

PHOENIX GAIA 82,200 m³ LPG Carrier

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☐ Contents ☐ By Builder ☒ By Ship Type



PHOENIX GAIA 82,200 m³ LPG Carrier 18

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Kawasaki Heavy Industries, Ltd. has delivered the PHOENIX GAIA (HN: 1742), an 82,200m³ capacity LPG carrier, to Phoenix Tankers Pte. Ltd. This is the 60th LPG carrier and the 11th vessel of the same type built by the company. This vessel adopts Kawasaki's uniquely developed bow shape called SEA-Arrow, which significantly improves propulsion performance by minimizing bow wave resistance. The main engine is an energy-efficient, electronically-controlled, ultra-long-stroke, two-stroke low-speed diesel engine. In addition, the Kawasaki rudder bulb system with fins (RBS-F) and the semi-duct system with contra fins (SDS-F) contribute to reducing fuel consumption. Four independent cargo tanks are installed in the cargo

holds for carrying LPG. The tanks are designed to provide optimal thermal insulation and absorb low-temperature contraction. The cargo tanks are constructed with special cryogenic steel for loading LPG with a minimum tempera-

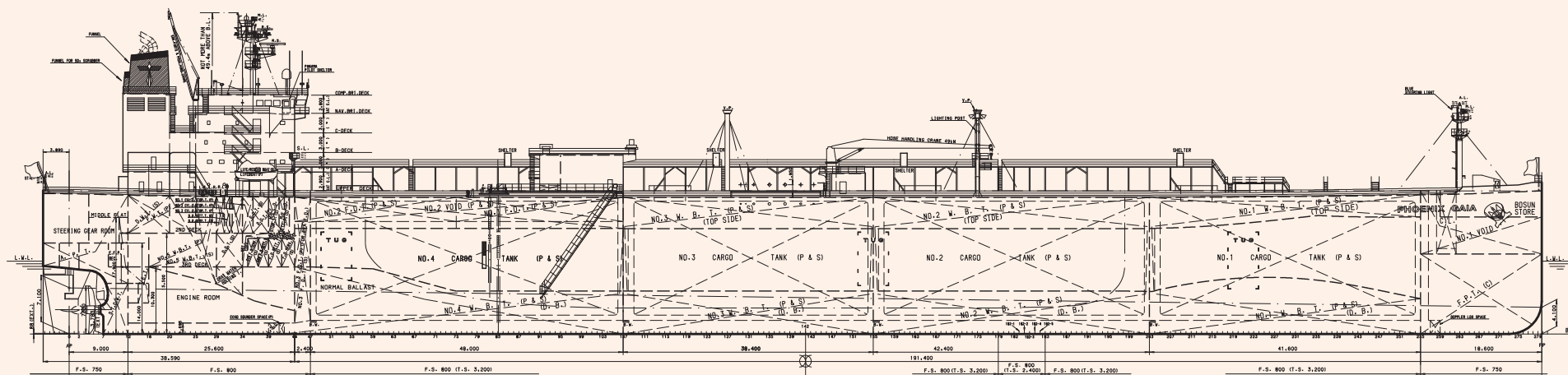
ture of -46°C. The tanks are wrapped in urethane foam for thermal insulation.

The vessel is designed to navigate the newly expanded Panama Canal, which was completed in June 2016.

PRINCIPAL PARTICULARS

Length (o.a.): 229.90 m
 Length (b.p.): 226.00 m
 Breadth (mld.): 37.20 m
 Depth (mld.): 21.00 m
 Draft (mld.): 11.20 m
 Gross tonnage: 47,231

Deadweight: 53,928 t
 Main engine: Kawasaki-MAN B&W
 7S60ME-C8.2 diesel x 1 unit
 Cargo hold capacity: 82,416 m³
 Complement: 29 people
 Classification: Class NK
 Builder: Kawasaki Heavy Industries Ltd.



CRYSTAL ANGEL 82,200 m³ LPG Carrier

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☐ Contents ☐ By Builder ☒ By Ship Type



CRYSTAL ANGEL 82,200 m³ LPG Carrier 19

Kawasaki Heavy Industries, Ltd. delivered on February 9, 2020 the CRYSTAL ANGEL (HN: 1741), an 82,200 m³ capacity liquefied petroleum gas (LPG) carrier, for KUMIAI NAVIGATION (PTE) LTD. This is the 61st LPG carrier and the 12th vessel of the same type to be built by the company.

