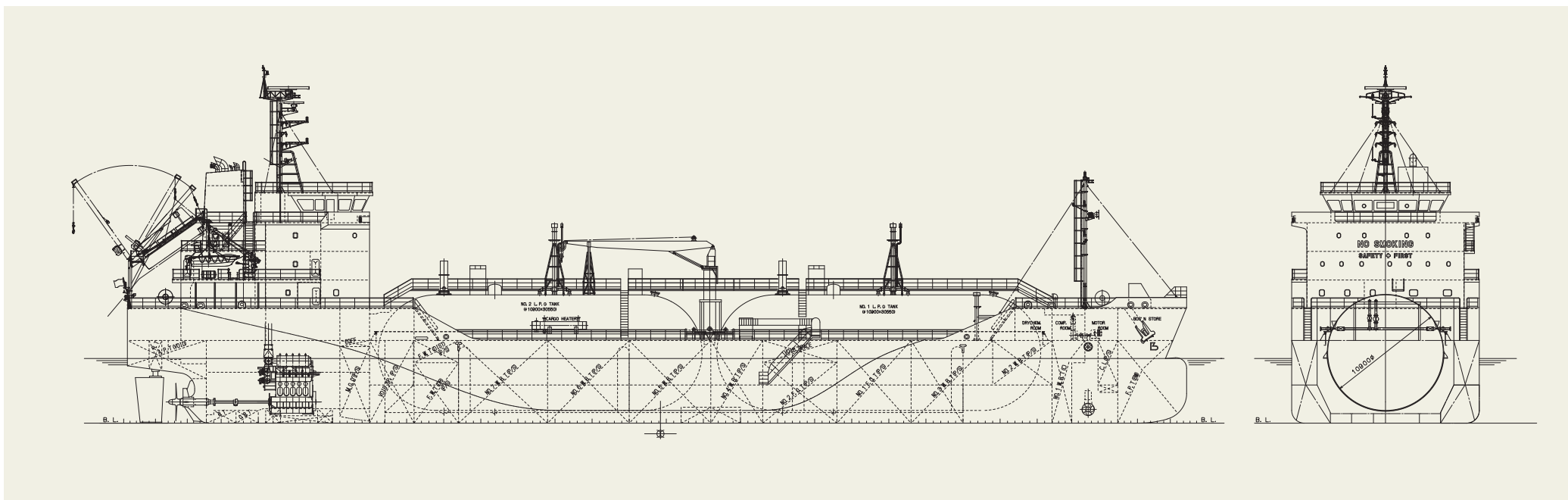
The consideration is also given to reduction of environmen-

## PRINCIPAL PARTICULARS

Length (o.a.) .....	99.98 m
Length (b.p.).....	95.30 m
Breadth (mld.).....	17.70 m
Depth (mld.).....	7.80 m
Draft (mld.).....	6.10 m
Gross tonnage.....	4,551
Deadweight.....	5,274 tons
Main engine .....	MAKITA-MITSUI-MAN B&W 5L35MC6

MCR (kw x rpm) .....	2,200 x 178
NOR (kw x rpm).....	1,980 x 172
Speed (max. trial).....	14.07 knots
(service).....	13.40 knots
Complement.....	20 persons
Classification .....	BV
Cargo pump.....	300 m <sup>3</sup> /h × 110 m × 130 kW × 2 sets
Loading capacity (tank).....	5,014 m <sup>3</sup>
Builder: .....	Sasaki Shipbuilding Co., Ltd.

tal burden such as installation of ballast water treatment system.



**AYAME** 49,998 MT Product/Chemical Tanker **18**

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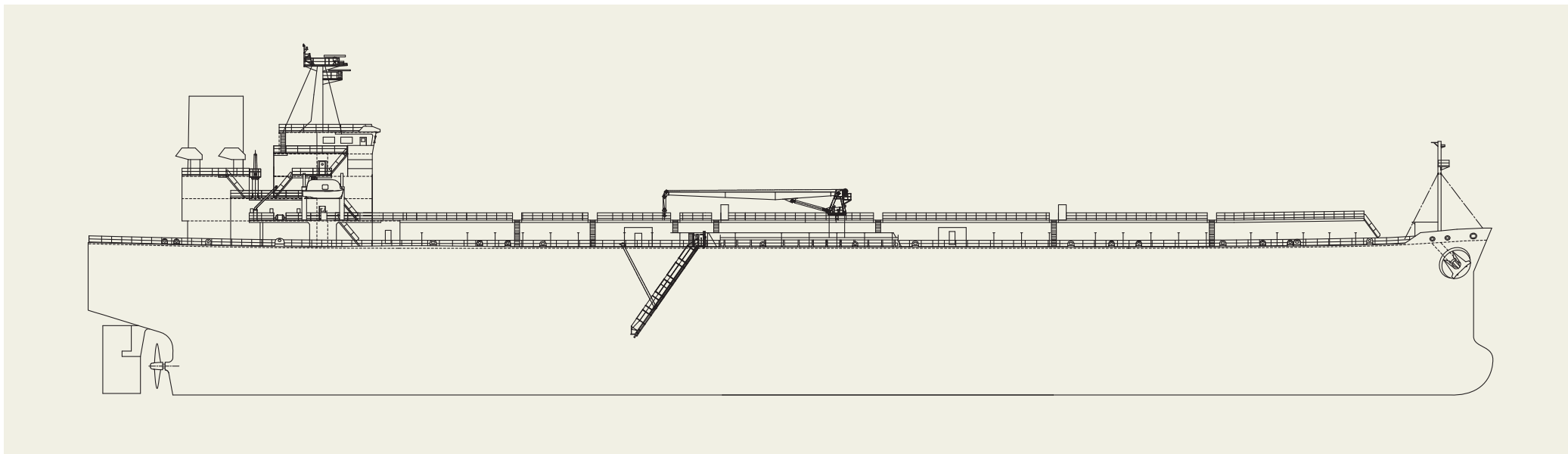


**Features**

1. The vessel is developed Medium Range Tanker called ONOMICHI MR MARK V. She is capable to carry chemical cargoes (IMO Type II & III ) with 14 cargo oil tanks and individual cargo oil pumping system.
2. Main engine is low-revolution and low-consumption electrically controlled type engine, MAN B&W 6S50ME-C9.7-HPSCR.
3. Stern fin is equipped in front of propeller, which controls the flow and improves the inflow to the propeller. It decreases the resistance acting on the ship's hull and helps to reduce fuel consumption.

**PRINCIPAL PARTICULARS**

Length (o.a.) .....	182.50 m	NOR (kw x rpm).....	5,820 kW x 97 min <sup>-1</sup>
Length (b.p.).....	175.00 m	Speed (max. trial) .....	15.27 knots
Breadth (mld.).....	32.20 m	(service).....	13.7 knots
Depth (mld.).....	19.05 m	Complement.....	25
Draft (mld.).....	13.079 m	Classification .....	NK
Gross tonnage.....	29,395	Handling gear.....	
Deadweight.....	49,998 MT	1 set Electro-Hydraulic type Manifold Hose Handling Crane	
Main engine .....	MAN B&W 6S50ME-C9.7-HPSCR	Cargo pump.....	12 sets 600 m <sup>3</sup> /h FRAMO Cargo Oil Pump
MCR (kw x rpm) .....	7,600 kW x 106 min <sup>-1</sup>	Loading capacity (tank).....	55077.4 m <sup>3</sup>
		Builder.....	Onomichi Dockyard Co., Ltd.





**YOTOI** 5,469 DWT Oil Tanker **19**

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**YOTOI** 5,469 DWT Oil Tanker **19**

Contents By Builder By Ship Type

The 5,469-dwt Oils Tanker YOTOI was built at SHIN KURUSHIMA HASHIHAMA DOCKYARD CO., LTD. and delivered to Japan Ministry of Defense in April 2022.

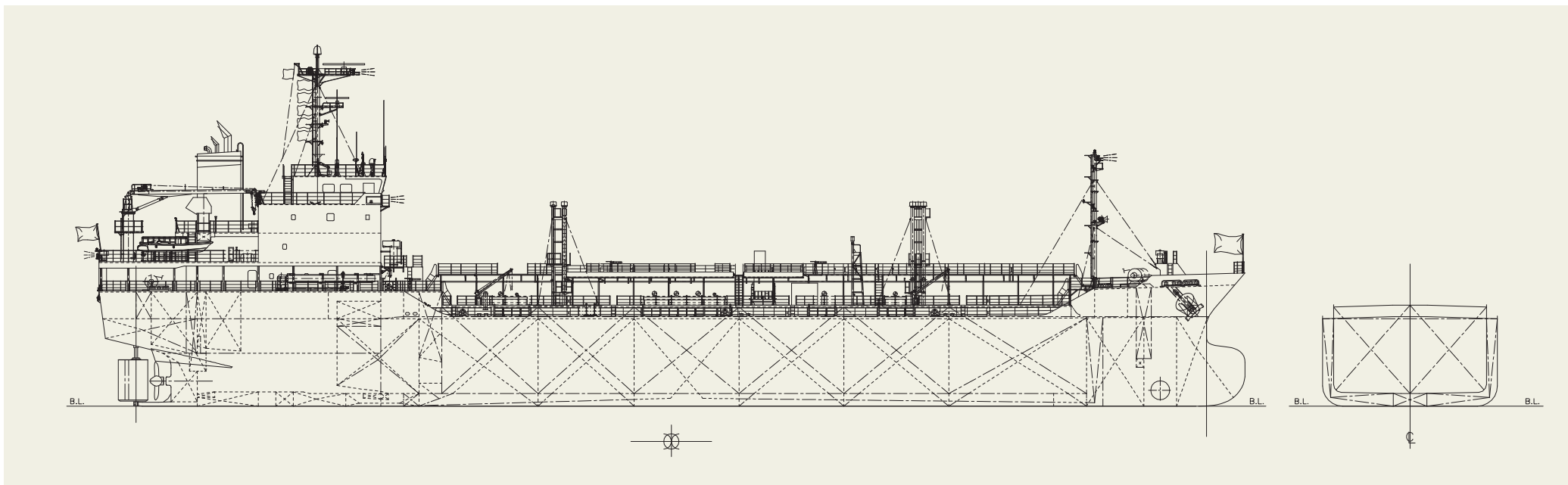
**Features**

- The vessel was built for ocean transport of oil products from domestic refinery to Japan Maritime Self-Defense Force base.
- 2. The vessel is equipped with the hose reel for floating hose and have secured loading space for 20ft container.
- 3. The vessel has twelve (12) cargo tanks constructed of Pure epoxy paint coating, and all cargo tanks are of double-hull structure.
- 4. The vessel has two (2) cargo pumps which is 1,300m<sup>3</sup>/h for bunkering at Ioto Island.

**PRINCIPAL PARTICULARS**

Length (o.a.).....	104.93 m	MCR (kW x rpm).....	3,000 kW x 210 min <sup>-1</sup>
Length (b.p.).....	98.00 m	Speed(service).....	13.30 knots
Breadth (mld.).....	16.00 m	Complement.....	14 P
Depth (mld.).....	8.00 m	Classification.....	NK
Draft (mld.).....	6.35 m	Cargo pump.....	1300 m <sup>3</sup> /h x 0.85MPa x 2 sets
Gross tonnage.....	3,485		250 m <sup>3</sup> /h x 0.85MPa x 1 sets
Deadweight.....	5,469 t	Loading capacity (tank).....	6,185m <sup>3</sup>
Main engine.....	HANSHIN-KAWASAKI-MAN B&W 5L35MC6	Builder:.....	Shin Kurushima Hashihama Dockyard Co., Ltd.

- 5. The vessel is applied "ClassNK".



# RISHIRI GALAXY 26,396 DWT Oil/Chemical Tanker 20

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# RISHIRI GALAXY 26,396 DWT Oil/Chemical Tanker 20

Contents By Builder By Ship Type

The 26,396 dwt type chemical carrier RISHIRI GALAXY was built at SHIN KURUSHIMA DOCKYARD CO., LTD. and delivered to TRADEWIND NAVIGATION S.A. in February 2023.

## Features

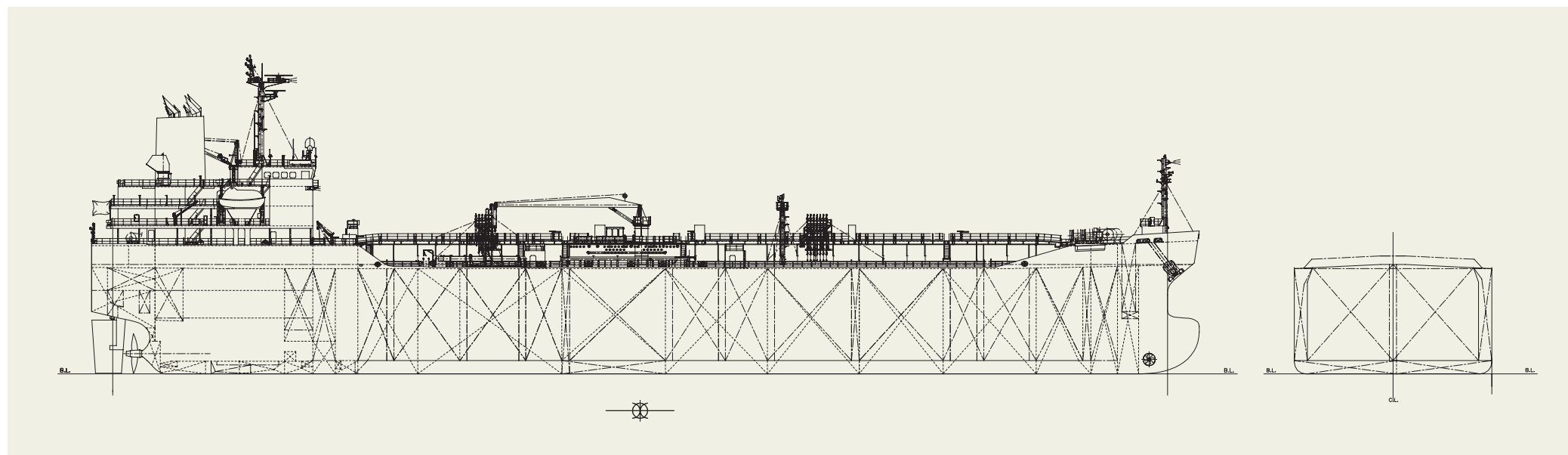
1. The vessel was built for ocean transport of chemicals (IMO type II and III ) and oil products.
2. The vessel has twenty- three (23) cargo tanks constructed of SUS316LN stainless steel and SUS316LN clad steel.
3. All cargo tanks (including slop tanks) are of double-hull structure and have sufficient strength to permit the carriage of a full cargo with a specific gravity of 1.30 t/m<sup>3</sup>.
4. Structures protruding into the tanks have been minimized by using an on-deck girder system for the upper deck and vertical corrugated type bulkheads.

5. Each cargo tank is equipped with one (1) submerged cargo pump driven by a hydraulic motor; these are remotely controlled from the cargo control room.

6. Cargo handling is simplified by a 10 metric-ton hydraulically operated deck crane for hose handling; it is arranged a midship on the upper deck.

## PRINCIPAL PARTICULARS

Length (o.a.) .....	157.03 m	NOR (kW × rpm) .....	5,483 kW x abt. 112 min <sup>-1</sup>
Length (b.p.).....	149.50 m	Speed (service).....	14.8 knots
Breadth (mld.).....	28.00 m	Complement.....	26P
Depth (mld.).....	14.90 m	Classification .....	NK
Draft (mld.).....	9.00 m	Cargo pump .....	Submerged type
Gross tonnage.....	18,287	330 m <sup>3</sup> /h x 115 mLC x 13 sets (based on S.G. 0.8)	
Deadweight.....	26,396 t	200 m <sup>3</sup> /h x 115 mLC x 10 sets (based on S.G. 0.8)	
Main engine .....	6UEC42LSH-Eco-D3-EGR	70m <sup>3</sup> /h x 70 mTH x 1 set (based on S.G. 1.0)	
MCR (kW × rpm) .....	6,450 kW x 118 min <sup>-1</sup>	Loading capacity (tank).....	30,258 m <sup>3</sup>
		Builder: .....	Shin Kurushima Dockyard Co., Ltd.



# CHEMROAD ZENITH 35,777 DWT Oil/Chemical Tanker 21

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# CHEMROAD ZENITH 35,777 DWT Oil/Chemical Tanker 21

Contents By Builder By Ship Type

The 35,777 dwt chemical carrier CHEMROAD ZENITH was built at SHIN KURUSHIMA DOCKYARD CO., LTD. and delivered to the Panamanian Owner in June 2022.

## Features

The vessel was built for ocean transport of chemicals (IMO type II and III) and oil products.

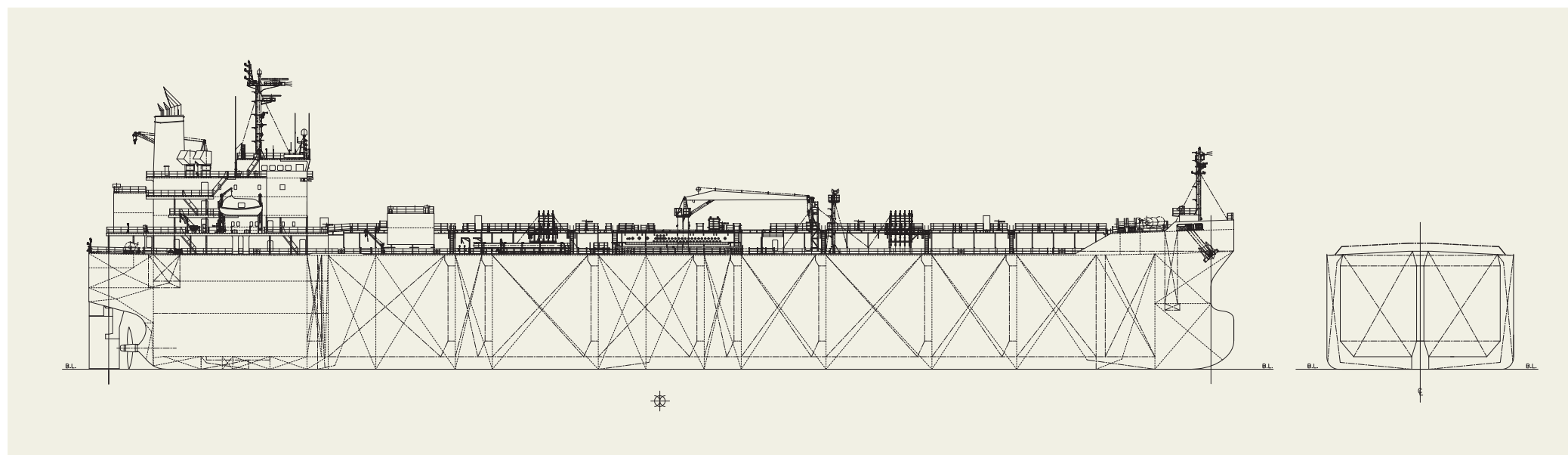
2. The vessel has eighteen (18) cargo tanks (including slop tanks) constructed of SUS316LN stainless steel and SUS316L clad steel.
3. All cargo tanks are of double-hull structure and have sufficient strength to permit the carriage of a full cargo with a specific gravity of 1.30 t/m<sup>3</sup>.
4. Structures protruding into the tanks have been minimized by using an on-deck girder system for the upper deck and vertical corrugated type bulkheads.

5. Each cargo tank is equipped with one (1) submerged cargo pump driven by a hydraulic motor; these are remotely controlled from the cargo control room.

6. Cargo handling is simplified by a 10 metric-ton hydraulically operated deck crane for hose handling; it is arranged a midship on the upper deck.

## PRINCIPAL PARTICULARS

Length (o.a.) .....	172.98 m	NOR (kW x rpm) .....	5,840 kW x abt. 89.0 min
Length (b.p.) .....	166.50 m	Speed (service) .....	14.5 knots
Breadth (mld.) .....	28.20 m	Complement .....	30 P
Depth (mld.) .....	17.20 m	Classification .....	NK
Draft (mld.) .....	11.40 m	Cargo pump .....	Submerged type
Gross tonnage .....	23,464		300m <sup>3</sup> /h x 115mLC (SG=0.80) x 14 sets
Deadweight .....	35,777 t		200m <sup>3</sup> /h x 115mLC (SG=0.80) x 4 sets
Main engine .....	6UEC50LSH-Eco-C3-EGR		70m <sup>3</sup> /h x 70mLC (SG=1.00) x 1 set (Portable type)
MCR (kW x rpm) .....	6,870 kW x 94.0 min	Loading capacity (tank) .....	39,790 m <sup>3</sup>
		Builder: .....	Shin Kurushima Dockyard Co., Ltd.



**KINSHU** 4,999 DWT Oil/Chemical Tanker 22

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**KINSHU** 4,999 DWT Oil/Chemical Tanker **22**

Contents By Builder By Ship Type

The 4,999-dwt Oils / Chemical Tanker KINSHU was built at SHIN KURUSHIMA HASHIHAMA DOCKYARD CO., LTD. and delivered to Japanese Owner. in March 2023.

**Features**

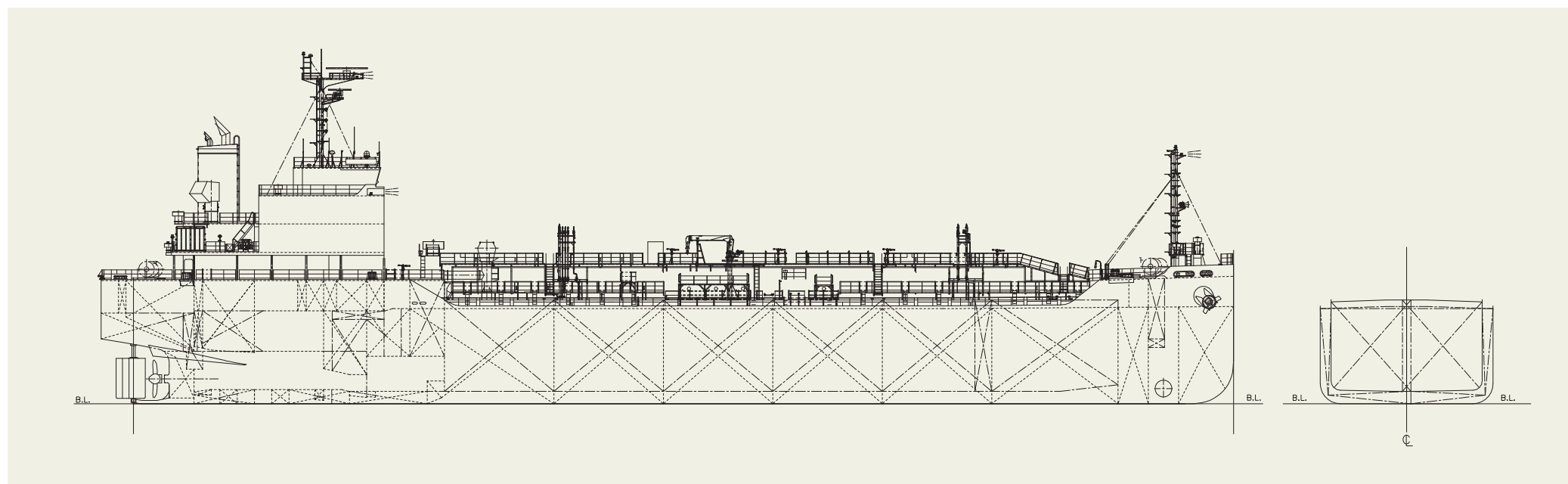
The vessel was built for ocean transport of oil products.

- 2. The vessel has twelve (12) cargo tanks constructed of Pure epoxy paint coating.
- 3. All cargo tanks are of double-hull structure and have sufficient strength to permit the carriage of a full cargo with a specific gravity of 1.025 t/m<sup>3</sup>.
- 4. Structures protruding into the tanks have been minimized by using an on-deck girder system for the upper deck and vertical corrugated type bulkheads.

- 5. The vessel has six (6) cargo pumps driven by electric motors remotely controlled from the ship's office.

**PRINCIPAL PARTICULARS**

Length (o.a.) .....	104.91 m	MCR (kW x rpm) .....	3,440 kW x 195 min <sup>-1</sup>
Length (b.p.) .....	101.90 m	NOR (kW × rpm) .....	2,924kW x abt. 185 min <sup>-1</sup>
Breadth (mld.) .....	16.00 m	Speedservice) .....	14.0 knots
Depth (mld.) .....	8.80 m	Complement .....	16P
Draft (mld.) .....	6.233 m	Classification .....	NK
Gross tonnage .....	4,248	Cargo pump .....	Screw type
Deadweight .....	4,999 t		370/270 m <sup>3</sup> /h x 0.83 MPa x 6 sets-
Main engine .....	MAKITA-MITSUI-MAN B&W 6S30ME-B9.5	Loading capacity (tank) .....	6,549 m <sup>3</sup>
		Builder: .....	Shin Kurushima Hashihama Dockyard Co., Ltd.





# FRONTIER SPIRIT 181,000 DWT Bulk Carrier 23

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# FRONTIER SPIRIT 181,000 DWT Bulk Carrier 23

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Japan Marine United Corporation (JMU) delivered “FRONTIER SPIRIT”, 181,000 DWT Bulk Carrier, at its Ariake Shipyard on 6th October 2023.

## Features

1. This is the newly developed Dunkirkmax type bulk carrier, called “N181BC,” which has larger deadweight and cargo hold capacity suitable for loading bulk coal and iron ore in its nine cargo holds, achieved by JMU’s expertise and vast experience.
2. The Vessel has an optimal hull shape that pursues low resistance and high efficiency using our latest analysis technology, and has also optimized our proprietary energy-saving devices such as Super Stream Duct®, SURF-BULB®, and ALV-Fin®

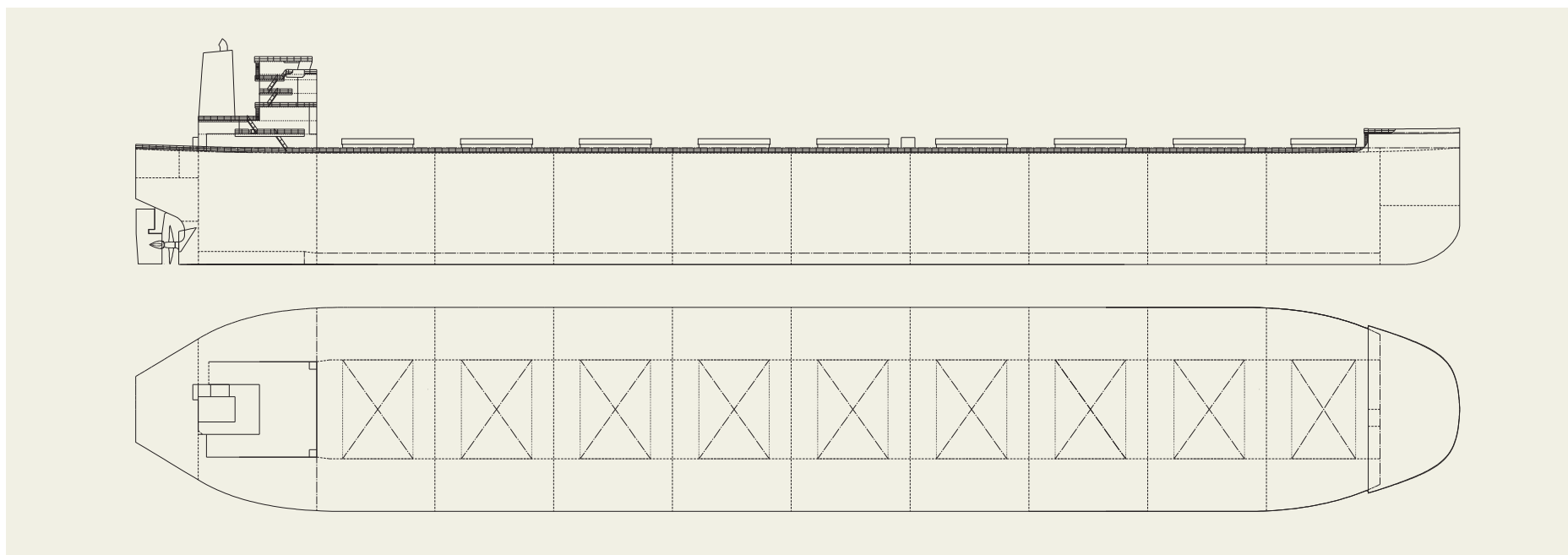
3. The Energy Efficiency Design Index (EEDI) of the subject Vessel has achieved Phase 3 (30% reduction from the reference line) by application of the optimal hull shape and latest energy saving technologies. This challenge will contribute to green environment by its eco-friendly

performance.

4. Furthermore, a unique bow shape, LEADGE-Bow®, can reduce the added resistance due to waves, and the well-refined shape of the superstructure can attain low wind resistance.

## PRINCIPAL PARTICULARS

Length (o.a.) .....	292.00 m	Deadweight.....	181,577
Breadth (mld.).....	45.00 m	Main engine .....	MAN B&W 7S60ME-C10.6-HPSCR
Depth (mld.).....	24.55 m	Complement.....	25
Draft (mld.).....	16.50 m	Classification.....	NK
Gross tonnage.....	93,367	Builder.....	JMU



# CAPE BROLGA 211,000 DWT Bulk Carrier 24

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**CAPE BROLGA** 211,000 DWT Bulk Carrier 24

Japan Marine United Corporation has delivered “CAPE BROLGA”, the second J-Series 211,000 DWT Bulk Carrier at its Tsu Shipyard on 29th September 2021.

**Features**

1. This is the newly developed Newcastlemax bulk carrier of J-Series, called J211BC, which is successful in both economical and environmentally friendly design.
2. This Vessel has larger deadweight and cargo hold capacity suitable for bulk coal and iron ore in its 9 cargo holds and has been developed with expertise and vast experience.
3. The SSD<sup>®</sup> (Super Stream Duct<sup>®</sup>) and SURF-BULB<sup>®</sup> equipped fore and aft of its propeller respectively, greatly improve the propulsion performance. ALV-Fin<sup>®</sup> (Ad-

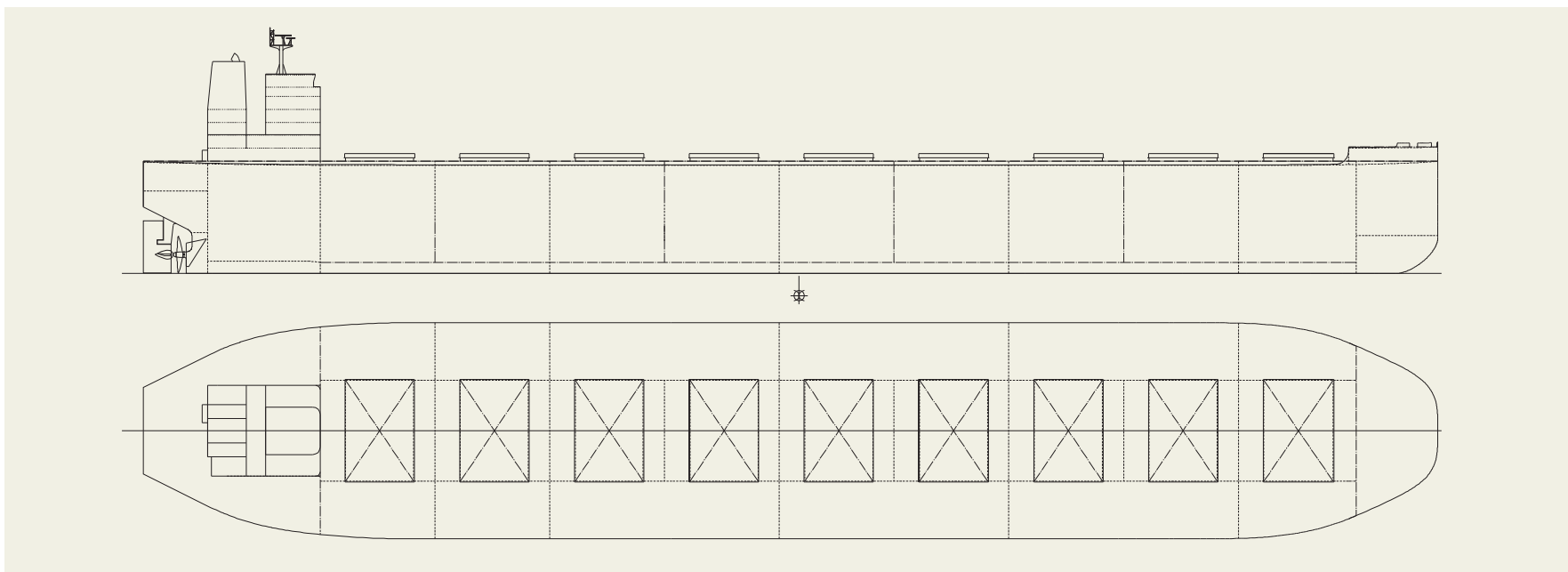
vanced Low Viscous Resistance Fin) equipped fore of its propeller controls stern flow to get better propulsive efficiency. Furthermore, unique bow shape of LEADGE-Bow<sup>®</sup> can reduce the added resistance due to waves and well-refined shape of superstructure can attain low wind resistance. This Vessel is also equipped with SOx scrub-

ber, and SCR(Selective Catalytic Reduction) to comply with MARPOL ANNEX VI Regulation 13 (NOx) and attaining NOx Tier III compliance.

4. Corrosion resistant steel (JFE-SIP<sup>®</sup>-CC) developed by JFE Steel Corporation has been applied in part of outside plating, hold frame and inner bottom plating.

**PRINCIPAL PARTICULARS**

Length (o.a.).....	299.99 m	Deadweight.....	211,982
Breadth (mld.).....	50.00 m	Main engine.....	MAN B&W 7S65ME-C8.5-HPSCR
Depth (mld.).....	25.00 m	Complement.....	28
Draft (mld.).....	18.40 m	Classification.....	NK
Gross tonnage.....	108,605	Builder.....	JMU



# WORLD SEAFARER 182,344 DWT Bulk Carrier 25

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## PRINCIPAL PARTICULARS

Length (o.a.) .....	291.92 m	Gross tonnage .....	93,719	Complement .....	24
Breadth (mld.) .....	45.0 m	Deadweight .....	182,344 t	Classification .....	Nippon Kaiji Kyokai (NK)
Draft (mld.) .....	18.20 m	Main engine .....	MAN B&W 7G60ME-C10.5-EGRBP	Builder .....	Namura Shipbuilding Co., Ltd.

**ENERGIA AZALEA** 99,965 DWT Bulk Carrier 26[Contents](#)[By Builder](#)[By Ship Type](#)**PRINCIPAL PARTICULARS**

Length (o.a.) .....	234.92 m	Gross tonnage .....	58,773	Complement .....	25
Breadth (mld.) .....	43.00 m	Deadweight .....	99,965 t	Classification .....	Nippon Kaiji Kyokai (NK)
Draft (mld.) .....	13.58 m	Main engine .....	MAN B&W 6S60ME-C10.5-EGRBP	Builder .....	Namura Shipbuilding Co., Ltd.

# KUROTAKISAN MARU III 89,999 DWT Bulk Carrier 27

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# KUROTAKISAN MARU III 89,999 DWT Bulk Carrier 27

Contents By Builder By Ship Type

Oshima Shipbuilding Co., Ltd. delivered KUROTAKISAN MARU III, a 89,999-DWT bulk carrier, to NOVA TRANSPORT INC. in December 2021.

## Features

1. Double hull structure and Box type cargo hold with top-side tanks to improve coal unloading efficiency.
2. Elimination of the use of ballast water in cargo holds to reduce the risk of salt, rust, and other contaminants in cargo holds.
3. Advanced Flipper Fins & Rudder Fin which improve propulsion efficiency are installed.

## PRINCIPAL PARTICULARS

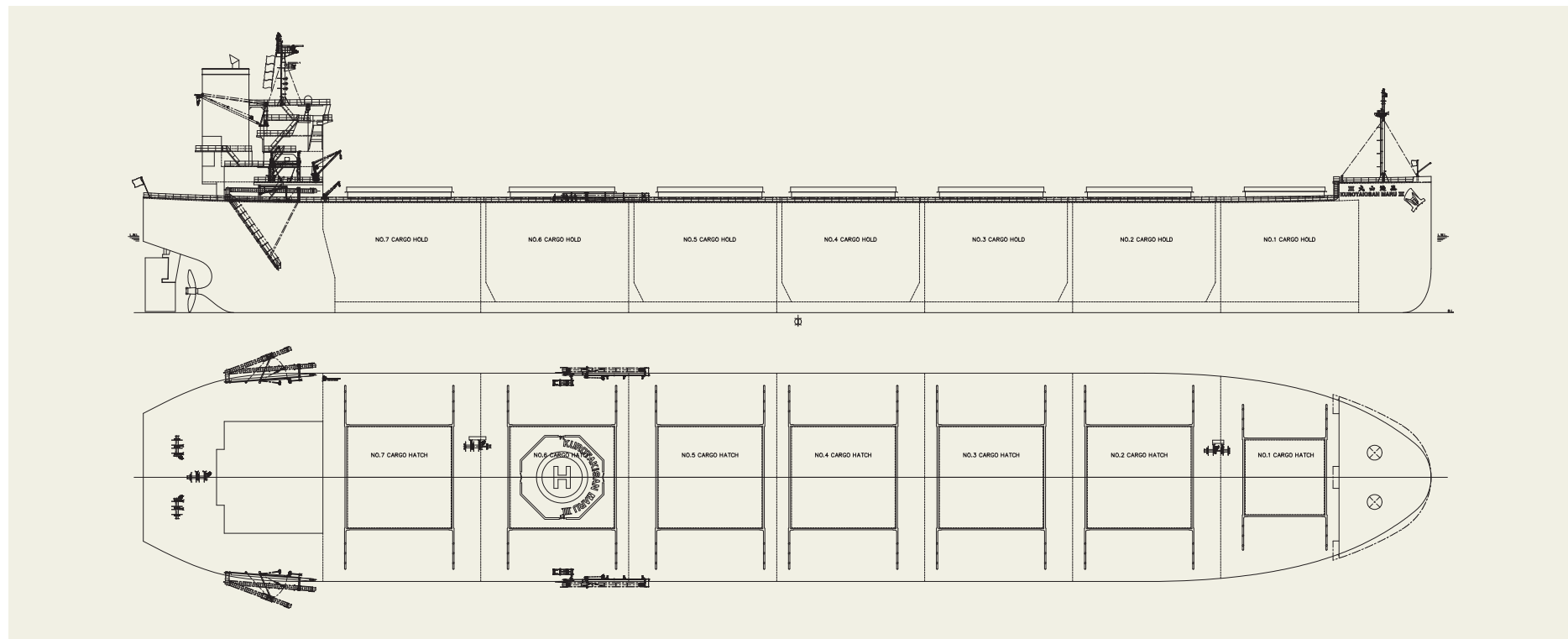
Length (o.a.)	234.96 m
Breadth (mld.)	38.00 m
Depth (mld.)	20.05 m
Draft (mld.)	13.86 m
Gross tonnage	51793
Deadweight	89,999 MT

Main engine	J-ENG UE 6UEC60LSE-Eco-A2-EGR
MCR (kw x rpm)	9,700 kW x 84.0 rpm
Speed (service)	14.00 knots
Complement	25
Classification	NK
Loading capacity (grain)	107,260 m <sup>3</sup>
Builder	Oshima Shipbuilding Co., Ltd.

4. Special bow form, Seaworthy Bow improves speed performance in rough sea conditions as compared to

ordinary bows.

5. SOx scrubber is installed for environmental friendliness.





# TAHO EUDAIMONIA 84,460 DWT Bulk Carrier 28

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# TAHO EUDAIMONIA 84,460 DWT Bulk Carrier 28

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Oshima Shipbuilding Co., Ltd. delivered TAHO EUDAIMONIA, a 84,460-DWT bulk carrier, to THC INTERNATIONAL S.A. in February 2022.

