

SIGNIFICANT SHIPS OF 2018



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SIGNIFICANT SHIPS OF 2018

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SIGNIFICANT SHIPS OF 2018

Welcome to the 2018 edition of RINA's *Significant Ships*. As is customary, the following is a selection of some of the most significant ships over 100m in length, from numerous sectors, delivered during 2018. By significant we mean ships that are the first in a series or type for a particular shipowner or builder, vessels that may be one-offs, or those featuring unique design features or technology.

By the nature of this publication we cannot be exhaustive; some yards and owners choose not to share details of their vessels, particularly in Europe, where shipbuilding is now dominated by more specialised, high-end projects. However, this year's crop is worthy of the publication's title, featuring a high number of ships built at a time when new technologies and regulations are having a great impact on design and operation. Many of them have been built with compliance for the 2020 global cap on sulphur as a deciding factor in choice of equipment or design.

To meet the 2020 rules, most of the vessels included will be obliged to run on MDO, MGO or one of the new low sulphur fuels that are promised to materialise in time for the 1 January 2020 deadline. Some, though, will be able to continue using HFO if they have been fitted with exhaust gas cleaning systems or scrubbers. These vessels might almost be considered pioneers, for they will have been ordered well in advance of the surge in scrubber orders that came in the second half on 2018.

LNG propulsion systems are a feature of quite a number of this year's selection bringing some significant new references for MAN and

WinGD's two-stroke dual-fuel engines. One vessel which is not yet LNG-fuelled, but which is designed to be 'LNG ready', is *Sao Diana* built by Hyundai for Polaris shipping. The charterer – Brazil's Vale – is determined not to be caught out by the 2020 rules, for as well as being ready for future conversion to LNG, it is also fitted with a scrubber.

The dual-fuel concept also features on both of the US-built ships in this publication. *El Coqui* is a Con-ro vessel built by VT Halter Marine for Crowley and *Daniel K Inouye* a container ship built at Philly Shipyard for Matson Navigation. Both are of course Jones Act ships, which necessitated their construction at US yards, but both have been designed for specific routes and services and will have at least one sister ship. They are good examples of how US operators have developed their fleets with new ship types to meet the requirements of the US ECAs in which they will operate for most of their service lives.

There are some newer ship types included alongside the usual bulkers, tankers, containerships and ferries. For example, *Golar Nanook* built by Samsung for Golar LNG, the Hyundai-built *Hoegh Gannet* (Hoegh) and *Marshal Vasilevskiy* (Gazpromflot) represent the new breed of LNG carrier/FSRUs designed to serve one of two roles at different times in their working lives. Meanwhile, the inclusion of *Kairos* built by Hyundai for Babcock Schulte Energy reflects another recent development in the shape of LNG bunker supply vessels.

No selection of significant ships could ignore CMA CGM's new vessel *CMA CGM Antoine de Saint Exupery*, the largest vessel under the

French flag and the largest ship ever built by the Philippines shipbuilder HHIC-Phil. This series would also appear to be the swansong for oil-fuelled ultra large container ships as far as the French operator is concerned, as next year will see the arrival of its new LNG-fuelled ships.

Although this edition is intended for ships delivered in 2018, we felt that we could make an exception and include one ship that has been launched but not yet delivered. The *RRS Sir David Attenborough* (RRS is an abbreviation for Royal Research Ship) has become infamous in some circles as being the ship that was very nearly given the unflattering name *Boaty McBoatface*. This came about after the owner decided to run a public vote on the ship's name, but ultimately backed down and opted instead for honouring the BBC naturalist. The *Sir David Attenborough* itself is a highly sophisticated vessel that will replace two older ships named after polar explorers. Appropriate to modern environmental concerns, the high ice-classed ship will feature a hybrid propulsion system and other energy saving measures.

The Royal Institution of Naval Architects would like to thank all contributors, as always, for generously giving their time and providing the information that has allowed us to compile this publication.

Malcom Latache
Associate Editor
February 2019

Notes

In the tables which form part of each ship description, all dimensions, also deadweight and displacement tonnages, are metric unless otherwise stated. Machinery powers have been specified as 'bhp' or 'kW' in accordance with information received from the shipbuilder or owner. Emergency alternators are not normally included in the number of alternators. The number of sister ships completed or on order does not include the ship presented. Some ships shown as 'on order' may have been delivered by the time this publication appears.



ALMI ATLAS: Very large crude carrier

Shipbuilder: **Hyundai Samho Heavy Industries Co. Ltd.**
 Vessel's name: **Almi Atlas**
 Hull No: **S913**
 Owner/Operator: **Almi Tankers**
 Country: **Greece**
 Designer: **Hyundai Samho Heavy Industries Co. Ltd.**
 Country: **Republic of Korea**
 Model test establishment used: **Hyundai Maritime Research Institute**
 Flag: **Liberia**
 IMO number: **9816323**
 Total number of sister ships already completed (excluding ship presented): **1**
 Total number of sister ships still on order: **nil**

Delivered in March 2018, *Almi Atlas* is one of the earliest vessels in this edition of Significant Ships, but planning for her and her sister *Almi Titan's* (delivered in June 2018) environmental credentials began almost two years previously when the pair were ordered from Hyundai Samho Heavy Industries.

The most obvious deviation from the usual VLCC profile is the large casing behind the stack of the vessel. This is necessary as the 315,221dwt ship features an Alfa Laval PureSOx ECA Open Loop U-type exhaust gas cleaning system underlining the owner's foresight in preparing for the 2020 sulphur cap some time before the surge of scrubber ordering in earnest began last year.

In fact the vessel is the first VLCC to feature a scrubber and is therefore a trailblazer for the technology – even more so considering that the vessel was ordered just weeks after the IMO decision to opt for a 2020 date. At the time of ordering, the competitive advantage that scrubbers are expected to deliver was less anticipated than it is now.

The scrubber fitted treats the exhaust from both main and auxiliary engines allowing the ship to operate full time on HFO as desired. Among other eco-friendly technologies on board, the vessel is also equipped with the Hyundai HiBallast HiB 6000ex Ballast Water Treatment System.

Almi Atlas features a Hyundai-built B&W 7G80ME - C9.5 - EGRTC (Tier III) engine – she is one of the first vessels of her size with a Tier III engine and the order for it in 2016 marked the 1500th order for MAN's G-series engines. The auxiliary engines are a trio of Hyundai's in-house engine division's Himsen 9H21/32 units. The EGRTC suffix for the main engine fitted to the *Almi Atlas* indicates that it is fitted for exhaust gas recirculation in order to meet IMO NOx Tier III emissions, and also features a turbocharger cut-out.

The G-type is an ultra-long stroke engine, which, in conjunction with a larger diameter propeller, offers significant fuel savings and produces less emissions than

engines with the same output, thus classifying it as one of the most environmentally efficient propulsion systems. *Almi Atlas* flies the Liberian flag and is classed by DNV GL.