Features

- 1. This vessel adopts Kawasaki's uniquely developed bow shape called SEA-Arrow, which significantly improves propulsion performance by minimizing bow wave resistance.
- 2. The main engine powering the vessel is an energy-efficient, electronically-controlled, ultra-long-stroke, two-stroke low-speed diesel engine. In addition, the Kawasaki rudder bulb system with fins (RBS-F) and the semi-duct system with contra fins (SDS-F) contribute to reducing fuel consumption.
- 3. In order to satisfy new restrictions on SOx emissions

which is implemented by the International Maritime Organization (IMO) in this year, the vessel includes a set of SOx scrubber at the exhaust gas outlets of the main engine and the power generation engine. With this system, general fuel oil can be used continuously after the regulations are tightened, without the need of switching to low sulfur fuel oil.

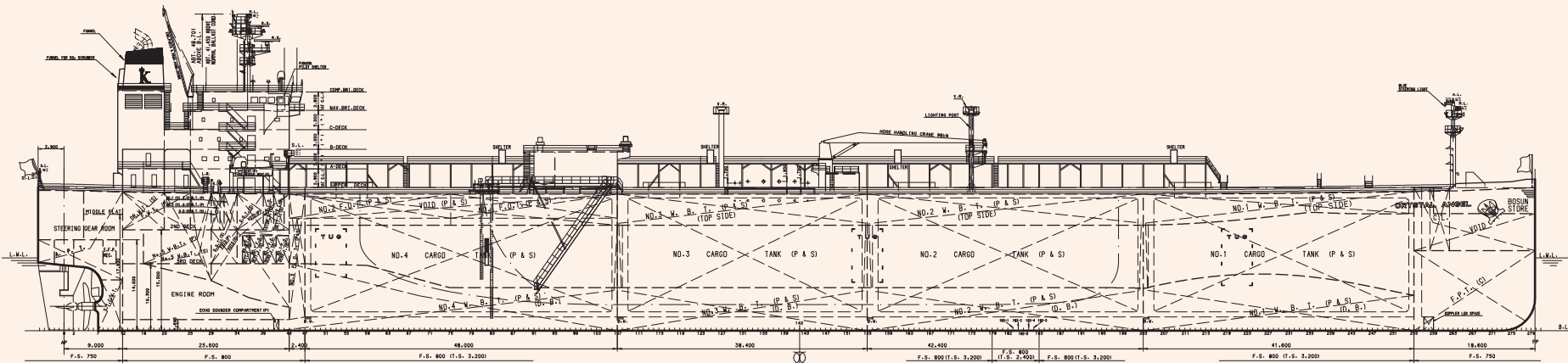
- 4. Four independent cargo tanks are installed in the cargo holds for carrying liquefied petroleum gas. The tanks

are designed to provide optimal thermal insulation and absorb low-temperature contraction.

- 5. The cargo tanks are made with special cryogenic steel for loading LPG with a minimum temperature of -46°C. The tanks are wrapped in urethane foam for thermal insulation.
- 6. The vessel is designed to be able to navigate the newly expanded Panama Canal, which was completed in June 2016.

PRINCIPAL PARTICULARS

length (o.a.)	229.90 m	Deadweight	53,995 t
Length (b.p.)	226.00 m	Main engine	Kawasaki-MAN B&W 7S60ME-C8.2 diesel engine
Breadth (mld.)	37.20 m	Complement	29 people
Depth (mld.)	21.00 m	Classification	ClassNK
Draft (mld.)	11.20 m	Loading capacity (tank)	82,402 m³
Gross tonnage	47,236	Builder	Kawasaki Heavy Industries Ltd.



GAS PLANET 84,000 m³ LPG Carrier

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☐ Contents ☐ By Builder ☒ By Ship Type