## Features

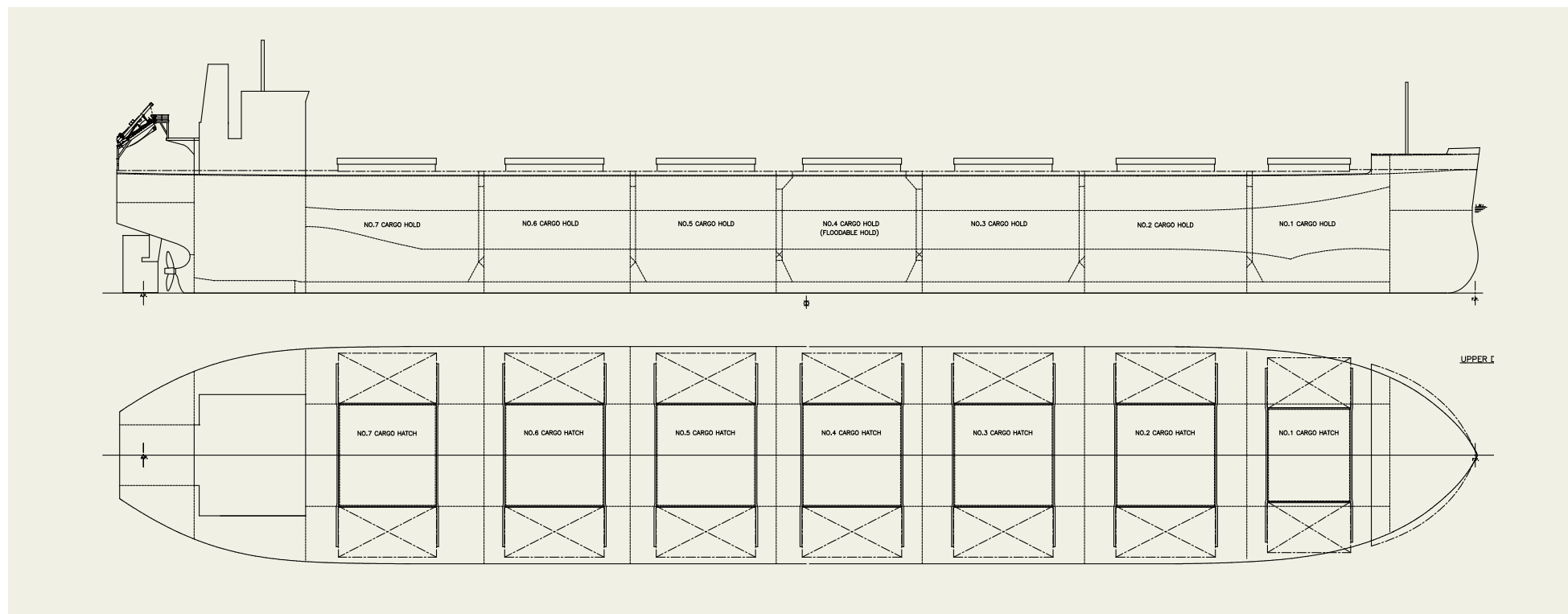
1. This vessel has an optimized hull form for carrying a variety of cargoes, such as grain, ore, coal and steel slab or steel billet and large deadweight(84,460 MT) with shallow draft (13.95 m)
2. Wide hatch cover improves cargo handling efficiency.
3. Advanced Flipper Fins & Rudder Fin which improve propulsion efficiency are installed.

## PRINCIPAL PARTICULARS

Length (o.a.)	228.41 m
Breadth (mld.)	36.50 m
Depth (mld.)	19.89 m
Draft (mld.)	13.95 m
Gross tonnage	46815
Deadweight	84,460 MT

Main engine	MITSUI MAN B&W 6S60ME-C8.5-EGRBP
MCR (kw x rpm)	9,120 kW x 84.0 rpm
Speed (service)	14.10 knots
Complement	25
Classification	ABS
Loading capacity (grain)	102,988 m <sup>3</sup>
Builder	Oshima Shipbuilding Co., Ltd.

4. Special bow form, Seaworthy Bow improves speed performance in rough sea conditions as compared to ordinary bows.



# CEMTEX EXCELLENCE 99,990 DWT Bulk Carrier 29

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# CEMTEX EXCELLENCE 99,990 DWT Bulk Carrier 29

Contents By Builder By Ship Type

Oshima Shipbuilding Co., Ltd. delivered CEMTEX EXCELLENCE, a 99,990-DWT bulk carrier, U-Ming Marine Transport Corporation in March 2022.

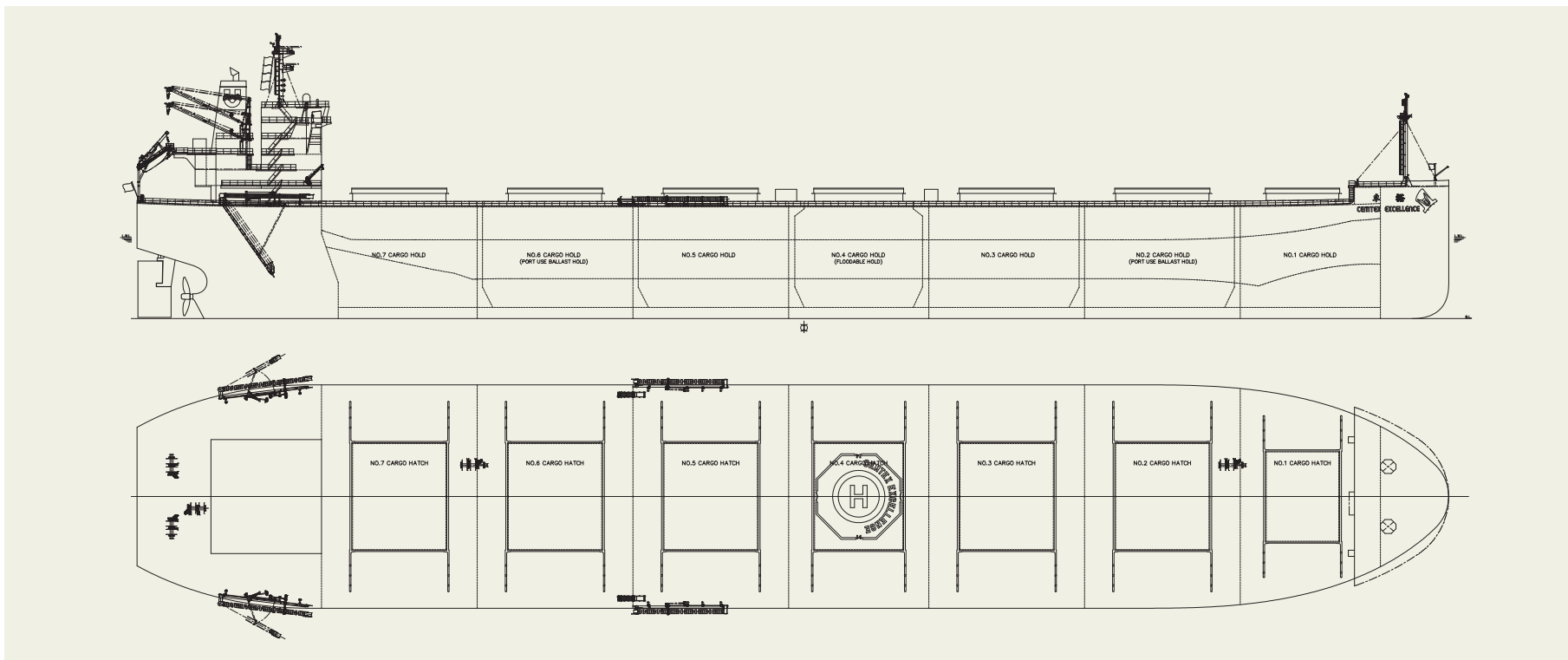
## Features

1. This vessel has a wider width (40.0 m) and larger cargo hold that allow to carry more cargo than a vessel with the approximately same DWT.
2. Wide hatch cover improves cargo handling efficiency.
3. Advanced Flipper Fins & Rudder Fin which improve propulsion efficiency are installed.
4. Special bow form, Seaworthy Bow improves speed

## PRINCIPAL PARTICULARS

Length (o.a.)	235.00 m	MCR (kw x rpm)	10,000 kW x 76.0 rpm
Breadth (mld.)	40.00 m	NOR (kw x rpm)	7,810 kW x 70.0 rpm
Depth (mld.)	20.00 m	Speed (service)	14.30 knots
Draft (mld.)	14.415 m	Complement	25
Gross tonnage	54244	Classification	NK/CR
Deadweight	99,990 MT	Loading capacity (grain)	118,908 m <sup>3</sup>
Main engine	MITSUI-MAN B&W 6G60ME-C10.5	Builder	Oshima Shipbuilding Co., Ltd.

performance in rough sea conditions as compared to ordinary bows.



# SHOFU MARU 100,422 DWT Bulk Carrier 30

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**SHOFU MARU** 100,422 DWT Bulk Carrier 30
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Oshima Shipbuilding Co., Ltd. delivered SHOFU MARU, a 100,422-DWT bulk carrier, to Mitsui O.S.K. Lines, Ltd. in October 2022.

**Features**

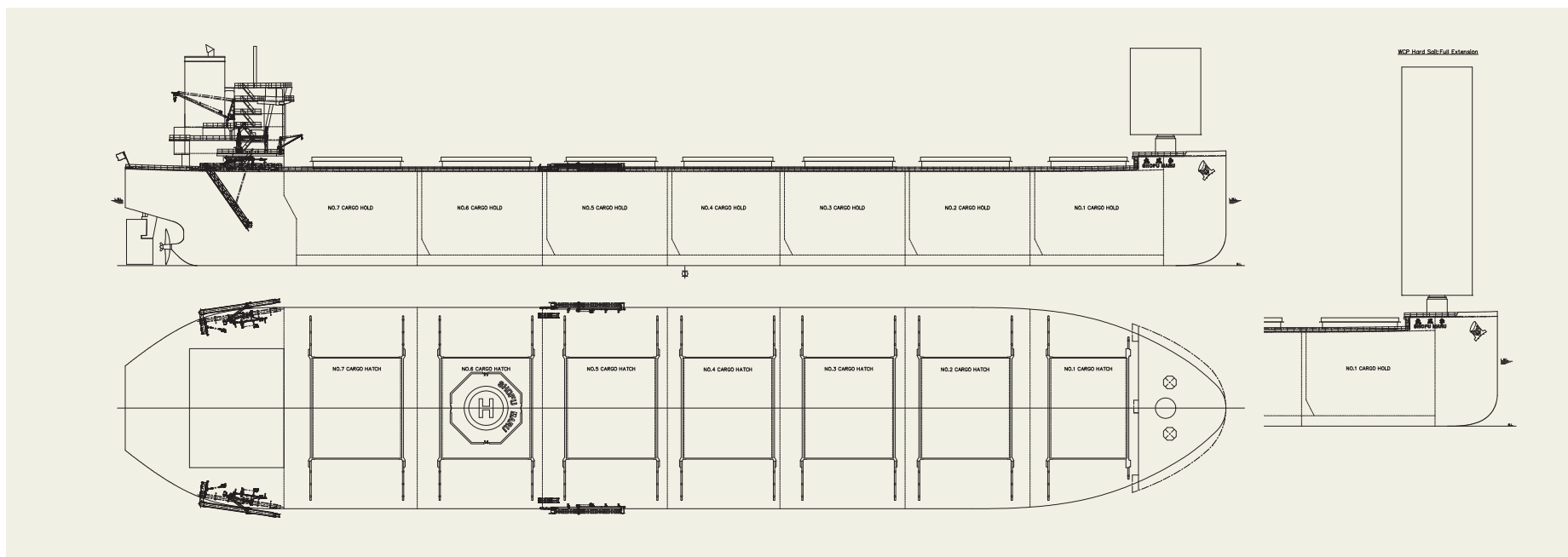
1. This is the 1st delivered vessel with a hard sail, so-called "Wind Challenger," which is wind power propulsion system.
2. The hard sail which consist of three FRP (Fiber Reinforced Plastics) sails and one steel sail is extended and reefed automatically in response to the wind conditions and ship motion.
3. The height of the sail from the main deck is about 53m with all sails fully extended and is about 20m with all sails reefed, and the direction of the sail can rotate 180 degrees.

**PRINCIPAL PARTICULARS**

Length (o.a.).....	235.00 m
Breadth (mld.).....	43.00 m
Depth (mld.).....	20.05 m
Draft (mld.).....	13.88 m
Gross tonnage.....	58209
Deadweight.....	100,422 MT

Main engine .....	MITSUI MAN B&W 6S60ME-C10.5-EGRBP
MCR (kw x rpm) .....	9,180 kW × 84.0 rpm
Speed (service).....	14.30 knots
Complement.....	25
Classification .....	NK
Loading capacity (grain).....	115,304 m <sup>3</sup>
Builder.....	Oshima Shipbuilding Co., Ltd.

4. The width of the sail is about 15m and complies with SOLAS regulation for visibility from wheel house.
5. By slewing in an appropriate direction, a large amount of wind forces is converted into the propulsive force of the ship and reduce fuel consumption.
6. Advanced Flipper Fins & Rudder Fin which improve propulsion efficiency are installed.
7. Special bow form, Seaworthy Bow improves speed performance in rough sea conditions as compared to ordinary bows.



# CLIMATE RESPECT 87,290 DWT Bulk Carrier 31

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# CLIMATE RESPECT 87,290 DWT Bulk Carrier 31

Contents By Builder By Ship Type

Oshima Shipbuilding Co., Ltd. delivered CLIMATE RESPECT, a 87,290-DWT bulk carrier, to LOFOU SHIPPING CORPORATION in July 2022.

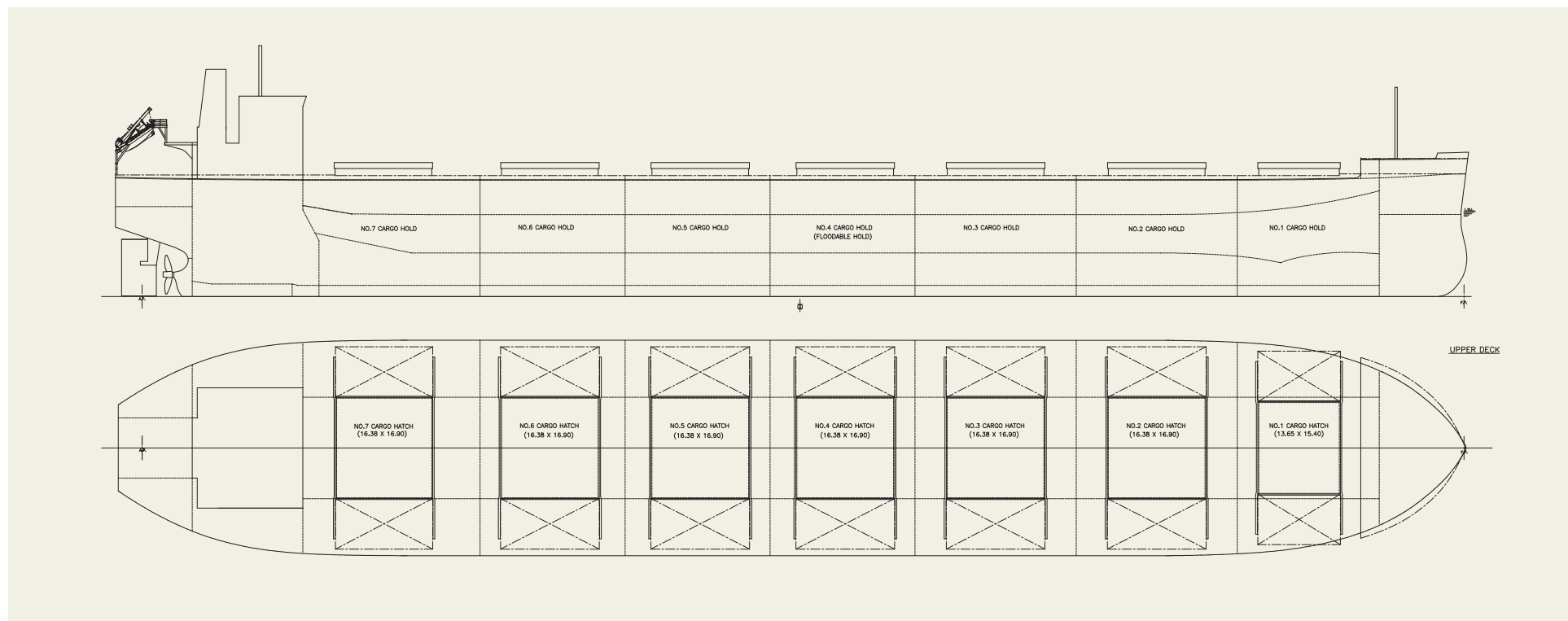
## Features

1. This vessel has an optimized hull form for carrying grain, ore, and coal, and large deadweight (87,290 MT) with shallow draft (14.322m)
2. Wide hatch cover improves cargo handling efficiency.
3. Advanced Flipper Fins & Rudder Fin which improve propulsion efficiency are installed.
4. Special bow form, Seaworthy Bow improves speed

## PRINCIPAL PARTICULARS

Length (o.a.).....	228.41 m	Main engine .....	MITSUI MAN B&W 5S60ME-C10.5-EGRBP
Breadth (mld.).....	36.50 m	MCR (kw x rpm) .....	8,180 kW x 84.0 rpm
Depth (mld.).....	20.39 m	Speed (service).....	14.30 knots
Draft (mld.).....	14.322 m	Complement.....	25
Gross tonnage.....	48233	Classification.....	NK
Deadweight.....	87,290 MT	Loading capacity (grain).....	106,222 m <sup>3</sup>
		Builder.....	Oshima Shipbuilding Co., Ltd.

performance in rough sea conditions as compared to ordinary bows.





# SHOHO MARU III 89,992 DWT Bulk Carrier 32

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# SHOHO MARU III 89,992 DWT Bulk Carrier 32

Contents By Builder By Ship Type

Oshima Shipbuilding Co., Ltd. delivered SHOHO MARU III , a 89,992-DWT bulk carrier, to OREGANO LINE S.A. in August 2023.

## Features

1. This vessel has an optimized hull form for carrying coal, and large deadweight(89,992 MT) with shallow draft (13.839m)
2. Advanced Flipper Fins & Rudder Fin which improve propulsion efficiency are installed.
3. Special bow form, Seaworthy Bow improves speed

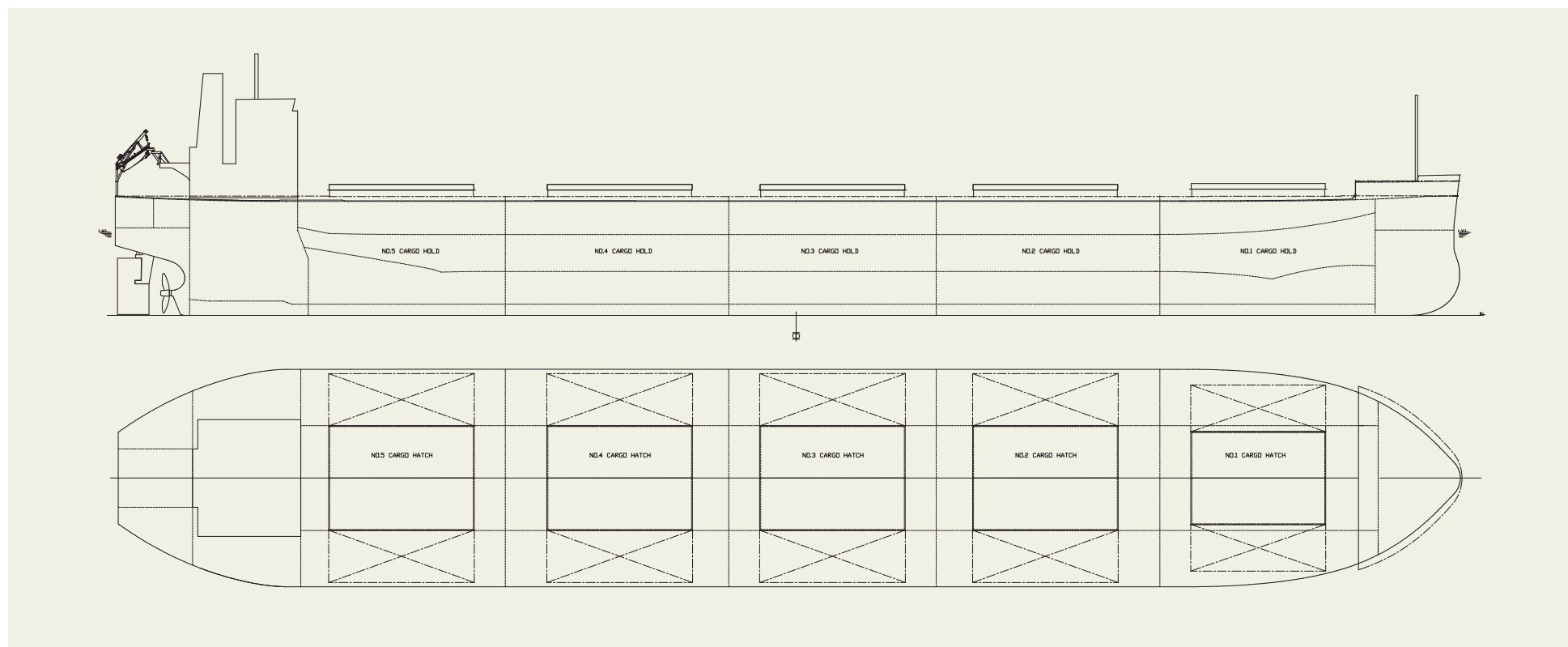
## PRINCIPAL PARTICULARS

Length (o.a.)	234.98 m
Breadth (mld.)	38.00 m
Depth (mld.)	19.91 m
Draft (mld.)	13.839 m
Gross tonnage	51027

Deadweight	89,992 MT
Main engine	MITSUI MAN B&W 6S60ME-C10.5-EGRBP
MCR (kw x rpm)	9,000 kW x 84.0 rpm
Speed (service)	14.30 knots
Loading capacity (grain)	110,529 m <sup>3</sup>
Builder	Oshima Shipbuilding Co., Ltd.

performance in rough sea conditions as compared to ordinary bows.

4. Class NK's notation of "EA (Environmental Awareness)" is assigned.



# KAGURA 99,990 DWT Bulk Carrier 33

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Oshima Shipbuilding Co., Ltd. delivered KAGURA, a 99,990-DWT bulk carrier, to ERICA NAVIGATION S.A. in March 2023.

**Features**

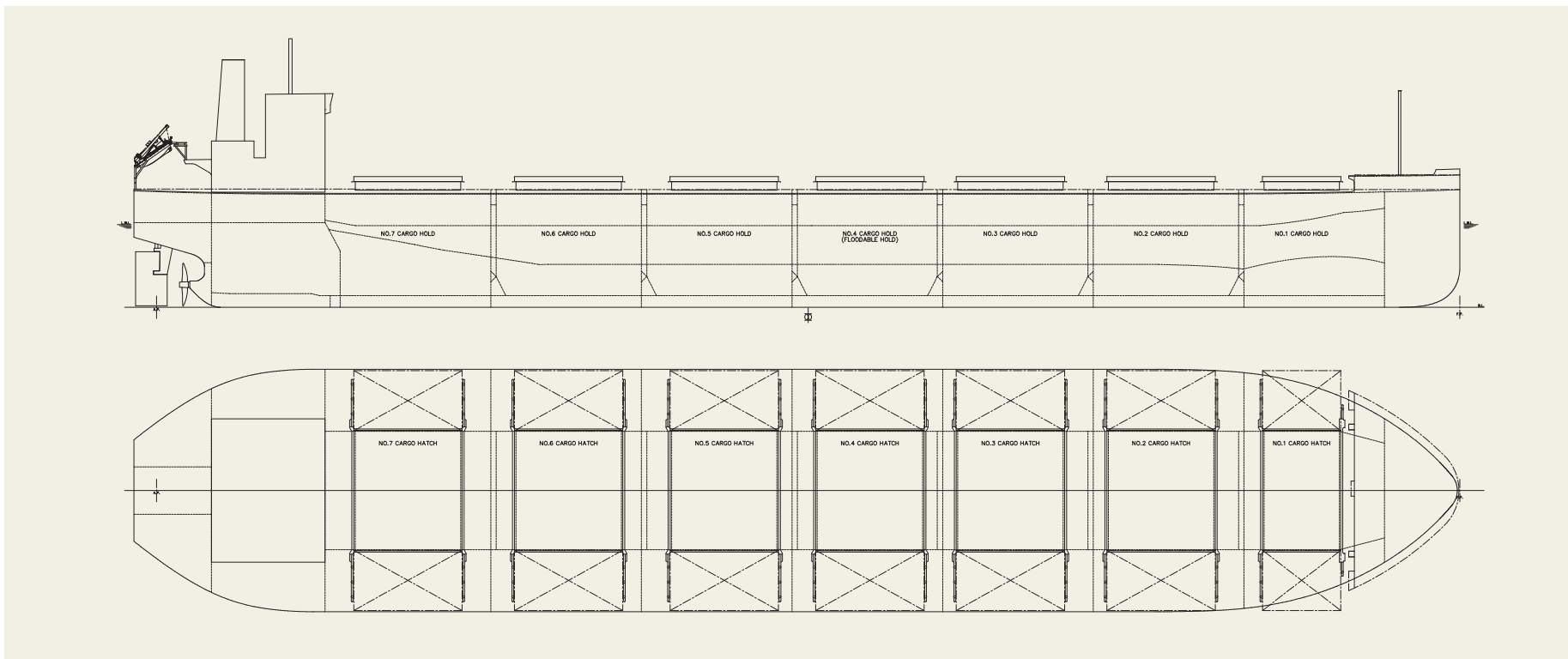
1. This vessel has an optimized hull form for carrying grain, ore, and coal, and large deadweight (99,990 MT)
2. Wide hatch cover improves cargo handling efficiency.
3. Advanced Flipper Fins & Rudder Fin which improve propulsion efficiency are installed.
4. Special bow form, Seaworthy Bow improves speed performance in rough sea conditions as compared to ordinary bows.

**PRINCIPAL PARTICULARS**

Length (o.a.).....	234.996 m
Breadth (mld.).....	43.00 m
Depth (mld.).....	20.05 m
Draft (mld.).....	13.829 m
Gross tonnage.....	57646
Deadweight.....	99,990 MT

Main engine .....	MITSUI MAN B&W 6S60ME-C10.5-EGRBP
MCR (kw x rpm) .....	10,000 kW x 85.0 rpm
Speed (service).....	14.30 knots
Complement.....	25
Classification .....	NK
Loading capacity (grain).....	123,592 m <sup>3</sup>
Builder.....	Oshima Shipbuilding Co., Ltd.

5. SOx scrubber is installed for environmental friendliness.



# SERENITY DIVA 87,396 DWT Bulk Carrier 34

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# SERENITY DIVA 87,396 DWT Bulk Carrier 34

Contents By Builder By Ship Type

Oshima Shipbuilding Co., Ltd. delivered SERENITY DIVA, a 87,396-DWT bulk carrier, to LUCRETIA SHIPPING, S.A. in June 2023.

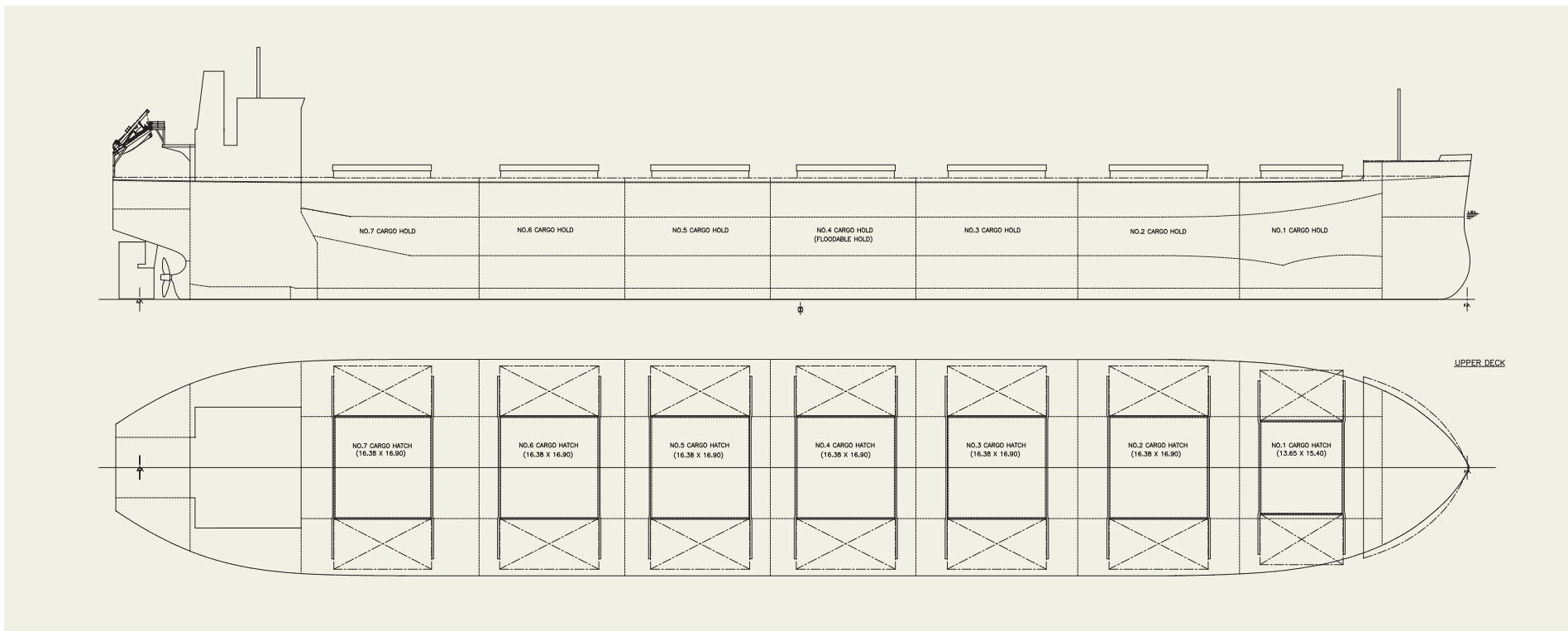
## Features

1. This vessel has an optimized hull form for carrying grain, ore, coal, and cement, and large deadweight(87,396 MT) with shallow draft (14.322m)
2. Wide hatch cover improves cargo handling efficiency.
3. Advanced Flipper Fins & Rudder Fin which improve propulsion efficiency are installed.
4. Special bow form, Seaworthy Bow improves speed

## PRINCIPAL PARTICULARS

Length (o.a.).....	228.41 m	Main engine .....	MITSUI MAN B&W 5S60ME-C10.5-EGRBP
Breadth (mld.).....	36.50 m	MCR (kw x rpm) .....	8,180 kW x 84.0 rpm
Depth (mld.).....	20.39 m	Speed (service).....	14.30 knots
Draft (mld.).....	14.322 m	Complement.....	25
Gross tonnage.....	48105	Classification.....	NK
Deadweight.....	87,396 MT	Loading capacity (grain).....	106,222 m <sup>3</sup>
		Builder.....	Oshima Shipbuilding Co., Ltd.

performance in rough sea conditions as compared to ordinary bows.



# NORD AQUARIUS 82,400 DWT Bulk Carrier 35

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# NORD AQUARIUS 82,400 DWT Bulk Carrier 35

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Japan Marine United Corporation (JMU) delivered "NORD AQUARIUS", the 82,400 DWT Bulk Carrier at its Tsu Shipyard on 31st May 2022.

## Features

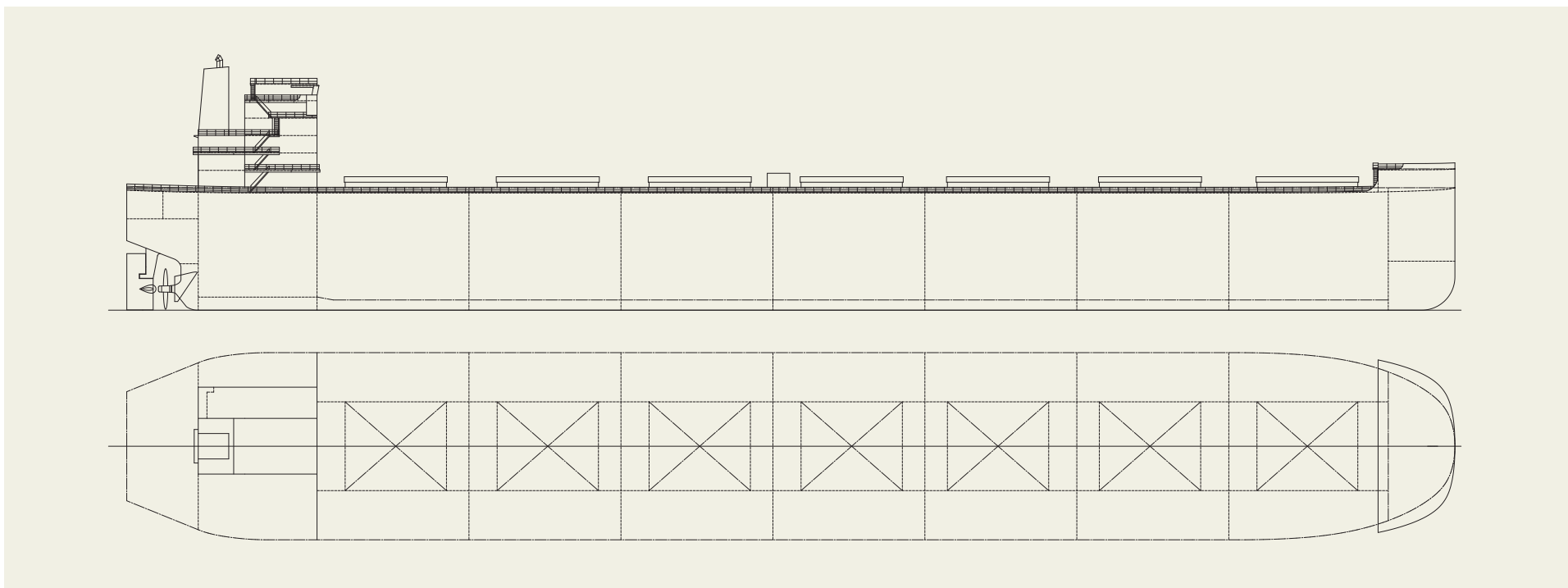
1. This vessel is JMU's J-Series 82,400DWT type bulk carrier (J82BC), which is an evolution of the previous G-Series 80,800 DWT type bulk carrier (G81BC), as the next generation of Panamax bulk carrier.
2. The most important features of this vessel are, improved fuel consumption and enhanced cargo loading capacity under the restriction of ship's dimensions as Panamax bulk carrier by JMU's accumulated technology.

3. Performance under actual seagoing condition has been improved by adopting a low wind resistance shape superstructure.
4. By optimizing our proprietary energy-saving devices, Su-

per Stream Duct®, SURF-BULB®, and ALV-Fin®, the vessel has achieved significant fuel savings.

### PRINCIPAL PARTICULARS

Length (o.a.).....	229.00 m	Deadweight.....	82,375
Breadth (mld.).....	32.26 m	Main engine.....	MAN-B&W 6S60ME-C8.5-EGRBP
Depth (mld.).....	20.20 m	Complement.....	25
Draft (mld.).....	14.55 m	Classification.....	NK
Gross tonnage.....	44,618	Builder.....	JMU





# WISDOM DIVA 82,216 DWT Bulk Carrier 36

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**WISDOM DIVA** 82,216 DWT Bulk Carrier 36

Contents By Builder By Ship Type

Oshima Shipbuilding Co., Ltd. delivered WISDOM DIVA, a 82,216-DWT bulk carrier, to Minsheng Zhijie (Tianjin) Shipping Leasing Company Limited in May 2023.

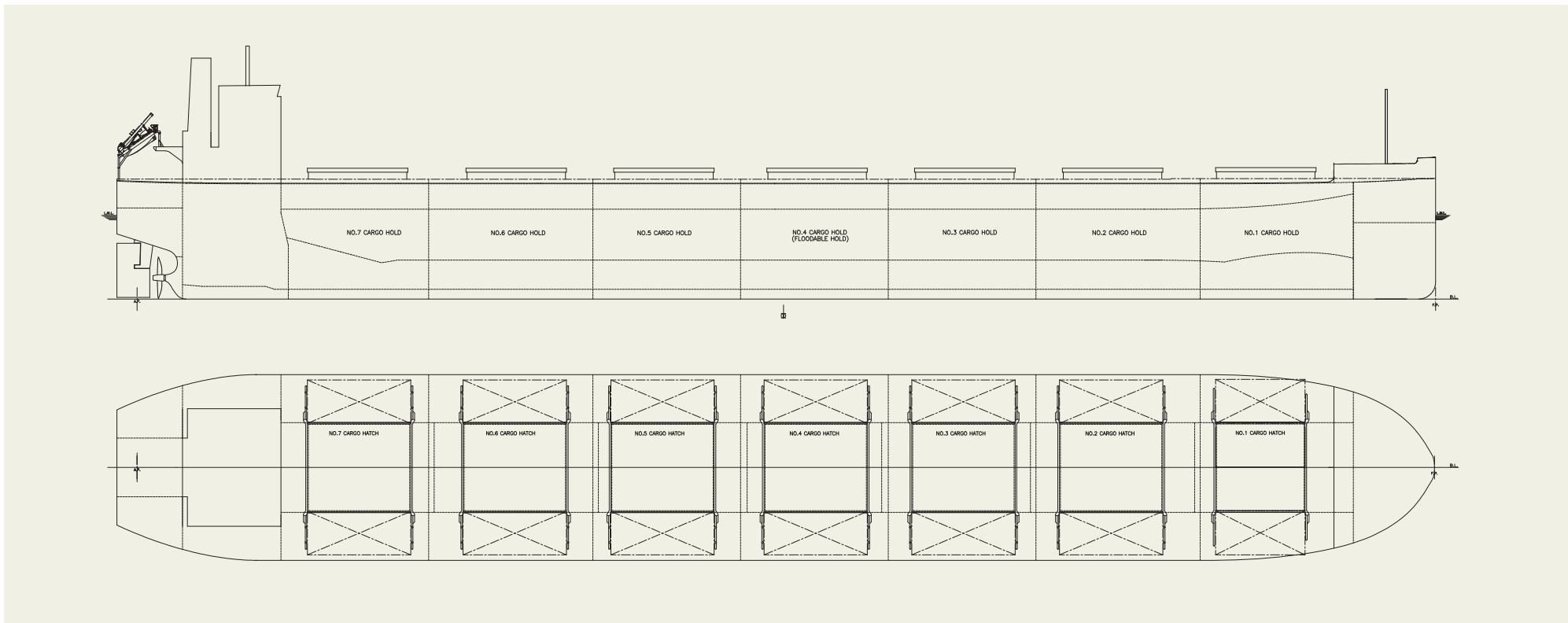
**Features**

1. This vessel has largest deadweight of Panamax bulkers in the world with shallow draft and Wide hatch cover improves cargo handling efficiency.
2. Advanced Flipper Fins & Rudder Fin which improve propulsion efficiency are installed. Special bow form, Seaworthy Bow improves speed performance in rough

**PRINCIPAL PARTICULARS**

Length (o.a.).....	228.995 m	Main engine .....	MITSUI MAN B&W 5S60ME-C10.5-EGRBP
Breadth (mld.).....	32.26 m	MCR (kw x rpm) .....	7,760 kW x 84.0 rpm
Depth (mld.).....	19.98 m	Speed (service).....	14.30 knots
Draft (mld.).....	14.480 m	Complement.....	25
Gross tonnage.....	43366	Classification.....	NK
Deadweight.....	82,216 MT	HLoading capacity (grain).....	97,416 m <sup>3</sup>
		Builder.....	Oshima Shipbuilding Co., Ltd.

sea conditions as compared to ordinary bows.



# NORA SCHULTE 81,957 DWT Bulk Carrier 37

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**NORA SCHULTE** 81,957 DWT Bulk Carrier 37[Contents](#)[By Builder](#)[By Ship Type](#)

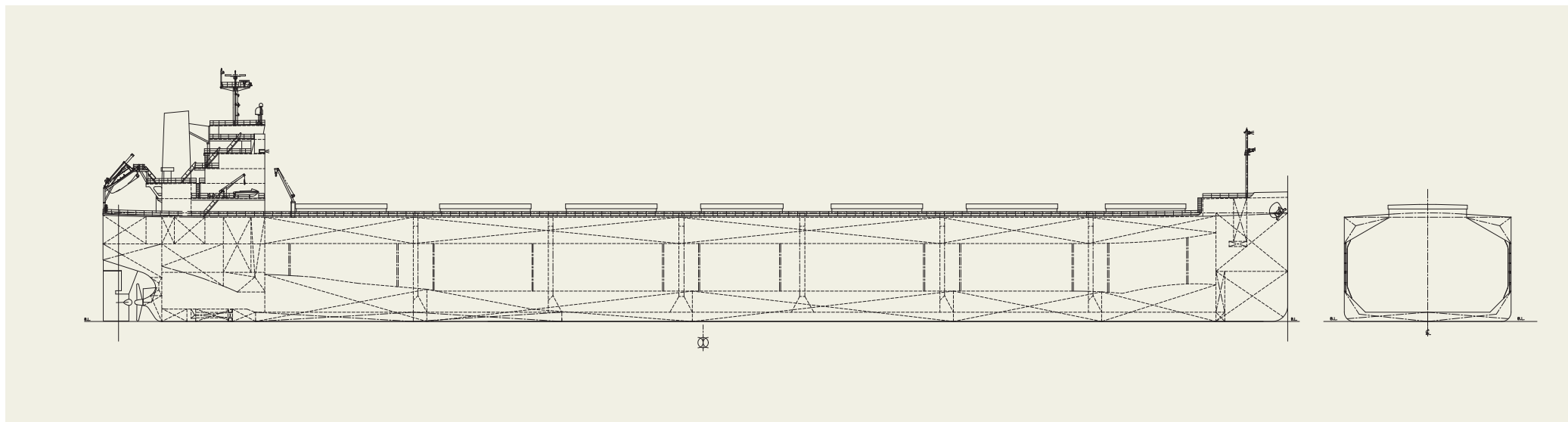
The 81,957 dwt bulk carrier NORA SCHULTE was built at SHIN KURUSHIMA SANOYAS SHIPBUILDING CO., LTD. and delivered to a Singaporean Owner in June 2023.