TECHNICAL PARTICULARS

Length oa: 336.08m
 Length bp: 330m
 Breadth moulded: 60m
 Depth moulded
 To upper deck: 30.3m
 Width of double skin
 Side: 3.0m
 Bottom: 2.9m
 Draught
 Scantling: 22.6m
 Design: 21m
 Gross: 162,306gt
 Displacement: 138,911t
 Lightweight: 46,974t
 Deadweight
 Design: 286,489dwt
 Scantling: 315,221dwt
 Block co-efficient: 0.7063
 Speed, service: 15.2knots at design draught

Cargo capacity
 Liquid volume: 357,777.8m³
 Bunkers
 Heavy oil: 4,609.2m³
 Diesel oil: 1,002.7m³
 Water ballast: 93,901.6m³
 Daily fuel consumption (tonnes/day)
 Main engine only: 169.59 g/kW-hr (MCR)

Classification society and notations: DNVGL
 ✕1A1, Tanker for oil, BIS, BWM (T, E(S)), CLEAN, COAT-PSPC (B, C), CSA (FLS1), CSR, E0, ESP, NAUT (OC), Recyclable, SPM, TMON (oil lubricated), VCS (2B)

% high-tensile steel used in construction: 49.8%

Main engines
 Design: Hyundai-B&W
 Model: 7G80ME-C9.5-EGRTC
 Manufacturer: Hyundai Heavy Industries Co., Ltd, Engine & Machinery Division
 Number: 1
 Type of fuel: HFO
 Output of each engine: 26,000kW

Propellers
 Material: Ni-Al-Bronze
 Designer/Manufacturer: Hyundai Heavy Industries Co., Ltd, Engine & Machinery Division
 Number: 1

Fixed/controllable pitch: Fixed
 Diameter: 10.5m
 Diesel-driven alternators
 Number: 3
 Engine make/type: Hyundai Heavy Industries Co., Ltd, Engine & Machinery Division / Himsen 9H21/32
 Type of fuel: HFO
 Output/speed of each set: 1,940kW / 900rpm
 Alternator make/type: Hyundai Electric & Energy Systems Co., Ltd / HFC7 638-8P
 Output/speed of each set: 1,830kW / 900rpm

Exhaust-gas scrubbing equipment
 Manufacturer: Alfa Laval Nijmegen B.V.
 Type: PureSOx ECA Open Loop U-type system
 On main engines: Yes
 On auxiliary engines: Yes

Boilers
 Number: 3
 Type: MAC-45B x 2 / Aalborg OC-TCi x 1
 Make: Mitsubishi Heavy Industries Co., Ltd / Alfa Laval
 Output, each boiler: 45,000kg/hr x 2 / 4,400kg/hr x 1

Cargo cranes/cargo gear
 Number: 2
 Make: Dongnam Marine Crane Co., Ltd.
 Type: Electro-hydraulic
 Performance: 20t SWL

Other cranes
 Number: 2
 Make: Dongnam Marine Crane Co., Ltd.
 Type: Electro-hydraulic
 Tasks: Provision crane
 Performance: 10t, 3t SWL

Other cranes
 Number: 1
 Make: Dongnam Marine Crane Co., Ltd.
 Type: Electro-magnetic
 Tasks: Engine room crane
 Performance: 10t SWL

Mooring equipment
 Number: 10
 Make: Rolls-Royce
 Type: Hydraulic

Special lifesaving equipment
 Number of each and capacity: 2 / 36 persons
 Make: Hyundai Lifeboats Co., Ltd.
 Type: Totally enclosed

Cargo tanks
 Number: 17
 Grades of cargo carried: Crude oil
 Coated tanks: Hempel / Hempadur XO 17870

Cargo pumps
 Number: 3
 Type: KV450-4
 Make: Shinko Industries Ltd.
 Capacity: 5,000m³/h each

Cargo control system
 Make: KSB Seil Co., Ltd.
 Type: Electro-hydraulic remote control

Ballast control system
 Make: KSB Seil Co., Ltd.
 Type: Hydraulic and remote control

Water Ballast Treatment System
 Make: Hyundai Heavy Industries Co., Ltd, Engine & Machinery Division
 Capacity: 6,000m³/h

Complement
 Officers: 14
 Crew: 22

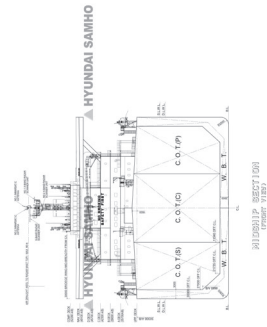
Stern appendages/special rudders: .. Half Duct
 Bridge control system
 Make: Hyundai Electric & Energy Systems Co., Ltd.
 Type: Console
 One-man operation: Yes

Radars
 Number: 2
 Make: JRC
 Model: JMR-9225-6X
 Integrated bridge system: No
 Contract date: 3 August 2016
 Launch/float-out date: 30 December 2017
 Delivery date: 13 March 2018

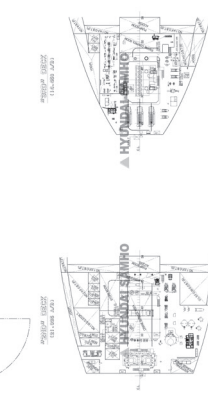
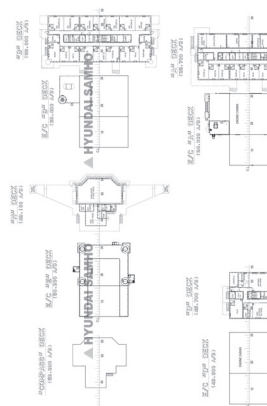
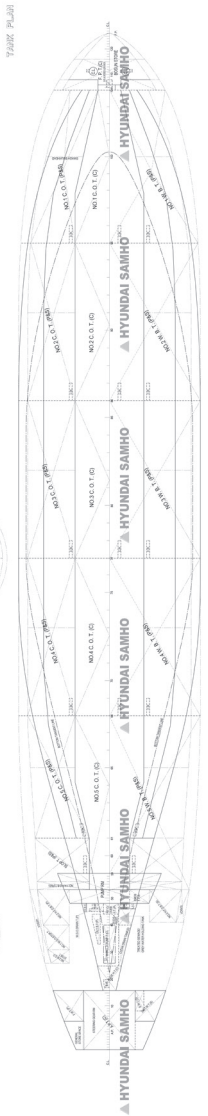
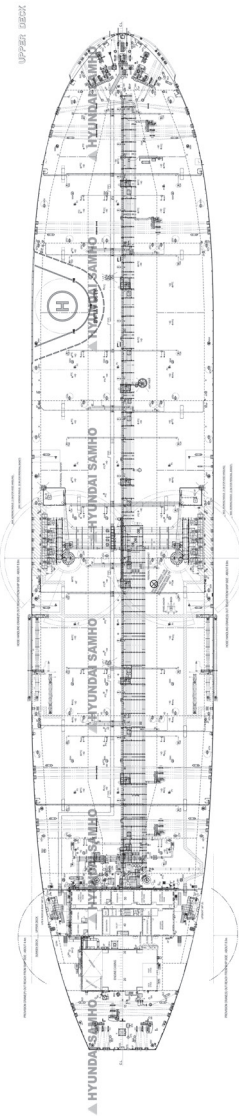
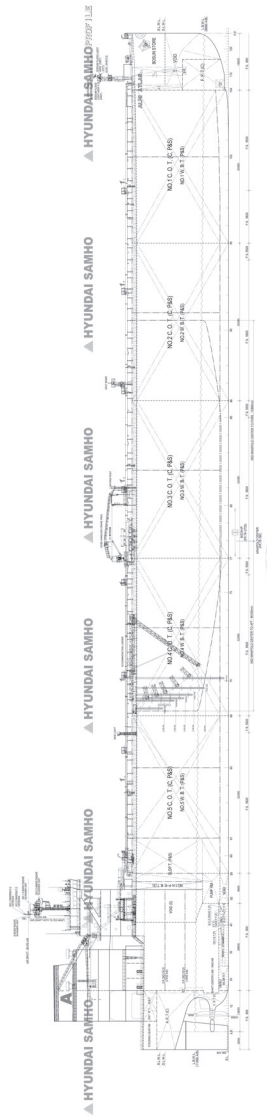
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AMPHION: Very large crude carrier