GAS PLANET 84,000 m³ LPG Carrier 20

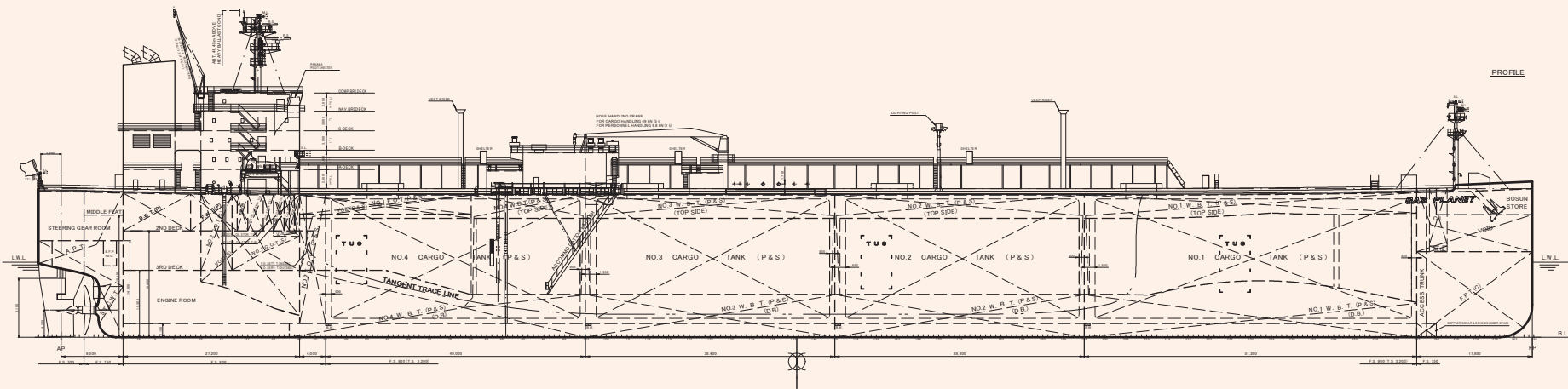
Kawasaki Heavy Industries, Ltd. delivered the 84,000m³ class LPG carrier, GAS PLANET (HN: 1743), to its owner, Lepta Shipping Co., Ltd. on October 16, 2020. The carrier has higher cargo-loading capacity without remodeling the hull form of the 82,200m³ type, which permits entry to LPG terminals as in the past. This ship is the first of the newly developed LPG carrier series compliant with the revised IGC code requiring more strict safety precautions for the ship. The GAS PLANET is compliant with the IMO NOx Tier III regulations. The main engine is an Exhaust Gas Recirculation (EGR) type and the electric generator engine adopts Selective Catalytic Reduction (SCR) as countermeasures for reduction of NOx emissions. Consequently, the carrier is permitted to navigate Emission Control Areas (ECAs). This vessel adopts Kawasaki's uniquely developed bow shape

called SEA-Arrow, which significantly improves propulsion performance by minimizing bow wave resistance. The main engine is an energy-efficient, electronically-controlled, ultra-long-stroke, two-stroke low-speed diesel engine. In addition, the Kawasaki Rudder Bulb System with Fins (RBS-F) and the Semi-Duct System with contra Fins (SDS-F) contribute to reducing fuel consumption. The main engine and electric

generator engine are equipped with a SOx scrubber at the gas exhaust port, to satisfy the SOx emission restrictions started in January 2020. Accordingly, low SOx fuel oil can be used under the control of restrictions, and fuel oil costs can be reduced due to continuous use of conventional fuel.

PRINCIPAL PARTICULARS

Length (o.a.):	229.90 m	Main engine:	Kawasaki-MAN B&W
Breadth (mld.):	37.20 m		7S60ME-C10.5 diesel x 1 unit
Depth (mld.):	21.90 m	Complement:	35 people
Draft (mld.):	11.54 m	Classification:	Class NK
Gross tonnage:	49,231	Loading capacity (tank)	84,178 m³
Deadweight:	55,432 t	Builder:	Kawasaki Heavy Industries Ltd.



DURHAM 84,000 m³ LPG Carrier

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☐ Contents ☐ By Builder ☒ By Ship Type



DURHAM 84,000 m³ LPG Carrier **21**
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Kawasaki Heavy Industries, Ltd. delivered the DURHAM, an 84,000m³ LPG carrier (HN: 1745), to Fair Wind Navigation, S.A. on January 29, 2021. This gas carrier is the second of the newly developed 84,000m³ type series compliant with the revised IGC code, with a larger cargo loading capacity based on the design of the previous Kawasaki 82,000m³ series. Kawasaki has now delivered a total of 63 LPG carriers. Despite larger cargo capacity of the new series, the principal particulars are almost the same, which permits entry to the same ports as the previous series.