**Features**

1. The vessel has Seven (7) cargo holds.
2. The upper deck hatch covers are side rolling type and operated by hydraulic motors and chains.
3. The patented energy saving devices such as SANOYAS developed "STF" (Sanoyas-Tandem-Fin), ACE DUCT (Sanoyas Advanced flow Controlling and Energy saving DUCT) and advanced rudder bulb/fin construction are applied.

**PRINCIPAL PARTICULARS**

Length (o.a.).....	229.00 m	MCR (kw x min <sup>-1</sup> ).....	7,660 kW x 79.0 min <sup>-1</sup>
Breadth (mld.).....	32.24 m	NOR (kw x min <sup>-1</sup> ).....	6,450 kW x about 74.6 min <sup>-1</sup>
Depth (mld.).....	20.15 m	Speed (service).....	14.1 knots
Draft (mld.).....	14.57 m	Complement.....	25P
Gross tonnage.....	43,442	Classification.....	NK
Deadweight.....	81,957 MT	Loading capacity (grain).....	97,034m <sup>3</sup>
Main engine.....	DIESEL UNITED-WIN GD 6X52	Builder:.....	Shin Kurushima Sanoyas Shipbuilding Co., Ltd.



# PERSISTENCE DIVA 88,100 DWT WIDE KAMSARMAX 38

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**PERSISTENCE DIVA** 88,100 DWT WIDE KAMSARMAX 38[Contents](#)[By Builder](#)[By Ship Type](#)

A new, larger ship that inherits the KAMSARMAX brand. The debut of KAMSARMAX has caused the wave of larger Panamax bulk carriers. Inheriting its brand-name, this next-generation WIDE KAMSARMAX has bigger cargo loading capacity by about 6,000 MT with further improved fuel efficiency.

**Features**

1. Fuel efficiency and environmental performance
  - The unique hull form, which reduces resistance, is paired with our exclusive fuel-efficiency technologies to improve the ship's performance.
  - Equipped with the environmental technologies devices to prevent the air pollution from the NOx and SOx emissions and marine pollution from the oil spillages, etc.
2. Versatility
  - Keeping the length of 229m makes the ship possible to

enter the Kamsar Port in the Republic of Guinea as well as about 90% of the ports that the KAMSARMAXs built by TSUNEISHI SHIPBUILDING have called at.

- Enable to carry the three major bulk cargos of iron ore, grains, coal, while alternate loading is possible for high-density cargo, such as iron ore.
  - Air draft was maintained at the same level as KAMSARMAX.
3. Loading performance

- The increase of 6,000 MT loading capacity has achieved by the wider beam and shallower draft, compared with the KAMSARMAX.

- Cargo capacity has increased by 5,300m<sup>3</sup> with bigger loading volumes of low-density cargo, such as grains.

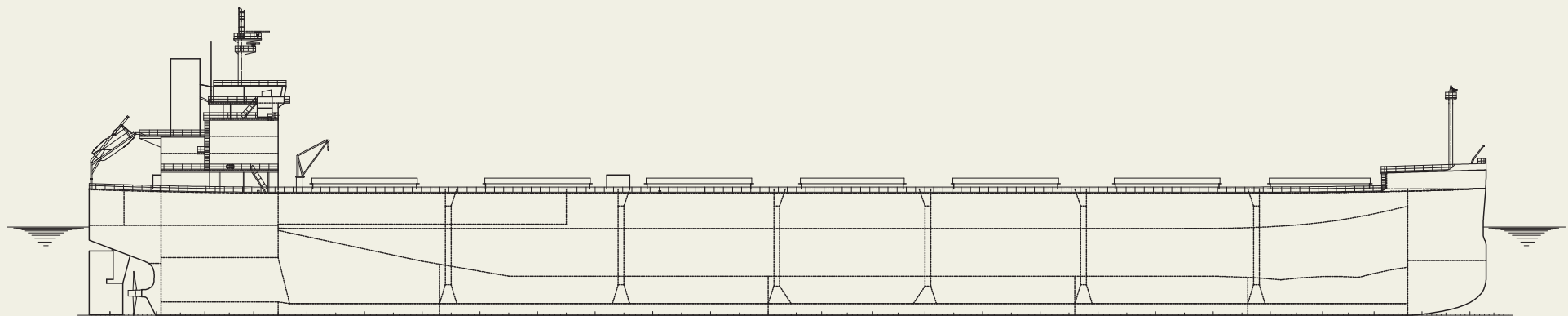
## 4. Comfortability

The original interior concept NEXT STYLE, utilizing exquisite design and indirect lighting, provides the crew with relaxation and comfort.

**PRINCIPAL PARTICULARS**

Length (o.a.) .....	229 m
Depth (mld.) .....	20 m
Draft (mld.) .....	14.45 m

Gross tonnage .....	47,400
Deadweight .....	88,100 mt
Loading capacity (grain) .....	103,300 m <sup>3</sup>
Builder: .....	Tsuneishi Shipbuilding Co., Ltd.



# DEFENDER 82,400 DWT KAMSARMAX 39

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**DEFENDER** 82,400 DWT KAMSARMAX 39

KAMSARMAX, an established world standard In response to needs for a larger-size Panamax bulk carrier, the KAMSARMAX, an innovative design with the maximum size in the category that can enter Kamsar Port in the Republic of Guinea, was developed. This ship model is favored for its optimal solutions of fuel efficiency, versatility, and cargo capacity. With over 380 ships being built, it holds the No.1 market share in the category.

**Features**

1. Fuel efficiency and environmental performance
  - Comply with EEDI Phase 3 regulations.
  - The unique hull form, which reduces resistance, is paired with our exclusive fuel-efficiency technologies to improve the ship's performance. A further improvement of about 31% reduction on the fuel consumption per ton-mile has been achieved successfully when comparing to the first KAMSARMAX delivered in 2005.

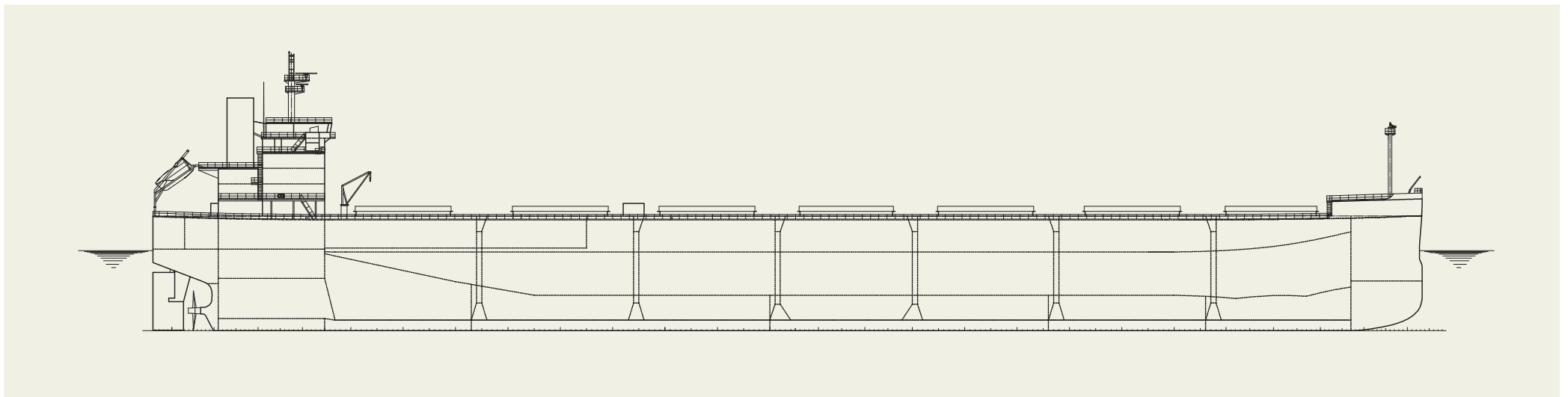
- Equipped with the environmental technologies devices to prevent the air pollution from the NOx and SOx emissions and marine pollution from the oil spillages, etc.
2. Versatility
    - Length of 229 meters, which allows entry to Kamsar Port in the Republic of Guinea.
    - Designed with shallow draft and minimal air draft for versatility to accommodate the majority of major ports.
    - Excellent trading flexibility for carrying the three major bulk cargoes of iron ore, grains, and coal, as well as hot

- coils.
3. Loading performance
    - Achieve a deadweight of over 82,000 MT with the shallowest draft in its category.
    - With a cargo capacity of 98,000m<sup>3</sup>, it can carry large volumes of low-density cargo, such as grains.
  4. Comfortability
 

The original interior concept NEXT STYLE, utilizing exquisite design and indirect lighting, provides the crew with relaxation and comfort.

**PRINCIPAL PARTICULARS**

Length (o.a.) .....	229 m	Gross tonnage.....	44,000
Length (b.p.).....	32.26 m	Deadweight.....	82,400 mt
Depth (mld.).....	20.15 m	Loading capacity (grain).....	98,000 m <sup>3</sup>
Draft (mld.).....	14.55 m	Builder: .....	Tsunishi Shipbuilding Co., Ltd.





# PORT KYOTO 64,000 DWT Bulk Carrier 40

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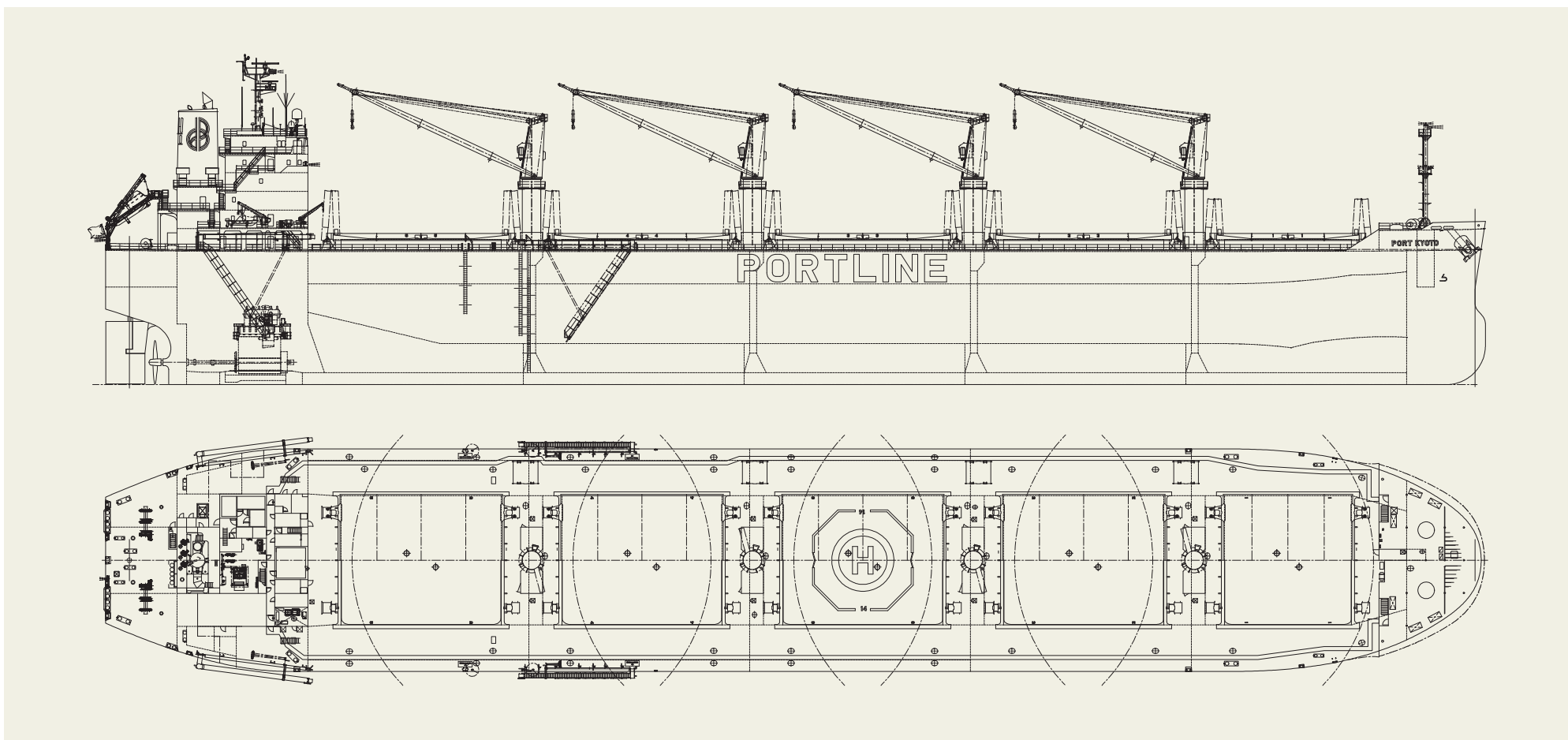


**PORT KYOTO** 64,000 DWT Bulk Carrier 40

Contents

By Builder

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**PRINCIPAL PARTICULARS**

Breadth (mld.).....	32.24 m	Deadweight.....	63,733
Depth (mld.).....	19.3 m	MCR (kw x rpm) .....	6,670 x 95
Gross tonnage.....	36,177	Speed (service).....	14 knots
		Builder: .....	Shin Kasado Dockyard Co., Ltd.

# NORD AEGEAN 64,000 DWT Bulk Carrier 41

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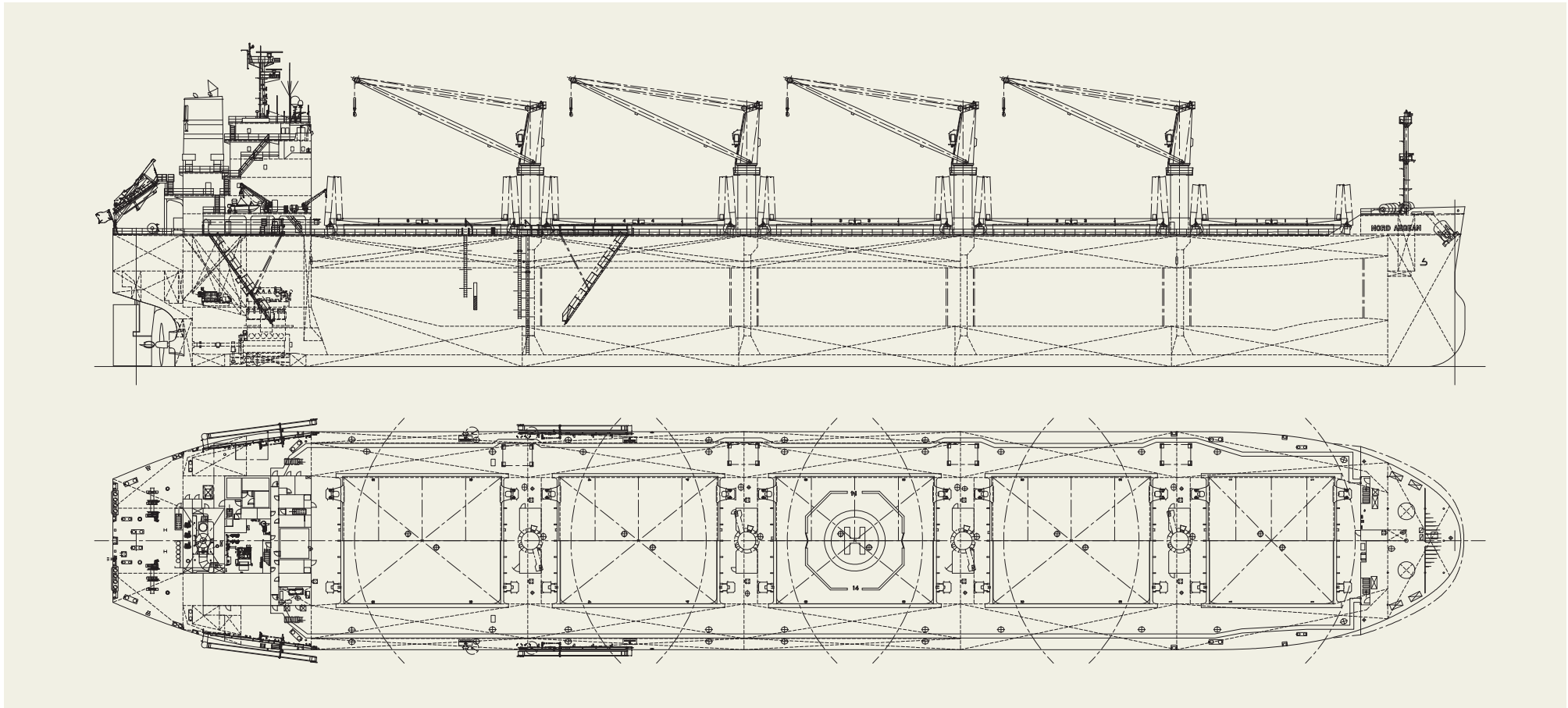


**NORD AEGEAN** 64,000 DWT Bulk Carrier 41

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**PRINCIPAL PARTICULARS**

Breadth (mld.).....	32.24 m	MCR (kw x rpm) .....	7,560 x 99.0
Depth (mld.).....	19.3 m	Speed (service).....	14.5 knots
Gross tonnage.....	36,177	Classification .....	NK
Deadweight.....	63,702	Builder: .....	Minaminippon Shipbuilding Co., Ltd.

# RICH AZURE 64,452 DWT Bulk Carrier 42

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**RICH AZURE** 64,452 DWT Bulk Carrier 42

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By Ship Type

Oshima Shipbuilding Co., Ltd. delivered RICH AZURE, a 64,452-DWT bulk carrier, to Inter Mers Shipping Pte. Ltd. in February 2023.

**Features**

1. This vessel has an optimized hull form for carrying grain, ore, coal, hot coil, cement and steel ingot /slabs/ billet, and large deadweight (64,452MT) with shallow draft (13.518 m).
2. Wide opening folding type hatch cover and four sets of high performance Jib cranes (30MT) are installed for efficient cargo handling.

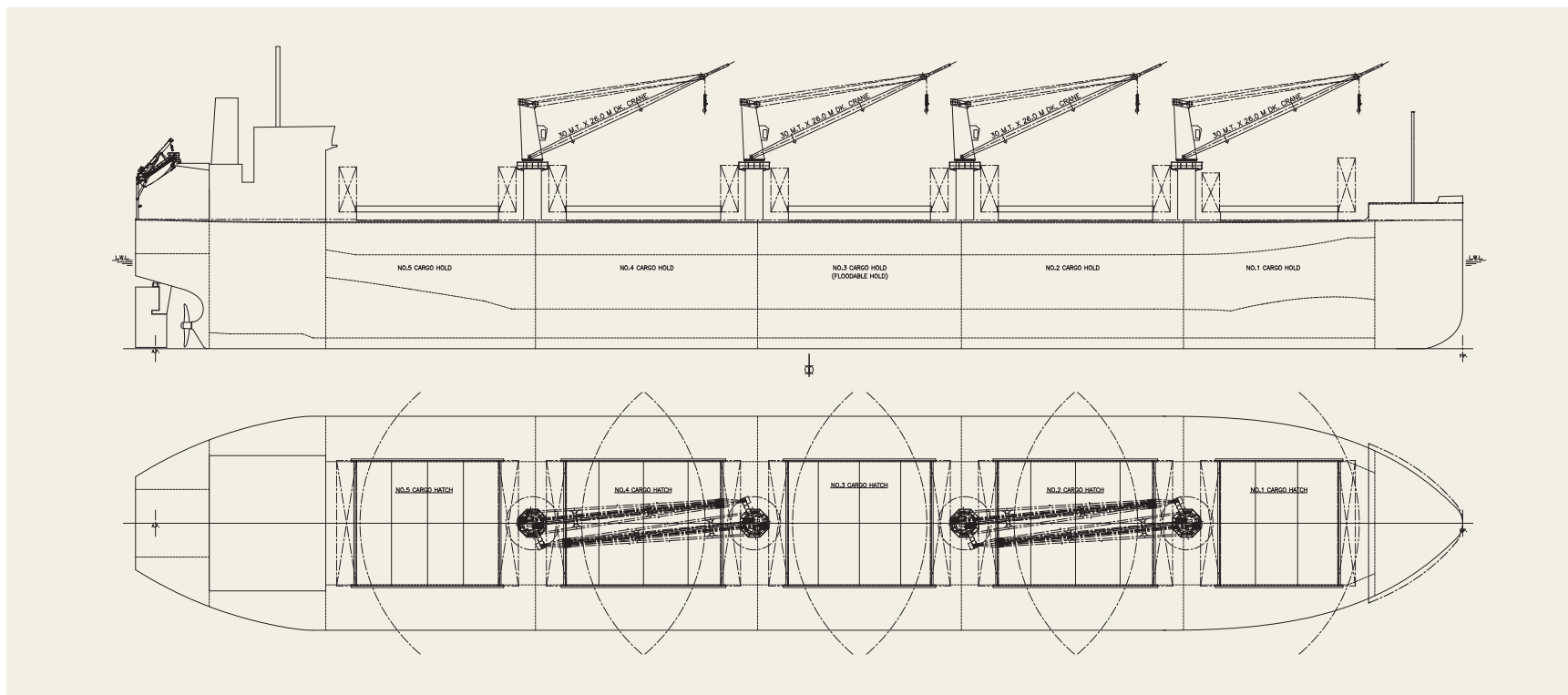
**PRINCIPAL PARTICULARS**

Length (o.a.).....	199.95 m
Breadth (mld.).....	32.26 m
Depth (mld.).....	19.28 m
Draft (mld.).....	13.518 m
Gross tonnage.....	36128
Deadweight.....	64,452 MT

Main engine.....	MITSUI MAN B&W 6S50ME-C9.7-EGRBP
MCR (kw x rpm).....	7,080 kW x 91.0 rpm
Speed (service).....	14.50 knots
Complement.....	25
Classification.....	NK
Loading capacity (grain).....	81,204 m <sup>3</sup>
Builder.....	Oshima Shipbuilding Co., Ltd.

3. Advanced Flipper Fins & Rudder Fin which improve propulsion efficiency are installed.

4. Special bow form, Seaworthy Bow improves speed performance in rough sea conditions as compared to ordinary bows.



# PEARL ETERNITY 63,810 DWT Bulk Carrier 43

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**PEARL ETERNITY** 63,810 DWT Bulk Carrier 43

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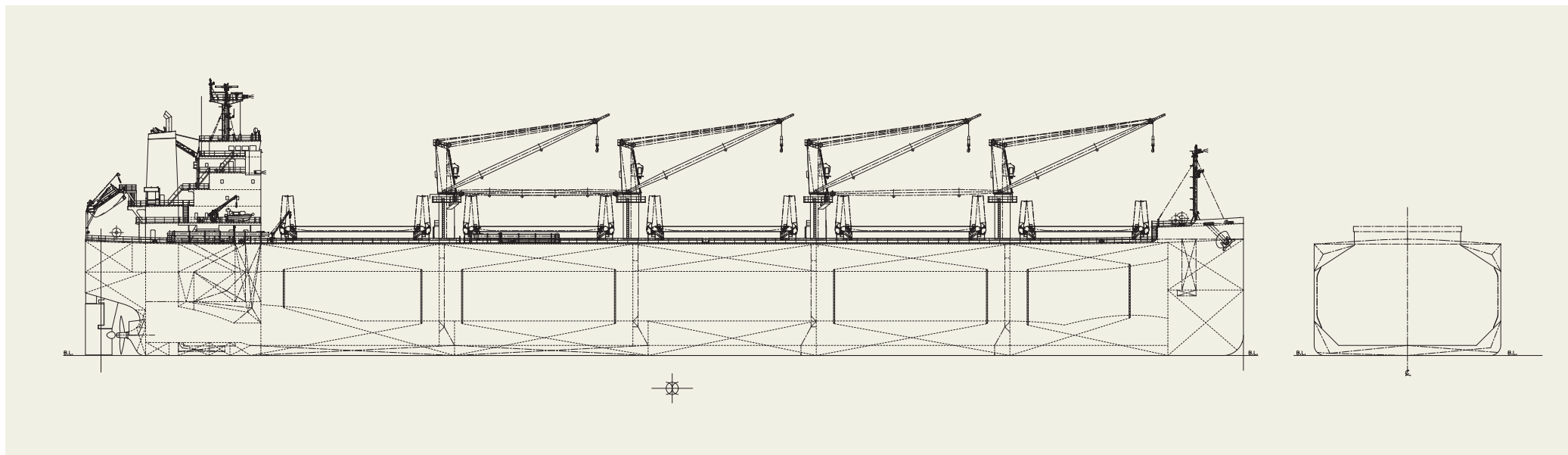
The 63,810-dwt bulk carrier PEARL ETERNITY was built at SHIN KURUSHIMA TOYOHASHI SHIPBUILDING CO., LTD. and delivered to BASIC ETENITY LINE S.A. and GENYO KAIUN CO., LTD. in December 2022.

**Features**

1. The vessel has five (5) cargo holds.
2. The upper deck hatch covers are folding type and operated by hydraulic cylinders.
3. The vessel has four (4) sets of 31-ton electro-hydraulic type single deck cranes.

**PRINCIPAL PARTICULARS**

Length (o.a.).....	199.99 m	MCR (kw x min <sup>-1</sup> ).....	6,650 kW x 88.8 min <sup>-1</sup>
Length (b.p.).....	197.30 m	NOR (kw x min <sup>-1</sup> ).....	5,650 kW x about 84.1 min <sup>-1</sup>
Breadth (mld.).....	32.24 m	Speed (service).....	14.1 knots
Depth (mld.).....	19.22 m	Complement.....	24 P
Draft (mld.).....	13.495 m	Classification.....	NK
Gross tonnage.....	36,298	Loading capacity (grain).....	81,490 m <sup>3</sup>
Deadweight.....	63,810 t	(bale).....	78,238 m <sup>3</sup>
Main engine.....	MITSUI-MAN B&W 6S50ME-C9.7-EGRBP	Builder:.....	Shin Kurushima Toyohashi Shipbuilding Co., Ltd.





# ACRUX ORCHID 63,300 DWT TESS64 AEROLINE 44

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# ACRUX ORCHID 63,300 DWT TESS64 AEROLINE 44

Contents By Builder By Ship Type

## The Birth of the ultimate Eco-ship

This ultimate Eco-ship design is the enlargement of the deadweight capacity and extension of the well-known TESS58 design which already has the track record of over 180 ships built. The distinctive bow and accommodation house are designed with our exclusive and unique technology, called AEROLINE to reduce the wind resistance.

### Features

#### 1. Fuel efficiency and environmental performance

- Comply with EEDI Phase 3 regulations.
- The unique hull form, which reduces resistance, is paired with our exclusive fuel-efficiency technologies to improve the ship's performance. This has improved fuel consumption per ton-mile by approximately 29%, compared to TESS58.
- Equipped with the environmental technologies devices to prevent the air pollution from the NOx and SOx emissions and marine pollution from the oil spillages, etc.

- The unique and exclusive AEROLINE technology for the reduction of wind resistance is applied to the bow and accommodation house to improve the fuel efficiency at actual sea performance.
- #### 2. Versatility
- Length extended to 200m while maintaining the breadth to pass through the Panama Canal.
  - Keeping the low air draft and the depth 18.6m to ensure the ship's versatility.
  - Excellent trading flexibility for carrying the three major bulk cargoes of iron ore, grains, and coal, as well as hot

coils.

#### 3. Loading performance

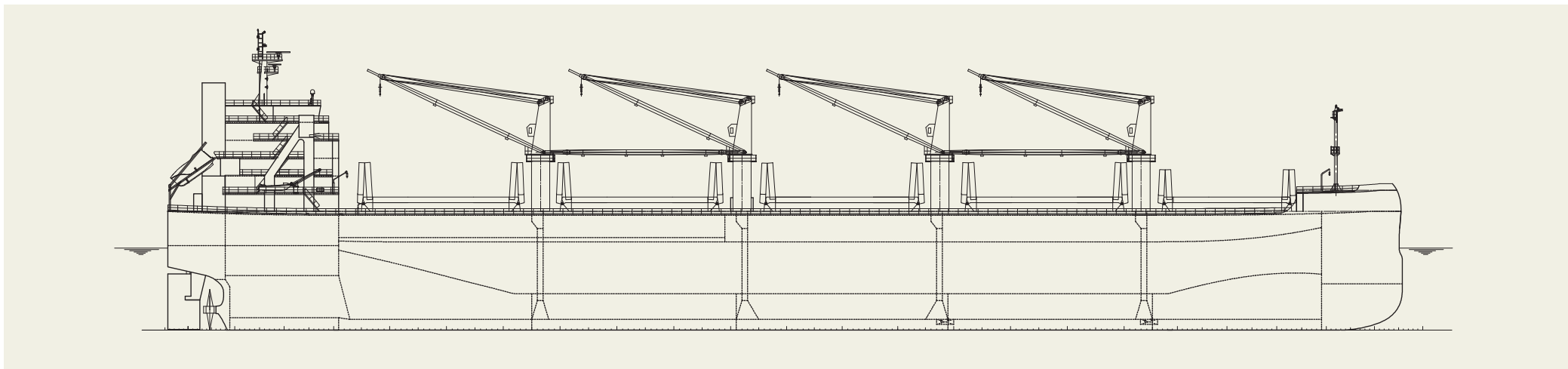
- Achieve a deadweight of over 63,000 MT with the shallowest draft in its category.
- With a cargo capacity of 79,000m<sup>3</sup>, it is capable of transporting large volumes of low-density cargo, such as grains, etc.

#### 4. Comfortability

The original interior concept NEXT STYLE, utilizing exquisite design and indirect lighting, provides the crew with relaxation and comfort.

### PRINCIPAL PARTICULARS

Length (o.a.) .....	200 m	Gross tonnage.....	36,000
Length (b.p.).....	32.26 m	Deadweight.....	63,300 mt
Depth (mld.).....	18.6 m	Loading capacity (grain).....	79,000 m <sup>3</sup>
Draft (mld.).....	13.3 m	Builder: .....	Tsuneishi Shipbuilding Co., Ltd.



# MARIMYR A 66,200 DWT TESS66 AEROLINE 45

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**MARIMYR A** 66,200 DWT TESS66 AEROLINE 45

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The largest class Eco-ship in Ultramax category  
The distinctive bow and accommodation house are designed with our exclusive and unique technology, called AEROLINE to reduce the wind resistance by approximately 20%. The largest class Eco-ship of the category, achieve a deadweight 66,200 MT with Panamax-sized breadth. Our new Ultramax tops its category with the design features: enhanced cargo capacity, fuel efficiency & environmental performance, and versatility.

**Features**

1. Fuel efficiency and environmental performance
  - Comply with EEDI Phase 3 regulations.
  - The unique and exclusive AEROLINE technology for the reduction of wind resistance is applied to the bow and accommodation house to improve the fuel efficiency at actual sea performance.
  - Equipped with the environmental technology devices to prevent the air pollution from the NOx and SOx emis-

sions and marine pollution from the oil spillages, etc.

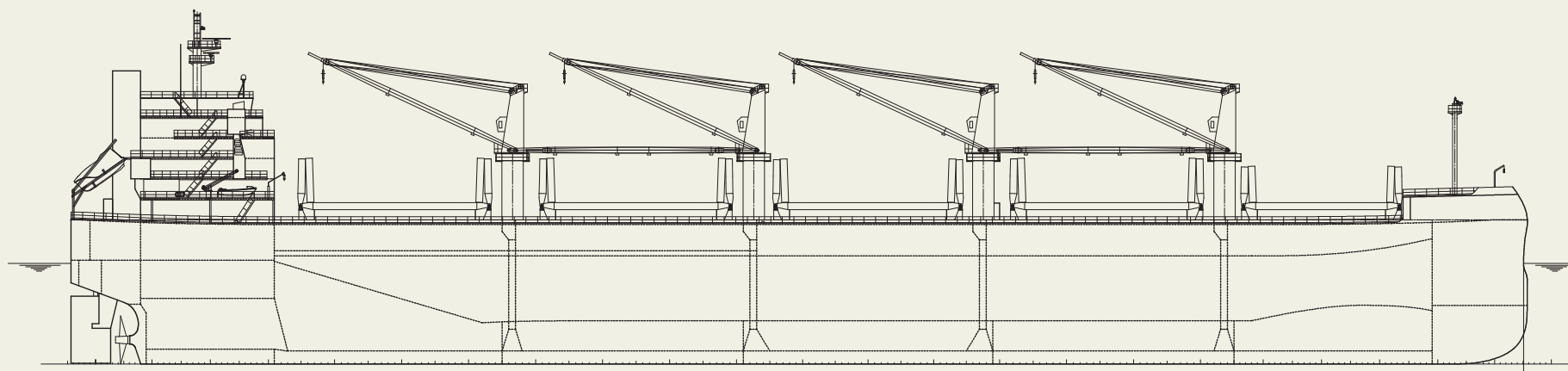
- The improved hull design allows for better fuel efficiency during both shallow and full draft operations.
2. Versatility
    - Versatility retained with the same length as TESS64, the breadth to pass through the Panama Canal.
    - The depth of 19.15m, and a suppressed air draft all lend to the operational flexibility.
    - Excellent trading flexibility for carrying the three major bulk cargoes of iron ore, grains, and coal, as well as hot coils.
  3. Loading performance

- The largest class deadweight capacity of Ultramax category, beyond 66,000 MT.
  - With hull design improvements and vessel weight reduction, loading capability has been enhanced.
  - Cargo capacity is 81,500m<sup>3</sup>, the largest in the Ultramax category.
4. Comfortability
 

The original interior concept NEXT STYLE, utilizing exquisite design and indirect lighting, provides the crew with relaxation and comfort. sions and marine pollution from the oil spillages, etc.

**PRINCIPAL PARTICULARS**

Length (o.a.) .....	200 m	Gross tonnage.....	36,900
Length (b.p.).....	32.25 m	Deadweight.....	66,200 mt
Depth (mld.).....	19.15 m	Loading capacity (grain).....	81,500 m <sup>3</sup>
Draft (mld.).....	13.8 m	Builder: .....	Tsuneishi Shipbuilding Co., Ltd.



# BUNUN UNICORN 40,045 DWT Bulk Carrier 46

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The Hakodate Dock Co., Ltd. delivered the 40,000 DWT type log / bulk carrier, BUNUN UNICORN, built at its Hakodate Shipyard on 8th June, 2023. The vessel is one of a series of HIGH BULK 40E jointly developed with Namura Shipbuilding Co., Ltd.

This design adopts all advantages of the previous generation of the HIGH BULK 34E series, with the concept of more

competitiveness in maximizing the volume of cargo capacity for grains, coals, steels, logs, etc. and more eco-friendly operation by reducing fuel consumption with optimized hull form and energy-saving devices.

Various measures for energy and fuel saving efficiency are incorporated in addition to the hull form such as the newly developed vertical shaped bow and three energy saving

devices, the Namura flow Control Fin (NCF), the Rudder Fin (R-Fin) and the additional fins behind NCF attached to the stern, which improve propulsion performance and fuel saving efficiency. Therefore, this vessel has achieved EEDI (Energy Efficiency Design Index) Phase 3.

Semi-box shaped cargo holds with larger cargo hatch covers are adopted for serviceable and safer operations in cargo handling work. Double hull construction is adopted for security against unexpected occurrences such as collision damage and cargo leakage. Four deck cranes on the upper deck in the centre line and the collapsible-type stanchion on the upper deck are equipped for loading logs.

## PRINCIPAL PARTICULARS

Length (o.a.) .....	182.94 m
Length (b.p.) .....	179.90 m
Breadth (mld.) .....	31.60 m
Depth (mld.) .....	14.80 m
Draft (mld.) .....	9.30 / 10.37 m
Gross tonnage .....	24,472
Deadweight .....	40,045 t
Main engine .....	J-ENG 6UEC42LSH-Eco-D3-EGR
MCR (kw x rpm) .....	5,050 kW x 101.0 rpm
NOR (kw x rpm) .....	4,290 kW x 95.7 rpm
Speed (max. trial) .....	14.93 knots
(service) .....	13.6 knots
Complement .....	24
Classification .....	NK
Handling gear .....	30.5 t x 26 m/R (Nos.1~4)
Loading capacity (grain) .....	50,517.50 cub.m
(bale) .....	49,153.38 cub.m
(Log) .....	7,282,165 S.C.R.
Builder .....	The Hakodate Dock Co., Ltd.

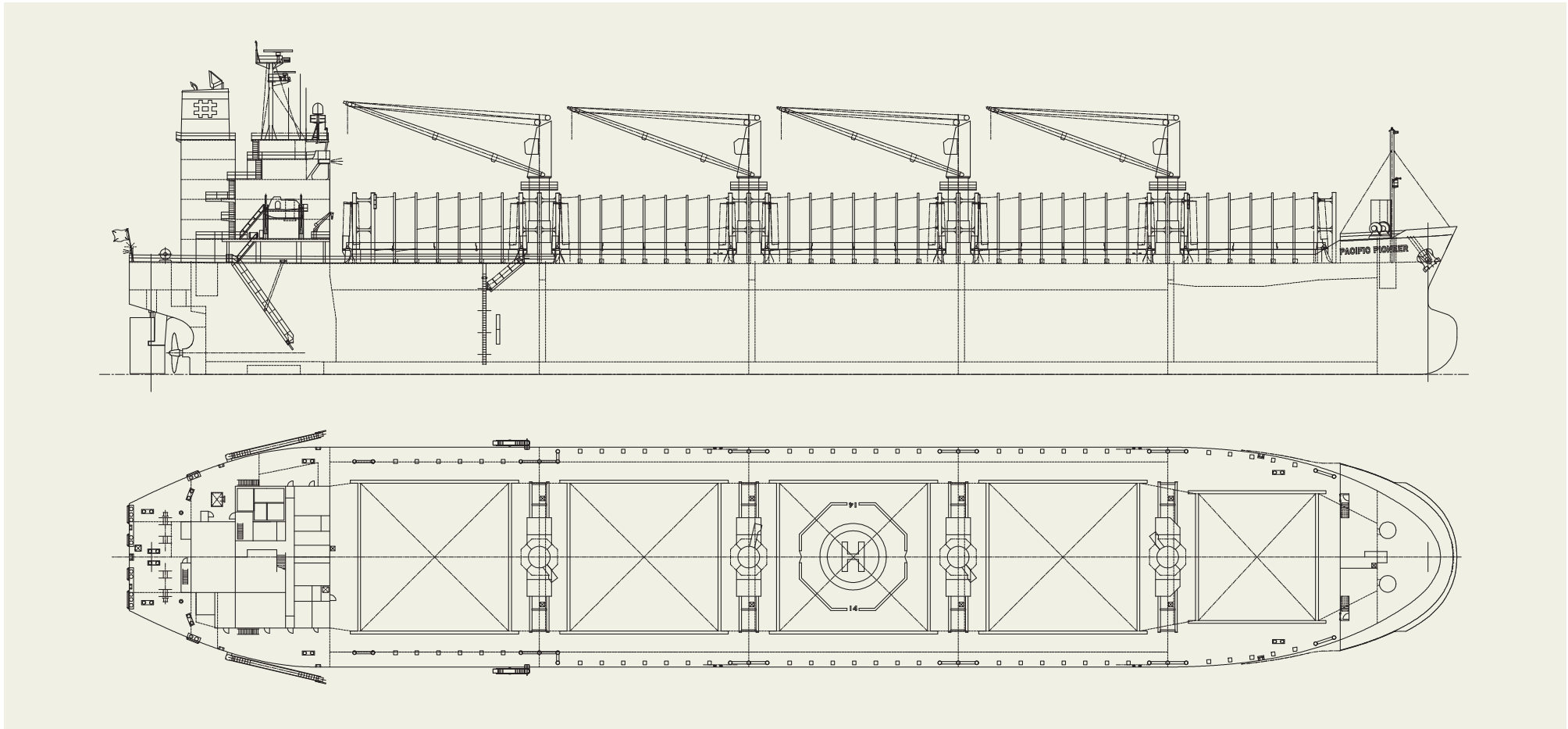
# PACIFIC PIONEER 38,000 DWT Bulk Carrier 47

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**PACIFIC PIONEER** 38,000 DWT Bulk Carrier 47[Contents](#)[By Builder](#)[By Ship Type](#)**PRINCIPAL PARTICULARS**

Depth (mld.).....	29.8 m	MCR (kw × rpm).....	5,920 x 106
Gross tonnage.....	23,579	Speed (service).....	14.25 knots
Deadweight.....	37,534	Classification.....	NK
		Builder: .....	Shimanami Shipyard Co., Ltd.