Shipbuilder: **Samsung Heavy Industries Co., Ltd.**
 Vessel's name: **Amphion**
 Hull No: **SN2225**
 Owner/Operator: **CVLC One Carrier Corp.**
 Country: **Greece**
 Designer: **Samsung Heavy Industries Co., Ltd.**
 Country: **Republic of Korea**
 Model test establishment used: **Samsung Ship Model Basin**
 Flag: **Liberia**
 IMO number: **9830795**
 Total number of sister ships already completed (excluding ship presented): **nil**
 Total number of sister ships still on order: **3**

Completed in late 2018, *Amphion* was handed over by Samsung Heavy Industries to its owners Capital Maritime early in January 2019. The 320,784dwt VLCC is the first of four ships delivered under a contract signed in May 2017 which includes the option of four further vessels.

The ship is described by its owner as an eco-type VLCC crude oil tanker in line with the company's long term ambition which has seen it win many environmental industry awards. In 2009, Capital developed a plan that commits the business to reduce GHG emissions by 30% on a 2009 baseline over an 11-year period until 2020. The company has sought to further improve its energy efficiency through active voyage management, including weather routing and speed optimisation. It has also been an enthusiastic supporter of the OCIMF 'virtual arrival' concept.

Samsung, the designer and builder of the vessel, describe it as a fuel-efficient and technically advanced crude oil tanker. The new vessel is fitted with an electronically controlled MAN B&W 7G80ME-C9 two-stroke engine producing 26,890kW at 72rpm and driving a fixed-pitch propeller to give a service speed of 13knots.

The vessel also features significant improvements in hull design, which increase fuel efficiency. From the growing list of the various Samsung in-house energy saving devices, *Amphion* is fitted with the SAVER fin for directing flow along the hull to the propeller, the SAVER Stator located directly in front of the propeller which optimises the flow, STAR (Samsung Tip Advanced Rake) propeller and SARB (Samsung Asymmetric Rudder Bulb). Between them these devices reduce fuel consumption by a claimed 6%. To allow the ship to run on HFO after the 2020 sulphur cap kicks in, the ship is scrubber ready.

The cargo tank configuration is standard for a VLCC comprising five each of port side, centre and starboard side tanks for a total of 15 tanks along with a port and starboard slop tank. There are three cargo pumps each with a 5,000m³/h capacity.

TECHNICAL PARTICULARS

Length oa: 333m
 Length bp: 326.4m
 Breadth moulded: 60m
 Depth moulded to upper deck: 30.5m

Draught
 Scantling: 22.8m
 Gross: 191,683gt
 Deadweight
 Scantling: 320,784dwt

Speed, service: 14.5knots

Cargo capacity
 Liquid volume: 360,000m³
 Bunkers
 Heavy oil: 6,000m³
 Diesel oil: 1,000m³
 Water ballast: 96,000m³
 Tankers - percentage segregated ballast: 100%

Classification society and notations: ABS
 A1, Oil Carrier, ESP, AMS, ACCU, CSR, CPS, RRDA, IHM, POT, BWE, SPMA, UWILD, CRC(I), ENVIRO, TCM, BWT, VEC, PORT, NBL Unrestricted Service

Main engines
 Model: MAN B&W 7G80ME-C9.5
 Manufacturer: MAN Diesel
 Number: 1
 Type of fuel: HFO or MDO

Propellers
 Material: Ni-Al-Bronze
 Number: 1
 Fixed/controllable pitch: Fixed
 Diesel-driven alternators
 Number: 3
 Type of fuel: HFO or MDO

Boilers
 Number: 2
 Type: Oil fired
 Cargo cranes/cargo gear
 Number: 2
 Type: Electro-hydraulic with Jib rest

Other cranes
 Number: 2
 Type: Electro-hydraulic with Jib rest
 Tasks: Provision & equipment handling

Mooring equipment
 Number: 10
 Type: Electro-hydraulic driven (high pressure)

Special lifesaving equipment
 Number: 2
 Type: Totally enclosed / Gravity type lifeboat

Cargo tanks
 Number: 15
 Grades of cargo carried: Crude oil

Cargo pumps
 Number: 3
 Type: Centrifugal, Steam turbine driven

Water Ballast Treatment System: Applied

Complement
 Officers: 11
 Crew: 19
 Suez/Repair Crew: 6

Bridge control system
 One-man operation: Yes

Fire detection system
 Make: Consilium
 Type: Salwico Fire Alarm System CCP

Fire extinguishing systems
 Engine room:
 Type: High expansion form
 Cabins:
 Type: Fire hydrants
 Public spaces:
 Type: Fire hydrants