The new gas carrier adopts the propulsion system compliant with the IMO NOx Tier III regulations as well as satisfying the revised IGC code. The main engine uses an Exhaust Gas Recirculation (EGR) type and the electric generator engine adopts Selective Catalytic Reduction (SCR) as counter-

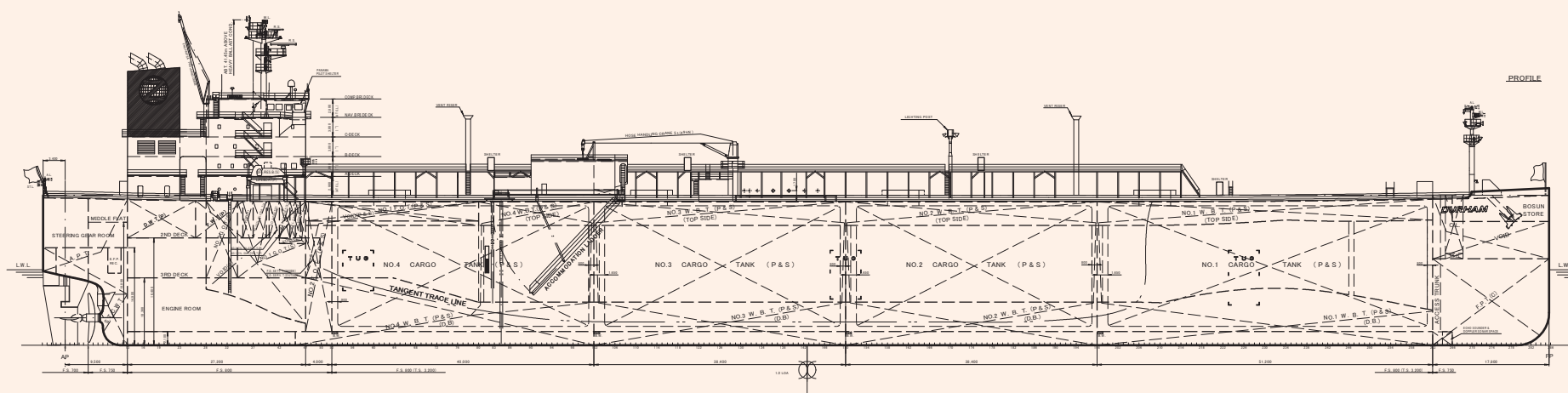
measures for reduction of NOx emissions. Consequently, the carrier can navigate Emission Control Areas (ECAs). The main engine is an energy-efficient, electronically-controlled, ultra-long-stroke, two-stroke low-speed diesel engine. The Kawasaki Rudder Bulb System with Fins (RBS-F) and the Semi-Duct System with contra Fins (SDS-F) also contribute to reducing fuel consumption. Kawasaki's unique bow shape called SEA-Arrow minimizes bow wave resistance

and significantly improves propulsion performance. The main engine and electric generator engine are equipped with a SOx scrubber at the gas exhaust port to satisfy the SOx emission restrictions started in January 2020. Accordingly, low SOx fuel oil can be used under the control of restrictions, and fuel oil costs can be reduced due to continuous use of conventional fuel.

PRINCIPAL PARTICULARS

Length (o.a.): 229.90 m
 Breadth (mld.): 37.20 m
 Depth (mld.): 21.90 m
 Draft (mld.): 11.54 m
 Gross tonnage: 49,231

Deadweight: 55,408 t
 Main engine: Kawasaki MAN 7S60ME-C10.5 diesel x 1 unit
 Complement: 35 people
 Classification: Class NK
 Loading capacity (tank) 84,278 m³
 Builder: Kawasaki Heavy Industries Ltd.



CRYSTAL ASTERIA 84,000 m³ LPG Carrier

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☐ Contents ☐ By Builder ☒ By Ship Type



CRYSTAL ASTERIA 84,000 m³ LPG Carrier 22

Kawasaki Heavy Industries, Ltd. delivered Japan's first LPG powered LPG carrier, CRYSTAL ASTERIA (HN: 1748), to its owner, Kumiai Navigation (Pte) Ltd., on August 31, 2021. The LPG carrier has a transport capacity of 84,000m³ LPG. The LPG carrier has been designed with a dual-fueled main engine using LPG and low sulfur fuel oil as fuel. This is the first LPG dual-fueled LPG carrier based on the Kawasaki 84,000m³ series and the 64th delivery of Kawasaki LPG carriers.

Vessels operated by liquefied gas fuel instead of heavy fuel oil have been progressively introduced worldwide as an effective measure to cope with exhaust-gas emission regulations for vessels. The CRYSTAL ASTERIA using LPG as fuel can reduce emissions of greenhouse gas (GHG), so reducing the load on the environment as well. The Kawasaki group's expertise that has accumulated through building LPG and LNG carriers, or LNG fuel-operated vessels, have been applied to this new carrier.

