CRYSTAL TRINITY 84,000 m³ LPG Carrier 9

Contents By Builder By Ship Type

Kawasaki Heavy Industries, Ltd.

Next Page

CRYSTAL TRINITY 84,000 m³ LPG Carrier 9

January 26, 2022 — Kawasaki Heavy Industries, Ltd. announced it has delivered the 84,000 m³ 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 m³ 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_2 and other pollutants compared with use of marine fuel oil. In this way, the new vessel will meet SOx emission standards*1 which were strengthened in January 2020, and EEDI*2 Phase 3 regulations which will further strengthen CO_2 emission standards in 2022.
2. In order to satisfy restrictions on NOx Tier III controls*3 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

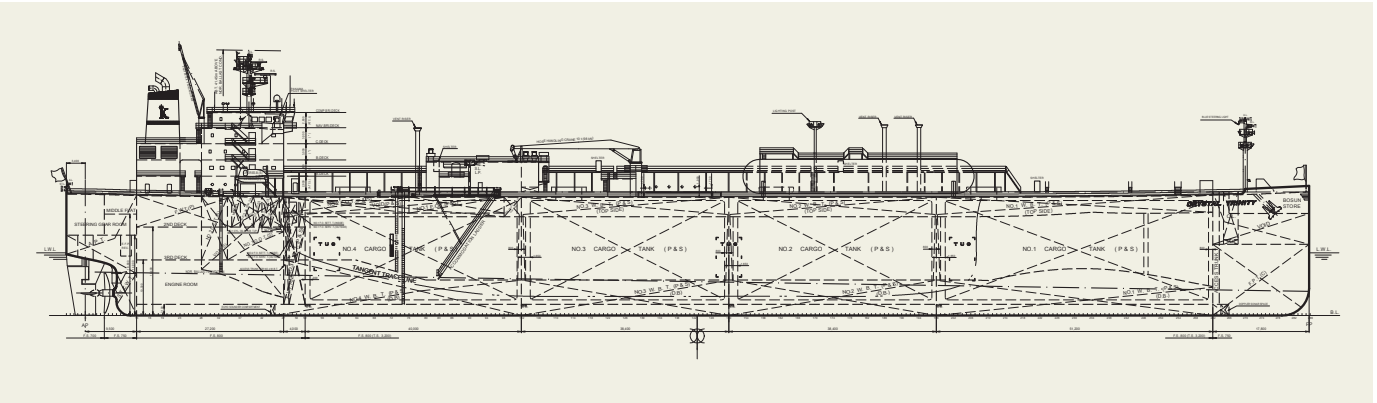
***1 SOx emission standards: Since January 2015, SOx emission restrictions in North American and European Emission Control Areas (ECAs) have limited sulfur content in fuels to 0.1% or less. Starting in January 2020, regulations have required ships operating in all other parts of the world to use fuel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

***2 Energy Efficiency Design Index: Compulsory international regulations requiring energy-efficiency compliance in newly built ships based on EEDI values, which specify CO_2 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_2 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.**

***3 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	55,068 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 m³
Builder	Kawasaki Heavy Industries, Ltd.



CALLUNA GAS 84,000 m³ LPG Carrier 10

Contents By Builder By Ship Type

Kawasaki Heavy Industries, Ltd.

Next Page

CALLUNA GAS 84,000 m³ LPG Carrier 10

LPG-fueled LPG carrier CALLUNA GAS Delivered

February 28, 2022 — Kawasaki Heavy Industries, Ltd. announced today it has delivered the 84,000 m³ 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 m³ 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_2 and other pollutants compared with use of marine fuel oil. In this way, the new vessel will meet SOx emission standards*1 which were strengthened in January 2020, and EEDI*2 Phase 3 regulations which will further strengthen CO_2 emission standards in 2022.
2. In order to satisfy restrictions on NOx Tier III controls*3 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