Radars
 Number: 2 sets

Waste disposal plant
 Incinerator: Applied
 Sewage plant
 Type: Biological

Contract date: May 2017
 Delivery date: 13 January 2019



CADMATIC

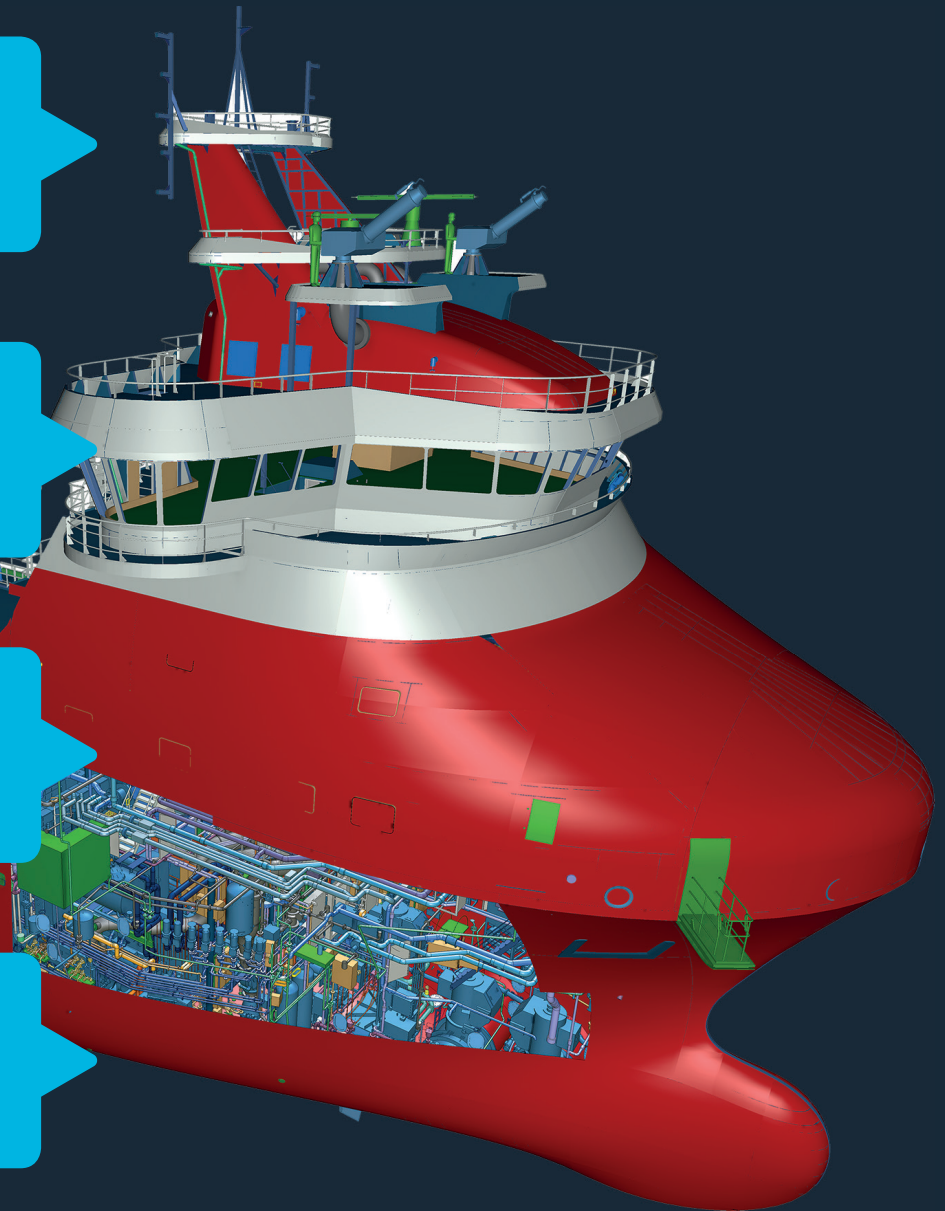
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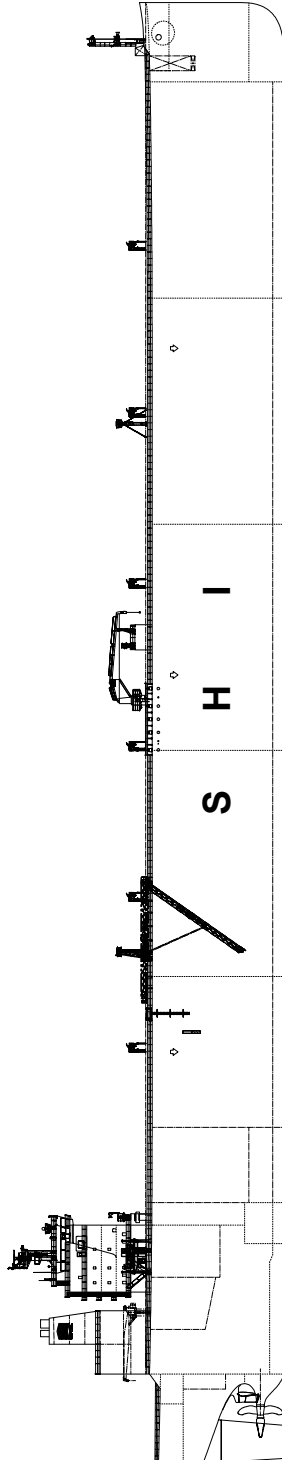
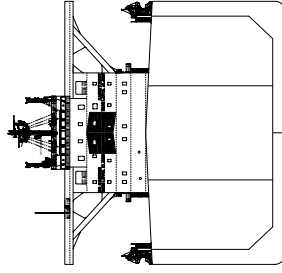
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BRITISH PARTNER: LNG carrier

Shipbuilder: ... **Daewoo Shipbuilding & Marine Engineering Co., Ltd.**
 Vessel's name: **British Partner**
 Hull No: **2441**
 Owner/Operator: **BP Shipping**
 Country: **UK**
 Designer: **Daewoo Shipbuilding & Marine Engineering Co., Ltd.**
 Country: **Republic of Korea**
 Model test establishment used: **KRISO, SSPA, Force Technology**
 Flag: **Isle of Man**
 IMO number: **9766530**
 Total number of sister ships already completed (excluding ship presented): **2**
 Total number of sister ships still on order: **3**

As the first of a series of six sister vessels, *British Partner* would warrant the title 'significant ship' on that basis alone. However, the ship and its five sisters in the new Partnership class take on more significance as the lead vessels in BP's fleet rejuvenation programme and, with a cargo capacity of 173,400m³ and a length of 295m, they are the largest LNG carriers yet owned by the company.

BP is putting a great deal of investment into renewing its fleet of LNG carriers with the Partnership class spearheading the rejuvenation programme. *British Partner* has been designed to take advantage of the new Panama Canal dimensions in a design and equipment package that significantly extends the range of ports they can serve compared to the company's older LNG carriers.

British Partner is powered by a pair of Doosan-built MAN B&W 5G70ME-C9.5-GI (derated) engines each coupled to its own shaft, propeller and rudder. The engines can run on most fuel types but as GI variants are intended to run on LNG taken from the cargo.

When running on gas, rather than use boil off gas as most LNG carriers do, the Partnership class vessels have a five-stage compressor that raises the pressure of the gas from just above atmospheric pressure to 300bar. It is then sent to the engines for fuel – or to the cargo re-liquefaction system. When the re-liquefaction plant is in use, up to 70% of the gas discharged from the compressor is cooled, re-liquefied and pumped back to the cargo tanks.

The design of the hull has been refined to improve efficiency and allow for greater manoeuvrability. The fuel efficiency of the vessels is claimed as being at least 25% better than the earlier vessels in the fleet. Other environmentally friendly systems include a sophisticated waste handling system that minimises and compacts all types of vessel waste.