The Kawasaki electronically controlled LPG-injection diesel

engine for marine application (ME-LGIP engine) is used as the main engine. Compared with the use of conventional fuel oil, this engine can greatly reduce SOx and CO₂ emissions so can comply with SOx regulations and EEDI Phase 3 applying to ships with building contracts to be concluded in and after 2022.

The applied system is compliant with NOx Tier III regulations, and the main engine uses an exhaust gas recirculation (EGR) device. The diesel-electric generator combines a selective catalytic reduction (SCR) for denitration. These features allow the ship to navigate emission control areas

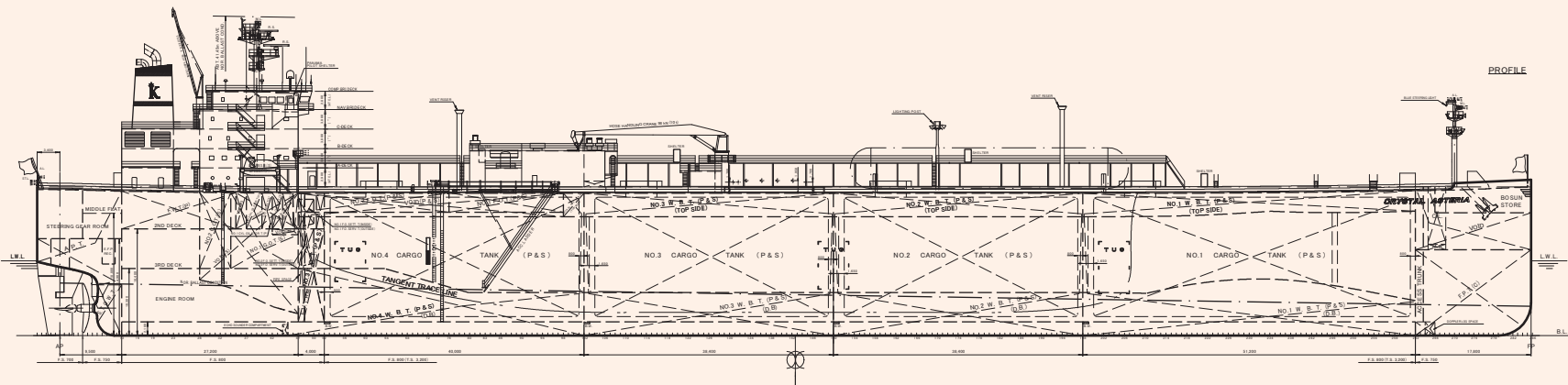
(ECAs) when operating on conventional low sulfur-content fuel oil. Low fuel consumption can be achieved with the Kawasaki rudder bulb system with fins (RBS-F), and the semi-duct system with contra fins (SDS-F).

Kawasaki will continue to contribute to the realization of a low carbon and decarbonized society by developing and providing environment-friendly marine technologies including various commercial vessels that comply with environmental regulations such as LPG powered LPG carriers, as well as carriers for liquefied hydrogen, which represent a next-generation energy source.

PRINCIPAL PARTICULARS

Length (o.a.):	229.90 m
Breadth (mld.):	37.20 m
Depth (mld.):	21.90 m
Draft (mld.):	11.51 m
Gross tonnage:	49,145
Deadweight:	54,922 t

Main engine:	Kawassaki-MAN B&W 7S60ME-C10.5-LGIP diesel x 1 unit
Speed (service):	about 17.0kt
Complement:	29 people
Classification:	Class NK
Loading capacity (tank)	84,229 m³
Builder:	Kawasaki Heavy Industries Ltd.