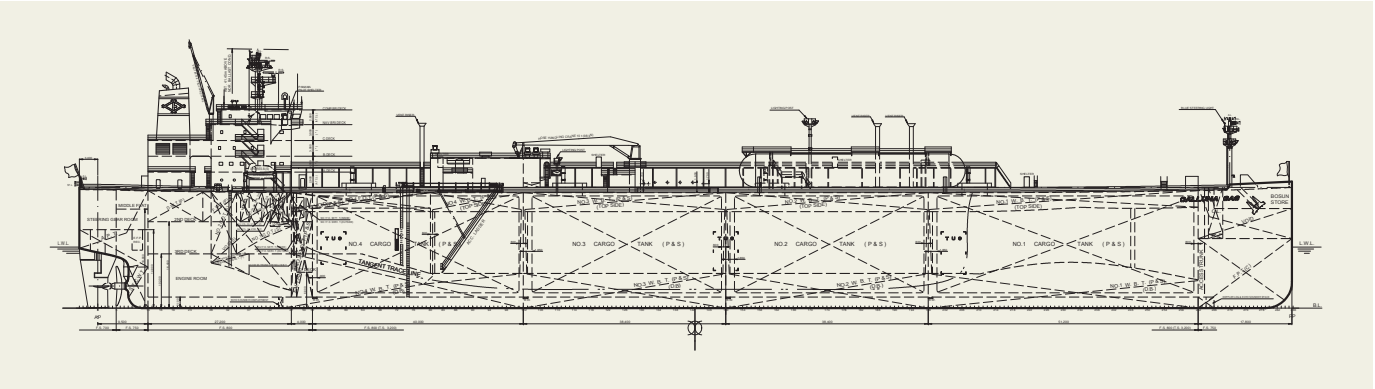
***1 SOx emission standards: Since January 2015, SOx emission restrictions in North American and European emission control areas (ECAs) have limited sulfur content in fuels to 0.1% or less. Starting in January 2020, regulations have required ships operating in all other parts of the world to use fuel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

***2 Energy Efficiency Design Index: Compulsory international regulations requiring energy-efficiency compliance in newly built ships based on EEDI values, which specify CO_2 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_2 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.**

***3 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 m³
Builder	Kawasaki Heavy Industries, Ltd.



CRYSTAL OASIS 84,000 m³ 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 m³ 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 m³ LPG carrier adopting a dual-fuel main engine.

CRYSTAL OASIS 84,000 m³ 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 NaturalGgas (LNG) carriers, and LNG-fueled vessels.

Kawasaki plans to develop and build more LPG-fueled LPG carriers, LPG/NH3 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 (SOx), CO_2 and other pollutants compared with use of marine fuel oil. In this way, the new vessel will meet SOx emission standards*1 which were strengthened in January 2020, and EEDI*2 Phase 3 regulations which will further strengthen CO_2 emission standards.
2. In order to satisfy restrictions on NOx Tier III controls*3 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 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

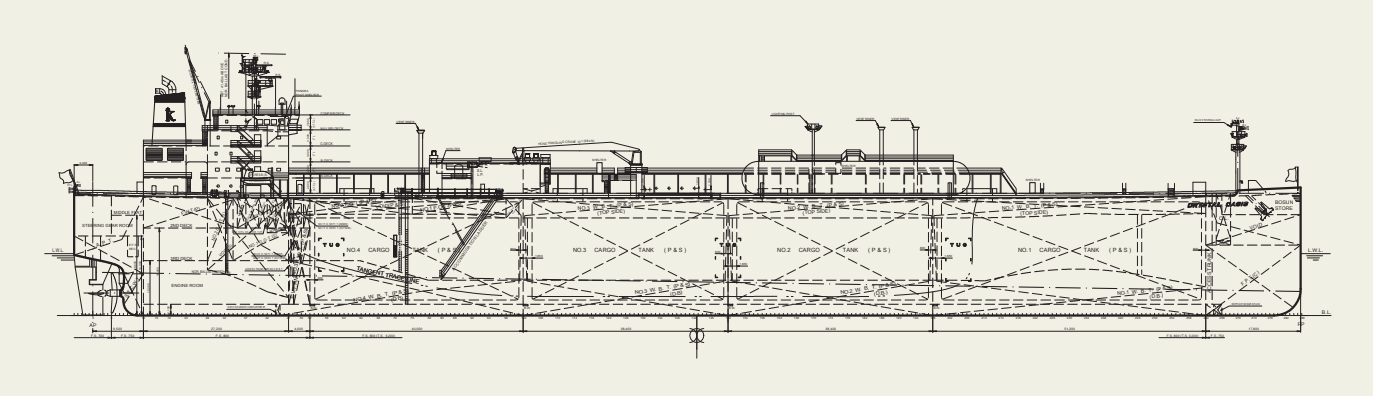
***1 SOx emission standards: Since January 2015, SOx emission restrictions in North American and European emission control areas (ECAs) have limited sulfur content in fuels to 0.1% or less. Starting in January 2020, regulations have required ships operating in all other parts of the world to use fuel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

***2 Energy Efficiency Design Index: Compulsory international regulations requiring energy-efficiency compliance in newly built ships based on EEDI values, which specify CO_2 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_2 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.**

***3 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	55,090 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 m³
Builder	Kawasaki Heavy Industries, Ltd.