TECHNICAL PARTICULARS

Length oa: 294.9m
 Length bp: 282.9m
 Breadth moulded: 46.4m

Depth moulded
 To main deck: 26.5m
 Width of double skin
 Side: 2.711m
 Bottom: 3.200m
 Draught
 Scantling: 12.5m
 Design: 11.5m
 Gross: 115,366gt
 Speed, service: 20.0knots at 72% MCR w/o S.M.
 Cargo capacity
 Refrigerated cargo: 173,400m³
 Bunkers
 Heavy oil: 4,400m³
 Diesel oil: 1,000m³
 Water ballast: 60,000m³
 Daily fuel consumption
 Main engine only: 73.4 t/day
 Auxiliaries: 9.3 t/day
 Classification society and notations: LR
 *100A1, Liquefied Gas Tanker, Ship type 2G, Methane(LNG) in Membrane Tanks, Maximum Vapour Pressure 0.35 bar, Minimum Temperature -163°C, ShipRight(SDA, FDA Plus(40, WW), CM, ACS(B)), *IWS, LI, ECO(BWT, IHM), +LMC, UMS, CCS, NAV1, IBS, CAC2 with the descriptive notes "ShipRight (BWMP(T, S), SERS, SCM, MCM, MPMS, FDA Plus(40, 50% NORTH EUROPE TO GULF OF MEXICO, 50% WW)), ETA"
 % high-tensile steel used in construction: .. 10%
 Main engine(s)
 Design: MAN Diesel & Turbo
 Model: MAN B&W 5G70ME-C9.5-GI (Derated)
 Manufacturer: Doosan Engine
 Number: 2
 Type of fuel: HFO, LSMGO and Fuel Gas
 Output of each engine: 13,470kW x 70.8rpm (MCR)
 Propeller(s)
 Material: Ni-Al-Bronze
 Designer/Manufacturer: Nakashima
 Number: 2
 Fixed/Controllable pitch: Fixed
 Diameter: 8.3m
 Speed: 20.0knots
 Diesel-driven alternators
 Number: 4
 Engine make/type: Wärtsilä 34DF / 4-stroke, trunk piston, in-line, dual fuel

Type of fuel: HFO, LSMGO and Fuel Gas
 Output/speed of each set: 2 x 2,880kW & 2 x 4,360kW / 720 rpm
 Alternator make/type: HHI/self-excited, brushless, synchronous
 Output/speed of each set: 2 x 2,700kW & 2 x 4,100kW / 720rpm

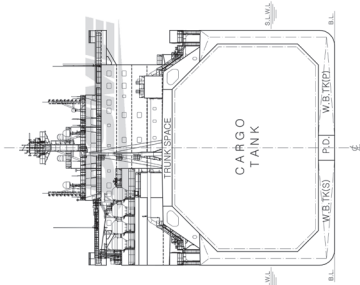
Boilers
 Number: 2
 Type: Vertical, water tube
 Make: Alfa Laval (Aalborg)
 Output, each boiler: 6,500kg/h x 6.0bar g. saturated
 Cargo cranes/cargo gear
 Number: 2
 Make: Tech Flower
 Type: Electro-hydraulic, luffing jib
 Performance: 10t SWL
 Other cranes
 Number: 2
 Make: Tech Flower
 Type: Electro-hydraulic, luffing jib
 Tasks: Provision handling
 Performance: 8t SWL
 Mooring equipment
 Number: 9
 Make: TTS
 Type: Hydraulic

Special lifesaving equipment
 Number and capacity: 1, 41 persons
 Make: Harding
 Type: Free-fall lifeboat

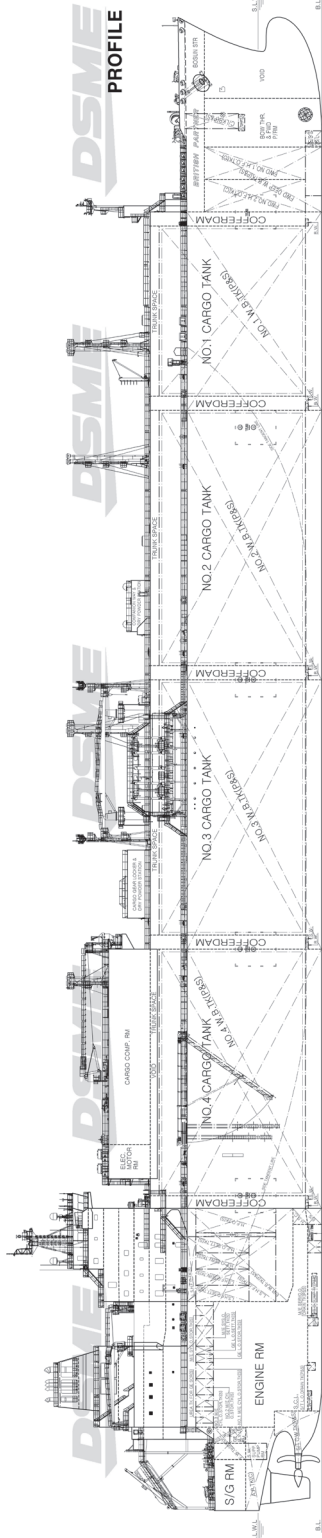
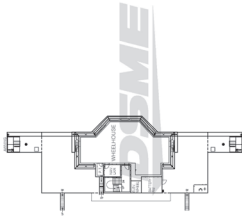
Cargo tanks
 Number: 4
 Grades of cargo carried: GTT NO96
 Cargo pumps
 Number: 8 (2 per each tank)
 Type: Centrifugal, vertical, submerged, single stage
 Make: Shinko
 Capacity: 2,050m³/h each
 Cargo control system
 Make: Honeywell
 Type: Integrated Automation System

Ballast control system
 Make: Honeywell
 Type: Integrated Automation System
 Water Ballast Treatment System
 Make: TeamTec (OceanSaver)
 Capacity: 6,200m³/h in total
 Complement
 Officers: 14
 Crew: 15
 Supernumeraries/Spare: 6
 Suez/Repair Crew: 6
 Single/double/other rooms: 36
 Stern appendages/special rudders: Full Spade Rudder with rudder bulb

Bow thrusters
 Make: Kawasaki
 Number: 1
 Output (each): 2,200kW
 Bridge control system
 Make: Kongsberg Maritime
 One-man operation: Yes
 Fire detection system
 Make: Consilium
 Type: Addressable type
 Integrated bridge system: Yes
 Make: Honeywell
 Model: Experion PKS
 Waste disposal plant
 Incinerator
 Make: HMMCO
 Model: MAXI 1200SL WS
 Waste compactor
 Make: USON
 Model: UBP-30S
 Waste shredder/crusher
 Make: USON
 Model: UMS-2530
 Sewage plant
 Make: EVAC
 Model: MBR 2K C
 Contract date: 12 December 2014
 Launch/float-out date: 30 September 2017
 Delivery date: 29 May 2018