# LAKE GRASSMERE 40,000 DWT Bulk Carrier 48

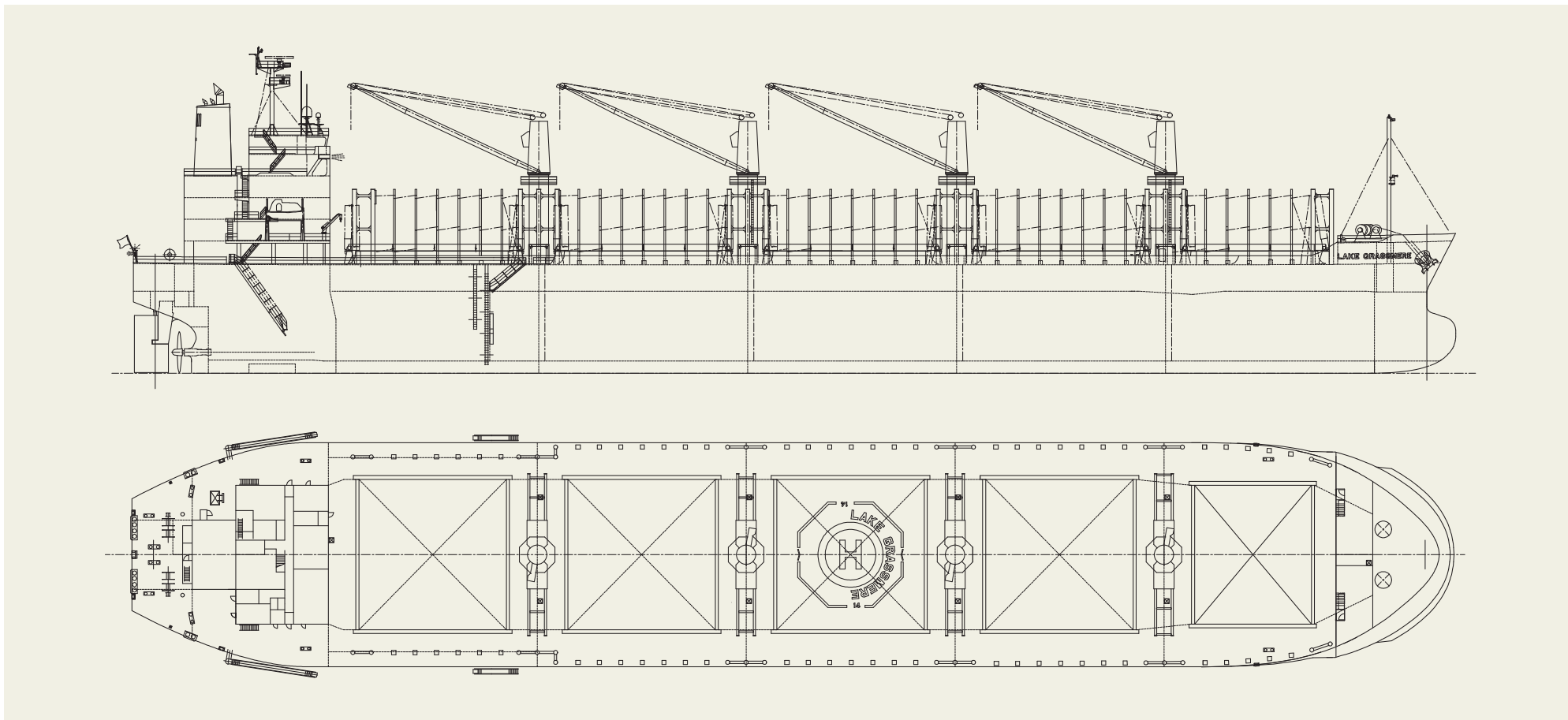
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**LAKE GRASSMERE** 40,000 DWT Bulk Carrier 48[Contents](#)[By Builder](#)[By Ship Type](#)**PRINCIPAL PARTICULARS**

Breadth (mld.).....	31 m	MCR (kw x rpm) .....	5,150 x 103
Depth (mld.).....	15 m	Speed (service).....	14 knots
Gross tonnage.....	25,006	Classification .....	NK
Deadweight.....	40,177	Builder.....	Imabari Shipbuilding Co., Ltd.

# BOHOL ISLAND 39,260 DWT Bulk Carrier 49

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# BOHOL ISLAND 39,260 DWT Bulk Carrier 49

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Oshima Shipbuilding Co., Ltd. delivered BOHOL ISLAND, a 39,260-DWT bulk carrier, to LEYTE NAVIGATION, S.A. in April 2022.

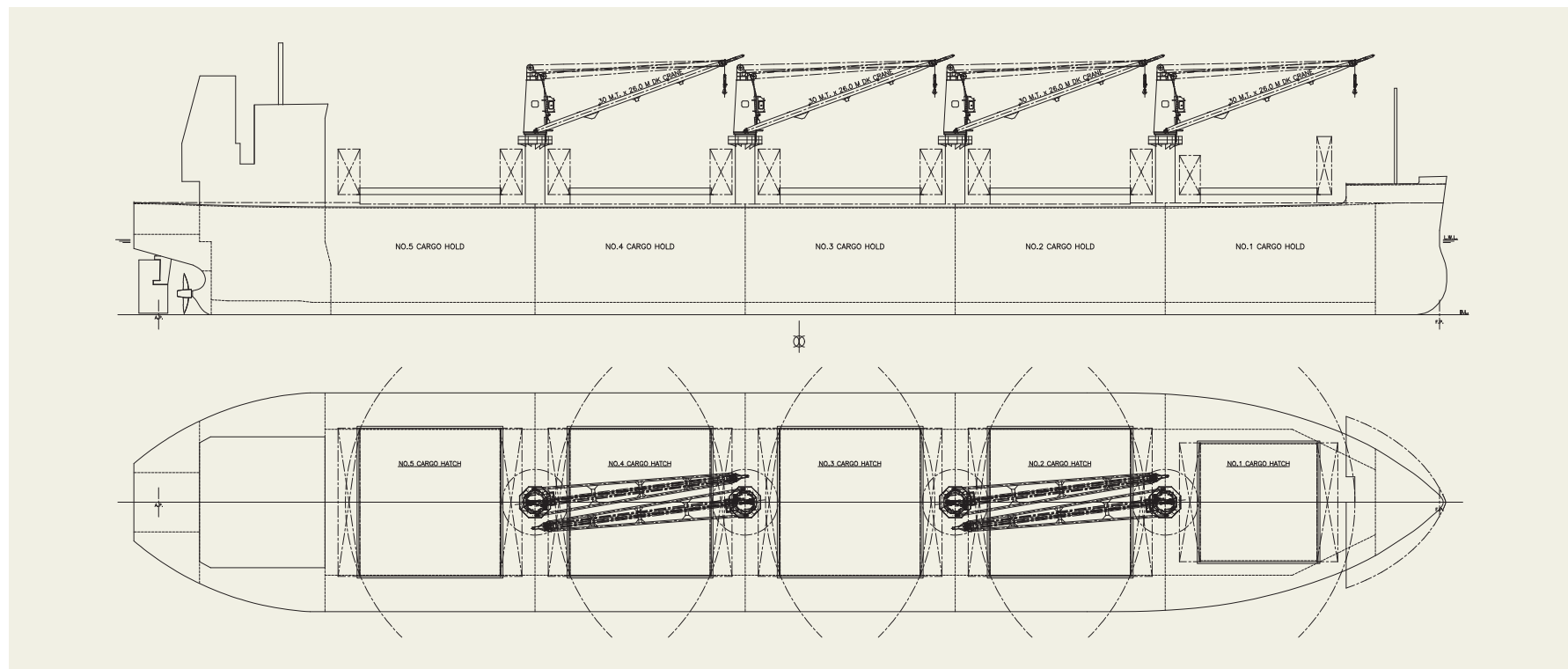
## Features

1. For unitized cargo and easy cargo handling, this vessel has box shaped cargo holds.
2. Wide hatch cover improves cargo handling efficiency.
3. Advanced Flipper Fins & Rudder Fin which improve propulsion efficiency are installed.
4. Special bow form, Seaworthy Bow improves speed performance in rough sea conditions as compared to ordinary bows.
5. Dangerous cargoes also can be loaded in cargo hold.

## PRINCIPAL PARTICULARS

Length (o.a.).....	179.99 m
Breadth (mld.).....	30.00 m
Depth (mld.).....	15.33 m
Draft (mld.).....	10.826 m
Gross tonnage.....	23602
Deadweight.....	39,260 MT

Main engine .....	J-ENG 6UEC42LSH-Eco-D3-EGR
MCR (kw x rpm) .....	5,400 kW x 106.0rpm
Speed (service).....	14.00 knots
Complement.....	25
Classification .....	NK
Loading capacity (grain).....	49,237 m <sup>3</sup>
Builder.....	Oshima Shipbuilding Co., Ltd.



# FEDERAL PASSION 42,692 DWT Bulk Carrier 50

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# FEDERAL PASSION 42,692 DWT Bulk Carrier 50

Contents By Builder By Ship Type

Oshima Shipbuilding Co., Ltd. delivered FEDERAL PASSION, a 42,692-DWT bulk carrier, to MK CENTENNIAL MARITIME B.V. in June 2022.

## Features

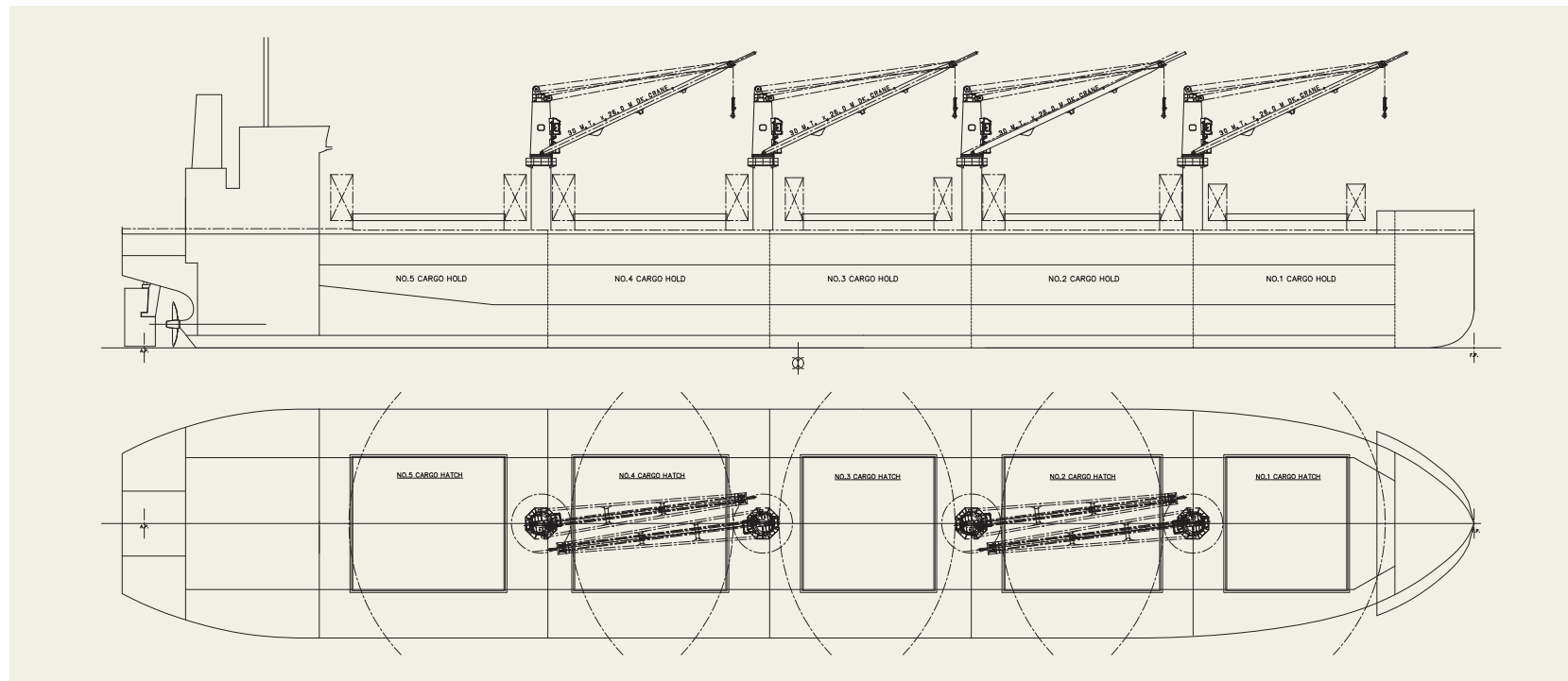
1. This vessel has an optimized hull form for carrying a variety of cargoes, such as grain, ore, cement, hot coil, nickel ore, coal and dangerous cargoes and large deadweight(42,692MT) with shallow draft (10.516m)
2. This vessel has a lot of cargo to be targeted and accommodates various loading patterns.
3. Wide opening folding type hatch cover and four sets of high performance Jib cranes (30MT) are installed for

## PRINCIPAL PARTICULARS

LLength (o.a.).....	182.998 m
Breadth (mld.).....	32.26 m
Depth (mld.).....	15.00 m
Draft (mld.).....	10.516 m
Gross tonnage.....	25831
Deadweight.....	42,692 MT

Main engine .....	MITSUI MAN B&W 5S50ME-C9.7-EGRBP
MCR (kw x rpm) .....	5,720 kW x 100.0 rpm
Speed (service).....	14.00 knots
Complement.....	25
Classification .....	NK
Loading capacity (grain).....	55,131 m <sup>3</sup>
Builder.....	Oshima Shipbuilding Co., Ltd.

4. Advanced Flipper Fins & Rudder Fin which improve propulsion efficiency are installed.
5. Special bow form, Seaworthy Bow improves speed performance in rough sea conditions as compared to ordinary bows.



# LILY GLORY 58,351 DWT Bulk Carrier 51

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# LILY GLORY 58,351 DWT Bulk Carrier 51

Contents By Builder By Ship Type

Oshima Shipbuilding Co., Ltd. delivered LILY GLORY, a 58,351-DWT bulk carrier, to LEEWARD NAVIGATION, S.A. in January 2023.

## Features

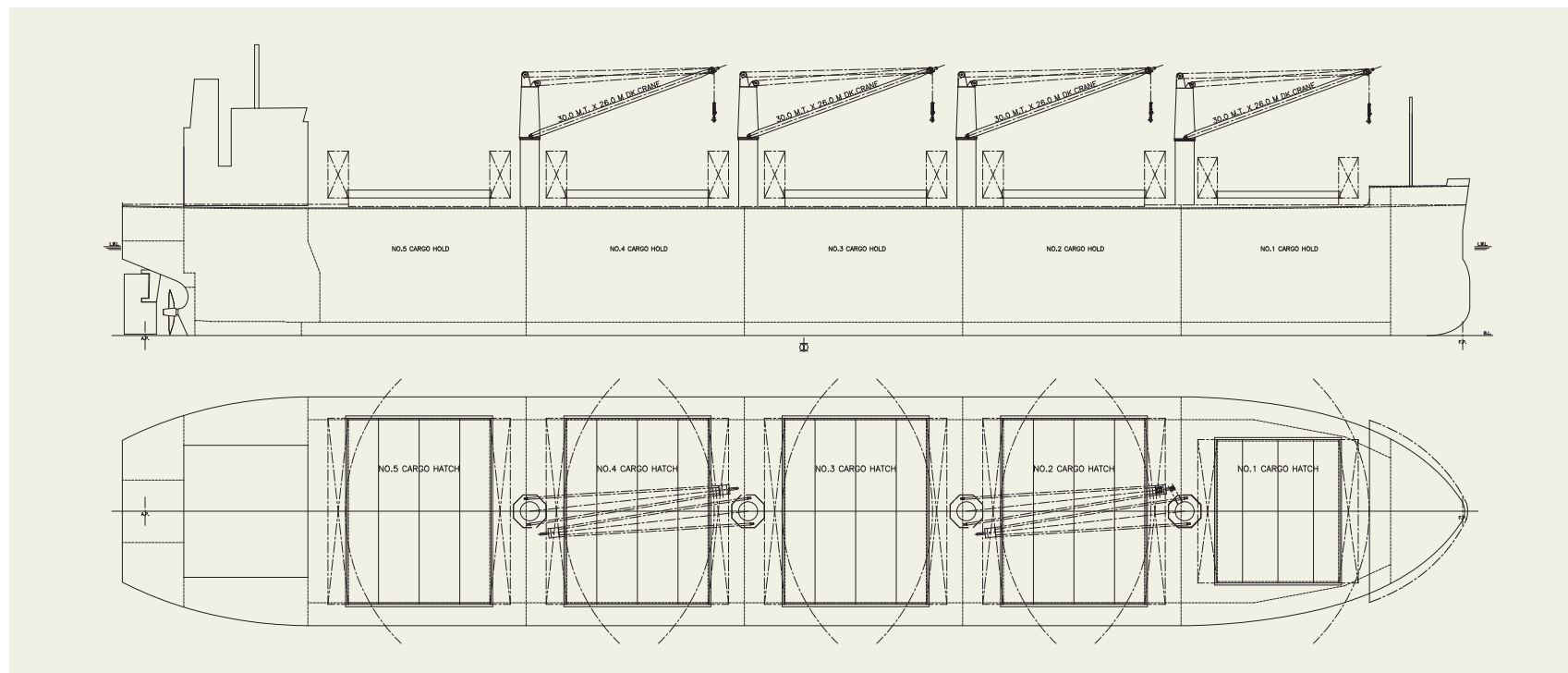
1. This vessel has an optimized hull form for carrying grain, ore, coal, hot coil, steel pipe, cement and dangerous cargoes, and large deadweight (58,351 MT) with shallow draft (13.048 m).
2. Due to wide opening folding type hatch cover and without top side tank, it is possible to prevent the cargo from being damaged due to handling by loading directly with crane.

## PRINCIPAL PARTICULARS

Length (o.a.)	189.99 m
Breadth (mld.)	32.26 m
Depth (mld.)	18.54 m
Draft (mld.)	13.048 m
Gross tonnage	33110
Deadweight	58,351 MT

Main engine	J-ENG 6UEC50LSH-Eco-C3-EGR
MCR (kw x rpm)	6,560 kW x 95.0 rpm
Speed (service)	14.30 knots
Complement	24
Classification	NK
Loading capacity (grain)	66,937 m <sup>3</sup>
Builder	Oshima Shipbuilding Co., Ltd.

3. Advanced Flipper Fins & Rudder Fin which improve propulsion efficiency are installed. performance in rough sea conditions as compared to ordinary bows.
4. Special bow form, Seaworthy Bow improves speed



# FEDERAL HAMILTON 34,763 DWT Bulk Carrier 52

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# FEDERAL HAMILTON 34,763 DWT Bulk Carrier 52

Contents By Builder By Ship Type

Oshima Shipbuilding Co., Ltd. delivered FEDERAL HAMILTON, a 34,763-DWT bulk carrier, to FEDERAL TRIDENT LTD., in August 2023.

## Features

1. The vessel is an ICE – 1C class Laker
2. This vessel has been designed with a large deadweight and shallow draft
3. For unitized cargo and easy cargo handling, this vessel has box shaped cargo hold.
4. Four sets of high performance jib cranes (35MT) are installed for efficient cargo handling.
5. Bow thruster and High-lift rudder of mariner type (with

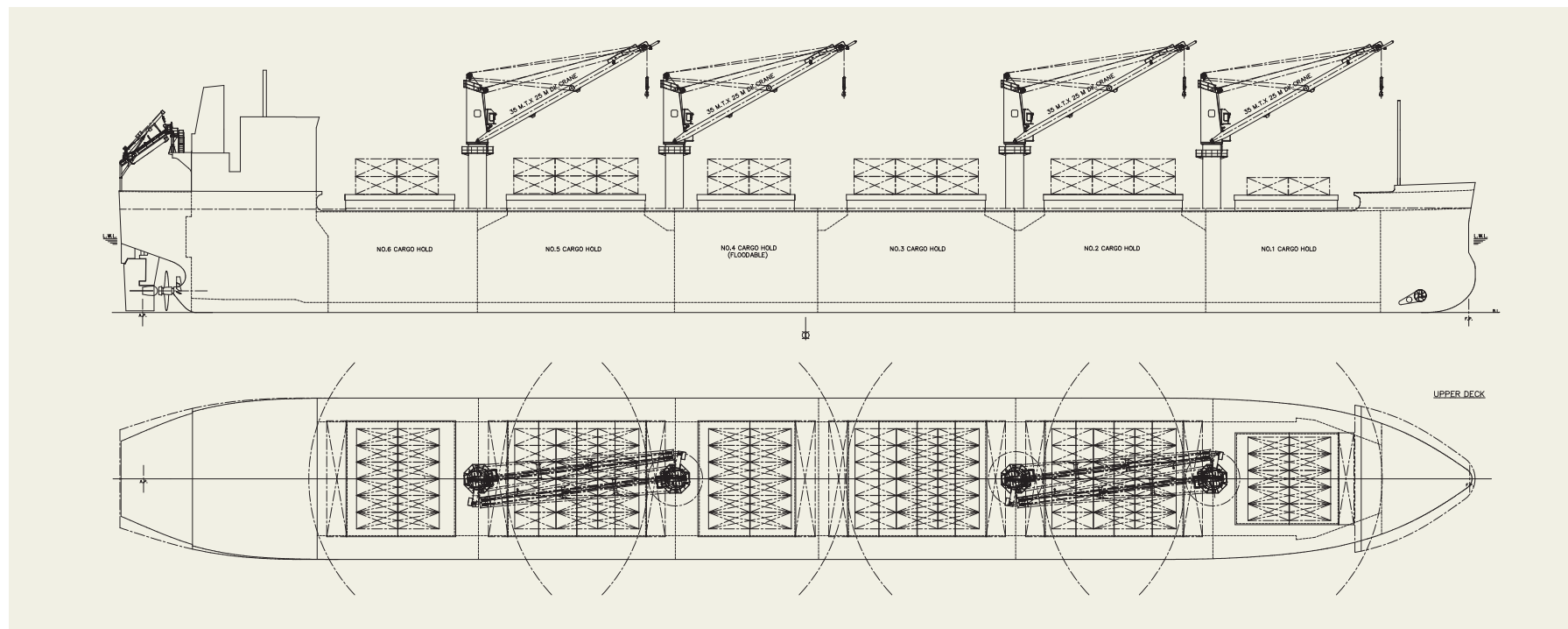
## PRINCIPAL PARTICULARS

Length (o.a.).....	199.98 m
Breadth (mld.).....	23.762 m
Depth (mld.).....	14.85 m
Draft (mld.).....	10.861 m
Gross tonnage.....	21043
Deadweight.....	34,763 MT

Main engine.....	MITSUI-MAN B&W 5S50ME-C9.7-HPSCR
MCR (kw x rpm).....	6,050 kW x 97.0 rpm
Speed (service).....	14.15 knots
Complement.....	25
Classification.....	DNV
Loading capacity (grain).....	41,607 m <sup>3</sup>
Builder.....	Oshima Shipbuilding Co., Ltd.

6. Special bow form Seaworthy Bow improves speed per-

formance in rough sea conditions compared ordinary bows.



# NORVIC SINGAPORE 39,738 MT Bulk Carrier 53

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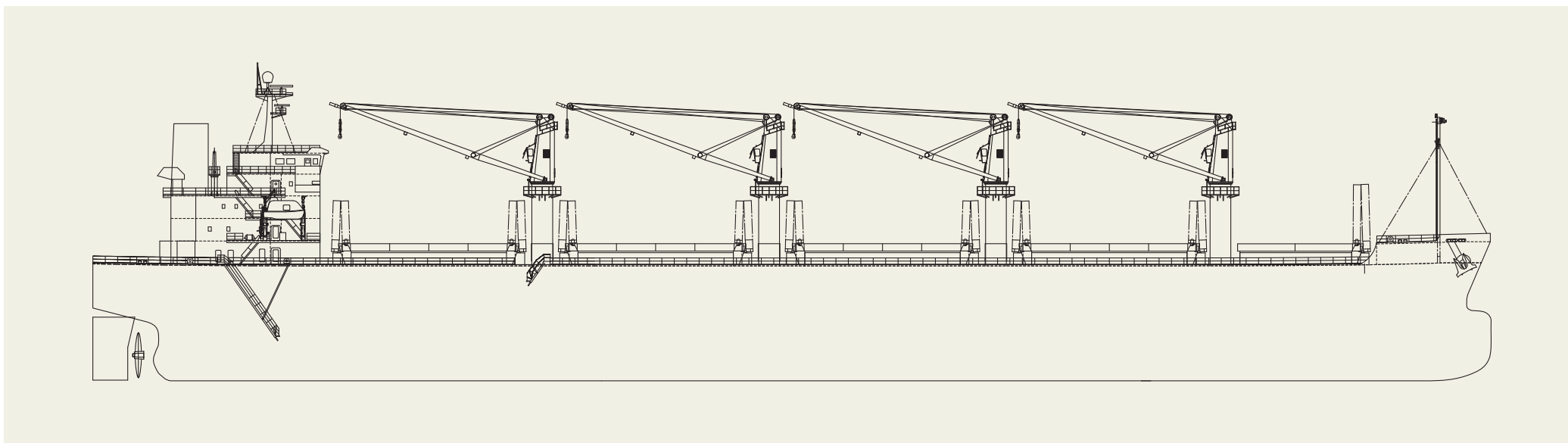


**NORVIC SINGAPORE** 39,738 MT Bulk Carrier **53**[Contents](#)[By Builder](#)[By Ship Type](#)**Features**

1. The cargo holds are semi-box shape, and it is capable to carry various cargoes with wide hatch cover.
2. The vessel has been developed as earth-friendly vessel. She features optimized hull shape, energy-saving device and low-revolution and low-consumption electrically controlled type engine, and these lead to comply EEDI phase 3 in advance.
3. The vessel has four (4) sets of 30 ton electro-hydraulic type deck crane.
4. Nitrogen oxides in exhaust gas reducing system is adopted to lessen the environmental burden.

**PRINCIPAL PARTICULARS**

Length (o.a.) .....	199.99 m	Speed (max. trial) .....	15.15 knots
Length (b.p.) .....	174.00 m	(service) .....	13.5 knots
Breadth (mld.) .....	32.00 m	Complement .....	25
Depth (mld.) .....	14.80 m	Classification .....	NK
Draft (mld.) .....	10.20 m	Handling gear .....	4sets Electro-Hydraulic type Deck Crane
Gross tonnage .....	24,754	Cargo pump .....	Nil
Deadweight .....	39,738 MT	Loading capacity (tank) .....	N/A
Main engine .....	MAN-B&W 6G45ME-C9.7-HPSCR	(grain) .....	49,880.4 m <sup>3</sup>
MCR (kw x rpm) .....	5,280 kW x 92.4min <sup>-1</sup>	(bale) .....	48,835.1 m <sup>3</sup>
NOR (kw x rpm) .....	4,490 kW x 87.5 min <sup>-1</sup>	Builder .....	Onomichi Dockyard Co., Ltd.



# TOSA HARMONY 39,911 DWT Bulk Carrier 54

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**TOSA HARMONY** 39,911 DWT Bulk Carrier 54

Contents

By Builder

By Ship Type

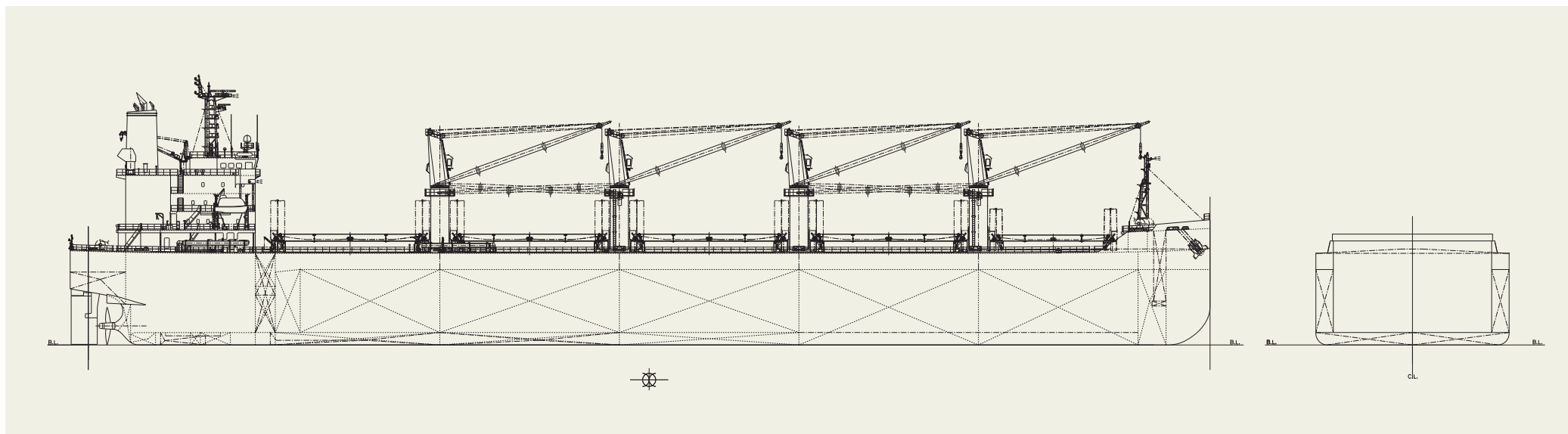
The 39,911-dwt bulk carrier TOSA HARMONY was built at SHIN KURUSHIMA KOCHIYUKO CO., LTD. and delivered to CORTES MARCHA CORPORATION in January 2023.

**Features**

1. The vessel has double hull construction for all five (5) cargo holds. No.2, No.3 and No.4 cargo holds are fully box shape construction.
2. Wide size hatches and box shape holds are highly efficient for steel coils and other cargoes loading.
3. The hatch covers are wide folding type and operated by hydraulic cylinders.
4. The vessel has four (4) sets of 30ton electro-hydraulic single deck cranes.

**PRINCIPAL PARTICULARS**

Length (o.a.) .....	182.87 m	MCR (kw x min <sup>-1</sup> ).....	5,700kW x 105min <sup>-1</sup>
Length (b.p.).....	179.95 m	NOR (kw x min <sup>-1</sup> ).....	4,845kW x abt 99.5 min <sup>-1</sup>
Breadth (mld.).....	31.00 m	Speed (service).....	14.0 knots
Depth (mld.).....	14.70 m	Complement.....	25P
Draft (mld.).....	10.32 m	Classification .....	NK
Gross tonnage.....	25,038	Loading capacity (grain).....	48,358 m <sup>3</sup>
Deadweight.....	39,911 t	(bale).....	47,116 m <sup>3</sup>
Main engine .....	MAKITA-MITSUI-MAN B&W 6S46ME-B8.5-HPSCR	Builder: .....	Shin Kurushima Kochijyuko Co., Ltd.



# NAGATO MARU 13,596 DWT Bulk Carrier 55

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**NAGATO MARU** 13,596 DWT Bulk Carrier 55

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The 13,596 dwt bulk carrier NAGATO MARU was built at SHIN KURUSHIMA KOCHIYUKO CO., LTD. and delivered to the Japanese Owner in November 2022

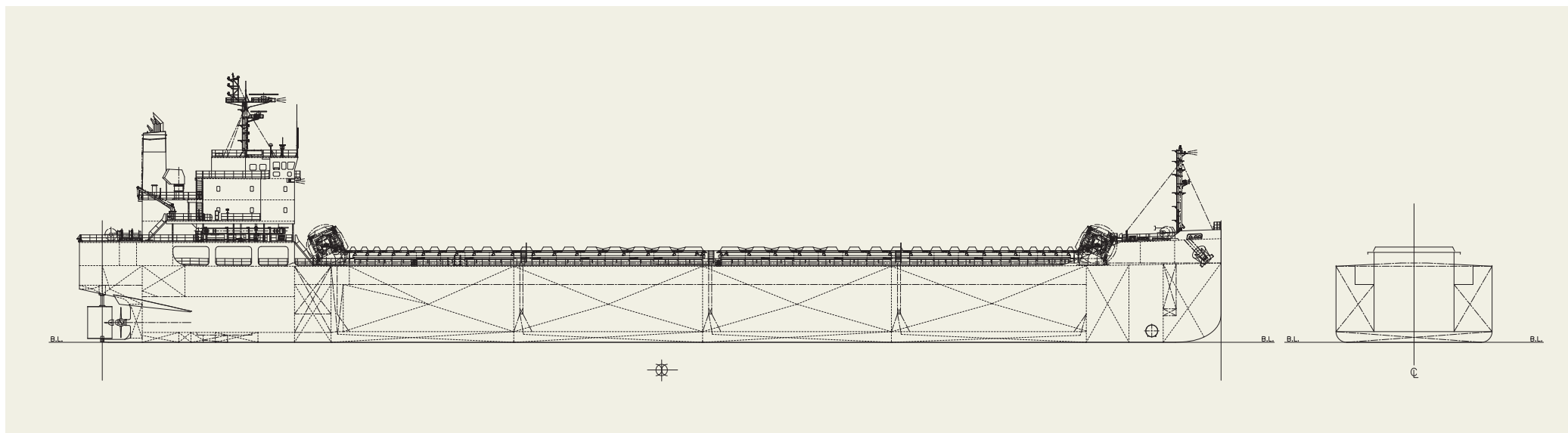
**Features**

1. The vessel can be used for loading coal as well as limestone.
2. The vessel has double hull and fully box shape construction for all four (4) cargo holds.
3. The hatch covers are two (2) sets of end rolling "ERMAN" type for NO.1&2 and NO.3&4 cargo holds.

**PRINCIPAL PARTICULARS**

Length (o.a.) .....	149.96 m
Length (b.p.) .....	146.95 m
Breadth (mld.) .....	20.50 m
Depth (mld.) .....	10.00 m
Draft (mld.) .....	7.1 m
Gross tonnage .....	9,250
Deadweight .....	13,596 t

Main engine .....	MAKITA-MITSUI-MAN B&W 6S35ME-B9.5
MCR (kw x min <sup>-1</sup> ) .....	3,850 kW x 153 min <sup>-1</sup>
NOR (kw x min <sup>-1</sup> ) .....	3,273 kW x abt. 145 min <sup>-1</sup>
Speed (service) .....	12.65 knots
Complement .....	15 P
Classification .....	NK
Loading capacity (grain) .....	10,431 m <sup>3</sup>
Builder: .....	Shin Kurushima Kochiyuko Co., Ltd.



# GREEN FAIRY 16,905 DWT Bulk Carrier 56

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**GREEN FAIRY** 16,905 DWT Bulk Carrier 56

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By Builder

By Ship Type

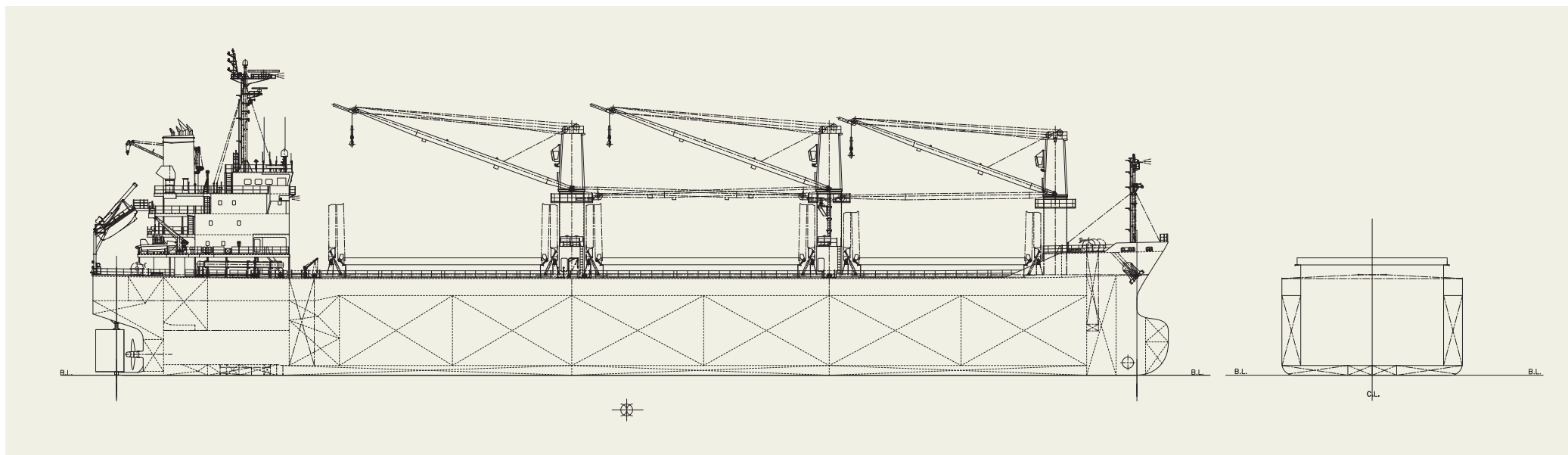
The 16,905-dwt bulk carrier GREEN FAIRY was built at SHIN KURUSHIMA KOCHIYUKO CO., LTD. and delivered to TRADE OCEAN CO., LTD. and NIPPON GAS LINE CO., LTD. in August 2023.

**Features**

1. The vessel has double hull construction for all three (3) cargo holds. are fully box shape construction.
2. Wide size hatches and box shape holds are highly efficient for steel coils and other cargoes loading.
3. The hatch covers are wide folding type and operated by hydraulic cylinders.
4. The vessel has three (3) sets of 30.7-ton electro-hydraulic single deck cranes.

**PRINCIPAL PARTICULARS**

Length (o.a.) .....	137.03 m	MCR (kw x min <sup>-1</sup> ).....	3,570 kW x 173min <sup>-1</sup>
Length (b.p.).....	130.00 m	NOR (kw x min <sup>-1</sup> ).....	3,213 kW x abt. 167 min <sup>-1</sup>
Breadth (mld.).....	23.00 m	Speed (service).....	12.85 knots
Depth (mld.).....	12.30 m	Complement.....	21 P
Draft (mld.).....	8.47 m	Classification.....	NK
Gross tonnage.....	11,361	Handling gear.....	30.7t x 3sets
Deadweight.....	16,905 t	Loading capacity (grain).....	21,038 m <sup>3</sup>
Main engine .....	MAKITA-MITSUI-MAN B&W 6S35MC7.1	(bale).....	20,573 m <sup>3</sup>
		Builder: .....	Shin Kurushima Kochiyuko Co., Ltd.



# SALVIA ISLAND 42,200 DWT TESS42 57

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**SALVIA ISLAND** 42,200 DWT TESS42 **57**

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By Ship Type

New model at the forefront of larger handysize bulk carriers  
We were at the first to address the new development of larger handysize bulk carrier with the deadweight of 42,200 MT. This is a new Eco-ship design developed by our exclusive and unique fuel efficiency technology together with the combinations of the versatility and popularity of the well-known TESS38 design.

**Features**

## 1. Fuel efficiency and environmental performance

- The unique hull form, which reduces resistance, is paired with our exclusive fuel-efficiency technologies to improve the ship's performance.
- Equipped with the environmental technologies devices to prevent the air pollution from the NOx and SOx emissions and marine pollution from the oil spillages, etc.

## 2. Versatility

- Versatility retained with the same length as TESS38.
  - Excellent trading flexibility for carrying the three major bulk cargoes of iron ore, grains, coal, as well as lumber, hot coils, sulfur, etc.
  - Apply semi-box-type cargo holds that are suitable for transporting steel products as well.
3. Loading performance
- Compared to TESS38, the deadweight capacity is in-

creased by approximately 2,000 MT at the same draft and by approximately 4,000 MT at full load.