LUPINUS PLANET 84,000 m³ LPG Carrier 12

Contents By Builder By Ship Type

Kawasaki Heavy Industries, Ltd.

Next Page

LUPINUS PLANET 84,000 m³ LPG Carrier 12

Kawasaki Heavy Industries, Ltd. announced it has delivered the 84,000 m³ 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 m³ 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/NH3 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 (SOx), CO_2 and other pollutants compared with use of marine fuel oil. In this way, the new vessel will meet SOx emission standards*1 which were strengthened in January 2020, and EEDI*2 Phase 3 regulations which will further strengthen CO_2 emission standards.
2. In order to satisfy restrictions on NOx Tier III controls*3 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) which contribute to reducing fuel consumption.

Remarks

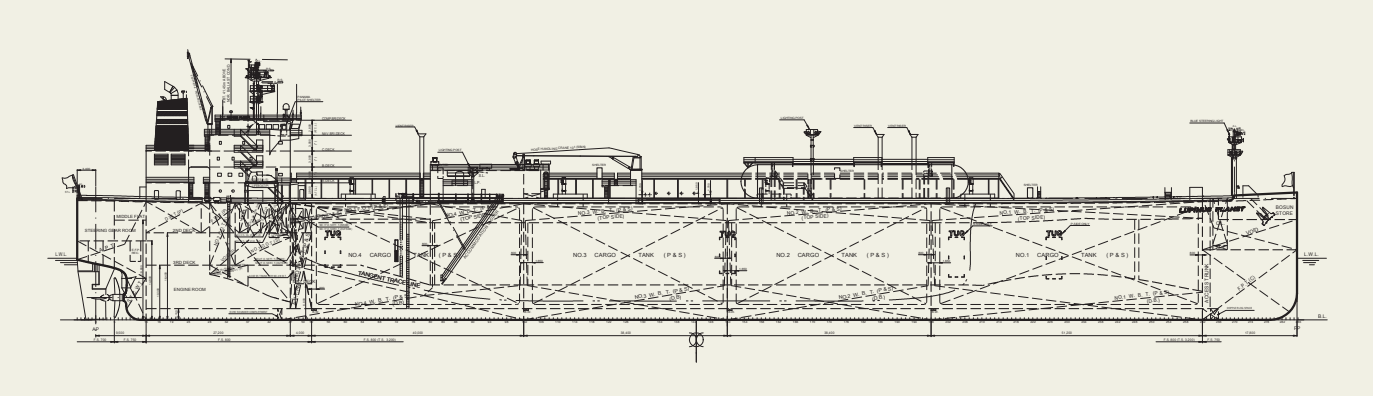
***1 SOx emission standards: Since January 2015, SOx emission restrictions in North American and European emission control areas (ECAs) have limited sulfur content in fuels to 0.1% or less. Starting in January 2020, regulations have required ships operating in all other parts of the world to use fuel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

***2 Energy Efficiency Design Index: Compulsory international regulations requiring energy-efficiency compliance in newly built ships based on EEDI values, which specify CO_2 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_2 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.**

***3 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	55,091 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 m³
Builder	Kawasaki Heavy Industries, Ltd.



LANTANA PLANET 84,000 m³ LPG Carrier 13

Contents By Builder By Ship Type

Kawasaki Heavy Industries, Ltd.

Next Page

LANTANA PLANET 84,000 m³ LPG Carrier 13

LPG-fueled LPG carrier LANTANA PLANET Delivered

January 23, 2023 — Kawasaki Heavy Industries, Ltd. announced today it has delivered the 84,000 m³ 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 m³ 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/NH3 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 (SOx), CO_2 and other pollutants compared with use of marine fuel oil. In this way, the new vessel will meet SOx emission standards*1 which were strengthened in January 2020, and EEDI*2 Phase 3 regulations which will further strengthen CO_2 emission standards.
2. In order to satisfy restrictions on NOx Tier III controls*3 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) which contribute to reducing fuel consumption.