MIDSHIP SECTION
NAV. BRI. DECK



E DECK



UPPER DECK

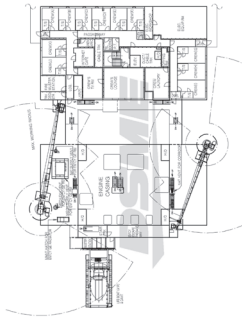
D DECK



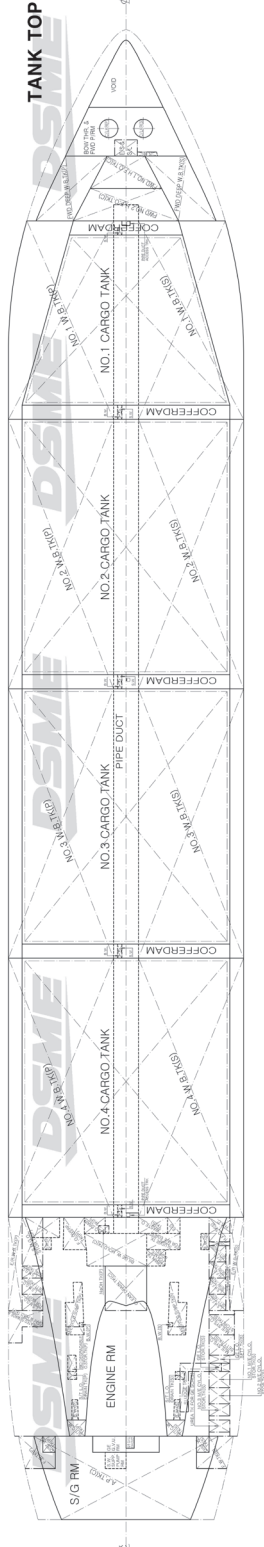
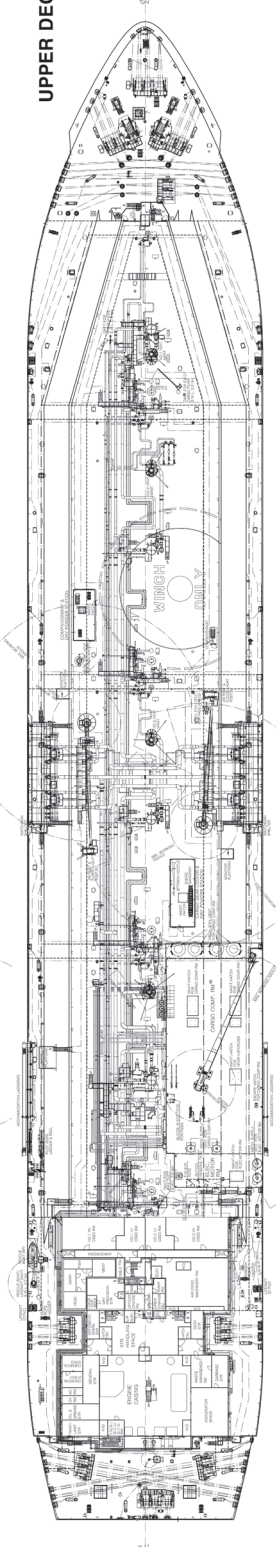
C DECK



B DECK



A DECK





BW TULIP: LNG carrier

Shipbuilder: ... **Daewoo Shipbuilding & Marine Engineering Co., Ltd.**
 Vessel's name: **BW Tulip**
 Hull No: **2435**
 Owner/Operator: **BW Discovery Pte. Ltd.**
 Country: **Singapore**
 Designer: **Daewoo Shipbuilding & Marine Engineering Co., Ltd.**
 Country: **Republic of Korea**
 Model test establishment used: .. **KRISO, SSPA MDL**
 Flag: **Singapore**
 IMO number: **9758064**
 Total number of sister ships already completed (excluding ship presented): **0**
 Total number of sister ships still on order: **2**

Ordered in 2014, *BW Tulip* is the first in a three-ship LNG carrier series for BW LNG. There would have been four identical ships, but BW decided to have one constructed as a FSRU rather than as a carrier. When delivered to the BW fleet in January 2018, *BW Tulip* was the first vessel owned by the company to feature two-stroke gas-injected engines. All other vessels have either been steam turbine or fitted with four stroke dual-fuel engines.

The vessels have a four-tank GTT-NO96 membrane cargo containment system with a gas capacity of 173,400m³ and feature a partial reliquefaction system. The latter allows for the elimination of a gas combustion unit and therefore increases the quantity of cargo delivered.

The propulsion system on the ship comprises a pair of MAN 5G70ME-GI-C9 Doosan-built engines each connected to its own 8.3m diameter fixed-pitch propeller. Each of the engines has an output of 11,975kW at 68rpm. The engines can also run on HFO and MDO but will usually operate on LNG. The auxiliary engines are a quartet of Wärtsilä 34DF engines which can also operate on any fuel type.

The decision to opt for high pressure injection ME-GI engines is one that several other operators have also made and has been explained by the owner as being done on efficiency and economic grounds. ME-GI engines consume less fuel compared to dual- or tri- diesel engines with the savings equivalent to a reduction of about 22,300tonnes of carbon dioxide emissions per vessel per year.

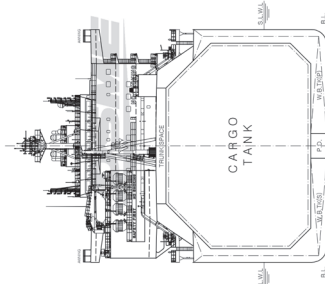
The ship's dimensions of 294.9m length, 46.4m beam and 12.5m draught are well within the new Panama Canal dimensions allowing for easy world-wide operation. The choice of a US Coast Guard type-approved ballast system in the shape of a Teamtec

(Oceansaver) model will ensure operation in US waters once the regulations there change to permit only ships with US type-approved systems on board.