CRYSTAL VALERIAN 5,017 m³ LPG Carrier

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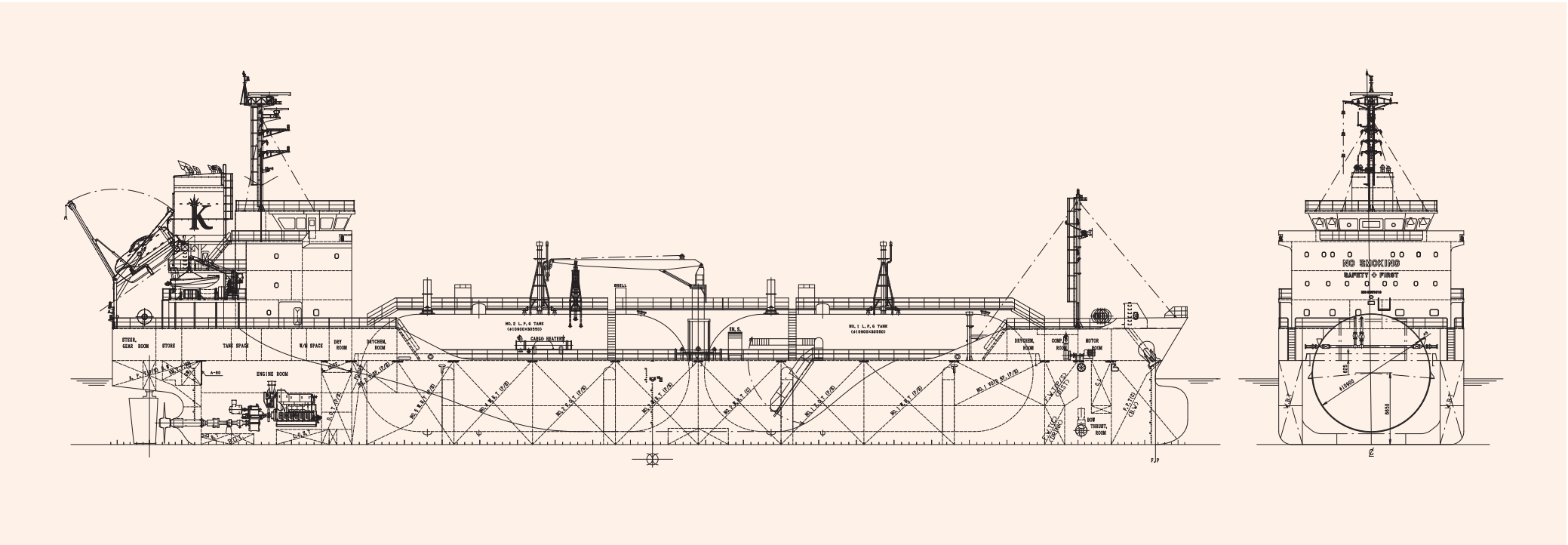


CRYSTAL VALERIAN 5,017 m³ LPG Carrier 23

This vessel is the 5,000cbm type LPG carrier with two cylindrical full-pressurized cargo tanks capable of loading liquefied petroleum gasses. The energy-saving hull form is designed to produce economic propulsion, furthermore fitted BV class regulation of CLEANSHIP and AUT-UMS. Main engine and generator engine is equipped with SCR system in order to comply the NOx regulations. This vessel adopts stern fins for the purpose of improving propulsion efficiency by arranging the water flow near the propeller. Controllable pitch propeller is installed as the propulsion system, and shaft generator is equipped for fuel consump-

PRINCIPAL PARTICULARS	
Length (o.a.)	99.98 m
Length (b.p.)	93.50 m
Breadth (mld.)	17.20 m
Depth (mld.)	7.80 m
Draft (mld.)	6.10 m
Gross tonnage	4,324
Deadweight	4,920 t
Main engine	DAIHATSU 6DCM-32eL
MCR (kw×rpm)	2,750 × 750
NOR (kw×rpm)	2,338 × 710
Speed (max. trial)	15.54 knots
(service)	13.20 knots
Complement	20 persons
Classification	BV
Cargo pump	300 m³/h × 110 mlc × 2 sets
Loading capacity	5,017 m³
Builder	Sasaki Shipbuilding Co., Ltd.

tion saving. Auxiliary boiler and exhaust gas economizer is also installed, and chiller unit is installed for using MGO.



SASANQUA 3,520 m³ LPG Carrier 24

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SASANQUA 3,520 m³ LPG Carrier 24