Remarks

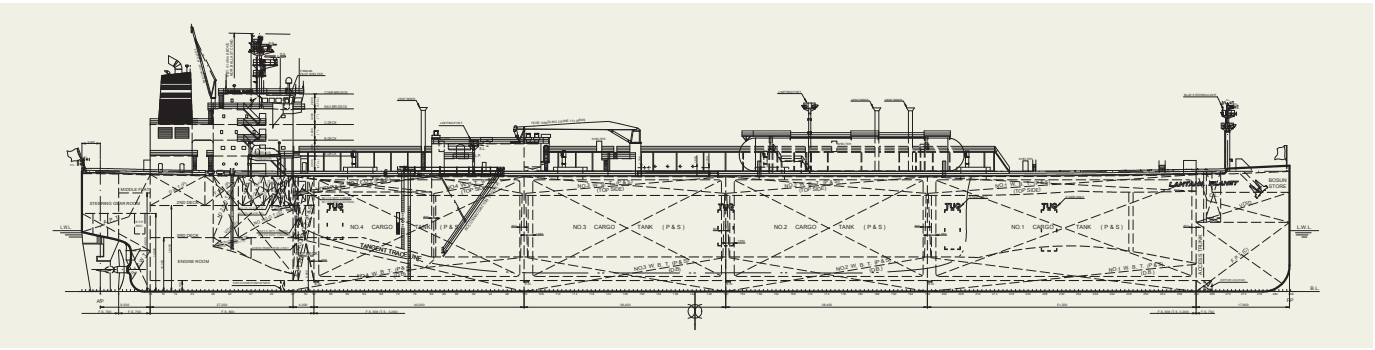
***1 SOx emission standards: Since January 2015, SOx emission restrictions in SOx emission standards: Since January 2015, SOx emission restrictions in North American and European emission control areas (ECAs) have limited sulfur content in fuels to 0.1% or less. Starting in January 2020, regulations 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.**

***2 Energy Efficiency Design Index: Compulsory international regulations requiring energy-efficiency compliance in newly built ships based on EEDI values, which specify CO_2 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_2 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.**

***3 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	55,153 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 m³
Builder	Kawasaki Heavy Industries, Ltd.



CAPTAIN MARKOS 84,000 m³ 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 m³ 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-sulfur fuel oil, and their seventh 84,000 m³ LPG carrier adopting a dual-fuel main engine.

In recent years, in order to effectively reduce emissions

CAPTAIN MARKOS 84,000 m³ LPG Carrier 14

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/NH3 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 (SOx), CO_2 and other pollutants compared with use of marine fuel oil. In this way, the new vessel will meet SOx emission standards*1 which were strengthened in January 2020, and EEDI*2 Phase 3 regulations which will further strengthen CO_2 emission standards.
2. In order to satisfy restrictions on NOx Tier III controls*3 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) which contribute to reducing fuel consumption.

Remarks

***1 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.**

***2 Energy Efficiency Design Index: Compulsory international regulations requiring energy-efficiency compliance in newly built ships based on EEDI values, which specify CO_2 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_2 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.**