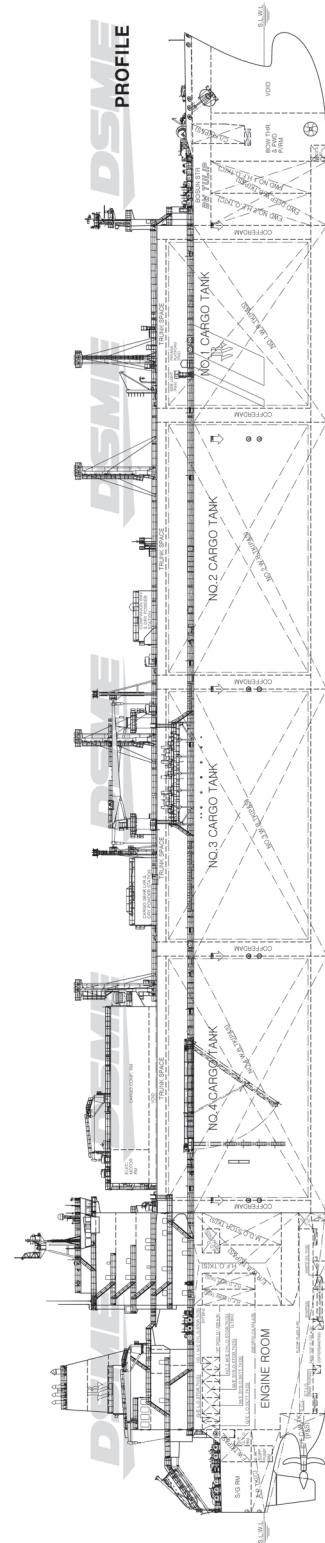
TECHNICAL PARTICULARS

Length oa: 294.9m
 Length bp: 282.9m
 Breadth moulded: 46.4m
 Depth moulded
 To main deck: 26.5m
 Width of double skin
 Side: 2.711m
 Bottom: 3.2m
 Draught
 Design: 11.5m
 Scantling: 12.5m
 Gross: 114,364gt
 Deadweight
 Design: 84,187dwt
 Scantling: 95,785dwt
 Block co-efficient: approx. 0.78 at scantling draught
 Speed, service (90% MCR output): 19.5knots
 Cargo capacity
 Refrigerated cargo: 173,647.9m³
 Bunkers
 Heavy oil: 5,293.9m³
 Diesel oil: 632.4m³
 Water ballast: 61,523.9m³
 Daily fuel consumption
 Main engine only: 82.1 (oil) / 66.8 (gas) t/day
 Classification society and notations: ... DNV-GL, +1A1, Tanker for Liquefied Gas, Ship type 2G (-163°, 500 kg/m³, 0.35 bar), NAUTICUS (Newbuilding), COAT-PSPC(B), E0, NAUT-OC, TMON, BIS BWM-T, Recyclable, GAS FUELLED
 % high-tensile steel used in construction: . 8.4%
 Main engine(s)
 Design: MAN B&W
 Model: 5G70ME-C9.5-GI
 Manufacturer: Doosan Engine Co., Ltd
 Number: 2
 Type of fuel: HFO, MDO, LSMGO and Fuel Gas
 Output of each engine: 11,975kW x 68.1rpm (MCR)
 Propeller(s)
 Material: Ni-Al-Bronze
 Designer/Manufacturer: Daewoo Shipbuilding & Marine Engineering Co., Ltd. / Nakashima Propeller Co., Ltd.
 Number: 2

Fixed/controllable pitch: Fixed
 Diameter: 8.3m
 Speed: 19.5knots
 Diesel-driven alternators
 Number: 4
 Engine make/type: ... Wärtsilä 34DF / 4-stroke, trunk piston, in-line, dual fuel
 Type of fuel: HFO, MDO, LSMGO and Fuel Gas
 Output/speed of each set: ... 2,880kW / 720rpm
 Alternator make/type: Hyundai / Electric + Synchronous type
 Output/speed of each set: 2,750kW / 720rpm
 Boilers
 Number: 2
 Type: Vertical, water tube
 Make: Alfa Laval (Aalborg)
 Output, each boiler: 6,500kg/h x 6.0bar g. saturated
 Cargo cranes/cargo gear
 Number: 2
 Make: Oriental
 Type: Hydraulic
 Performance: 10t SWL
 Other cranes
 Number: 2
 Make: Oriental
 Type: Hydraulic
 Tasks: Provision handling
 Performance: 8t SWL
 Mooring equipment
 Number: 9
 Make: TTS
 Type: Hydraulic
 Special lifesaving equipment
 Number of each and capacity: 1
 Make: Norsafe
 Type: Free-fall lifeboat
 Cargo tanks
 Number: 4
 Grades of cargo carried: LNG
 Cargo pumps
 Number: 8
 Type: Centrifugal, vertical, submerged, single stage, integrated electric motor
 Make: Shinko
 Capacity: 1,750m³/h each
 Cargo control system
 Make: Kongsberg
 Type: Integrated Automation System
 Ballast control system
 Make: Kongsberg
 Type: Integrated Automation System
 Water Ballast Treatment System
 Make : Teamtec(OceanSaver)
 Capacity: 6,000m³/h in total
 Complement
 Officers: 18
 Crew: 16
 Suez/Repair Crew: 6
 Single/double/other rooms: ..Single rooms / 6 beds in one room for suez crew
 Bow thrusters
 Make: KTE
 Number: 1
 Output: 2,200kW each
 Bridge control system
 Make: Kongsberg
 Type: Bridge Manoeuvring System
 One-man operation: Yes
 Fire detection system
 Make: Autronica
 Type: Addressable
 Fire extinguishing systems
 Engine room:
 Make/Type: .. Survitec (Wilhelmsen) / High expansion foam
 Radars
 Number: 3
 Make: Furuno
 Model(s) : FAR-3220 / FAR-3230S
 Waste disposal plant
 Incinerator
 Make: Kangrim
 Model: KFB-110S
 Contract date: 17 September 2014
 Launch/float-out date: 13 May 2017
 Delivery date: 3 January 2018