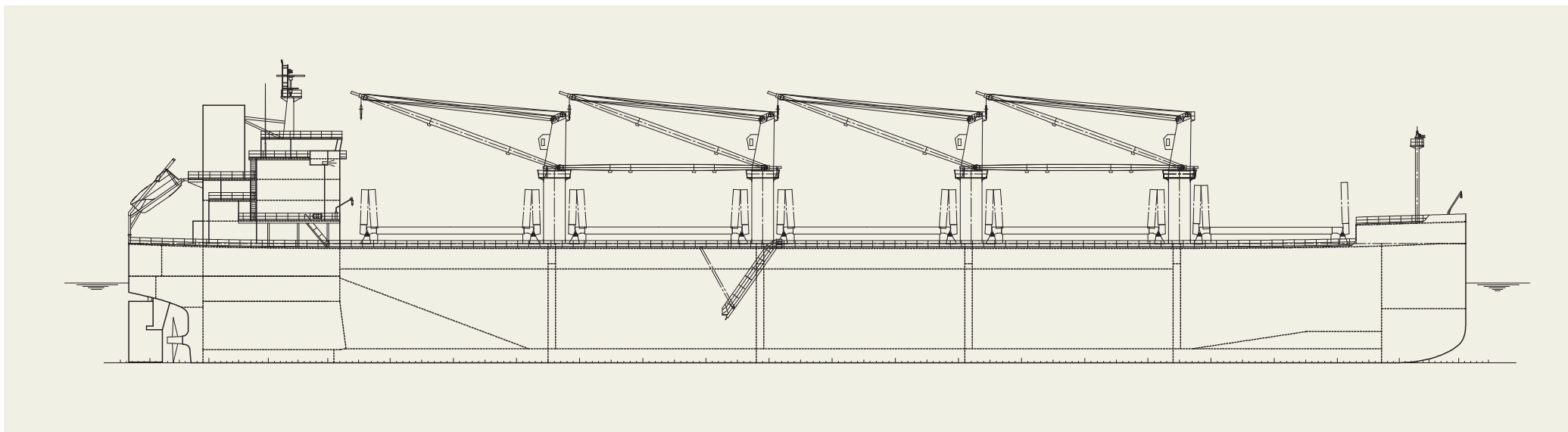
- With a cargo capacity of 52,400 m<sup>3</sup>, this ship can transport large volumes of low-density cargo, such as grains.

## 4. Comfortability

The original interior concept NEXT STYLE, utilizing exquisite design and indirect lighting, provides the crew with relaxation and comfort.

**PRINCIPAL PARTICULARS**

Length (o.a.) .....	180 m	Gross tonnage .....	26,700
Length (b.p.) .....	32.2 m	Deadweight .....	42,200 mt
Depth (mld.) .....	15.4 m	Loading capacity (grain) .....	52,400 m <sup>3</sup>
Draft (mld.) .....	10.75 m	Builder: .....	Tsuneishi Shipbuilding Co., Ltd.



# GT SELENE 3,600,000 C.F. TYPE WOODCHIP CARRIER 58

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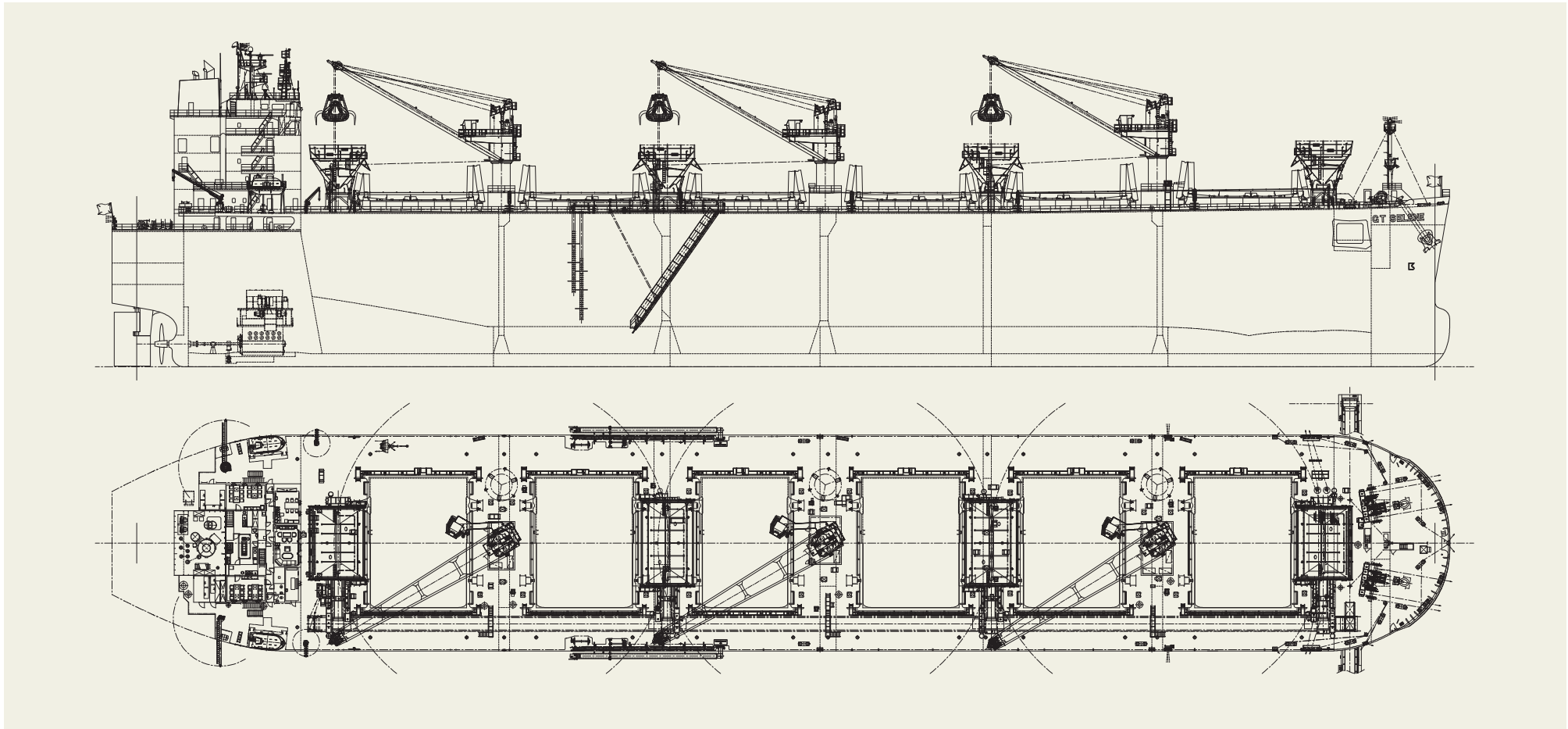


**GT SELENE** 3,600,000 C.F. TYPE WOODCHIP CARRIER 58

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By Builder

By Ship Type

**PRINCIPAL PARTICULARS**

Breadth (mld.).....	32.24 m	Deadweight.....	49,324
Depth (mld.).....	22.9 m	Speed (service).....	14.5 knots
Gross tonnage.....	41,273	Classification.....	NK
		Builder.....	Iwagi Zosen Co., Ltd.

# HACHINOHE MARU 60,288 DWT Wood Chip Carrier 59

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# HACHINOHE MARU 60,288 DWT Wood Chip Carrier 59

Contents By Builder By Ship Type

Oshima Shipbuilding Co., Ltd. delivered HACHINOHE MARU, a 4,326,650 cub. ft Wood Chip carrier, to RACCOON SHIPHOLDING S.A. in December 2021.

## Features

1. Specially designed vessel to carry wood chips.
2. This vessel has large cargo hold for wooden chip loading and its self-unloading system with three electric deck cranes, four hoppers and conveyor systems achieves, four hoppers and conveyor systems achieves high unloading efficiency.
3. To prevent chip scattering, anti-scattering nets and water spraying system are equipped at hopper.

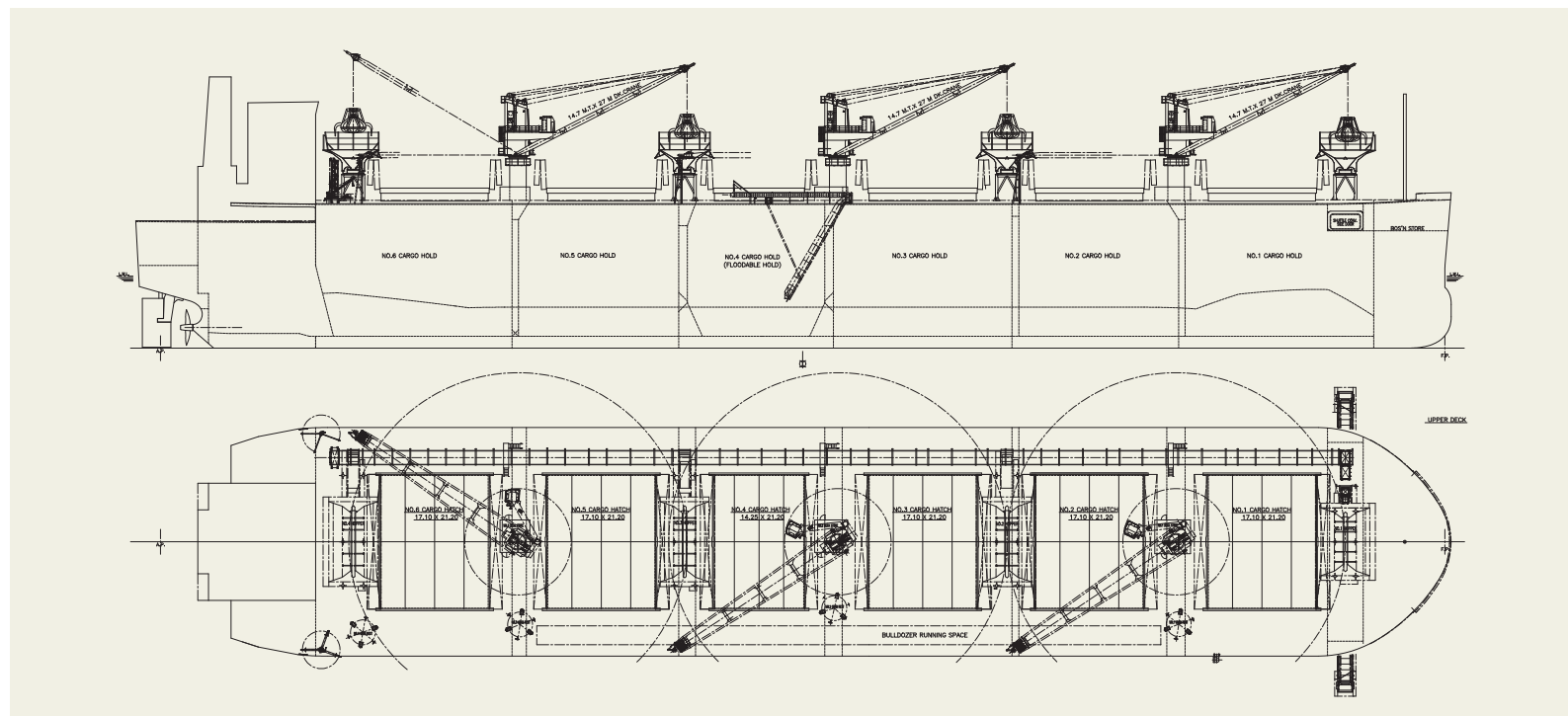
## PRINCIPAL PARTICULARS

Length (o.a.)	209.96 m
Breadth (mld.)	37.00 m
Depth (mld.)	22.80 m
Draft (mld.)	11.50 m
Gross tonnage	49887
Deadweight	60,288 MT

Main engine	J-ENG UE 6UEC50LSH-ECO-C2
MCR (kw x rpm)	7,430 kW x 92.0 rpm
Speed (service)	14.20 knots
Complement	25
Classification	NK
Loading capacity (grain)	122,517 m <sup>3</sup>
Builder	Oshima Shipbuilding Co., Ltd.

4. Advanced Flipper Fins & Rudder Fin which improve propulsion efficiency are installed.
5. Special bow form, Seaworthy Bow improves speed

performance in rough sea conditions as compared to ordinary bows.



# DYNA FLORESTA 52,804 DWT Wood Chip Carrier 60

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**DYNA FLORESTA** 52,804 DWT Wood Chip Carrier 60

Contents

By Builder

By Ship Type

Oshima Shipbuilding Co., Ltd. delivered DYNA FLORESTA, a 3,824,652 cub. ft Wood Chip carrier, to STEVENS LINE CO.,LTD. in September 2022.

**Features**

1. Specially designed vessel to carry wood chips.
2. This vessel has large cargo hold for wooden chip loading and its self-unloading system with three electric deck cranes, four hoppers and conveyor systems achieves, four hoppers and conveyor systems achieves high unloading efficiency.
3. To prevent chip scattering, anti-scattering nets and water spraying system are equipped at hopper.

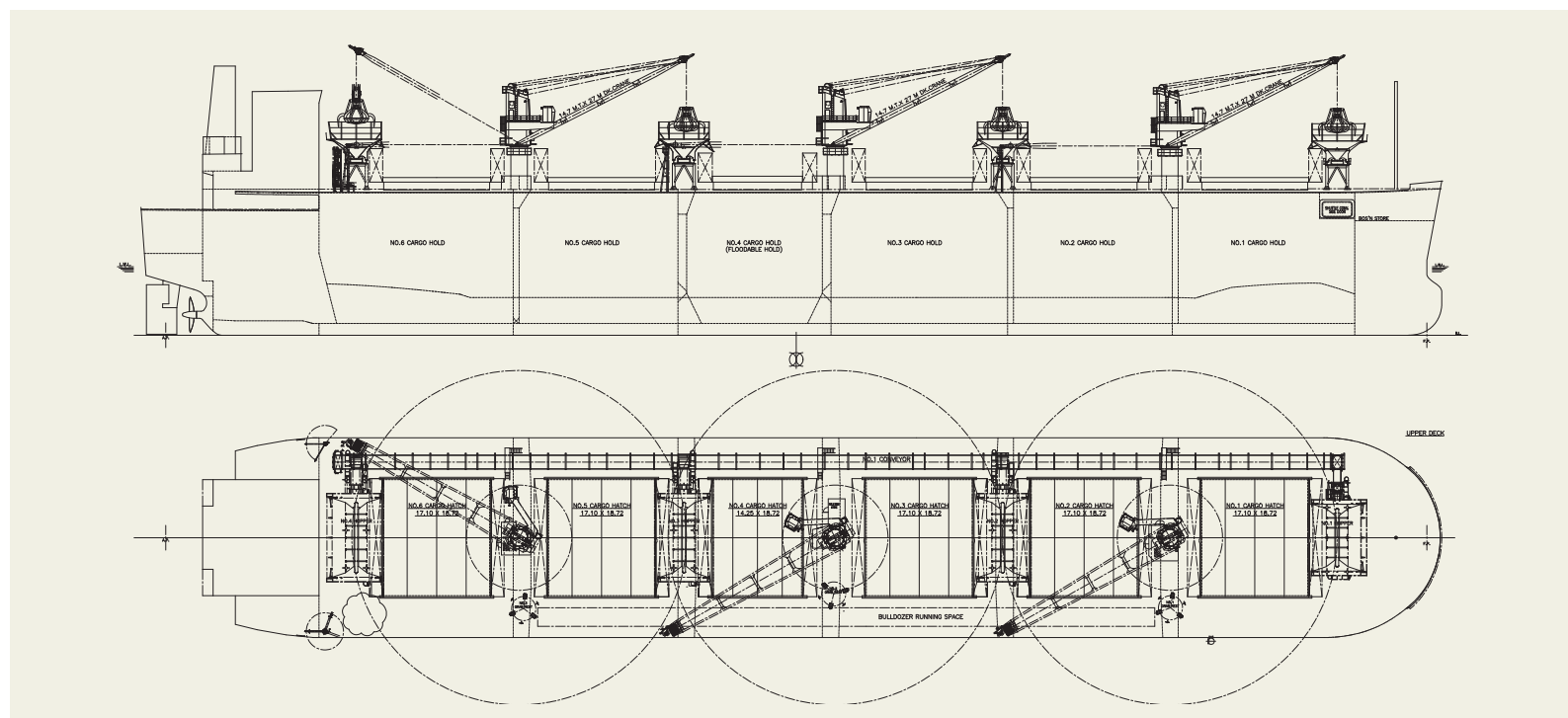
**PRINCIPAL PARTICULARS**

Length (o.a.).....	209.99 m
Breadth (mld.).....	32.26 m
Depth (mld.).....	22.98 m
Draft (mld.).....	11.50 m
Gross tonnage.....	43917
Deadweight.....	52,804 MT

Main engine .....	MITSUI MAN B&W 6S50ME-C9.7-EGRBP
MCR (kw x rpm) .....	7,260 kW x 99.0 rpm
Speed (service).....	14.20 knots
Complement.....	25
Classification .....	NK
Loading capacity (grain).....	108,302 m <sup>3</sup>
Builder.....	Oshima Shipbuilding Co., Ltd.

4. Advanced Flipper Fins & Rudder Fin which improve propulsion efficiency are installed.
5. Special bow form, Seaworthy Bow improves speed

- performance in rough sea conditions as compared to ordinary bows.
6. SOx scrubber is installed for environmental friendliness.



# MAERSK NORESUND 2,020 TEU Containership 61

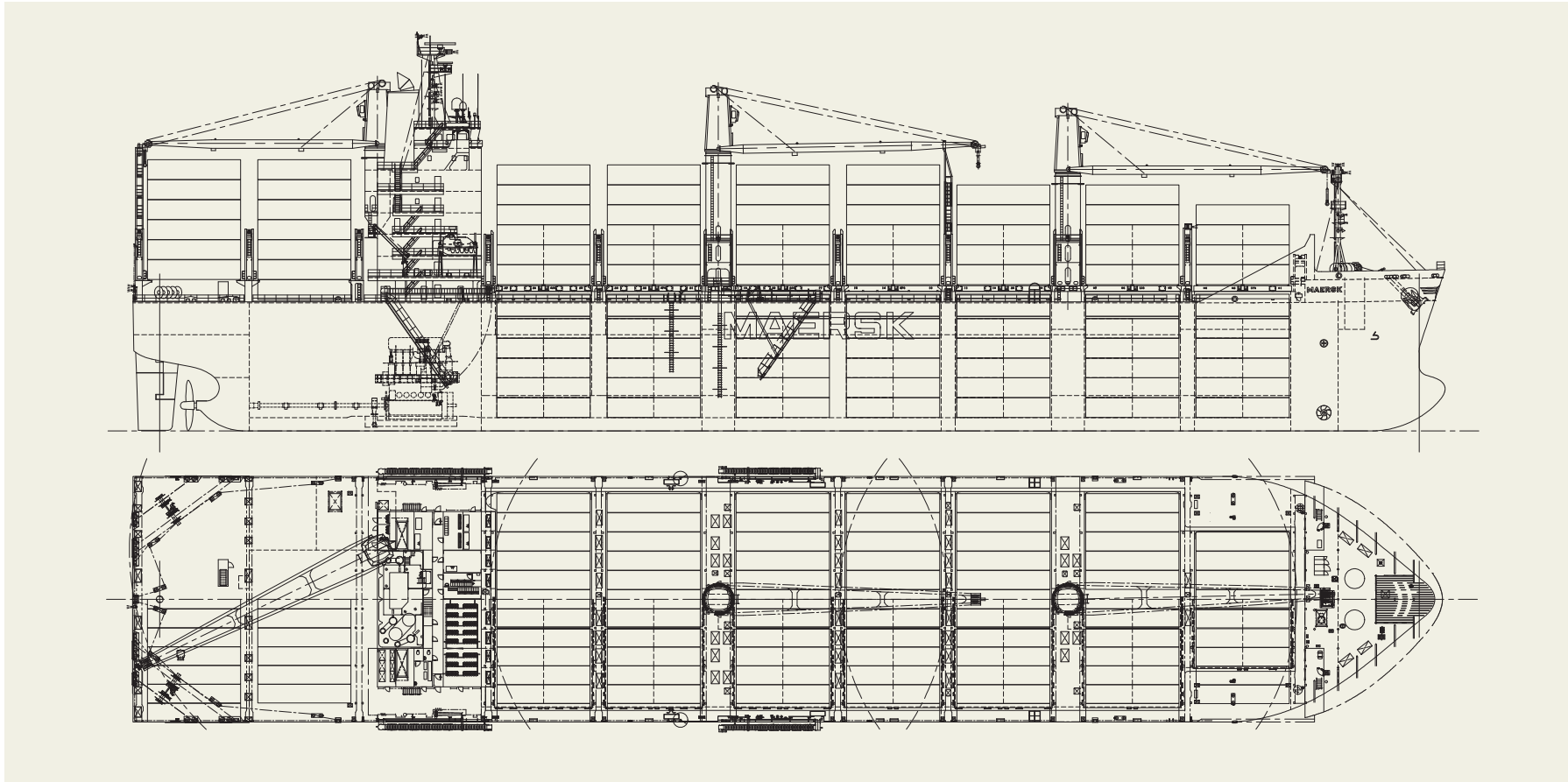
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# MAERSK NORESUND 2,020 TEU Containership 61

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## PRINCIPAL PARTICULARS

Breadth (mld.)..... 32.2 m  
 Depth (mld.)..... 16.8 m  
 Gross tonnage.....25,805  
 Deadweight.....28,697

MCR (kw x rpm) ..... 13,500 x 102  
 Speed (service)..... 18 knots  
 Classification.....NK  
 Loading capacity (container).....2,086 TEU  
 Builder: .....Imabari Shipbuilding Co., Ltd.

# ONE INFINITY 24,000 TEU Containership 62

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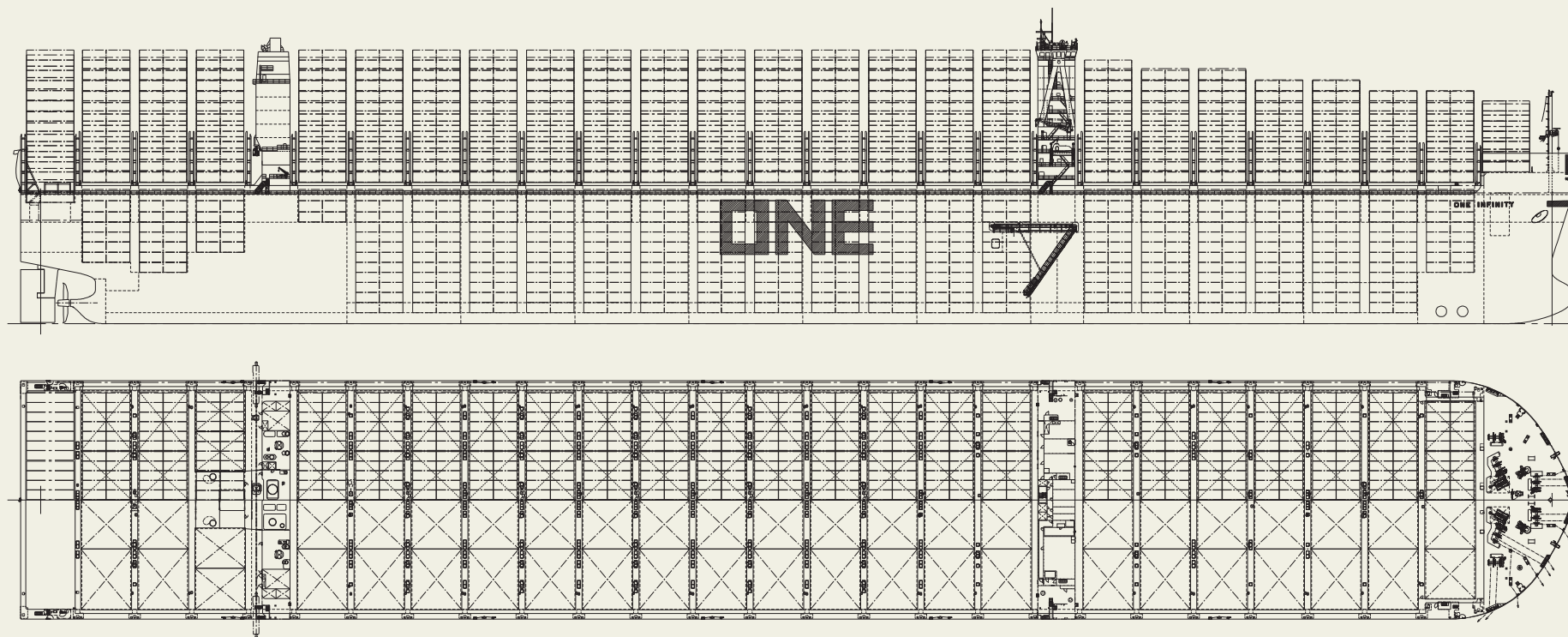


**ONE INFINITY** 24,000 TEU Containership 62

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**PRINCIPAL PARTICULARS**

Breadth (mld.).....61.4 m  
 Depth (mld.).....33.2 m

Classification.....DNV  
 Loading capacity (container).....24,136 TEU  
 Builder: .....Imabari Shipbuilding Co., Ltd.

# EVER FULL 11,000 TEU Containership 63

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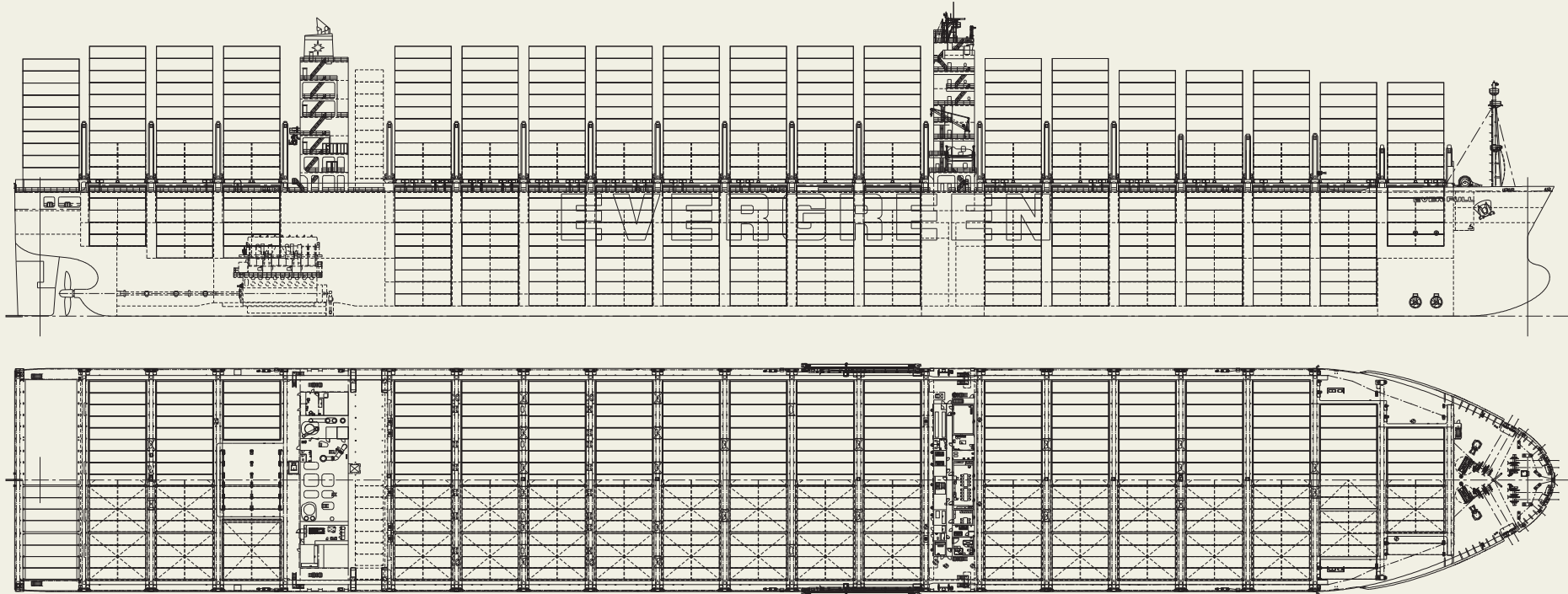


**EVER FULL** 11,000 TEU Containership **63**

Contents

By Builder

By Ship Type

**PRINCIPAL PARTICULARS**

Breadth (mld.).....	48.4 m	MCR (kw x rpm) .....	41,080 x 76
Depth (mld.).....	26.8 m	Speed (service).....	23 knots
Gross tonnage.....	116,295	Classification .....	NK
Deadweight.....	130,573	Loading capacity (container).....	11,888 TEU
		Builder .....	Imabari Shipbuilding Co., Ltd.

# ONE INNOVATION 24,000 TEU Containership 64

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# ONE INNOVATION 24,000 TEU Containership 64

Contents By Builder By Ship Type

Japan Marine United Corporation (JMU) delivered 24,000TEU container ship, "ONE INNOVATION" at its Kure Shipyard on 2nd June 2023.

## Features

1. This is the 1st Vessel of newly developed 24,000TEU type container ship, the largest class cargo capacity in the world, which utilizes JMU's technology to achieve a high level of both environmental and loading performance and is designed to operate in wide range of sea area.
2. By adopting JMU's original energy saving devices such as SURF-BULB®, the ALV-Fin® and Rupas® rudder, we have achieved extremely high fuel efficiency despite such a large hull size. This Vessel significantly satisfies the EEDI Phase 3 (reduction rate of 50% or more from the reference line) in advance that became mandatory for the vessels contracted after 1st January, 2022.
3. Brittle crack arrest technology in extremely thick, high-strength steel plates for this size of vessel has been applied for the first time in the world, which improves safety of

the hull structure without sacrificing loading efficiency.

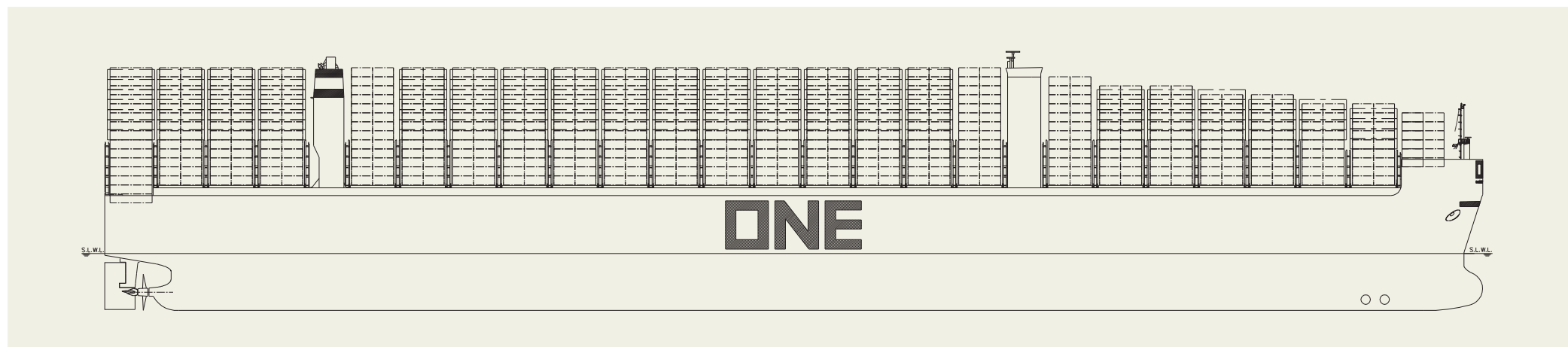
4. MAN-B&W's latest electronically controlled main engine, Mark 10.6 and inverter-controlled cooling sea water pump contribute to reduce the fuel oil consumption.
5. To improve performance in the actual sea, "Bow Wind Cover" is equipped, making it possible for the first time in the world to allow containers to be loaded onto mooring deck inside the "Wind Cover".
6. This vessel is equipped with INS (Integrated Navigation System) with seats and fully enclosed navigation bridge, improving the convenience and safety for steering

during voyage and reaching/leaving the pier.

7. Voyage assistance and monitoring of the engine room by CCTV camera system is provided for improved safety.
8. As cyber security measure, the vessel has applied DNV Cyber Secure notation.
9. This vessel complies with various environmental regulations such as; a hybrid type EGCS SOx scrubber, complying with requirements for maintaining a list of hazardous materials; AMP(Alternative Maritime Power) that allows the diesel generator to be shut down during cargo handling at the quay.

## PRINCIPAL PARTICULARS

Length (o.a.) .....	399.95 m	Main engine .....	MAN-B&W 9G95ME-C10.6
Breadth (mld.).....	61.40 m	Complement.....	34
Depth (mld.).....	33.20 m	Classification .....	DNV
Draft (mld.).....	16.50 m	Builder.....	JMU



# WAN HAI 363 3,013 TEU Containership 65

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# WAN HAI 363 3,013 TEU Containership 65

Contents By Builder By Ship Type

Japan Marine United Corporation (JMU) delivered the 3,013 TEU container ship, "WAN HAI 363" at its Kure Shipyard on 30th May 2023.

## Features

1. This Vessel is 3,013TEU type container ship that is compliant with NOx Tier III, which is the NOx emission regulation. This vessel is optimally designed for medium to long range voyage in order to comply with expanding seaborne trade volume for both Asian regional trade and to/from Asian countries and achieves significantly improved environmental and operational performance compared with conventional vessels, with both high loading capacity and high navigation performance by using JMU's latest technology.
2. This Vessel achieves high propulsion efficiency through its advanced lower resistance hull form and JMU's origi-

nal energy saving devices such as the ALV-Fin® (Advanced Low Viscous resistance Fin) and LV-Fin(Low Viscous resistance Fin)..

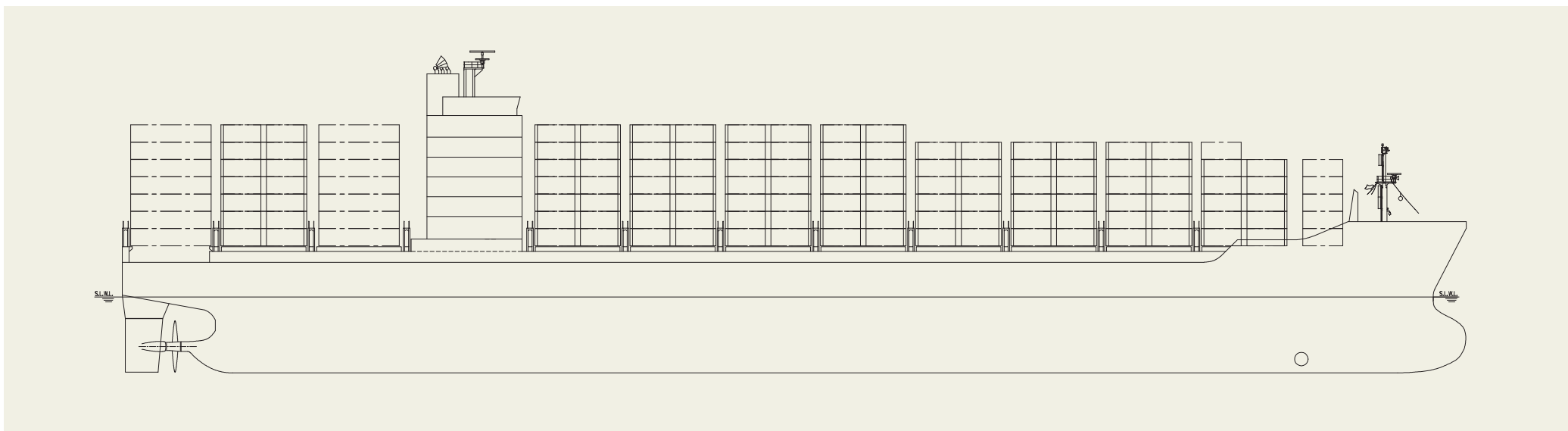
3. MAN-B&W's latest electronically controlled main engine, Mark 10.5 and inverter-controlled cooling sea water pump reduce the fuel oil consumption.
4. This vessel is equipped with INS (Integrated Navigation System) and full enclosed navigation bridge, improving

the convenience and safety for steering during voyage and reaching/leaving the pier.

5. In consideration of the environment, this vessel is equipped with AMP(Alternative Maritime Power) that allows the diesel generator to be shut down during cargo handling at the quay.
6. Voyage assistance and monitoring of the engine room by CCTV camera system improves safety.

### PRINCIPAL PARTICULARS

Length (o.a.) .....	203.50 m	Deadweight.....	36,776
Breadth (mld.).....	34.80 m	Main engine .....	MAN-B&W 7S70ME-C10.5
Depth (mld.).....	16.60 m	Complement.....	25
Draft (mld.).....	11.5 m	Classification .....	ABS/CR
Gross tonnage.....	30,776	Builder.....	JMU



# SUSTAINABLE EARTH 1,091 TEU Containership 66

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# SUSTAINABLE EARTH 1,091 TEU Containership 66

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1,000 TEU-type container carrier with the best balance  
The high cargo capacity combined with the top-class fuel efficiency is designed to maximize the benefits of the operators. This container carrier is the embodiment of optimum solutions for feeder transport.

## Features

- Fuel efficiency and environmental performance
  - The unique hull form, which reduces resistance, is paired with our exclusive fuel-efficiency technologies to improve the ship's performance.
  - Equipped with the environmental technologies devices to prevent the air pollution from the NOx and SOx emissions and marine pollution from the oil spillages, etc.

## 2. Versatility

- As gross tonnage is less than 10,000, there is no need for a pilot in Japan's major ports.
- Equipped with reefer container sockets on both the upper deck and cargo holds. Some cargo holds can also load dangerous cargo containers.
- The accommodation house is located at the stern end.

This allows the crane to move smoothly and faster in loading / discharging operation.

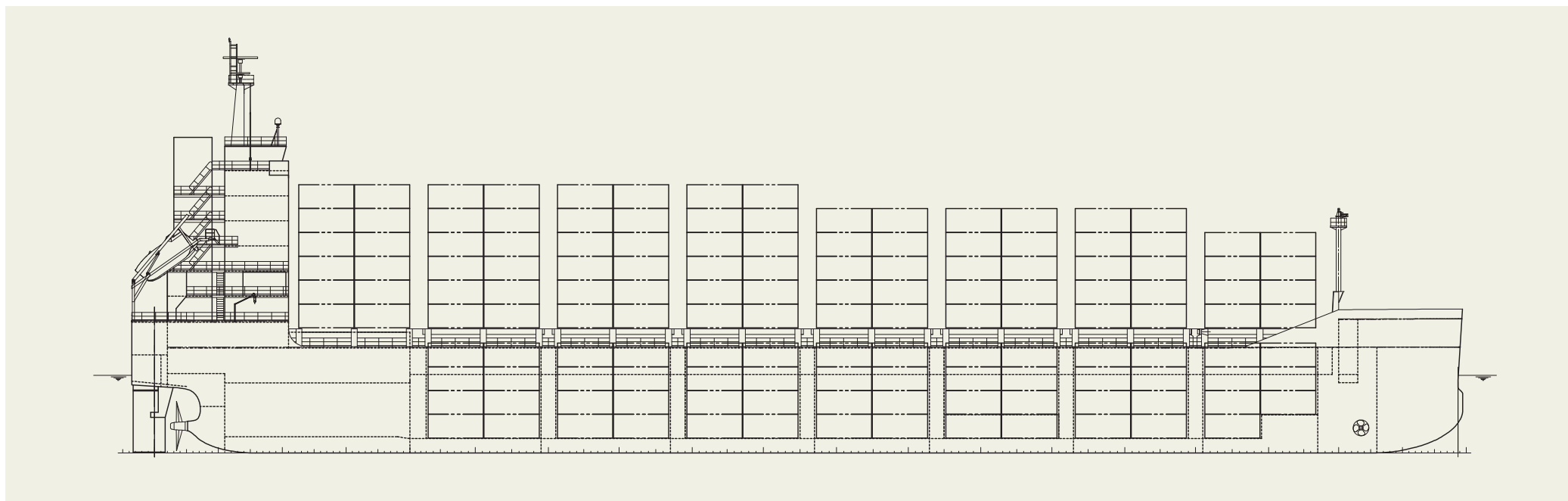
## 3. Loading performance

- While keeping the compact principal particulars and stability, maximal loading capacity and actual loading capacity have been improved, compared to the previous design.

## PRINCIPAL PARTICULARS

Length (o.a.) ..... 146 m  
Breadth (mld.) ..... 23.25 m  
Depth (mld.) ..... 11.5 m

Draft (mld.) ..... 8.5 m  
Gross tonnage ..... less than 10,000  
Loading capacity (container) ..... Max. 1,091 TEU  
Builder: ..... Tsuneishi Shipbuilding Co., Ltd.