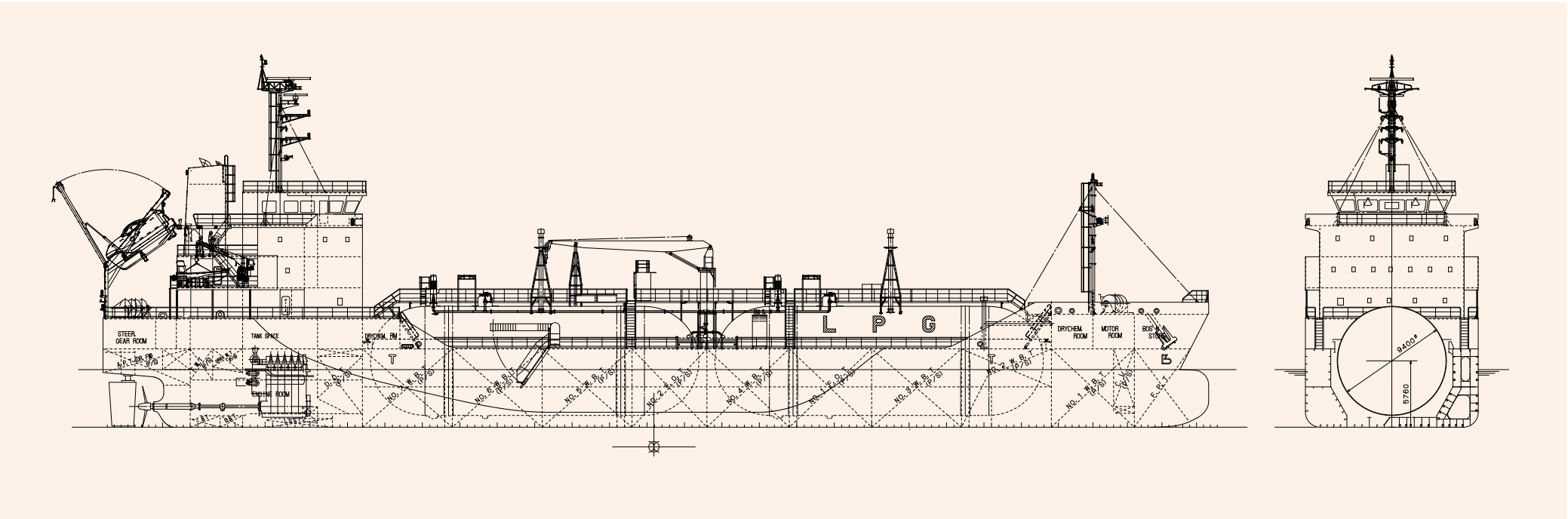
This vessel is designed as the 3,500cbm type LPG carrier with two cylindrical full-pressurized cargo tanks capable of loading 11 LPG cargo including VCM. Main engine is 2 stroke engine capable to keep service speed 12.5 kt and navigate about 12,000 seamiles.

For energy-saving measurement, a bulbous bow and stern fins are adopted for the hull form. Stern fins are installed to maintain a good flow into the propeller to improve propulsion efficiency and reduce fuel consumption.

In addition, the vessel has good stability and crew's comfortability is also considered. Vibration and noise are extremely low level in accommodation area, making it very comfortable to crew.

PRINCIPAL PARTICULARS

Length (o.a.)	95.99 m	MCR (kw×rpm)	2,200 × 178
Length (b.p.)	91.30 m	NOR (kw×rpm)	1,980 × 172
Breadth (mld.)	15.00 m	Speed (max. trial)	14.46 knots
Depth (mld.)	6.80 m	(service)	12.50 knots
Draft (mld.)	5.00 m	Complement	20 persons
Gross tonnage	3,216	Classification	BV
Deadweight	3,208 T	Cargo pump	300 m³/h × 115 m × 130 kW × 2 sets
Main engine	HITACHI-MAN B&W 5L35MC6.1	Loading capacity	3,520 m³
		Builder	Sasaki Shipbuilding Co., Ltd.