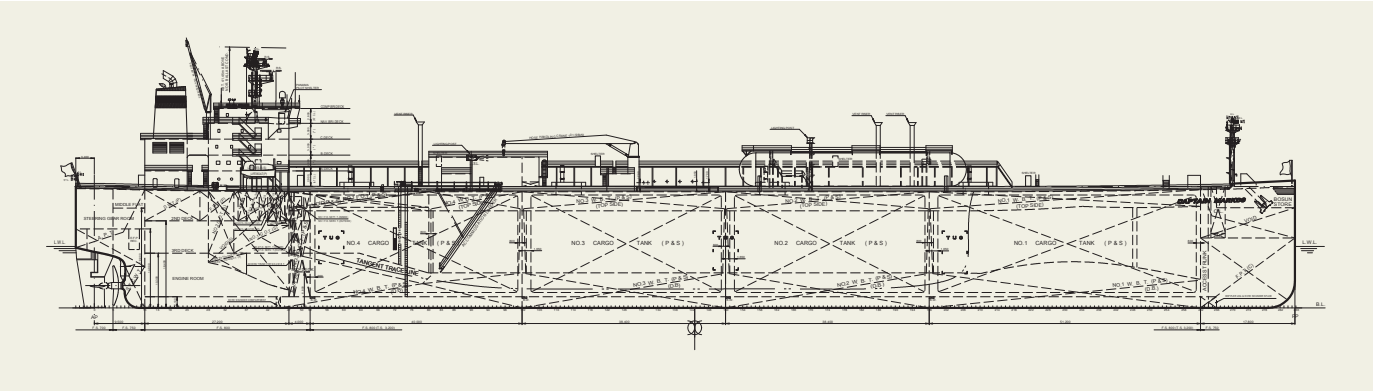
***3 The Tier III controls apply only to the specified ships while operating in Emission Control Areas (ECA), requiring 80% NOx emissions reduction compared with Tier I controls.**

***4 Exhaust Gas Recirculation System (EGR): This device reduces NOx 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.**

***5 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 NOx in the exhaust gas via a titanium/vanadium catalyst to reduce NOx 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 m³
Builder	Kawasaki Heavy Industries, Ltd.



AXIS RIVER 86,700 m³ LPG/NH3 Carrier 15

Contents By Builder By Ship Type

Delivery of the LPG-powered "AXIS RIVER" LPG/NH3 Carrier

June 30, 2023 — Kawasaki Heavy Industries, Ltd. announced today its delivery of the "AXIS RIVER" (HN:1756), an 86,700 m³ Liquefied Petroleum Gas (LPG) and ammonia (NH3) carrier powered by LPG.

The "AXIS RIVER" - an LPG-powered LPG/NH3 carrier

The "AXIS RIVER" is the first of Kawasaki's newest-design 86,700 m³ capacity, LPG-fueled LPG/NH3 carrier, with the increased cargo capacity from the existing 84,000 m³ 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/NH3 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 m³ LPG/NH3 Carrier 15

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/NH3 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 (SOx) and CO_2 emissions in exhaust gases compared with ships running on conventional marine fuel oil, enabling compliance with SOx emission standards*1 and EEDI phase 3 regulations.*2
2. The propulsion system is compliant with nitrogen oxide (NOx) Tier III requirements*3 and utilizes EGR*4 and SCR*5 equipment. Thanks to this system, the vessel is able to travel in NOx 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 SOx emission standards:**
Since January 2015, International Maritime Organization (IMO) SOx 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 SOx 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_2 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_2 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.

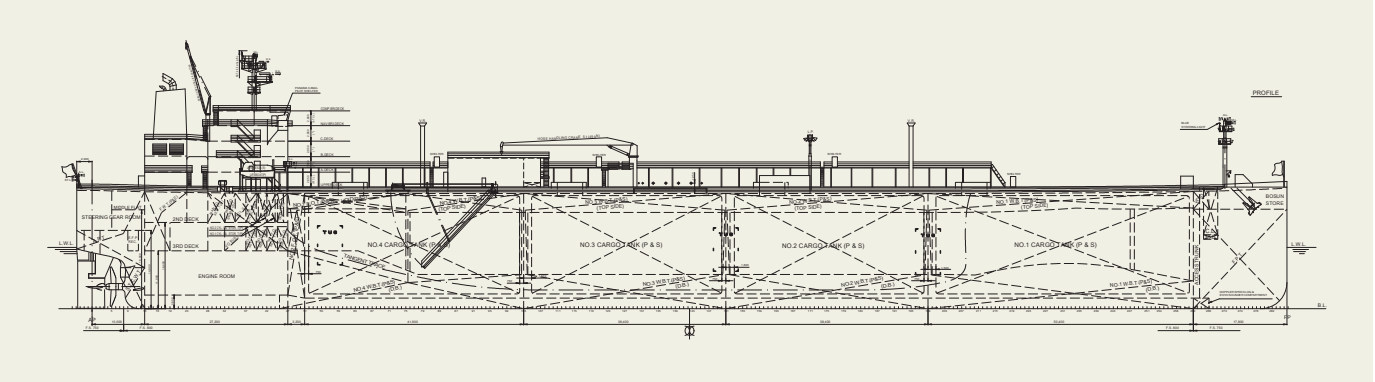
***3 NOx emission standards:**
The IMO regulates ship NOx emissions. Tier III regulations, which were enacted in 2016, specify controls for North American and European ECAs only, and stipulate an 80% NOx reduction over the Tier I value.