# CENTURY HIGHWAY GREEN 7,000 CARS TYPE LNG Dual-fuelled Vehicles Carrier 67

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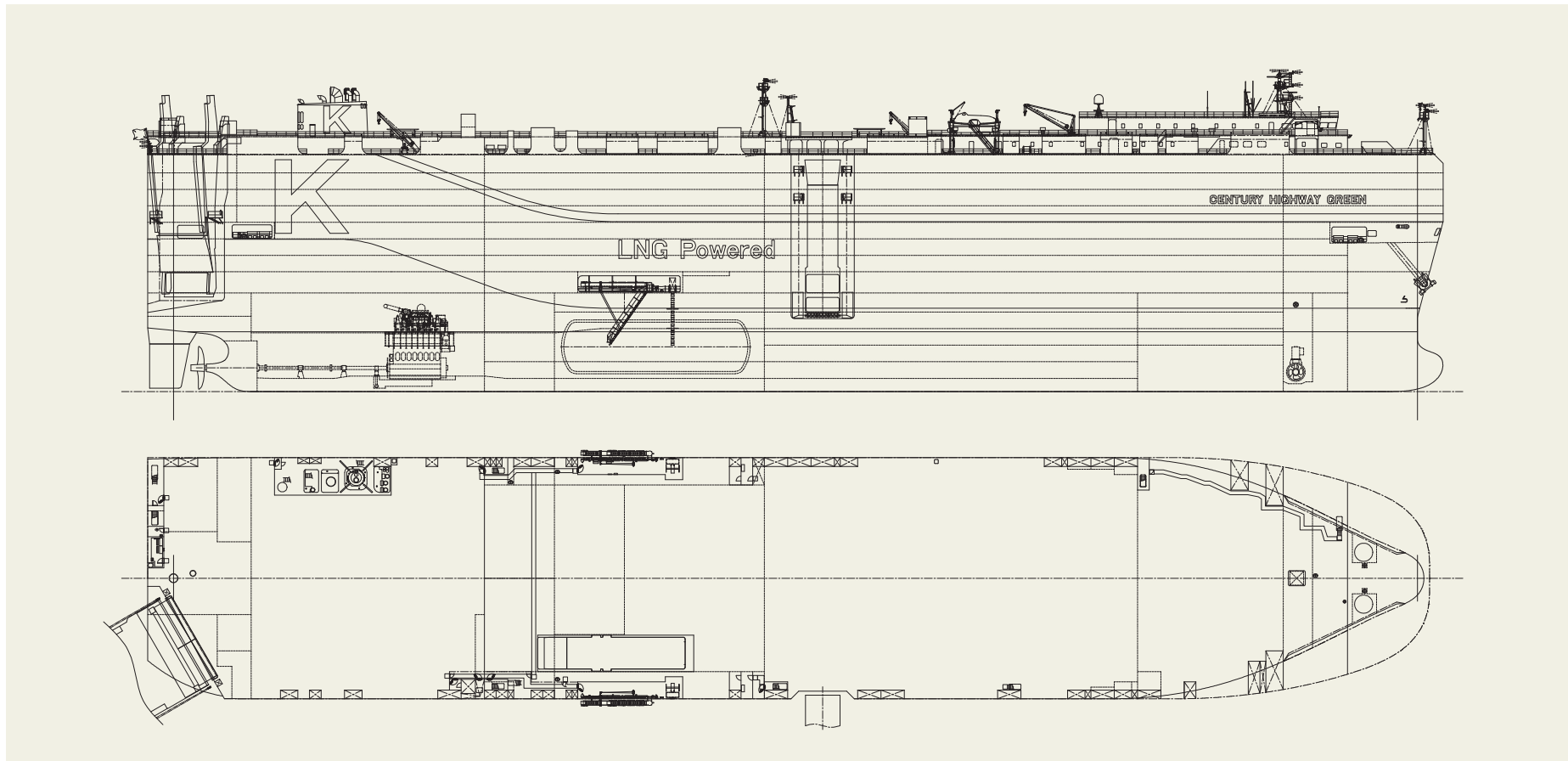


**CENTURY HIGHWAY GREEN** 7,000 CARS TYPE LNG Dual-fuelled Vehicles Carrier **67**

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**PRINCIPAL PARTICULARS**

Breadth (mld.).....	37.2 m	MCR (kw x rpm) .....	9,380 x 92.0
Depth (mld.).....	36.51 m	Speed (service).....	18 knots
Gross tonnage.....	73,515	Classification .....	NK
Deadweight.....	16,844	HBuilder .....	Tadotsu Shipyard Co., Ltd.

# PLUMERIA LEADER 7,000 Unit Car Carrier 68

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# PLUMERIA LEADER 7,000 Unit Car Carrier 68

The 7,000 units type car carrier PLUMERIA LEADER was completed in March 2022 at SHIN KURUSHIMA TOYOHASHI SHIPBUILDING CO., LTD. and delivered to Nippon Yusen Kabushiki Kaisha.

## Features

1. This ship is 7,000 units type next-generation car carrier equipped with dual fuel engine using LNG as main fuel. The ship equipped with an environmentally friendly the engine that can reduce CO<sup>2</sup> emissions by more than 30% and almost no SOx emissions, etc. compared to conventional engines fueled by heavy oil.
2. The ship, which is keeping the length overall to less than 200m, and is expanded the breadth than conventional Panamax width, has increased cargo loading number. For this reason, fuel consumption per vehicle cargo is much better compared with the existing car carriers.
3. It is achieved lower fuel consumption by applying the following energy efficiency devices including Shin Kurushima Dockyard originally developed; A.S.FIN, TURBO-RING, SKEG FIN, K<sup>3</sup> PROPELLER, AERODYNAMIC SCREEN, REACTION RUDDER, and applying LOW FRICTION TYPE SHELL PAINT.
4. By applying the partial bulkhead less structural method for hull construction, it can be applied One-way system of slope way of both side of ship, and it is very efficient for car loading/unloading

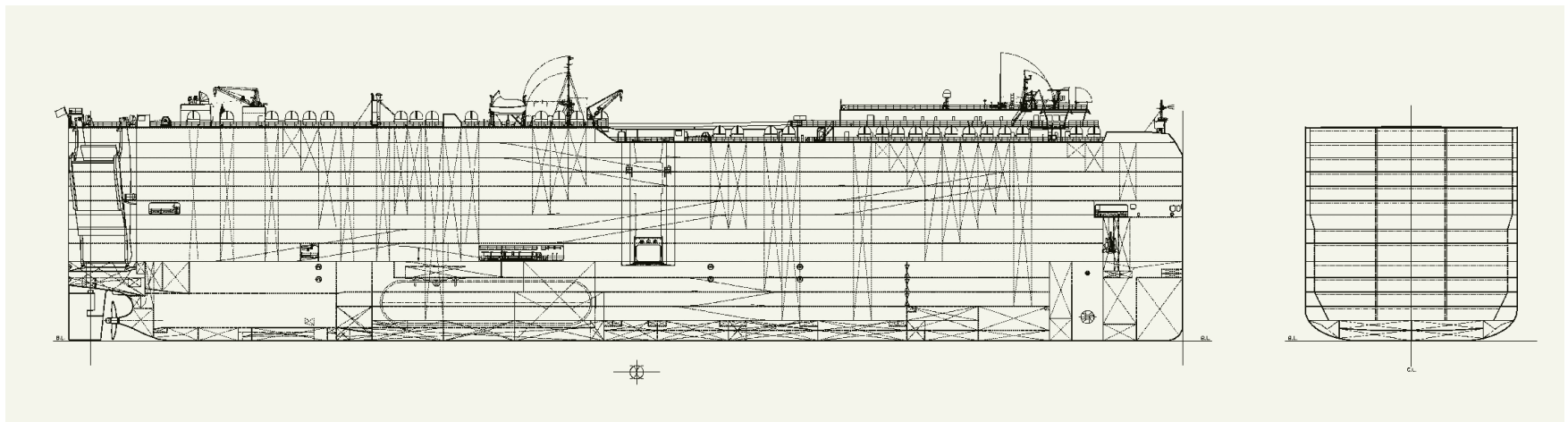
operation accordingly.

5. Regarding loading/unloading equipments, the ship has a stern ramp (35m x 13.2m : SWL 30t) and a center ramp (22m x 4.3m : SWL 15t).
6. The ship's wheelhouse is the all-weather structure type. Therefore, it is improved workability of departure/arrival, the surrounding watch, operability and safety. The center console is considered the shape of the wheelhouse and

person's movement. The consoles are equipped with all the equipment essential for maneuvering, monitoring, route planning, etc. so that it can be operated efficiently. In addition, the consoles on the both wings are equipped with a multi-monitor for checking image of radar etc. and equipments required for departure/arrival. These equipments are satisfied the international regulations and are latest type.

## PRINCIPAL PARTICULARS

Length (o.a.).....	199.96 m	MCR (kW x rpm).....	11,920 kW x 105 min <sup>-1</sup>
Length (b.p.).....	196.00 m	NOR (kW x rpm).....	8,940 kW x abt. 95.5 min <sup>-1</sup>
Breadth (mld.).....	38.00 m	Speed (service).....	18.0 knots
Depth (mld.).....	35.54 m	Complement.....	30 P
Draft (mld.).....	9.55 m	Classification.....	NK
Gross tonnage.....	72,287	Loading capacity (car/vehicle).....	7,150 units
Deadweight.....	17,210 t	(others).....	LNG Tank x 2 sets
Main engine.....	Diesel United – Win GD 8X52DF x 1 set	Builder:.....	Shin Kurushima Toyohashi Shipbuilding Co., Ltd.



# SHURI 15,800 GT TYPE Ro/Ro Cargo Ship 69

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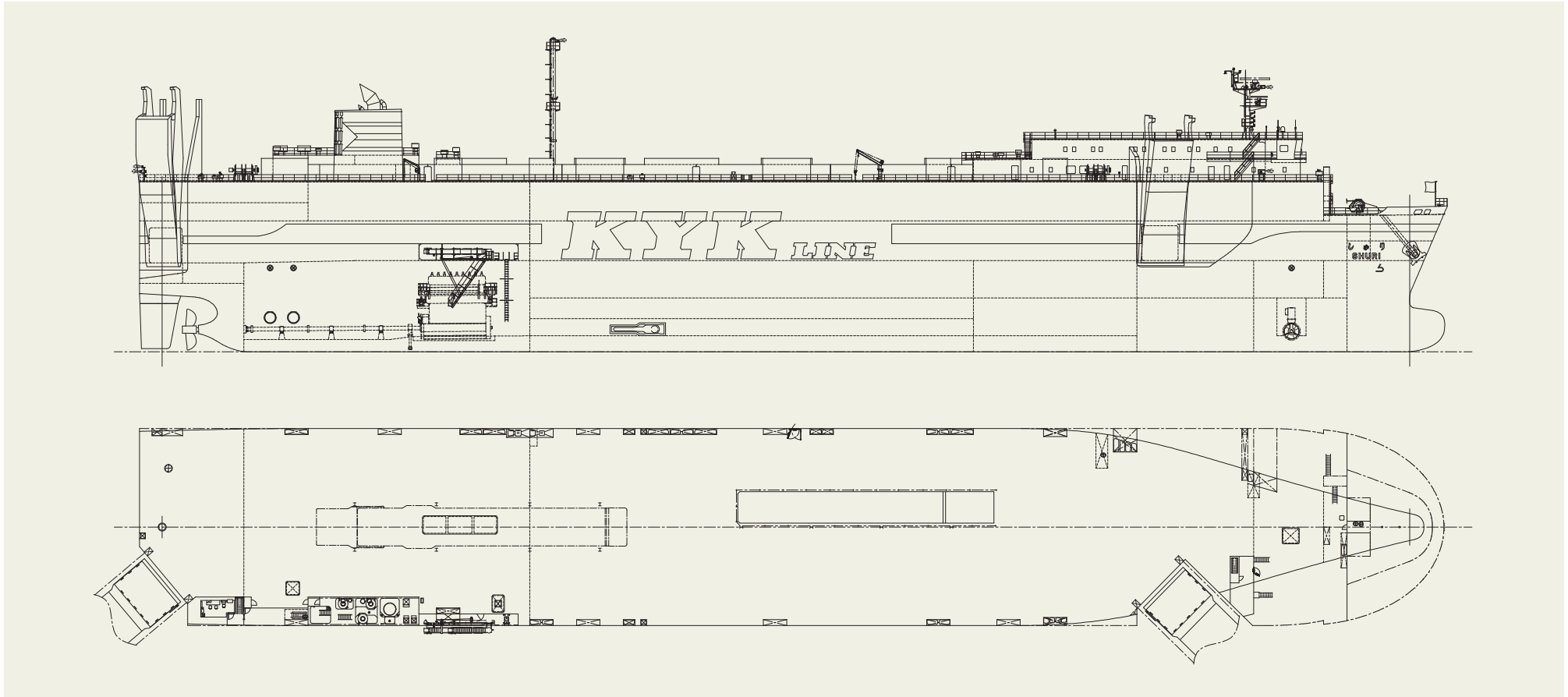


**SHURI** 15,800 GT TYPE Ro/Ro Cargo Ship 69

Contents

By Builder

By Ship Type



**PRINCIPAL PARTICULARS**

Breadth (mld.).....	27 m	MCR (kw x rpm) .....	14,940 x 127
Depth (mld.).....	23.27 m	Speed (service).....	21.1 knots
Gross tonnage.....	15,816	Classification .....	NK
Deadweight.....	7,073	Builder.....	I-S Shipyard Co., Ltd.

**MAPUTI** 17,667 MT Tween Deck Cargo Vessel 70

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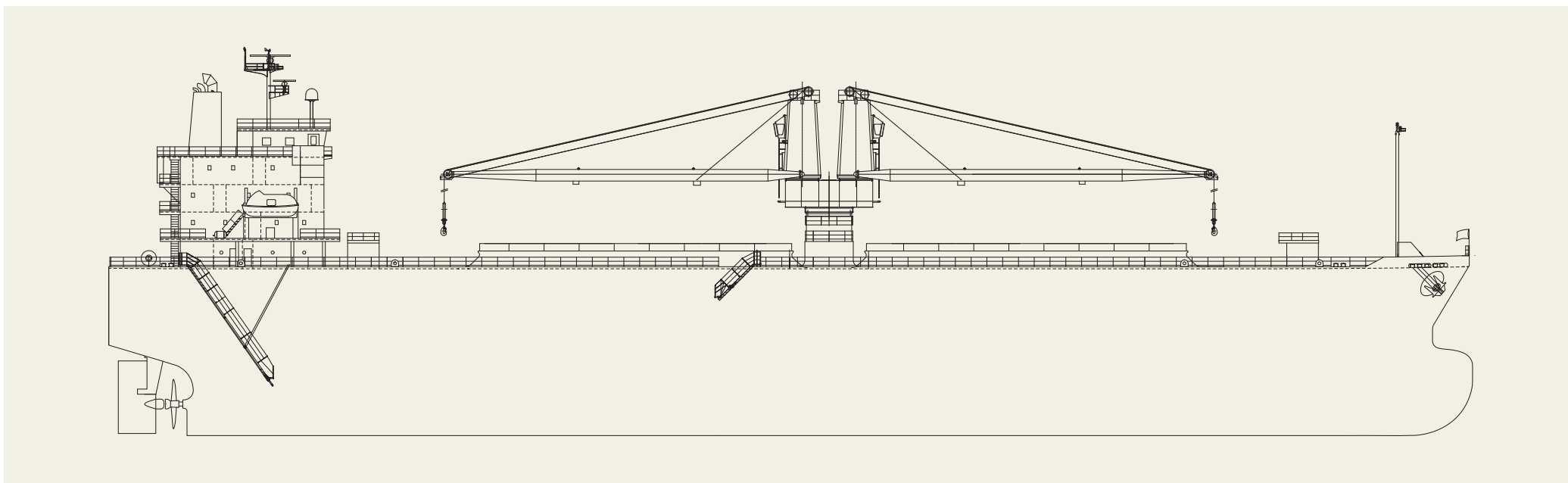


**Features**

1. The vessel has two (2) tween deck cargo holds for carrying various cargoes, and equipped with one (1) set 100 tons capacity twin type electro-hydraulic type deck crane.
2. Cargo hold is designed semi-box shaped type and has 25,400 cubic meter capacity and with 30m length long type wide hatch.
3. She has wide breadth and shallow draft, so it is not only for safe cargo transportation, but also for improvement for crew living environment.
4. In order to be complied with EEDI phase-3 environmental regulation, the ship archives high propulsion performance by combination of optimized hull shape and propeller.

**PRINCIPAL PARTICULARS**

Length (o.a.) .....	129.66 m	Complement.....	20 persons
Length (b.p.).....	122.60 m	Classification .....	NK
Breadth (mld.).....	23.60 m	Handling gear.....	1 set Electro-Hydraulic Type Deck Crane (Twin type)
Depth (mld.).....	15.85 m	Cargo pump.....	Nil
Draft (mld.).....	9.80 m	Loading capacity (grain).....	25383.3 m <sup>3</sup>
Gross tonnage.....	13,263	(bale).....	23842.4 m <sup>3</sup>
Deadweight.....	17,667 MT	(container) .....	N/A
Main engine .....	J-ENG 6UEC35LSE-B2	(passenger).....	N/A
MCR (kw x rpm) .....	3,090 kW x 118 min <sup>-1</sup>	(car/vehicle).....	N/A
NOR (kw x rpm).....	2,625 kW x 111.8min <sup>-1</sup>	(others) .....	N/A
Speed (max. trial).....	14.8 knots	Builder.....	Onomichi Dockyard Co., Ltd.
(service).....	12.5 knots		



# KIZUNA 21 8,015 DWT General Cargo Ship 71

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**KIZUNA 21** 8,015 DWT General Cargo Ship **71**

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One set of hydraulic twin type deck crane is installed on the vessel, which is available for hoisting load 80t on twin use condition.

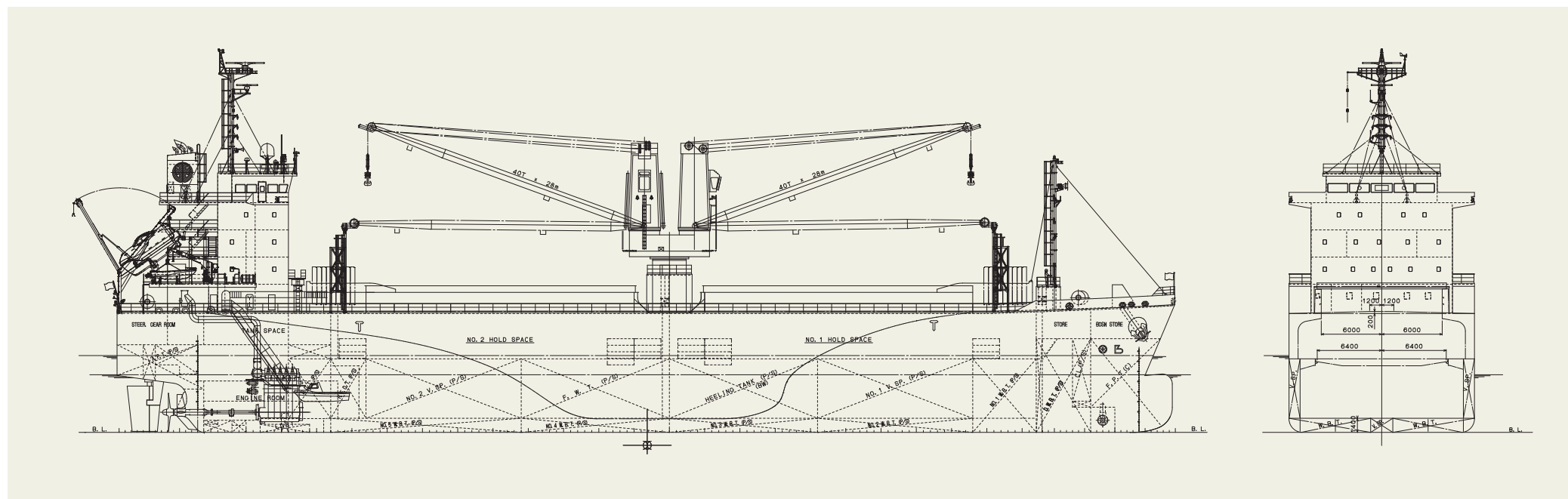
Stern fins are installed on the stern frame to maintain a good water flow to the propeller to improve propulsion efficiency and reduce fuel consumption, which are patented proprietary technology of Sasaki. The vessel also complies EEDI phase III and has achieved to reduce environmental impact.

The ship vibration is suppressed as much as possible for crew comfort by conducting adequate analysis at the initial design stage, as well as low noise and good stability has been achieved.

**PRINCIPAL PARTICULARS**

Length (o.a.) .....	104.97 m
Length (b.p.) .....	98.80 m
Breadth (mld.) .....	18.40 m
Depth (mld.) .....	11.80 m
Draft (mld.) .....	7.62 m
Gross tonnage .....	6,267
Deadweight .....	8,015 tons
Main engine .....	HITACHI-MAN B&W 5L35MC6.1
MCR (kw × rpm) .....	2,750 × 178

NOR (kw x rpm) .....	2,475 × 172
Speed (max. trial) .....	14.32 knots
(service) .....	13.00 knots
Complement .....	18 persons
Classification .....	BV
Handling gear .....	
	Hydraulic twin deck crane 80T x 28m / R x 1 set
Loading capacity (grain) .....	12,866 m <sup>3</sup>
(bale) .....	11,195 m <sup>3</sup>
Builder: .....	Sasaki Shipbuilding Co., Ltd.



# KYOWA EAGLE 11,917 DWT General Cargo Ship 72

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**KYOWA EAGLE** 11,917 DWT General Cargo Ship **72**

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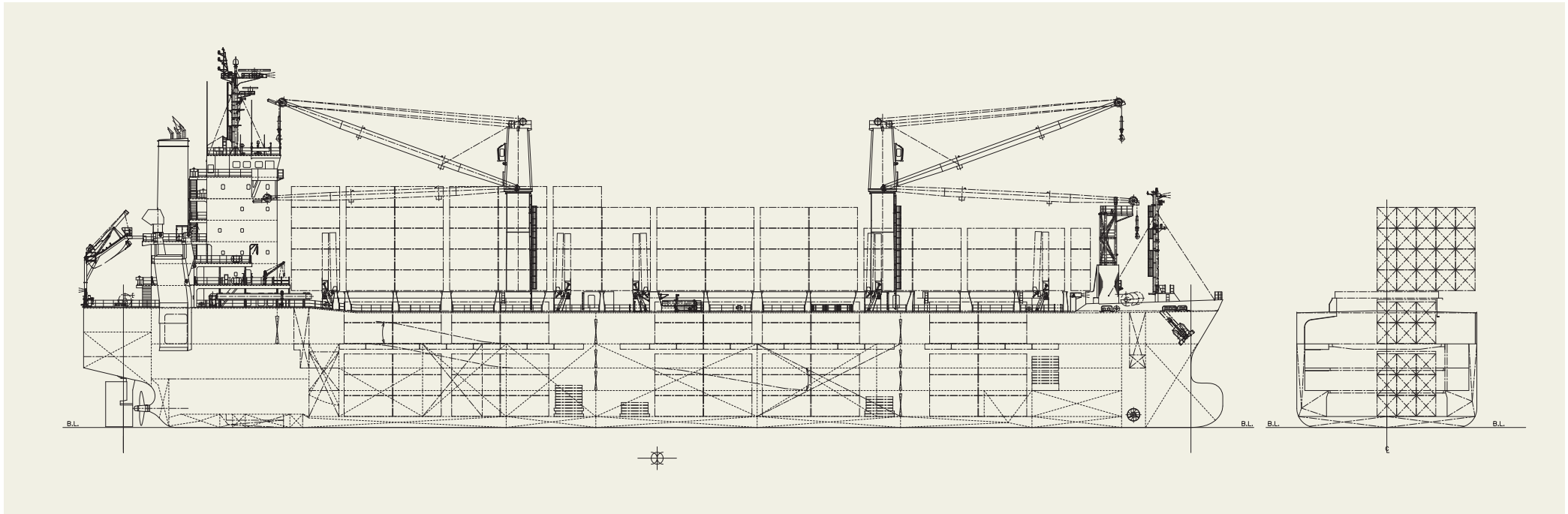
The 11,917 dwt General cargo ship KYOWA EAGLE was built at SHIN KURUSHIMA DOCKYARD CO., LTD. and delivered to Panamanian Owner in December 2022.

**Features**

1. The vessel is designed as carrying steel products, plywood, vehicles, containers, general cargo and dangerous cargo not in bulk.
2. Upper deck hatch covers are folding type and 2nd, 3rd and 4th deck hatch covers are pontoon type
3. One (1) set of stern ramp are provided.
4. The vessel has two (2) sets of 40ton electro-hydraulic single deck cranes on the port side of upper deck.

**PRINCIPAL PARTICULARS**

Length (o.a.).....	143.03 m	Speed (service).....	14.0 knots
Length (b.p.).....	134.00 m	Complement.....	25 P
Breadth (mld.).....	22.60 m	Classification.....	NK
Depth (mld.).....	14.40 m	Handling gear.....	40 t x 18.0 m/min x 30 mR x 2 sets
Draft (mld.).....	7.85 m	Loading capacity (grain).....	26,923 m <sup>3</sup>
Gross tonnage.....	12,740	(bale).....	23,813m <sup>3</sup>
Deadweight.....	11,917 t	(container).....	
Main engine.....	MAKITA – MITSUI – MAN B&W 6S35MC7.1		355 units of 40 Feet / 782 units of 20 Feet
MCR (kW x rpm).....	3,630 kW x 147 min	(car/vehicle).....	554 units
NOR (kW x rpm).....	3,086 kW x abt. 139 min	Builder:.....	Shin Kurushima Dockyard Co., Ltd.



# KANOA 13,551 DWT General Cargo Ship 73

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**KANOA** 13,551 DWT General Cargo Ship 73

Contents By Builder By Ship Type

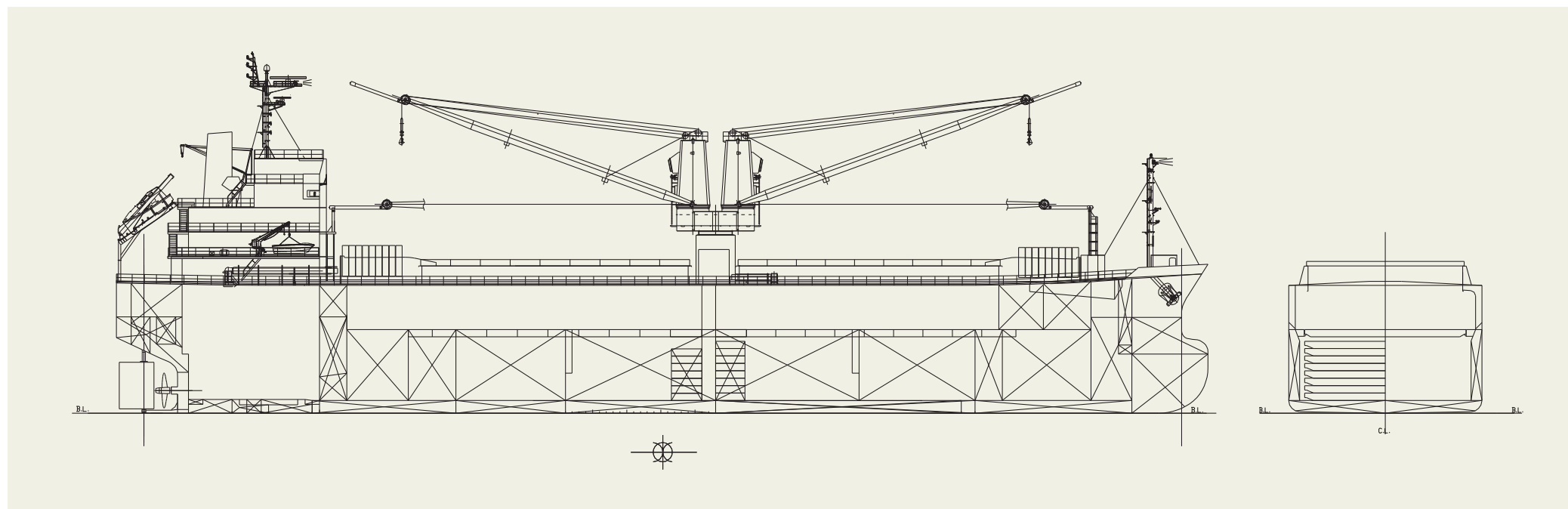
The 13,551-dwt general cargo ship KANOA was built at SHIN KURUSHIMA DOCKYARD CO., LTD. and delivered to a Philippines Owner in June 2023.

**Features**

1. The vessel has twin-deck cargo holds and the cargo holds are designed as suitable for carrying long-size cargoes.
2. Upper deck hatch covers are single pull type for No.1 hatch and No.2 hatch. Second deck hatch covers are pontoon type.
3. The vessel has 1 set of 72-ton electro-hydraulic twin deck cranes on the upper deck.
4. The ship can carry coal, grain(overstowing), chip, steel coil, steel products, dangerous cargoes and general cargoes.

**PRINCIPAL PARTICULARS**

Length (o.a.) .....	119.93 m	MCR (kW x min <sup>-1</sup> ) .....	3,030 kW x 147min <sup>-1</sup>
Length (b.p.).....	114.00 m	NOR (kW x min <sup>-1</sup> ).....	2,576 kW x about 139 min <sup>-1</sup>
Breadth (mld.).....	21.20 m	Speed (service).....	12.0 knots
Depth (mld.).....	14.05 m	Complement.....	21 P
Draft (mld.).....	9.15 m	Classification .....	NK
Gross tonnage.....	9,943	Loading capacity (grain) .....	19,550 m <sup>3</sup>
Deadweight.....	13,551 t	(bale).....	18,848 m <sup>3</sup>
Main engine .....	MAKITA - MITSUI - MAN B&W 6S35MC7.1	Builder: .....	Shin Kurushima Dockyard Co., Ltd.



# AOMORI MARU Fisheries Training Vessel 74

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**AOMORI MARU** Fisheries Training Vessel 74

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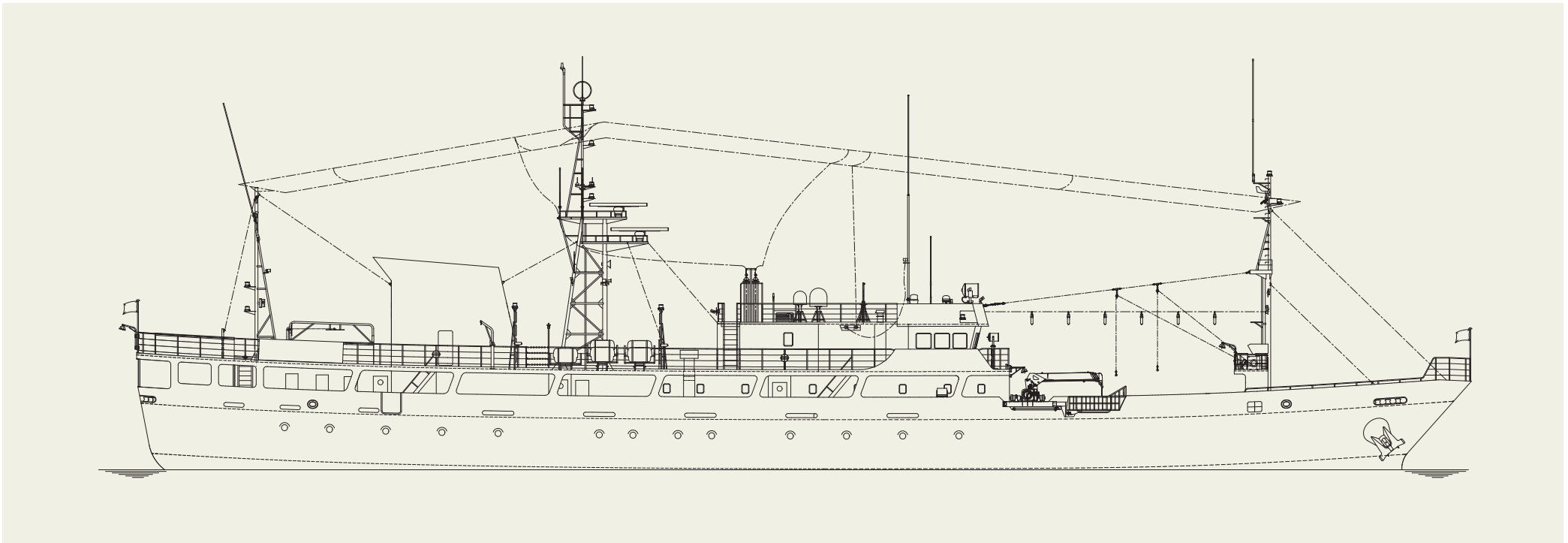
**Features**

1. "AOMORI MARU" is a one-engine, one-shaft type Fisheries Training Vessel that into the route of between Japan and Hawaii, for international voyage.
2. Controllable Pitch Propellers(CPP) are adopted for Improvement of propulsion efficiency and reduced the stern vibration.
3. For good maneuverability in harbor, the bow thruster and frap rudder is provided.
4. It is equipped with an anti-rolling tank to reduce rolling

**PRINCIPAL PARTICULARS**

Length (o.a.).....	65.33 m	Main engine .....	IHI 6M34BFT-4 x 1
Breadth (mld.).....	10.10 m	Speed (service).....	abt 12.00 knots
Depth (mld.).....	4.00 m	Complement.....	83 persons
Draft (mld.).....	3.95 m	Classification .....	JG
Gross tonnage.....	998 (International)	Builder: .....	Naikai Zosen Corporation

during navigation, ensuring a safe and comfortable ship living.



**HEIANMARU** Sea research vessel **75**

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**HEIANMARU** Sea research vessel 75

Contents By Builder By Ship Type

This ship was built as a marine research vessel for Kyoto Prefecture, Japan, for the purpose of conducting fisheries research and ocean observation along the coast of Kyoto Prefecture and offshore.

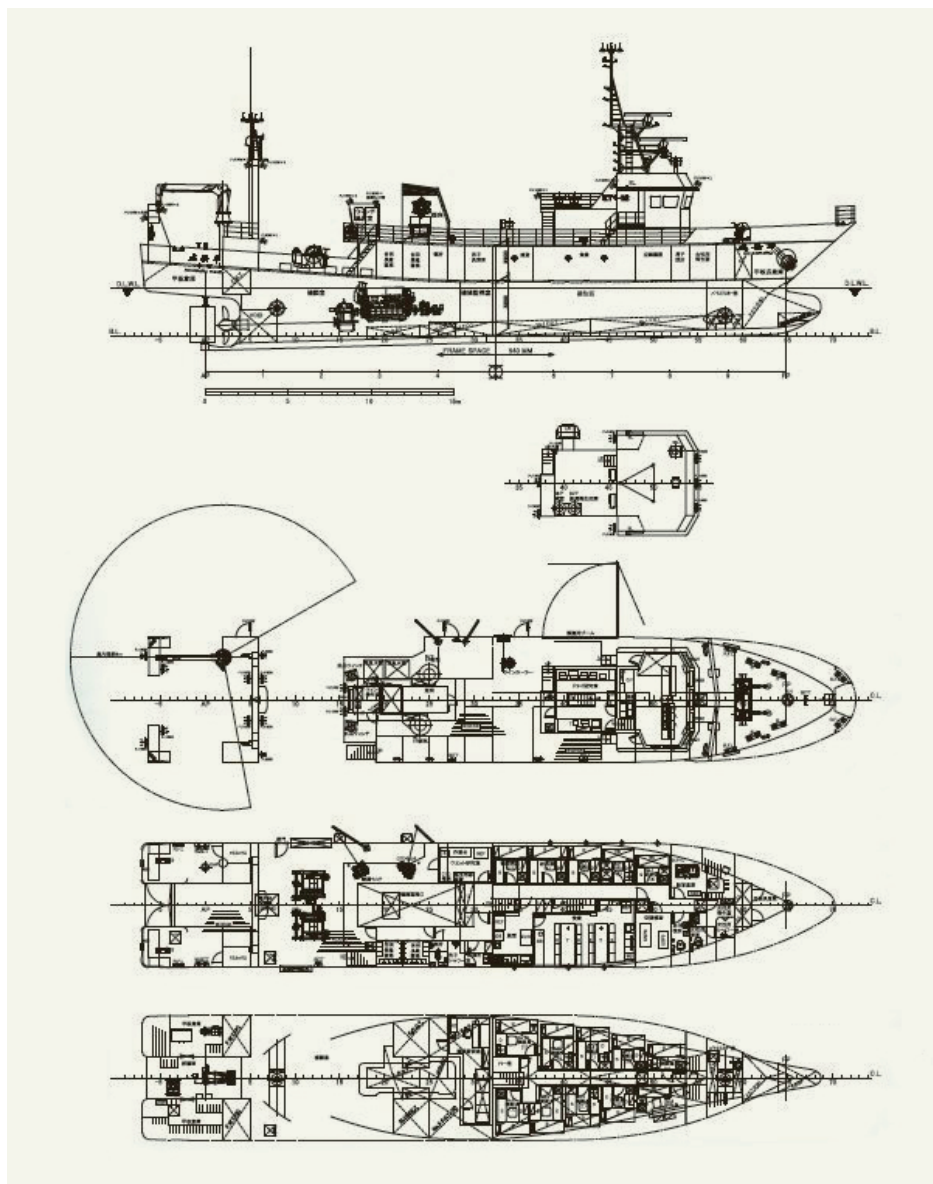
The ship is a steel, single-deck ship with a long forecastle.

Furthermore,

in order to reduce the weight of this ship and lower the center of gravity, her wheelhouse and dry laboratory were made of light alloy. The bow of this ship was equipped with a bulbous bow to reduce wave-making resistance and improve wave-survival, and the stern of the ship was a square stern, and the stern below the water surface was shaped like a stern bulb. This ship also employed a highly skewed variable pitch propeller to reduce stern vibrations. Additionally, each bottom transducer on this ship was placed to avoid interference with sonic equipment, integrated with False Keel.

**PRINCIPAL PARTICULARS**

Length (o.a.) .....	43.14 m
Length (b.p.) .....	35.42 m
Breadth (mld.) .....	7.50 m
Depth (mld.) .....	3.2 m
Draft (mld.) .....	2.9 m
Gross tonnage .....	191 ton
Main engine .....	YANMAR 6EY22A
MCR (kw x rpm) .....	1330kW x 900 rpm
Speed (max. trial) .....	14.63 knots
(service) .....	13 knots
Builder .....	Niigata Shipbuilding & Repair, Inc.



# OSHIMA MARU Training Ship 76

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**OSHIMA MARU** Training Ship 76

Contents By Builder By Ship Type

Oshima Maru is the successor to the same name ship which was built by Mitsubishi Heavy Industries, Ltd. in 1993. Compared with its predecessor, new Oshima Maru is enlarged in gross tonnage, which has enhanced the safety and learning environment as follows.

- The student rooms have been moved from below to above waterline.
- Dedicated area for female students for convenience and security.
- Air-conditioning system designed to prevent infectious diseases.
- A wide variety of research equipment to enable research and survey of seabed topography, oceanography and meteorology.

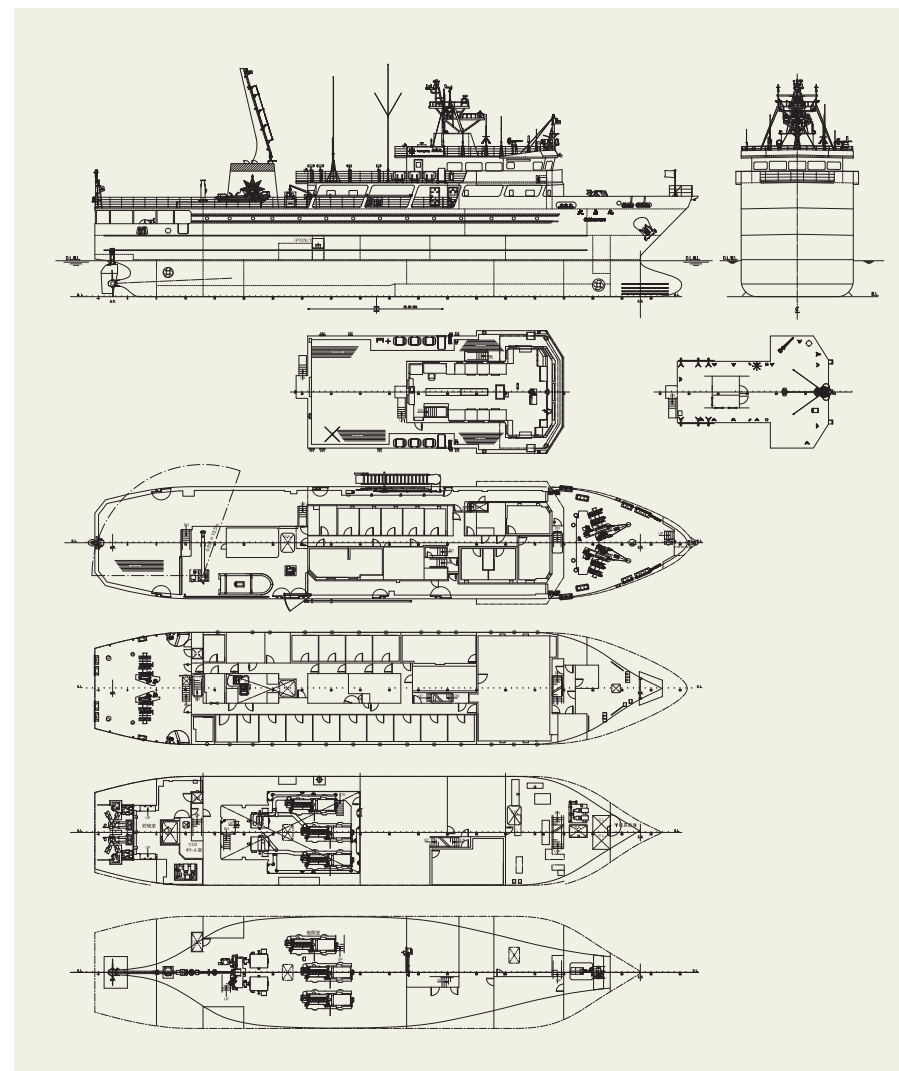
It also functions as a support vessel in the event of a disaster by providing electricity, water and sanitary facilities. The propulsion system of Oshima Maru employs two two-

speed propulsion motors and one Controllable Pitch Propeller (CPP) via a clutched reduction gear. The system is equipped with a function to limit the propulsion motor output by automatic load control (ALC) of CPP to protect the propulsion motor overload and the power plant. Other protective functions, such as emergency stop and automatic slow down, ensure the safety of the propulsion system. Furthermore, an electric propulsion system has resulted in low vibration and noise, which contributes to improved concentration during training and reduced fatigue.