MORNING HOPE 5,016 m³ LPG Carrier 25

☐ Contents ☐ By Builder ☐ By Ship Type



MORNING HOPE 5,016 m³ LPG Carrier 25

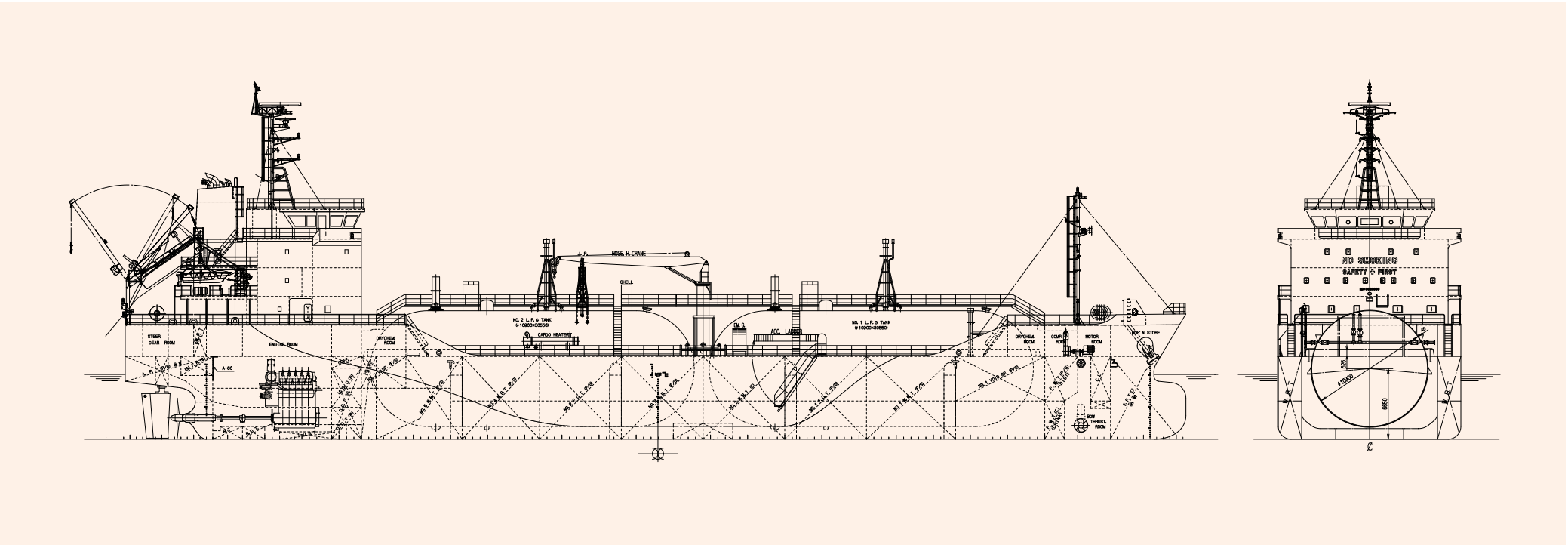
This vessel is designed as the 5,000cbm type LPG carrier with two cylindrical full-pressurized cargo tanks capable of loading liquefied petroleum gasses. The energy-saving hull form is designed to produce economic propulsion. One stream line balanced hanging rudder (C type) is adopted and steering gear 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.)	93.50 m
Breadth (mld.)	17.20 m
Depth (mld.)	7.80 m
Draft (mld.)	6.10 m
Gross tonnage	4,301
Deadweight	4,978 T
Main engine	MAKITA-MITSUI-MAN B&W 5L35MC6
MCR (kw×rpm)	2,750 × 178
NOR (kw×rpm)	2,475 × 172
Speed (max. trial)	15.47 knots
(service)	13.40 knots
Complement	20 persons
Classification	NK
Cargo pump	300 m³/h × 110 mlc × 2 sets
Loading capacity	5,016 m³
Builder	Sasaki Shipbuilding Co., Ltd.

tal burden such as installation of ballast water treatment system.



KIPPO MARU 1,829 m³ LPG Carrier

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☐ Contents ☐ By Builder ☒ By Ship Type



KIPPO MARU 1,829 m³ LPG Carrier 26

☐ Contents
 ☐ By Builder
 ☐ By Ship Type

The 1,829m³ LPG carrier KIPPO MARU was built at SHIN KURUSHIMA HASHIHAMA DOCKYARD CO., LTD. and delivered to Japanese Owner in June 2020.

Features

1. The vessel was built for ocean transport of LPG (main cargo: VCM).
2. Two(2) sets of cargo tank are cylindrical shell with hemi-spherical heads and have sufficient strength with a specific pressure of 1.77 MPa(High).
3. Each cargo tank is equipped with two (2) deepwell pump driven by a electric motor.

PRINCIPAL PARTICULARS

Length (o.a.)	75.92 m	NOR (kw×rpm)	1,375 kW x abt. 294 min ⁻¹
Length (b.p.)	71.00 m	Speed (service)	12.3 knots
Breadth (mld.)	12.80 m	Complement	11 P
Depth (mld.)	5.90 m	Classification	NK
Draft (mld.)	4.80 m	Cargo pump	2 sets Deepwell type
Gross tonnage	1,544		350 m ³ /h x 120mTH (Butane γ = 0.601)
Deadweight	2,020 t		200 m ³ /h x 150mTH (VCM γ = 0.948)
Main engine	AKASAKA-AX33B	Loading capacity (tank)	1,829 m ³
MCR (kw×rpm)	1,618 kW x 310min ⁻¹	Builder	Shin Kurushima Hashihama Dockyard Co., Ltd.