***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 NOx 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 NOx in exhaust gases, converting them into nitrogen and water and thus reducing NOx 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 m³
Builder	Kawasaki Heavy Industries, Ltd.



MARKO MARULIC 7,524 CBM LPG Carrier 16

Contents By Builder By Ship Type

Sasaki Shipbuilding Co., Ltd.

Next Page

MARKO MARULIC 7,524 CBM LPG Carrier 16

This is the first LPG carrier propelled by a dual-type LPG-fueled main engine bulit in Japan as a smaller ship than 11,000m³ cargo loading capacity, and has two pressurized cargo tanks with total designed capacity of 7,500m³, and one LPG-fuel tank of 450m³ capacity. The cargo tank is durable up to 17.65 bar as well as minus 10 degC.

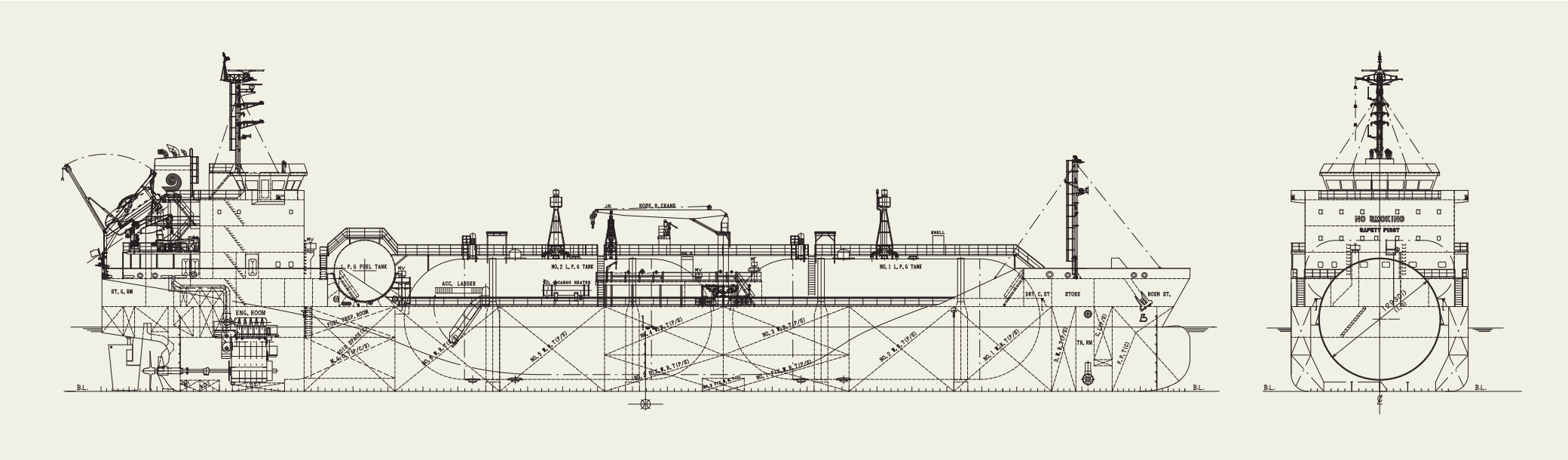
The carrier is equipped with Sasaki patent stern fins in the front of the propeller. The stern fins control water flow before the propeller, resulting in improved propulsion performance and fuel reduction.

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 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.

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 m3/h × 110 m × 180 kW × 2 sets
Loading capacity (tank)	7,524 m³
Builder	Sasaki Shipbuilding Co., Ltd.



MORNING KATE 5,014 CBM LPG Carrier 17

Contents By Builder By Ship Type

Sasaki Shipbuilding Co., Ltd.

Next Page

MORNING KATE 5,014 CBM LPG Carrier 17

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 environmental burden such as installation of ballast water treatment system.

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 m3/h × 110 m × 130 kW × 2 sets
Loading capacity (tank)	5,014 m^3
Builder:	Sasaki Shipbuilding Co., Ltd.