It is equipped with three main generators as main power supply and a lithium-ion battery as auxiliary power supply. This hybrid power supply system has energy-saving functions such as main generator output levelling/peak shaving and suppression of bus line frequency fluctuations, in addition to number control of generator in accordance with the ship's load such as propulsion motors.

In home port, it has a dedicated land-based power supply system, which receives power from shore when the ship is moored, and the main generator can be switched off, thereby reducing fuel consumption and CO<sub>2</sub> emissions. During onboard tours and training at

berths in other ports, the main generator can be shut down and the battery system alone can provide onboard power, achieving zero emissions for limited time.



**PRINCIPAL PARTICULARS**

Length (o.a.)	56.49 m
Length (b.p.)	49.90 m
Breadth (mld.)	10.60 m
Depth (mld.)	5.80 m
Draft (mld.)	3.40 m
Gross tonnage	373
Main generator	750 kW x 3 units
lithium-ion battery	417kWh x 1 unit
Propulsion motor	745/220kW x 2units
Speed (max. trial)	13.44 knots
(service)	12.5 knots
Complement	60
Classification	JG
Builder	Mitsubishi Shipbuilding Co., Ltd.

**KAIKI** Environment Survey/Cleaning Ship 77

Contents

By Builder

By Ship Type



Kaiki is the successor to the same name ship which was constructed by Mitsubishi Heavy Industries, Ltd. in 2003. The mission of Kaiki is to carry out marine environment improvement projects such as survey and observation in closed shallow water area, collection of floating debris and drifting wood. In addition, a dedicated fresh water supply line is provided as a disaster support device, and a small container for transporting relief supplies can be mounted. With reference to the design concept of Kaiki, it is able to work in shallow water with a water depth of about 2 meters. There is enough space on board to accommodate various types of observation equipment in a restricted deck area. Moreover, it is able to travel at high-speed movement in order to cover widespread observation points.

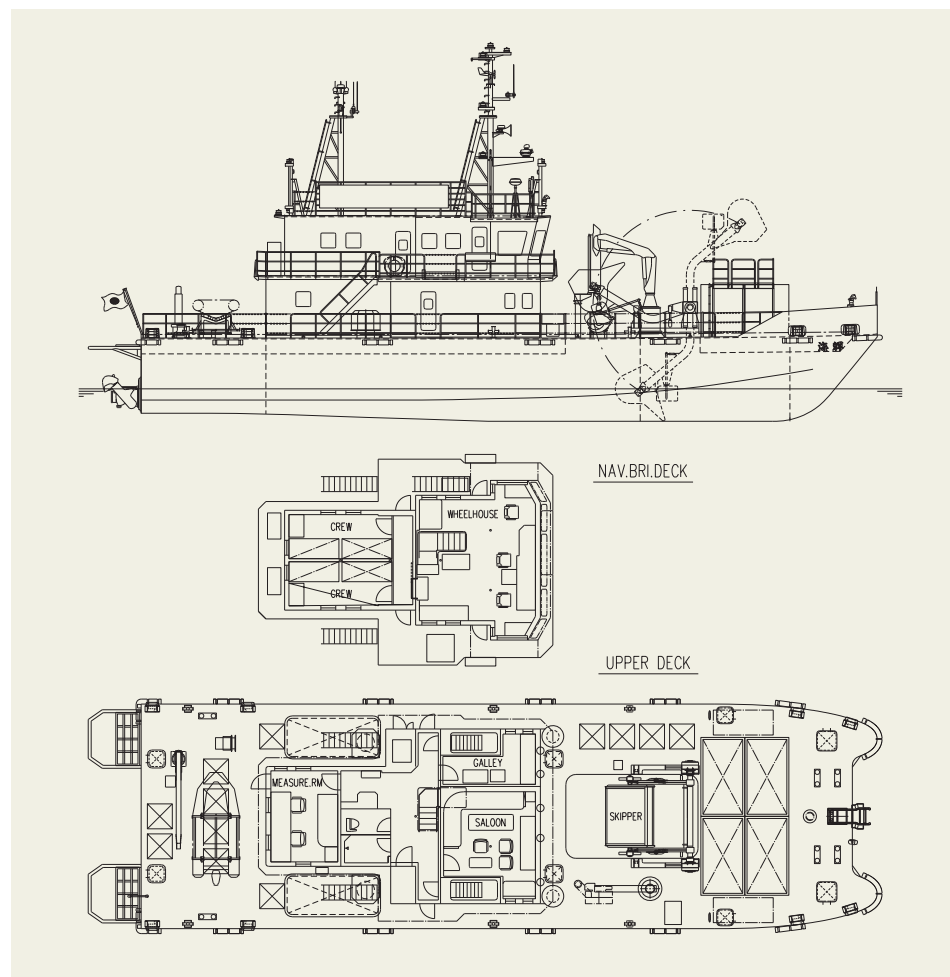
In view of efficient navigation, it has the following features;

- A catamaran hull configuration and a water jet propulsion system are adopted.
- A skipper type debris recovery system is installed in the bow of the ship between the two hulls.

- Grab is attached to an articulated crane, and drifting wood can be picked up and recovered by the grab.
- Equipped with a number of survey equipment to carry out water quality surveys, sediment surveys, tidal current observations, deep shallow surveys, etc.

**PRINCIPAL PARTICULARS**

Length (o.a.) .....	29.50 m
Length (b.p.).....	27.80 m
Breadth (mld.).....	9.00 m
Depth (mld.).....	3.3 m
Draft (mld.).....	1.3 m
Gross tonnage.....	128
Deadweight.....	14.63 t
Main engine.....	MTU16V2000M72 x 2 sets
MCR (kw × rpm).....	1,440 x 2,250 x 2 sets
Speed (max. trial) .....	above 24 knots
Complement .....	[24h or more] 6p(Officer & Crew) [Less than 24h] 6p(Officer & Crew), 10p(passengers), 2p(others)
Classification .....	JG
(tank) .....	FO 21.42m <sup>3</sup> / FW 11.86m <sup>3</sup> / BW 20.35m <sup>3</sup>
Builder.....	Mitsubishi Shipbuilding Co., Ltd.



# BLUE WIND a Jack-Up Vessel (JUV) 78

Contents By Builder By Ship Type



Japan Marine United Corporation (JMU) delivered the “BLUE WIND”, a Jack-Up Vessel (JUV), to Shimizu Corporation, a general contractor in Japan, at the Kure Shipyard on January 31, 2023. The BLUE WIND is one of the world’s largest class of JUV

## Features

1. The basic design of the BLUE WIND was developed by

GustoMSC, an offshore engineering company in the Netherlands. JMU is in charge of the detailed design and construction of the vessel.

2. The vessel is equipped with the dynamic positioning system (DPS) to maintain the vessel position automatically.
3. The jacking-up legs are 92 meters long, and the vessel is applicable to water depths of up to 45 meters. The

- world's largest class 2,500-ton crane with telescopic boom that is extensible up to 158 meters, which allows installation of a 15 mega-watt class wind turbine.
4. The living quarters of the BLUE WIND can accommodate 130 people and are provided with a recreation room and theater for more comfortable long-term offshore life.
5. JMU will contribute to conservation of the global environment by supporting carbon neutrality in the year 2050. JMU's experience in shipbuilding and offshore structures will help to construct JUVs as well as pursuing the business related to offshore floating wind power generation.

## PRINCIPAL PARTICULARS

Long .....	142.0 m
Wide .....	50.00 m
Depth .....	11.0 m
Gross tonnage .....	23,539
Speed, navigational .....	11 knots
Complement .....	130
Classification .....	NK
Registry .....	Tokyo, Japan
Propulsion system .....	Azimuth thruster 3,800 kW x 3 units Thruster Elevating-type azimuth thruster 3,200 kW x 1 unit Tunnel thruster 3,200 kW x 2 units
Power generators .....	4,630 kW x 4 units, 1,425 kW x 2 units
Jacking-up system .....	Rack-and-pinion (electric power drive type) Legs 92 m long x 4 legs
Main crane .....	Telescopic/revolving type crane
Max. hoisting capacity .....	2,500 t (boom contracted) 1,250 t (boom extended)

# KHI's Education, Training Program for KICS<sup>®</sup> Operators Certified by ClassNK 79

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By Ship Type

An education and training program for ship dynamic positioning system (DPS)<sup>\*1</sup> operators developed by Kawasaki Heavy Industries, Ltd. (KHI) has been certified by Nippon Kaiji Kyokai (ClassNK).

DPS-equipped vessels are playing more and more important roles in offshore construction projects requiring highly accurate work, such as those for generating electric power with wind and other renewable energy. The education and training program certified by ClassNK is designed for the operators of the Kawasaki Integrated Control System (KICS<sup>®</sup>)<sup>\*2</sup>, which has also been developed by KHI. The program is made up of classroom lectures, onshore training with simulators and on-board training. Those completing it receive certificates endorsed by both KHI and ClassNK. By providing systematic education and training to KICS<sup>®</sup> operators, the program contributes to improving the safety and reliability of domestic offshore construction projects in Japan.

KICS<sup>®</sup> is available in two series: the DPS series for self-elevating platform (SEP) vessels<sup>\*3</sup>, cable layers and others engaged in specialized operations and the joystick ship operation series for ferries, roll-on/roll-off (Ro/Ro) ships<sup>\*4</sup> and others having more than one propulsion systems. To date, KICS<sup>®</sup> has been employed on board more than 100 vessels in total.

As a ship propulsion system integrator, KHI continues to work to realize safe and secure maritime mobility by providing propulsion system packages suitable for all types of vessels.



Certification ceremony

- <sup>\*1</sup> A dynamic positioning system (DPS) helps detect hull conditions with the global positioning system (GPS) and other sensors and automatically control propulsion systems and rudders so as to keep hulls from currents, winds, waves and other external factors and in designated positions.
- <sup>\*2</sup> The Kawasaki Integrated Control System (KICS<sup>®</sup>) helps collectively operate several systems, such as variable-pitch propellers, rotating thrusters, side thrusters and rudders. Refer to: <https://www.khi.co.jp/mobility/marine/machinery/kics.html>.
- <sup>\*3</sup> A self-elevating platform (SEP) vessel has both a platform and a self-elevating system. A platform is lifted above the sea surface with a self-evaluating system, on which crane and other operations are made. It is mainly deployed for installing offshore windmills and other tasks.
- <sup>\*4</sup> A roll-on/roll-off (Ro/Ro) ship a type of cargo freighter that has boarding ramps as ferries do and a deck for accommodating automobiles and other commodities.



KICS<sup>®</sup> simulator

# Dynamic Positioning System 80

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Recently, automatic ship's maneuvering controlling technology is used in various operation at sea not only offshore development of natural resources. Since the first DPS was installed in 1985, MES has developed and installed Automatic Position Control Systems, including DPS and Joystick Control System, in over 120 ships. As one of the DPS operational technology developments based on these achievements, we developed a function to support vessel operation during fishing operations, including surveys and observations of fishery resources in the fishery field, and actually installed the function on board a vessel to demonstrate its capability. The following three fishing operations were targeted for development in this project.

- Maneuvering the vessel to track detected schools of fish
- Maneuvering at low speed for long periods of time during bathymetric surveys
- Maneuvering during fixed-point oceanographic observations at depths exceeding 2,000m

First, for tracking fish schools, the system automatically controls the speed and bow direction of the vessel while

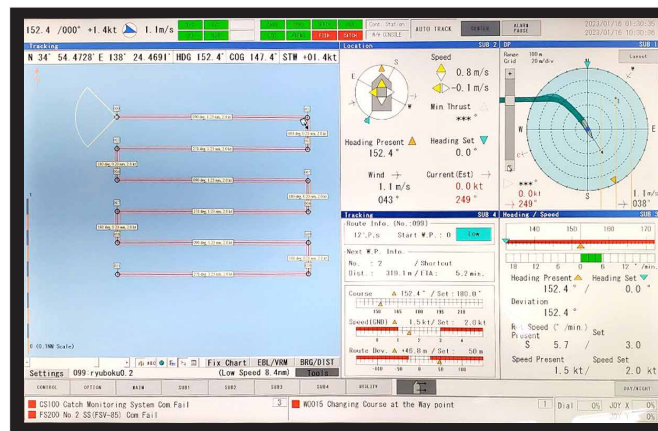


Figure 2: Operation Screen of Low Speed Tracking for Seabed Survey

maintaining the relative position to the fish schools detected by the fish detection system, thereby reducing the operator's burden on the vessel. Next, for low-speed operation during underwater and seafloor surveys, the system controls the position, speed, and bow direction with high precision, taking into account the effects of external disturbances on the pre-planned route, thereby greatly reducing the burden on the operator over a long period of time. The system is also designed to be used in deep water. In addition, the system automatically controls the vessel's position and bow direction over a long period of time while monitoring the relative position of the vessel and the observation equipment in the water under the influence of currents, wind, waves, and other disturbances, thereby improving the efficiency of the survey work.

The DPS with these functions was installed on

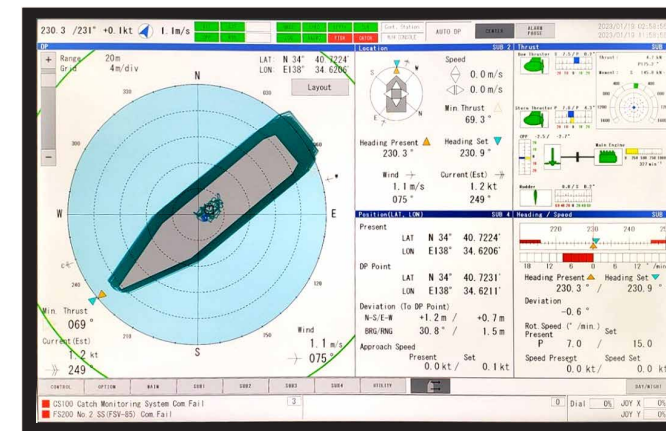


Figure 3: Operation Screen of Automatic Position and Heading Keeping

the Shizuoka Prefecture's fisheries research and guidance ship "Suruga Maru" shown in Figure 1 to adjust the performance and demonstrate the functions of each function. The vessel has an overall length of 41.92 m, an overall width of 7 m, and a displacement of 188 tons. Figure 2 and Figure 3 show examples of the DPS operation screenshots of the automatic tracking maneuver for the planned route, and Figure 3 shows an example of the automatic ship's position keeping maneuver when the CTD (Conductivity Temperature Depth Profiler) was applied to a depth of 2,000m. Figure 3 shows the operation screen of the automatic vessel position keeping maneuver when the CTD (Conductivity Temperature Depth Profiler) was deployed to 2,000m depth. Based on these achievements, we intend to further develop systems to achieve a high degree of automation of various vessel operations in the fishing industry, to reduce the burden of vessel operation on operators, and to improve efficiency while ensuring the safety of operations.



Figure 1: Suruga Maru

# Shin Kurushima Sanoyas Shipbuilding manufacture LNG Fuel Tank 81

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Shin Kurushima Sanoyas Shipbuilding Gas Tank Division designs and manufactures various cargo and fuel gas tanks. Recently, we have been manufacturing LNG fuel tanks to be installed on Pure Car Carrier built at the Shin Kurushima Dockyard. This is first large LNG fuel tank using 9% nickel steel in Japan.

Our company has a wide range of experience and achievements that have been accumulated for many years in LPG cargo tanks manufacturing. Furthermore, we constructed a new insulating shop for insulation work, which is an important factor of cryogenic LNG tanks, and has an organizational structure in consideration of continuous manufactur-

ing. In addition to LNG fuel tanks, we are also conducting research and development on ammonia tanks and LCO<sub>2</sub> tanks, which are expected to be in demand as alternative fuels and transportation in the future. We design and manufacture a wide variety of marine gas tanks to meet the diverse needs of our customers.

# Proposal by KHI, YPT, J-ENG Adopted as NEDO's Green Innovative Fund Project

## Step Taken Forward to Realize Zero-Emission Ships 82

Contents By Builder By Ship Type

A joint proposal made by Kawasaki Heavy Industries, Ltd. (KHI), Yanmar Power Technology Co, Ltd. (YPT) and Japan Engine Corp. (J-ENG) has been adopted by the New Energy and Industrial Technology Development Organization (NEDO) for its Green Innovation Fund Projects\*<sup>1</sup> and Next-Generation Ship Development.

The proposal, the development of marine hydrogen engines and a marine hydrogen fuel system (MHFS), was made to contribute to realizing the Virtuous Cycle of Environment and Economy, an initiative to bring about innovative industrial structure and socioeconomic changes to accomplish further growth by taking active measure to global warming. The initiative is set forth in the Green Growth Strategy through Achieving Carbon Neutrality in 2050, which was formulated by the Ministry of Economy, Trade and Industry (METI) and other relevant governmental organizations on Dec. 25, 2020.

KHI, YPT and J-ENG will simultaneously develop medium-speed four-stroke, medium- and high-speed four-stroke and low-speed two-stroke engines, respectively, aiming to complete a lineup of engines for a wide variety of purposes around 2026. By collaborating with shipping and shipbuilding companies, in addition, they will run engine prototypes on a trial basis on board real vessels, hoping they will actually be implemented in the real world. KHI will be responsible for the development of marine hydrogen fuel tanks and an MHFS as well. Together with the other members, it will strive to complete a hydrogen fuel propulsion system.

KHI, YPT and J-ENG will also join hands—through HyEng Corp., a joint venture they have set up—in conducting a basic combustion analysis; developing raw material and seal technologies as well as common technology components, such as compliance with classification society rules; and using shared test facilities.

KHI, YPT and J-ENG will endeavor to develop marine hy-

drogen engines and an MHFS by combining the technologies and knowledge that they have accumulated. They will also work on a project to verify the commercialization of a liquefied hydrogen supply chain, proposed by KHI to further reduce costs for supplying hydrogen. By advancing the project, which has been adopted separately, they will contribute to realizing carbon neutrality by 2050.

\*<sup>1</sup> The Green Innovation Fund is a program in which the government of Japan financially supports the enterprises and others that make efforts to address business challenges to realize carbon neutrality by 2050. Financial support is provided for a period of 10 years to allow enterprises and other organizations to research, develop, demonstrate and implement outcomes. A total of 14 sectors are eligible, including hydrogen, fuel ammonia and other energy; transport- and manufacturing; and home- and office-related industries.

Development of Next-Generation Ships

### Development of Marine Hydrogen Engines and MHFS

MHFS: Marine Hydrogen Fuel System

#### Project Outline and Purpose

- To reduce greenhouse gas (GHG) emissions from ships, **KHI, YPT and J-ENG simultaneously develop marine hydrogen engines that are different in output and usage.** They operate ships on a trial basis with engine prototypes and confirm their performances and reliabilities to put them into practical application.
- KHI develops marine hydrogen fuel tanks and an MHFS.** After being onshore, a medium- and high-speed four-stroke auxiliary engine and a low-speed two-stroke propulsion engine are applied in demonstrative ship operations. They confirm the engines' performances and reliabilities to put them into practical application.

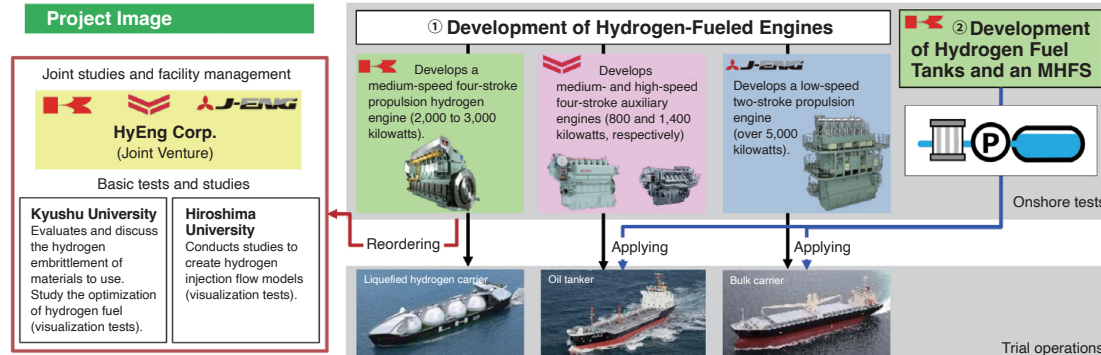
#### Implementation Structure

- Kawasaki Heavy Industries, Ltd. (KHI); Yanmar Power Technology Co., Ltd. (YPT); and Japan Engine Corp. (J-ENG)**
  - KHI**
- \*Bold: Managing company

#### Project Term

- and ② Fiscal 2021-Fiscal 2030 (10 years)

#### Project Image



Sources: Kawasaki Heavy Industries, Yanmar Power Technology and Japan Engine

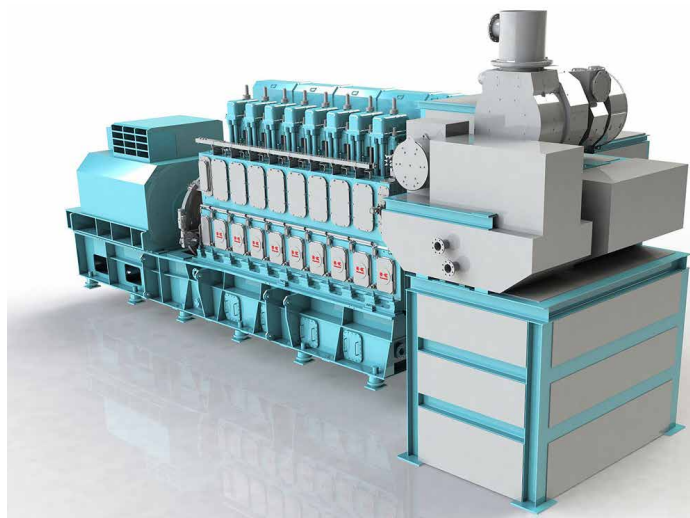


# World's First AiP Granted to Kawasaki's 2.4 MW Class Dual Fuel Engine Using Hydrogen Gas as Fuel 83

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Artist's rendition of a DF engine using hydrogen gas as fuel

November 30, 2022 — Kawasaki Heavy Industries, Ltd. announced today that an Approval in Principle (AiP)\*<sup>1</sup> was granted by Nippon Kaiji Kyokai (ClassNK) for Kawasaki's dual fuel (DF) engine using hydrogen gas as fuel, which will be installed on a 160,000 m<sup>3</sup> liquefied hydrogen carrier developed by Kawasaki.

This DF engine allows operators to flexibly alternate between the use of hydrogen fuel and conventional low-sulfur fuel oil. When hydrogen fuel is selected, the boil-off gas that evaporates naturally from the vessel's liquefied hydrogen cargo tanks is used as the main fuel at a calorie-based ratio of 95% or higher\*<sup>2</sup>, which results in a significant reduction of greenhouse gas emissions.

Kawasaki has a track record of selling more than 200 units



Artist's rendition of the 160,000 m<sup>3</sup> liquefied hydrogen carrier

of engines fueled solely by natural gas. To expand its product portfolio, Kawasaki developed combustion technologies tailored to hydrogen's properties — a fast combustion speed, which often results in backfire, and a high combustion temperature — and in a demonstration test using a single-cylinder test engine, the Company achieved stable combustion of hydrogen without causing abnormal combustion or the overheating of parts in the combustion chamber. Kawasaki is developing hydrogen powered engine for propulsion as a Green Innovation Fund Project of the New Energy and Industrial Technology Development Organization (NEDO). Kawasaki intends to conduct a demonstration test of this engine after installing it as a generator engine on a large-scale liquefied hydrogen carrier which is planned

to be commercialized in the mid-2020s. As Kawasaki foresees a significant increase in the use of hydrogen energy in the future, which will play a vital role in achieving a decarbonized society, the Company is developing a range of technologies for a hydrogen supply chain (production, transportation, storage, and utilization). The technology used for this engine serves the "transportation" and "utilization" stages, covering both the demand and supply aspects of the supply chain. Moving forward, Kawasaki will continue to develop more products that capitalize on hydrogen energy, contributing to the realization of carbon neutrality.

## Specifications of DF generator engine using hydrogen gas as fuel

Rated output: 2,400 kW<sub>e</sub> (when hydrogen fuel is used)

Cylinder diameter: 300 mm

\*<sup>1</sup> At the initial stage of designing or before a decision is made regarding which ship on which the product will be used, the product's design is examined based on existing regulations, such as international treaties and ship classification rules, and an Approval in Principle (AiP) is issued as proof of conformity with such requirements. This time, an AiP was granted by ClassNK based on the result of a risk assessment using the International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk (the IGC Code, to which all liquefied gas carriers built during and after 1986 must conform, and which is included in ClassNK's rules for steel ships) and the Hazard Identification Study (HAZID, a method of assessing risks which are determined by experts based on the frequency with which potential hazards in a system arise, and aimed at identifying ways to minimize that frequency).

\*<sup>2</sup> A calorie-based ratio of hydrogen boil-off gas to low-sulfur fuel oil.

# Delivery of G95ME-C10.6 engine for Large Container Ships 84

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## Largest two-stroke marine propulsion engine G95ME-C10

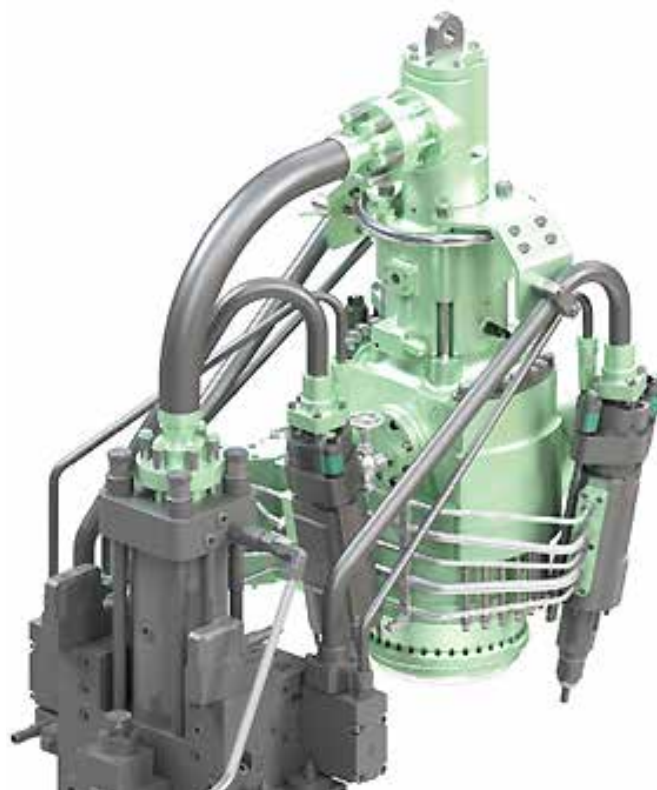
We, MITSUI E&S Co., Ltd. manufacture a two-stroke marine propulsion engine under license from MAN energy solutions. G95ME-C engine is the largest engine applied to container vessels with output range from 27MW to 82MW.

### G95ME-C10.6

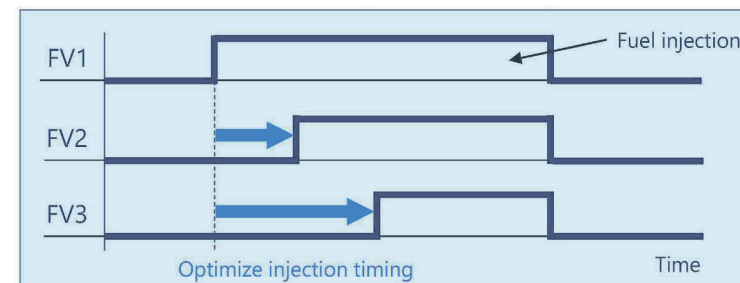
The engine with improved SFOC (Specific Fuel Oil Consumption) in the low load range based on the existing G95ME-C10.5. The layout area and engine footprint are same as conventional engine. G95ME-C10.6 has the following feature.

### Sequential fuel injection

The sequential fuel injection can be applied in the high load range and NOx emission rate is reduced. The technology controls fuel injection timing individually for each injection valve. Reduced NOx emission rate in the high load range is used as SFOC improvement in the low load range.



G95ME-C10.6 engine



Overview of Sequential fuel injection

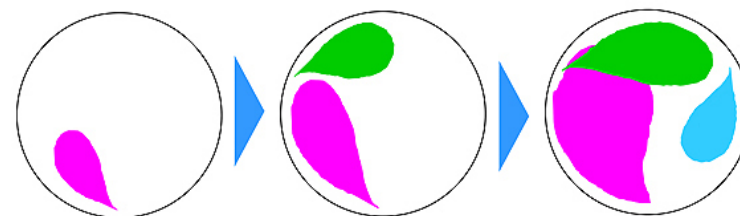


Image of fuel injection

# Delivery of LNG-fuelled main engine S60MEC10.5-GI for car carriers 85

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In 2015, MITSUI E&S Co., Ltd. manufactured LNG-fueled engine; ME-GI (Gas Injection) which offers environmental benefit of decreasing large amount of CO<sub>2</sub>, SO<sub>x</sub> and PM emission. It has been adopted and delivered the container ship, LNG carrier and car carrier and so on.

Now, we have delivered 6S60ME-C10.5-GI engine applied with the latest ME-GI Mk.2 for car carrier, which has the following features.

## Features of ME-GI Mk.2 system

### ● Reduction of pilot oil consumption

The ME-GI engine needs the injection of a small amount of pilot oil as ignition sources. The conventional type (ME-GI Mk.1) required 3% pilot oil consumption at L1 point. On the other hand, it is possible to reduce from 3% to 1.5% of pilot oil for ME-GI Mk.2. By adding a lift function to the fuel valve, it is possible to inject small amount of pilot oil using only small atomizer holes during gas operation.

### ● 1cyl. Gas cut operation function

When a problem occurs in a specific cylinder during gas operation, the gas operation is stopped in all cylinders and changeover to fuel oil operation. By identifying the cylinder in which the problem occurred, the other cylinders can restart gas operation.

### ● Simplification around the cylinder cover and piping

Removing the double wall return pipe has simplified around the cylinder cover and piping.

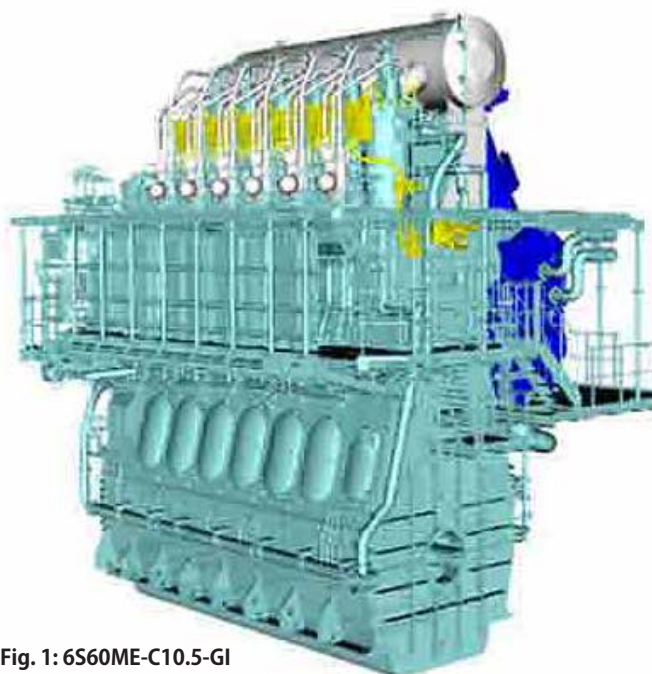
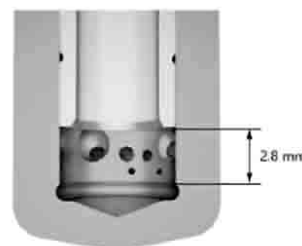


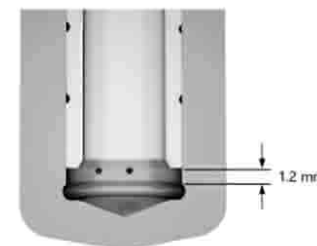
Fig. 1: 6S60ME-C10.5-GI

During fuel operation



Large and small holes

During gas operation



Small holes only

Fig. 2: Fuel valve

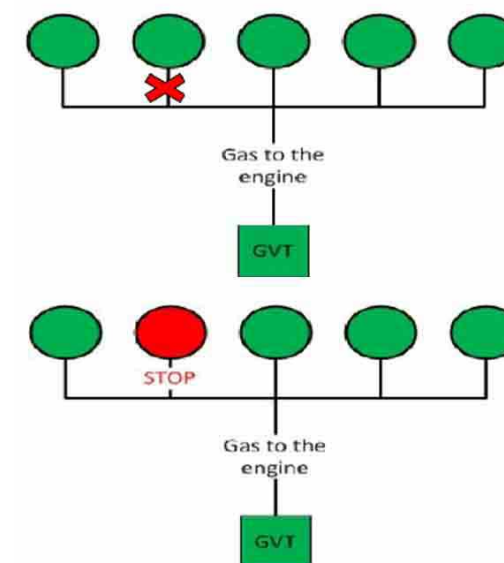


Fig. 3: 1cyl. Gas cut

# Received consecutive orders for methanol-fuelled main engine (ME-LGIM) 86

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In 2015, MITSUI E&S Co., Ltd. released world's first methanol-fuelled ME-LGIM (Liquid Gas Injection Methanol) engine, which offers environmental benefit of decreasing amount of CO<sub>2</sub>, SO<sub>x</sub>, PM emission. As methanol is liquid form and easy to handle, the cost of methanol supply system can be lower compared to gas system. Three ME-LGIM engines, 7S50ME-B9.3-LGIM, were delivered to shipyard and installed on methanol carriers. These three methanol-powered vessels went into service in 2016.

And in 2023, we have received the orders of many LGIM engines ; 6G80ME-C10.5-LGIM for Container vessels and 7G50ME-C9.6-LGIM for Panamax bulk carriers. Many customers are interested in methanol fuelled vessels for using "green methanol" in future to comply with GHG regulations.

## Features of ME-LGIM system

- Same as ME-GI engine, ME-LGIM is dual fuel engine which can run on both conventional fuel oil as primary fuel and methanol as secondary fuel. Engine operation mode can be selected between FO mode (fuel oil running) and SF mode (methanol running).
- Diesel type combustion is adopted to methanol running as same as fuel oil running.
- Compared with normal ME engine, only the supply line and fuel injection valve for methanol are newly added on the engine and the other parts including fuel oil line are remaining as conventional.
- Engine output and load response of methanol running



**7S50ME-B9.3-LGIM**

- is almost the same as that of fuel oil running, and totally independent of weather/sea condition or engine load.
- In case of detecting abnormal condition during methanol running, the engine automatically changes to fuel oil

running immediately.

- ME-LGI type engine can also be adopted for the other secondary fuel such as ethanol, LPG, and dimethyl ether

# Entered service of hydraulic waste heat recovery system, THS2 87

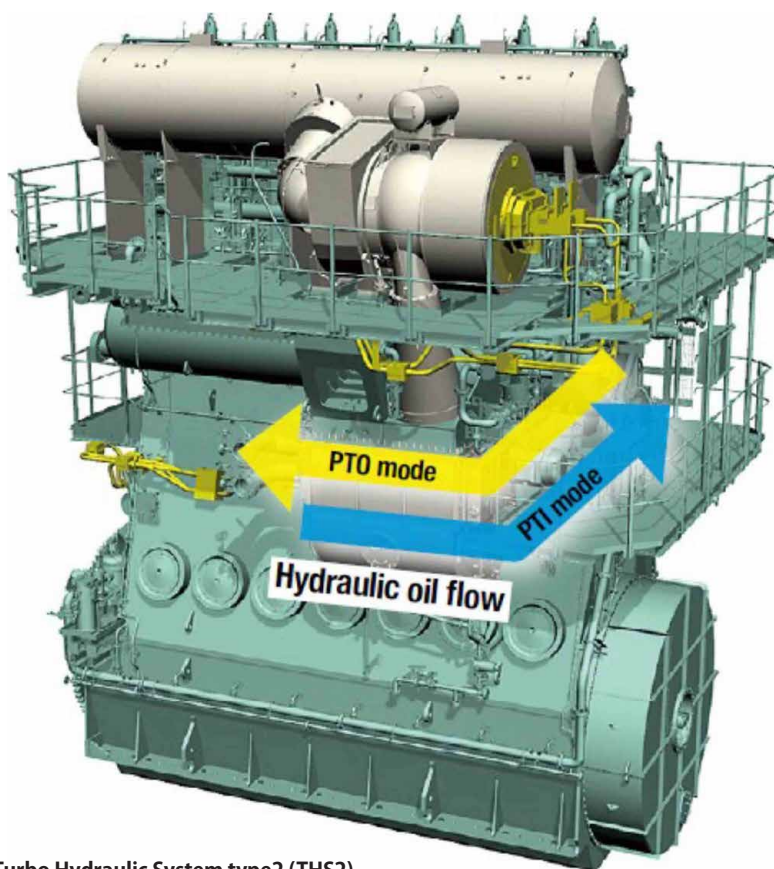
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## Turbo Hydraulic System type2 (THS2)

The excess exhaust gas energy can be utilized by the recent improvement of the efficiency of turbocharger for the marine engine. THS (Turbo Hydraulic System), developed by MITSUI E&S Co., Ltd., is a system which recovers and uses the excess gas energy as hydraulic power.



Turbo Hydraulic System type2 (THS2)

THS is very compact compared to traditional waste heat recovery system and consequently large modification of the engine room is not required. THS2 is a system specialized ME-C engine, following the conventional THS technology, and is also applicable to Tier III engine. Furthermore, it is used with EcoEGR at the same time. THS2 has the following two operating mode.

### PTO mode - Hydraulic oil power supply to assist engine rotation

PTO (Power Take Off) mode can be applied at 50% load or more. THS is a system which recovers and uses the excess gas energy as hydraulic power, thereby, specific fuel oil consumption can be reduced by max. 2% and EEDI can be improved. In addition, it is also possible to assist the engine rotation by using excess exhaust gas energy to crankshaft side.

### PTI mode – Hydraulic oil power supply to assist T/C rotation

PTI (Power Take In) mode can be applied in the low load range. Turbocharger speed is increased and the scavenging pressure is also increased. As a result, the engine operating range with the auxiliary blower stopped condition can be extended, contributing to further slow steaming. In addition, the required engine load is reduced by PTI and thereby, the acceleration time of the engine speed can be shortened.

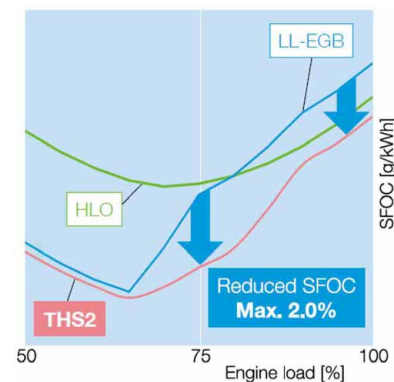


Image of Fuel consumption rate of THS2

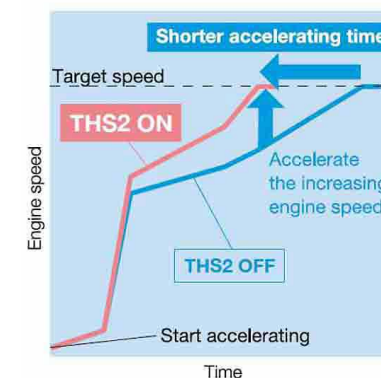
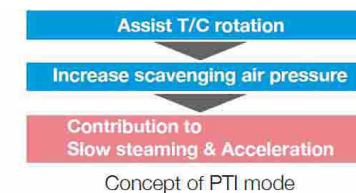


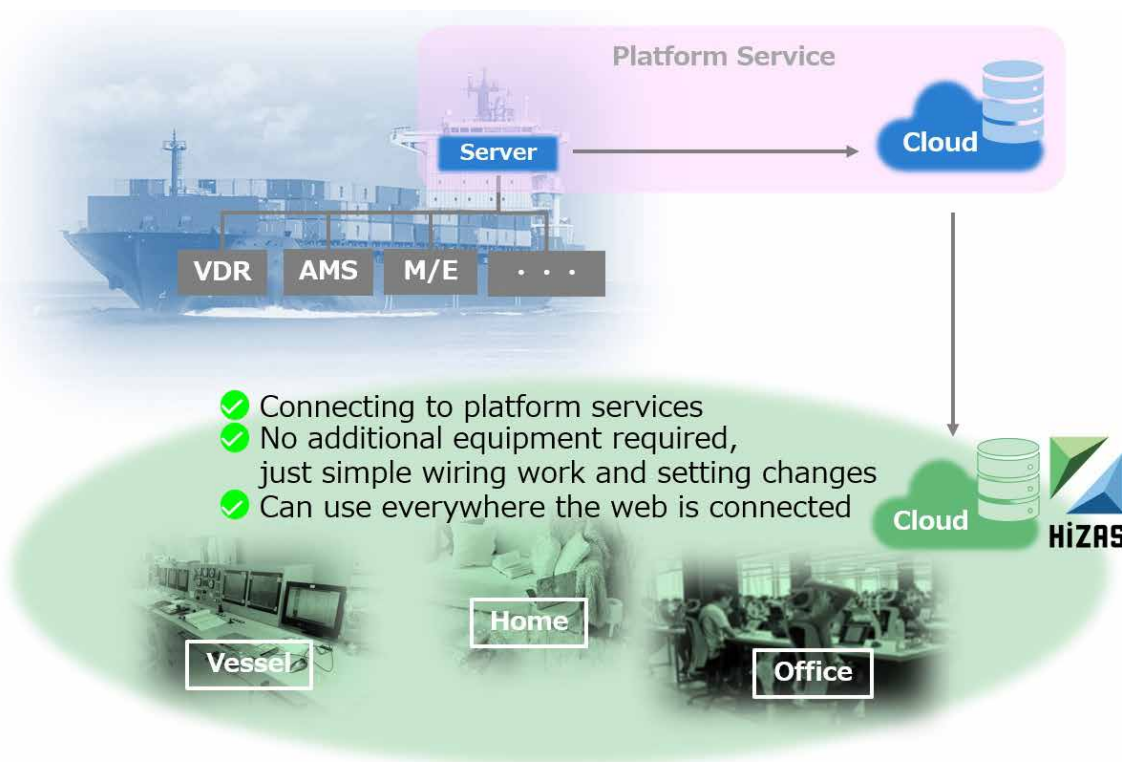
Image of improved acceleration by THS2

# HiZAS VDA Service 88

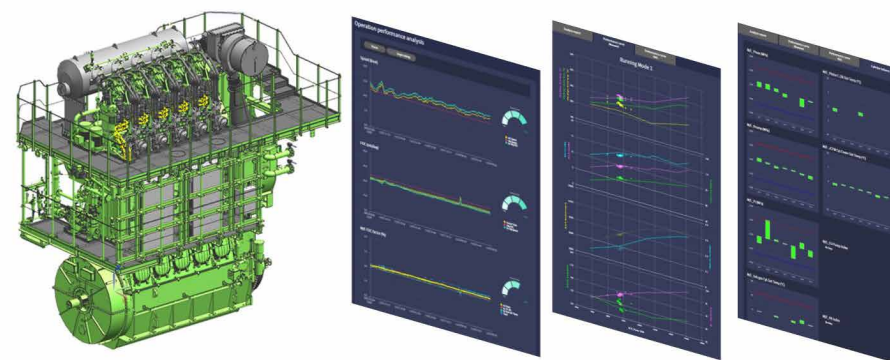
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- ✔ Automatic M/E performance analysis
- ✔ Supports multiple M/E running modes
- ✔ Evaluation of advanced analysis values (TC efficiency, etc.)



Various companies are providing platform services that automatically transmit measured data from ship to shore, and these services are increasingly being applied to new vessels. By connecting to each platform services of these companies, HiZAS is provided as web applications with various functions at minimal cost and without installing additional equipment on vessel.

For vessels that are not applied with platform service, HiZAS is available by manual data upload.

- **Service**  
Cloud base web application
- **Contract**  
Annual contract (subscription)
- **Main functions**
  - Main engine performance analysis
  - Alarm notification
  - Vessel operation performance visualization and evaluation
  - Parts measurement data management
  - Data export

Hitachi Zosen Marine Engine Co., Ltd. is one of the group companies of Hitachi Zosen Corporation

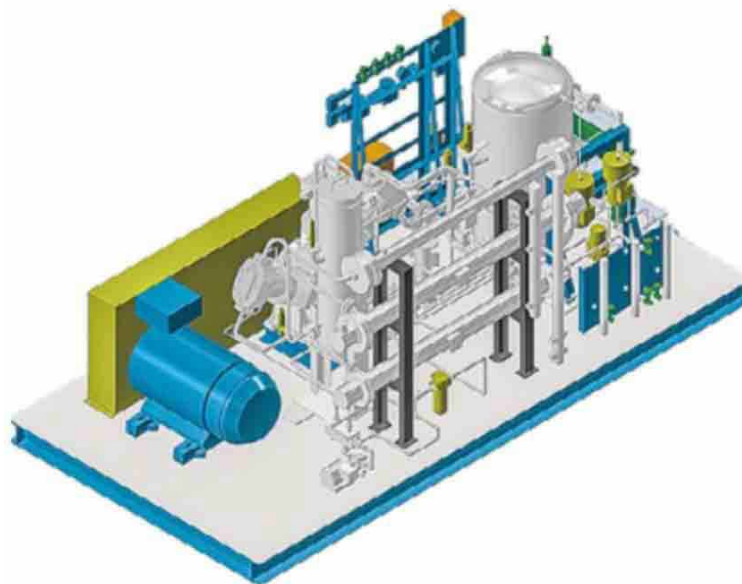
# Received first order of High Pressure BOG Compressor for LNG fuelled vessel with ME-GI engine 89

## High Pressure BOG Compressor System Outline

MITSUI E&S Co., Ltd. has released a BOG (Boil Off Gas) Compressor for LNG fueled vessels. The product can compress BOG to high pressure and supply it as fuel for the main engine. This technology is attracting attention as energy saving with effective utilization of excess BOG. The capacity is suitable for excess BOG treatment of LNG fueled vessels and applicable for various ship types.

## System Outline

The compressor itself is proven type of many delivery records for land automotive CNG stations. We provide the compressor as a integrated unit including associated equipment, e.g. snubbers and coolers.



<b>Compressor unit type</b>	WT3-110GH
<b>Compressor type</b>	W-type 3-stage
<b>Flow rate [kg/h]</b>	250
<b>Discharge pressure [MPaG]</b>	31.5

# Received consecutive orders of high-pressure LNG pump for LNG-fuelled main engine (ME-GI) 90

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## MITSUI High Pressure LNG Pump

### MHP System Outline

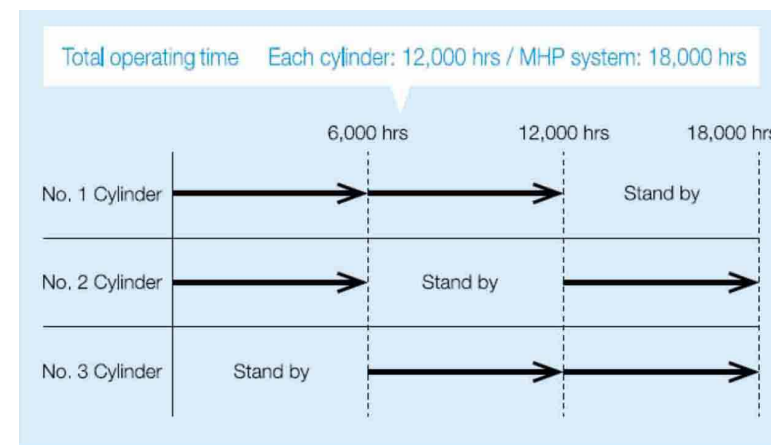
MITSUI E&S Co., Ltd. has originally developed and released Mitsui High Pressure LNG Pump (MHP) as a fuel supply system for the dual fuel engines using high pressure LNG fuel (ME-GI engines). The MHP system uses Hydraulic Drive Unit to control the operation of each cylinder of the High Pressure LNG Pump individually. Thereby standby cylinders can be installed on the same skid. In addition, the cylinder speed is designed to be low, and the life span of the cylinder is extended. Furthermore, MHP system can prevent the

sudden rise of LNG discharge pressure by controlling the startup from a low-speed cycle and the rapid stop operation in case of the emergency.

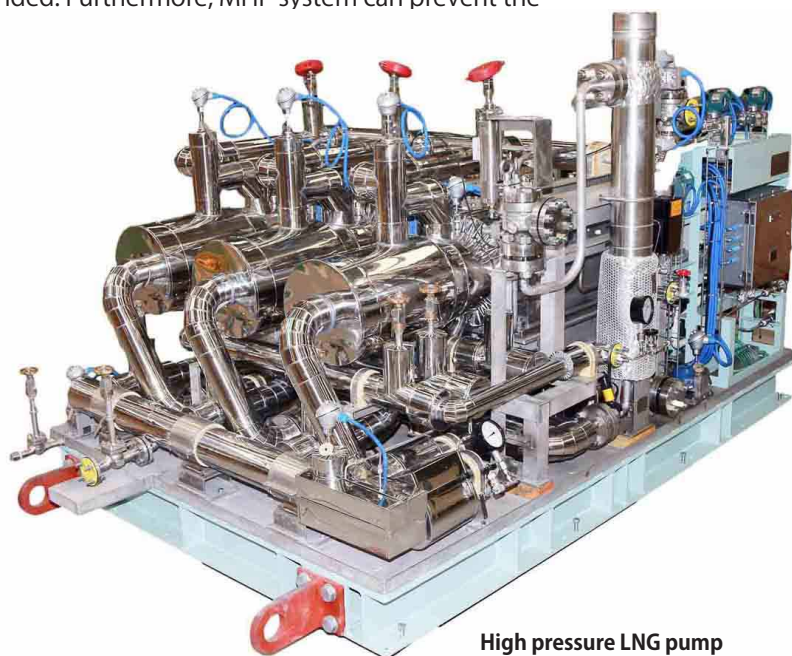
### MHP Series Specification

According to the required flow rate of the main engine, the number of cylinders can be selected as shown in the table below.

The design of the cylinder is same for all MHP models, so the cylinder can be supplied quickly even if something wrong with the cylinder.



Life span image of cylinder operation



High pressure LNG pump

TYPE	Cylinder No.		
	MHP-3	MHP-4	MHP-5
Engine output [MW]	~ 18.6	~ 27.9	~ 37.2
Cylinder No.	3	4	5
Operation Cylinder No.	2	3	4
Flow rate [L/min]	~ 70	~ 105	~ 140
Flow rate [kg/h] (@460kg/m <sup>3</sup> )	~ 1,930	~ 2,895	~ 3,860



# Liquefied Hydrogen Carrier -SUISO FRONTIER- Receives Classification from Nippon Kaiji Kyokai 91

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© HySTRA

Kawasaki Heavy Industries, Ltd. announced that its world's first liquefied hydrogen carrier -the SUIISO FRONTIER- has received a classification from Nippon Kaiji Kyokai (ClassNK), recognizing that it complies with International Maritime Organisation (IMO) standards.

The SUIISO FRONTIER can carry 75 tonnes of liquefied hydrogen in one trip. The liquefied hydrogen is produced by cooling gaseous hydrogen to minus 253° C therefore

reducing its volume to 1/800.

The vessel was inspected for its hull structure, machinery, onboard equipment and materials and more, in accordance with its class rules and the requirements for the safe transport of hydrogen by sea, formulated by ClassNK, based on the provisional recommendations of IMO. The vessel was then added to ClassNK's register on 3 December, 2021.

Hydrogen is a clean energy source that emits no CO<sup>2</sup> when

burned, and when used as a fuel it can generate power, cars, motorcycles, ships and aircrafts. Various initiatives are underway in many countries to build a supply chain for the realization of a hydrogen society.

In order to realize a future in which hydrogen is used as commonly as oil and natural gas, Kawasaki aims to build a supply chain that produces, stores, transports and uses hydrogen in cooperation with various partners.

# Dawn of Australia's Hydrogen Industry 92

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Arrival of the world's first liquified hydrogen carrier on January 21, 2022, the Suiso Frontier, in Victoria marks the success of the Hydrogen Energy Supply Chain (HESC) Pilot Project and the dawn of the Australia's hydrogen industry.

HESC's vision is to produce carbon neutral hydrogen through extraction from a mix of Latrobe Valley coal and biomass, capturing and storing CO<sub>2</sub> via CarbonNet and optimizing energy efficiency in the ZHESC supply chain. The 225,000 tonnes of carbon neutral liquefied hydrogen (LH<sub>2</sub>) produced by HESC in a commercial phase will contribute to reducing global CO<sub>2</sub> emissions by some 1.8 million tonnes per year (equivalent to the emission of about 350,000 petrol-driven cars), while providing valuable infrastructure for other hydrogen projects in the region.

In a commercial phase, the project will create 30,000 full-time jobs across the Gippsland and Mornington Peninsula regions over the life of the project. During the Pilot Project, 99.999% pure hydrogen has been produced from Latrobe Valley coal and biomass via gasification, trucked to Hastings, cooled to -253 degrees and subsequently liquified to less than 800 times its gaseous volume to create highly valuable liquefied hydrogen.

The loading of liquefied hydrogen onto the Suiso Frontier for the return journey to Kobe, Japan, makes the HESC Proj-



ect the most advanced and scalable hydrogen project in Australia and the first project in the world to make, liquefy and transport liquid hydrogen by sea to an international market.

The Australia-Japan HESC partnership is at the cutting edge of creating new technology, cleaner energy, and jobs for both countries. The learnings from the Pilot will form the basis for further work towards delivering HESC at a commercial scale. Specifically, the team will undertake extensive research and development into the technical and operational requirements that delivery of a commercial-scale project will entail.

Activities that will be undertaken include:

- Continuing to test and demonstrate the transport of liquid hydrogen across the ocean with further return trips of the Suiso Frontier between Australia and Japan.
- Undertaking regulatory approval activities.
- Ongoing discussion and monitoring of CarbonNet.
- Investigations on the economics of the commercial-scale project and its business model.
- Engagement with potential 'off-takers' in Australia and Japan.
- Further refining and testing of biomass feed stock for hydrogen production (blending with Latrobe Valley coal).
- Improving technologies to reduce costs and carbon intensity across the supply chain. This includes further development

of the ortho-para conversion catalyst for creating LH<sub>2</sub> in partnership with CSIRO.

- Implementing a comprehensive stakeholder engagement program to continue building social licence among impacted communities.

The HESC Project Partners are: Kawasaki Heavy Industries, Ltd (KHI), Electric Power Development Co., Ltd. (J-POWER), Iwatani Corporation (Iwatani), Marubeni Corporation (Marubeni), AGL Energy (AGL) and Sumitomo Corporation (Sumitomo). Royal Dutch Shell (Shell), ENEOS Corporation and Kawasaki Kisen Kaisha, Ltd. (K-Line) are also involved in the Japanese portion of the project.

# Liquefied Hydrogen Carrier -SUIISO FRONTIER- Wins PM Award at Japan Industrial Technology Awards 93

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The world's first liquefied hydrogen carrier, developed and built by Kawasaki Heavy Industries, Ltd. (KHI), won the Prime Minister's Award at the 51st Japan Industrial Technology Awards on April 6, 2022.

The Japan Industrial Technology Awards, presented by The Nikkan Kogyo Shimbun, Ltd., boasts a long history as they were established in 1972. The awards are granted every year to products and others—such as large innovative industrial facilities and cutting-edge technologies—that are turned into practical application and contribute to industrial and/or social development.

The Suiso Frontier was constructed to establish a technology to transport hydrogen, a promising next-generation energy resource, efficiently and stably from overseas to Japan. Having highly insulated tanks of a total capacity of some 1,250 cubic meters, it can carry as much as 75 tons of liquefied hydrogen by refrigerating hydrogen to minus 253 degrees Celsius to diminishing it to one eight hundredths in volume.

The construction of the Suiso Frontier began in 2015 as a demonstration project to establish a supply chain for transporting unused brown coal-based hydrogen in large quantities by sea, which was promoted by the New



Then Education, Culture, Sports, Science and Technology State Minister Tanaka Hideyuki (left) and KHI President and CEO Hashimoto Yasuhiko (right)



President Imizu Haruhiko of The Nikkan Kogyo Shimbun (left) and KHI President and CEO Hashimoto Yasuhiko (right)



KHI President and CEO Hashimoto Yasuhiko gives an address as the Suiso Frontier receives the Prime Minister's Award.



Executive members of KHI's Suiso Frontier development team (\*)

(\*) From left: Manager Mizumukai Kentaro of the Hydrogen Strategy Division's Project Group; Chief Executive Staff Officer Komura Atsushi, General Manager Imamura Keigo and Deputy General Manager Motoi Tatsuya of the Ship and Offshore Structure Business Division; and Chief Executive Staff Officer Kamenno Yui-chi of the Hydrogen Strategy Division's Project Group

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Energy and Industrial Technology Development Organization (NEDO). In 2016, KHI joined forces with Iwatani Corp., Shell Japan Ltd. and Electric Power Development Co., Ltd. (J-POWER) to set up a joint venture, the CO<sub>2</sub>-free Hydrogen Energy Supply-chain Technology Research Association (HySTRA). The association then accelerated the Suiso Frontier development by beginning to review safety from a viewpoint of hydrogen users and so on. In fiscal 2017, full-scale design and construction work was kicked off. In December 2019, the liquefied hydrogen carrier newbuilding was launched at KHI's Kobe Works, and in December 2020, it obtained a ship classification from Nippon Kaiji Kyokai (ClassNK). KHI successfully conducted trial transport of liquefied hydrogen produced in Australia to the Port of Kobe from Dec. 24, 2021 to Feb. 25, 2022.

KHI has been developing hydrogen technologies for 35

years, or since 1987. For example, it has produced and manages tanks for storing liquefied hydrogen for rocket fuel at the Japan Aerospace Exploration Agency (JAXA)'s Tanegashima Space Center. KHI has also made it possible to transport large quantities of hydrogen in ships by developing cargo tanks for safely carrying liquefied hydrogen, which is extremely low in temperature at minus 253 degrees Celsius; a plumbing system for cargo handling; and so forth. Not only has it constructed the world's first liquefied hydrogen carrier, but KHI also has participated in the formulation of international standards for safely moving liquefied hydrogen as well. Developing a supply chain to safely transport hydrogen from overseas, KHI has been highly rated, as it will contribute considerably to realizing carbon neutrality, one of the world's social agendas.

To realize a hydrogen society, KHI will develop a much

larger liquefied hydrogen carrier having a tank capacity of 160,000 cubic meters, 128 times as great as the Suiso Frontier's, and endeavor to reduce costs for supplying hydrogen. Hoping that hydrogen will be consumed as commonly as natural gas and petroleum in the future, it will strive to build larger liquefied hydrogen carriers by making the most of the technologies and know-how that it has gained from the construction of the Suiso Frontier. In partnership with various enterprises, KHI will build a supply chain to produce, transport, store and consume hydrogen, a next-generation energy resource.

About The Nikkan Kogyo Shimbun's 51st Japan Industrial Technology Awards: <https://corp.nikkan.co.jp/p/honoring/nihonsangyogijyutsutaishou>

# HySTRA celebrates completion of world's first liquefied hydrogen vessel voyage in Japan 94

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**HySTRA**

未利用褐炭由来水素大規模海上輸送サプライチェーン構築実証事業  
日豪サプライチェーン完遂 記念式典

# HySTRA celebrates completion of world's first liquefied hydrogen vessel voyage in Japan 94

A ceremony to mark the completion of the world's first maritime transport of liquefied hydrogen, including its loading and unloading has been held in Kobe, Japan. The demonstration voyage by the world's first liquefied hydrogen carrier, Suiso Frontier, proved that an international liquefied hydrogen supply chain is possible, marking a significant step towards the utilization of hydrogen as a new energy source.

The HySTRA\*<sup>1</sup> joint venture, comprising Iwatani Corporation, Kawasaki Heavy Industries, Ltd., Shell Japan Ltd., Electric Power Development Co., Ltd.(J-POWER), Marubeni Corporation, ENEOS Corporation, and Kawasaki Kisen Kaisha, Ltd. with support from NEDO\*<sup>2</sup>, is exploring the development of a large-scale marine transport supply chain.

Ceremony for completing the demonstration test  
The joint venture developed technologies to produce and transport large volumes of liquefied hydrogen, conducting demonstration tests between Japan and Australia to establish processes around the safe loading, offloading and storage of hydrogen. Insights from the demonstration voyage will also guide the development of international safety standards and codes for transporting liquefied hydrogen. Suiso Frontier, the world's first liquefied hydrogen carrier, departed Japan in December 2021 and arrived in Australia in January 2022. The ship was loaded with liquefied hydrogen produced from coal in Victoria, Australia, and returned to Japan in February 2022, unloading the cargo to a land-side storage tank.

The HySTRA joint venture partners will continue to gather

data and findings, and collaborate with various parties to promote this project and contribute to the development

of a commercial hydrogen supply chain, as more industries explore hydrogen as a new energy source.

### The HySTRA joint venture comprises:

<b>Iwatani Corporation</b>	Operation of Hy touch Kobe, a liquefied hydrogen cargo handling demonstration terminal
<b>Kawasaki Heavy Industries</b>	Design and construction of "Suiso Frontier", a liquefied hydrogen carrier, and the Hy touch Kobe, a liquefied hydrogen cargo handling demonstration terminal
<b>Shell Japan</b>	Operation and crewing of Suiso Frontier
<b>J-POWER</b>	Construction and operation of the facilities to produce hydrogen gas using Victorian coal in Latrobe Valley, Victoria
<b>Marubeni</b>	Examination of implementation of CO <sub>2</sub> -free hydrogen supply chain technologies by leveraging knowhow cultivated as a general trading company
<b>ENEOS</b>	Feasibility study of CO <sub>2</sub> -free Hydrogen Supply Chain
<b>Kawasaki Kisen Kaisha</b>	Assistance for safe transportation of liquid hydrogen by using its knowledge and experience acquired through the operation of LNG carriers.

The project had input from Japanese and Australian government agencies, including the Ministry of Economy, Trade and Industry and NEDO, and companies in Japan and Australia.

\*1 An abbreviation of the Japan CO<sub>2</sub> Free Hydrogen Energy Supply-chain Technology Research Association. The company was established by Iwatani, Kawasaki Heavy Industries, Shell Japan and J-POWER to establish and demonstrate technologies for hydrogen production using Victorian coal, transportation and storage for the commercialization of a CO<sub>2</sub>-free hydrogen supply chain. Marubeni Corporation, ENEOS Corporation, and Kawasaki

Kisen Kaisha joined the project later.  
\*2 New Energy and Industrial Technology Development Organization

### Japan-Australia Supply Chain Pilot Diagram



※HySTRA business supported by NEDO(New Energy and Industrial Technology Development Organization) is written in red.  
 ※Consortium business supported by Commonwealth of Australia and Victoria State Government is written in white.  
 ※KHI=Kawasaki Heavy Industries, Ltd.  
 ※STASCO=Shell International Trading and Shipping Company Limited

### Reference

In Australia, Iwatani Corporation, Kawasaki Heavy Industries Group, J-POWER Group, Marubeni Corporation, Sumitomo Corporation, and AGL Energy Limited formed a consortium to build a gas refining facility, hydrogen liquefaction and loading terminal with subsidies from the Australian and Victorian governments. A local industrial gas company oversees ground transportation of hydrogen.

# Kawasaki Obtains AiP for Large, 160,000 m<sup>3</sup> Liquefied Hydrogen Carrier

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## AiP issuance ceremony

April 22, 2022 — Kawasaki Heavy Industries, Ltd. announced its obtainment of approval in principle (AiP) from Nippon Kaiji Kyokai (ClassNK) for a large, 160,000 m<sup>3</sup> liquefied hydrogen carrier.

The liquefied hydrogen carrier that received the AiP is a large-sized vessel equipped with a cargo containment system ("CCS") comprising four liquefied hydrogen tanks having a combined capacity of 160,000 m<sup>3</sup>. The CCS received its own AiP in April 2021. The carrier is designed to transport cryogenic liquefied hydrogen, cooled down to a temperature of -253° C and reduced to one eight-hundredth its initial volume, by sea in large amounts on each voyage, helping to reduce hydrogen supply costs. In order

## AiP certificate



to build this large-sized carrier, Kawasaki leveraged design and shipbuilding technologies as well as safety-related technologies and knowledge utilized in the construction of the globally pioneering, 1,250 m<sup>3</sup> liquefied hydrogen carrier SUISEI FRONTIER,<sup>\*1</sup> while also calling upon its many years of experience in building liquefied natural gas (LNG) carriers and other liquefied-gas transport vessels. This vessel's AiP was issued by ClassNK following examinations to confirm that the vessel satisfies the IGC Code<sup>\*2</sup> and the International Maritime Organization (IMO) Interim

Recommendations for Carriage of Liquefied Hydrogen in Bulk,<sup>\*3</sup> and also clears Class regulations as well as a risk assessment based on Hazard Identification Study (HAZID)<sup>\*4</sup> methods.

## The main features of Kawasaki's carrier are as follows.

1. The vessel contains four 40,000 m<sup>3</sup> liquefied hydrogen carrying tanks for a combined total capacity of 160,000 m<sup>3</sup>. These tanks utilize a newly developed, high-performance insulation system that minimizes boil-off gas (BOG), which occurs in response to heat ingress, in order to enable large-quantity transport of cryogenic liquefied hydrogen.
2. The propulsion system includes a boiler and steam turbine plant capable of operating using hydrogen as fuel, and a dual-fuel propulsion system that makes use of natural BOG as fuel to power the ship. Utilizing hydrogen, which does not emit CO<sub>2</sub> during combustion, as a fuel for propulsion contributes to reduced CO<sub>2</sub> emissions from liquefied hydrogen transport operations. Furthermore, the vessel is equipped with a hydrogen-gas-fuel supply system comprising hydrogen gas compression equipment, hydrogen gas heat exchanger equipment and other components in order to enable supply of BOG from the CCS to the propulsion system.
3. The vessel uses a cargo handling system designed to load large amounts of liquefied hydrogen onto the vessel in just a short time, and it is equipped with vacuum insulated double wall pipes in order to efficiently and safely transfer hydrogen in its cryogenic, liquefied state from

## Kawasaki Obtains AiP for Large, 160,000 m<sup>3</sup> Liquefied Hydrogen Carrier 95

onshore storage facilities to the vessel tanks minimizing vaporization.

4. The hull and draft of the vessel were designed with consideration for the low specific gravity of the liquefied hydrogen cargo, and horsepower required for propulsion was kept low in response, resulting in higher-efficiency propulsion performance. Moreover, risk assessments were carried out for the vessel's propulsion system, cargo handling system and other elements in relation to liquefied hydrogen, and suitable safety measures were implemented in response. This eliminates liquefied-hydrogen-caused risk to the ship's crew, the ship environment, structural strength, and overall ship soundness while ensuring safety.

Kawasaki developed this vessel as part of a subsidized project by NEDO\*5 and is currently carrying out more in-depth design with an eye to commercial operations starting in the mid-2020s. Amid global calls for the early achievement of carbon neutrality targets, the company is striving to achieve large-volume transport of liquefied hydrogen—for which demand is expected to grow as a clean energy source—in order to promote the use of hydrogen energy and thus help achieve decarbonization, working as one for the good of the planet.

### Main Specifications of Kawasaki's Large, 160,000 m<sup>3</sup> Liquefied Hydrogen Carrier

Length: approx. 346 m; width: approx. 57 m; draft: 9.5m  
 Cargo tank capacity: 160,000 m<sup>3</sup> (40,000 m<sup>3</sup> × 4 tanks, enabling carrying of approx. 10,000 tons of liquefied hydrogen)



Simulated appearance of the completed 160,000 m<sup>3</sup> liquefied hydrogen carrier

\*1 Constructed by Kawasaki as a member of the CO<sub>2</sub>-free Hydrogen Energy Supply-chain Technology Research Association (HySTRA; website: <http://www.hystra.or.jp/en/>), as part of the Demonstration Project for Establishment of Mass Hydrogen Marine Transportation Supply Chain Derived from Unused Brown Coal by the New Energy and Industrial Technology Development Organization (NEDO).

\*2 International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk. A set of international regulations governing the constructions and equipment of such ships. All ships that carry liquefied gases and that were built in or after 1986 are required to adhere to the code, and ClassNK incorporates the code as part of its Rules and Guidance

for the Survey and Construction of Steel Ships.

\*3 Provisional recommendations adopted by the IMO for bulk transport of liquefied hydrogen.

\*4 Method of assessing risk, which is determined by experts based on the frequency with which potential hazards in a system arise, and aimed at identifying ways to minimize that frequency.

\*5 NEDO Technology Development Project for Building a Hydrogen-based Society / Technology Development Project for Large-Scale Utilization of Hydrogen / Project for Enlargement of Liquefied Hydrogen Cargo Tank Facilities and Development of Unloading Terminal Equipment.



# Liquefied Hydrogen Carrier -SUIISO FRONTIER- Chosen for Ship of the Year 2021 96

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## Liquefied Hydrogen Carrier -SUISO FRONTIER- Chosen for Ship of the Year 2021 96

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From left: Chief Executive Staff Officer Muragishi Osamu of KHI's Ship and Marine Structure Business Division, General Manager Harada Eiichi of KHI's Hydrogen Strategy Division, then JASNAOE President Fujikubo Masahiko, KHI President and CEO Hashimoto Yasuhiko and General Manager Imamura Keigo of KHI's Ship and Offshore Structure Business Division

The world's first liquefied hydrogen carrier, developed and constructed by Kawasaki Heavy Industries, Ltd. (KHI), was chosen for the Ship of the Year 2021 on July 25, 2022 at the 32nd Ship of the Year Awards, presented by the Japan Society of Naval Architects and Ocean Engineers (JASNAOE). The Ship of the Year award, the highest honor for the domestic shipbuilding industry, is given every year to the most prominent product in accordance with technical,

artistic and social considerations about high-profile ships built in Japan.

The Suiso Fronter was developed in a demonstration experiment to handle and transport brown coal-based hydrogen by sea on a liquefied hydrogen carrier between Japan and Australia. The project was conducted by the CO<sub>2</sub>-free Hydrogen Energy Supply-chain Technology Research Association (HySTRA)\*1 in a demonstration project to establish a supply chain for transporting unused brown coal-based hydrogen in large quantities by sea, which was promoted by the New Energy and Industrial Technology Development Organization (NEDO). The Suiso Frontier left Japan in December 2021; arrived in Australia in

January 2022, where it was loaded with hydrogen produced from brown coal; and returned to Japan in February 2022. In receiving the Ship of the Year award, the Suiso Frontier was highly rated as it had been developed and constructed ahead of the rest of the world as a liquefied hydrogen carrier prototype for transporting hydrogen, a promising next-generation energy resource that does not emit CO<sub>2</sub>, by liquefying it at a temperature of minus 253 degrees

Celsius and reducing it to one eight hundredths in volume. Other reasons for which it was acclaimed were the facts that it had attained success in transporting hydrogen from Australia and that it would lead to the development of larger freighters. The award review committee recommended by an overwhelming majority that the Suiso Frontier be the Ship of the Year.

The technologies for handling liquefied hydrogen, assessing risks, ensuring safety and so on that have been obtained from the development of the Suiso Frontier are being applied to the ongoing development of a 160,000-cubic-meter-capacity liquefied hydrogen carrier, which is being advanced to transport hydrogen in large quantities. Nippon Kaiji Kyokai (ClassNK) approved its basic design in April 2022.

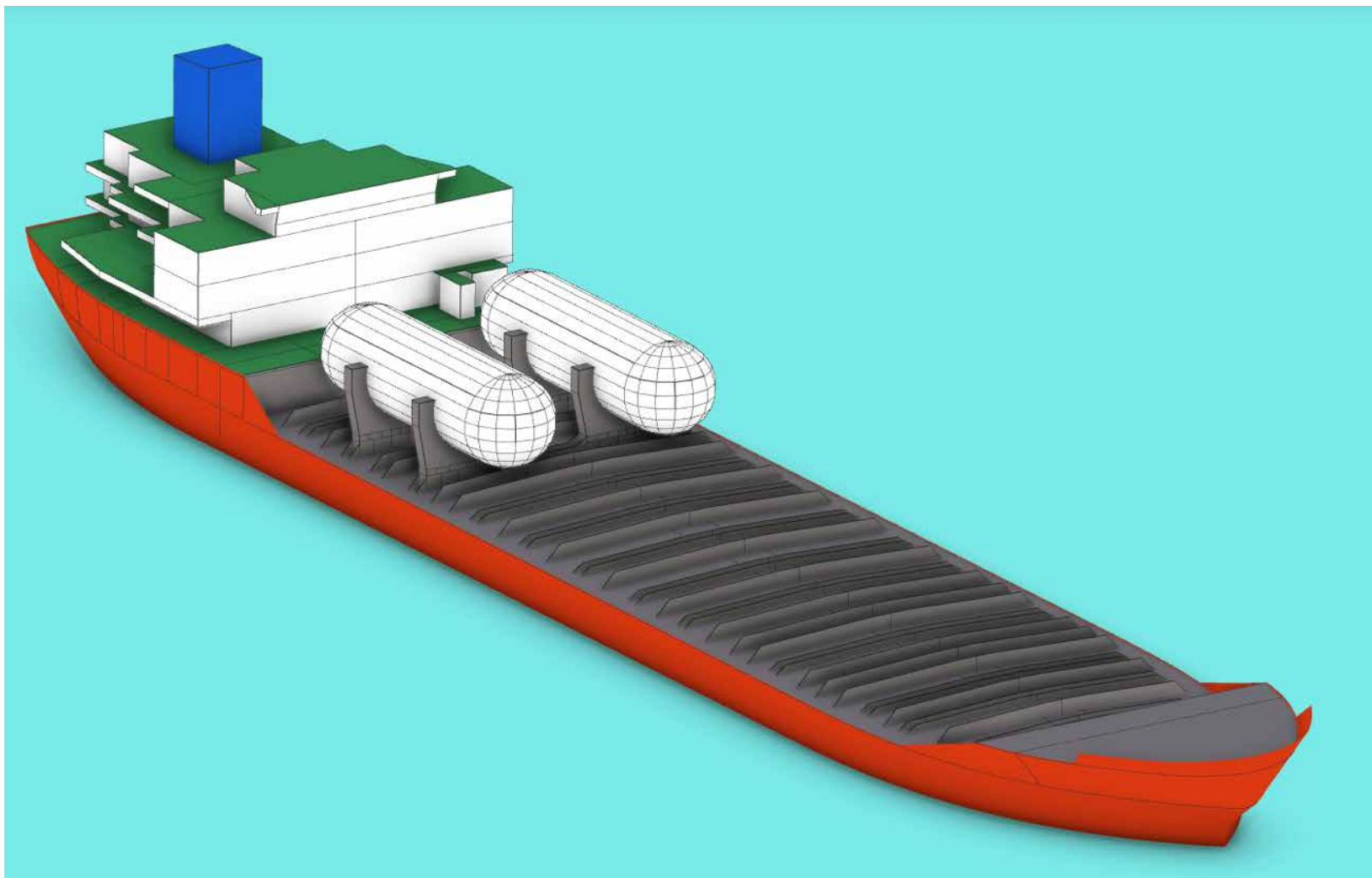
Hoping that hydrogen will be consumed as commonly as natural gas and petroleum, KHI will work to establish a supply chain to produce, transport, store and use hydrogen, a next-generation energy resource by making the most of the technologies and know-how that we have gained from the construction of the Suiso Frontier and cooperating with various partners.

\*1 The CO<sub>2</sub>-free Hydrogen Energy Supply-chain Technology Research Association (HySTRA) was set up by KHI together with Iwatani Corp., Shell Japan Ltd. and Electric Power Development Co., Ltd. (J-POWER) mainly to develop technologies to produce hydrogen from brown coal; transport and store it; and conduct verifications to establish and commercialize a CO<sub>2</sub>-free supply chain. Marubeni Corp., ENEOS Corp. and Kawasaki Kisen Kaisha, Ltd. ("K" Line) have since joined HySTRA.

About the 32nd Ship of the Year Awards, presented by the JASNAOE : <https://www.jasnaoe.or.jp/soy/2021.html>

# Shin Kurushima Dockyard group obtains ClassNK's GDA for LNG-fueled chemical tanker and FGSS

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Shin Kurushima Dockyard Co.,Ltd. (SKDY) has received General Design Approval (GDA) for 26,000 DWT-class LNG-fueled chemical tankers as well as the fuel gas supply system (FGSS) from the Nippon Kaiji Kyokai (ClassNK) for contributing to further reduction of greenhouse gases (GHG). The marine transport industry has been becoming more active to achieve GHG reduction for conservation of the environment. Under such circumstances, SKDY has so far been tackling development of new ships to cope with reduction of GHG, and has built Japan's first LNG-powered pure car carrier (PCC). In use of ammonia as a main fuel, one of next-generation fuels, the company has also obtained AiP for building ammonia-combustion PCC from ClassNK. In this time, the SKDY group has completed the design of the LNG fueled chemical tanker and FGSS by conducting discussions and studies in cooperation with Shin

## Shin Kurushima Dockyard group obtains ClassNK's GDA for LNG-fueled chemical tanker and FGSS

Chemical tanker, IMO Type II & III **97**

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Kurushima Sanoyas Shipbuilding Co., Ltd. (Shin Kurushima Sanoyas), an SKDY group company and FGSS manufacturer. As a result, ClassNK has granted SKDY and Shin Kurushima Sanoyas the GDAs for the chemical tanker and FGSS, respectively.

Acquisition of the GDA means that SKDY's chemical tanker and FGSS have been acknowledged as being equivalent to the detailed design condition, differing from AiP conditions. Therefore, this 26,000DWT-class chemical tanker design including FGSS has cleared various problems that would happen in an actual designing process, and smooth actual design work after receiving a shipbuilding order is possible. Thus, the SKDY group can design and construct not only LNG-fueled ships but also a complete FGSS that covers LNG-fuel supply from LNG fuel tanks to consumer installations. This allows SKDY to meet flexibly requirements of ship owners.

The LNG-fueled ship obtained GDA this time is a SKDY's major series of 26,000DWT-class chemical tanker designed in accordance with the design concept of a 49,000DWT

chemical tanker provided with AiP in 2020, and has designed to have two LNG fuel tanks on the upper deck, which are the Independent Type C tank without secondary barrier.

In general, chemical tankers have the unique upper deck on which many pipelines are laid extendedly. So, when installing LNG fuel tanks, some problems may arise to arrange appropriately the fuel tanks on the deck. In cooperation with Shin Kurushima Sanoyas, SKDY has developed a FGSS-installing procedures provided with the conventional functions as a chemical tanker intact.

In addition, a gas preparation room is arranged between the engine room under the superstructure and the cargo

tanks, and this arrangement optimizes reaches of fuel-gas piping from the fuel tanks as well as the bunker station to the engine room, and makes it possible to supply LNG fuel to the main engine, generator engines, and auxiliary boilers without a hitch. Under the gas preparation room, various tanks and a room for ballast pumps are disposed, not to make wasteful space.

The Shin Kurushima Dock group says that they will continue to develop and construct vessels corresponding to increasing requirements for the environment conservation, utilizing the environment-load-reduction technology based on their experiences in engineering and construction of vessels and marine machinery and equipment.

### PRINCIPAL PARTICULARS

Length (o.a.) .....	149.50 m	Gross tonnage.....	18,900
Breadth (mld.).....	28.40 m	Deadweight.....	26,500 t
Depth (mld.).....	14.60 m	Speed (service).....	14.7 knots
Draft (mld.).....	10.25 m	Builder: .....	Shin Kurushima Dockyard Co., Ltd.