MIDSHIP SECTION



PROFILE

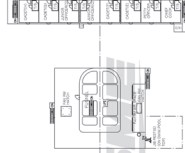
NAV. BRI. DECK



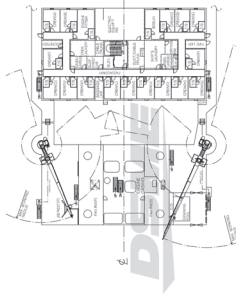
D DECK



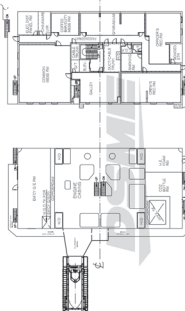
C DECK



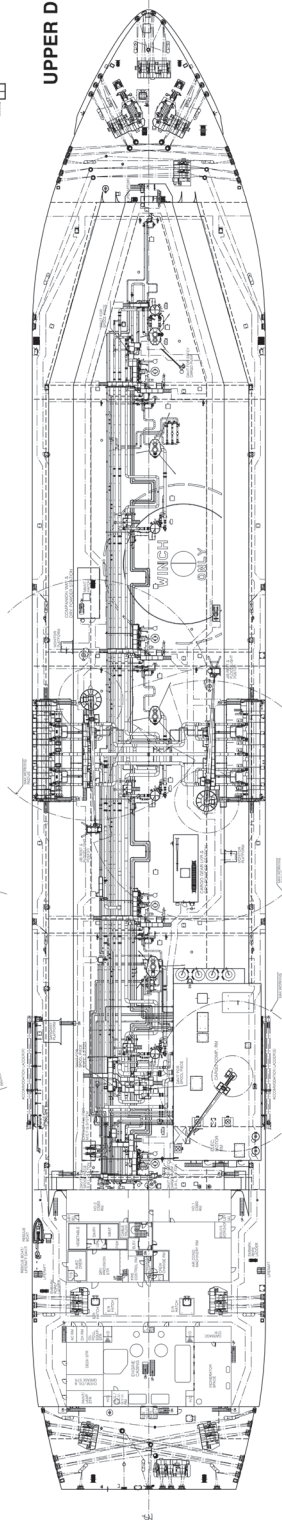
B DECK



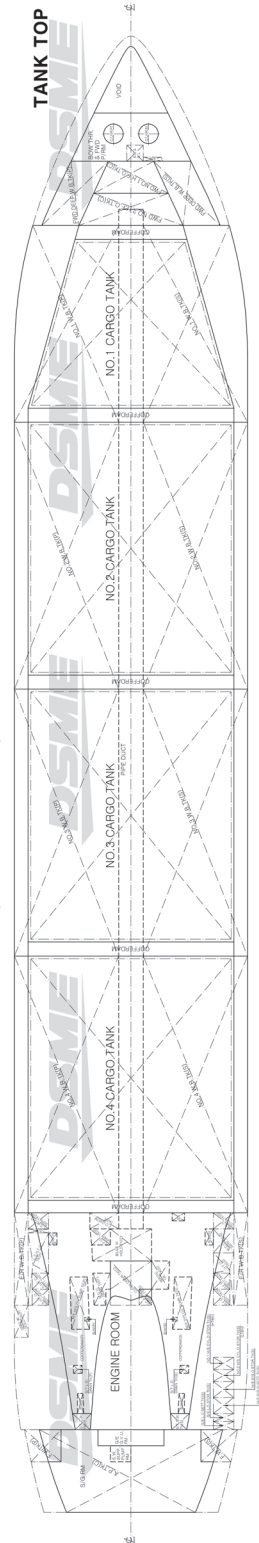
A DECK



UPPER DECK



TANK TOP





CMA CGM ANTOINE DE SAINT EXUPERY: Ultra large container ship

Shipbuilder: **HHIC-Phil Inc.**
 Vessel's name: **CMA CGM Antoine De Saint Exupery**
 Hull No: **NCP0149**
 Owner/Operator: **CMA CGM**
 Country: **France**
 Designer: **HHIC-Phil Korea / HHIC-Tech Inc**
 Country: **Republic of Korea / Republic of the Philippines**
 Model test establishment used: **KRISO**
 Flag: **France**
 IMO number: **9776418**
 Total number of sister ships already completed (excluding ship presented): **2**
 Total number of sister ships still on order: **nil**

Leading container ship operators have vied with each other for many years to be able to claim the title of world's largest, most innovative or any other epithet they can boast of.

CMA CGM Antoine de Saint Exupery may not fit some of those categories but at the time of its delivery in January 2018, it could certainly lay claim to be the first in a series of three sister ships; at 20,600teu the largest container ship under the French flag; the flagship of the CMA CGM fleet and also the largest container ship yet produced by its builder HHIC of the Philippines.

The arrival of the vessel and its two sisters later in 2018 has been a little overshadowed by the announcement of the company's larger LNG-fuelled ships which when delivered will take the honours so far attributed to CMA CGM Antoine de Saint Exupery but the ship stands up well to any scrutiny. The hull dimensions are 400m in length and 59m in beam with a 16m scantling draught. It has a gross tonnage of 217,673 and a deadweight of 202,684dwt.

Outwardly the ship is little different from its peers and as with all ultra large container ships, the bridge and accommodation are necessarily moved forward for line of sight regulations leaving the engines and stacks towards the aft part of the ship. The nominal capacity of 20,600teu in the owner's own description is a little less than the 20,954 claimed by the builder but under most circumstances the capacity at 14 tonnes homogenous of 13,200teu is more realistic.

The ship is powered by a single main engine – a WinGD W11X92 two-stroke engine with a 67,430kW power output at MCR and 57,315kW at CSR driving

a single fixed pitch propeller of 10.2m diameter at a maximum 80rpm. This gives the ship a service speed of 21.5knots.

The design of the engine significantly reduces cylinder lubricating oil consumption (-25%) and fuel consumption for a 3% average reduction of CO₂ emissions with further energy savings coming from a Becker Twisted Fin allowing improvements in the propeller's performance, generating a 4% reduction in CO₂ emissions. The ship also features a UV Bio-Sea ballast treatment system provided by the French Bio-UV Group.

TECHNICAL PARTICULARS

Length oa: 400m
 Length bp: 383.0m
 Breadth moulded: 59.0m
 Depth moulded
 To main deck: 33.0m
 To upper deck: 33.0m
 Width of double skin
 Side: 2.64m
 Bottom: 2.55m
 Draught
 Scantling: 16.0m
 Design: 14.5m
 Gross: 217,600gt
 Deadweight
 Design: 172,400dwt
 Scantling: 202,600dwt
 Speed, service (90% SMCR output): 21.5knots

Bunkers
 Heavy oil: 12,600m³
 Marine gas oil: 1,600m³
 Marine diesel oil: 450m³
 Water ballast: 52,800m³
 Container ships – water ballast in loaded condition: 820t at 14MT/TEU loaded in summer draught

Daily fuel consumption
 Main engine only: 223.9 (Rating.1), 204.8 (Rating.2) t/day
 Auxiliaries: 19.66 (G/E x 3sets), 13.1 (G/E x 1set) t/day

Classification society and notations: Bureau Veritas
 I, +HULL, +MACH, Container ship, Unrestricted navigation, +AUT-UMS, +AUT-PORT, +VeriSTAR-HULL DF 25 years, BWT, INWATERSURVEY, MON-SHAFT, LASHING, SDS, CLEAN-

SHIP, GREEN PASSPORT, ●ALP, FORS-NS
 Heel control equipment: Anti heeling system
 Roll-stabilisation equipment: Bilge keel
 Main engines
 Design: Hyundai-WinGD
 Model: W11X92
 Manufacturer: Hyundai Heavy Industries
 Number: 1
 Type of fuel: HFO or MGO
 Output of each engine: 67,430kW at 80rpm (Rating.1), 59,370kW at 76.7rpm (Rating.2)

Propellers
 Material: Ni-Al-Bronze
 Designer/Manufacturer: HHIC-Phil Korea / MMG
 Number: 1
 Fixed/Controllable pitch: Fixed
 Diameter: 10,200mm
 Speed: 76.7rpm

Diesel-driven alternators
 Number: 4
 Engine make/type: Hyundai HIMSSEN 9H32/40 x 3 sets / 6H32/40 x 1 set
 Type of fuel: HFO or MGO
 Output/speed of each set: 4,500kW at 720rpm x 3, 3,000kW at 720rpm x 1
 Alternator make/type: HHI-EES / HSJ7 913-10P x 3 / HSJ7 805-10P x 1
 Output/speed of each set: 4,320kW / 720rpm x 3, 2,880kW / 720rpm x 1

Boilers
 Number: 2
 Type: Vertical smoke tube
 Make: Alfa Laval
 Output, each boiler: EGB – 5,000kg/h, aux. boiler – 6,000kg/h

Mooring equipment
 Number: 16
 Make: BLM
 Type: Electric motor driven

Special lifesaving equipment
 Number and capacity: 2 x 40
 Make: Hatecke
 Type: Hinged gravity

Hatch covers
 Design: MacGregor
 Manufacturer: HHIC-Phil Inc.
 Type: Lift-away

Containers
 Lengths: 6,058mm (20ft)/12,192mm (40ft & 40ft EURO)/14,631 (45ft)
 Heights: 2,591mm (20ft, 40ft, 40ft EURO)/2,896mm (45ft)
 Cell guides: Fixed Type (150 x 150 x 15mm angles)
 Total TEU capacity: 20,954
 On deck: 11,560
 In holds: 9,394
 Homogeneously loaded to 14t: 13,200
 Reefer plugs: 1,600 FEU

Tiers/rows (maximum)
 On deck: 11/23
 In holds: 12/21

Ballast control system
 Make: Hoppe Marine
 Type: Valve with hydraulic actuator

Water Ballast Treatment System
 Make: Bio UV
 Capacity: UV type – 1,400m³/h

Complement
 Officers: 17
 Crew: 17

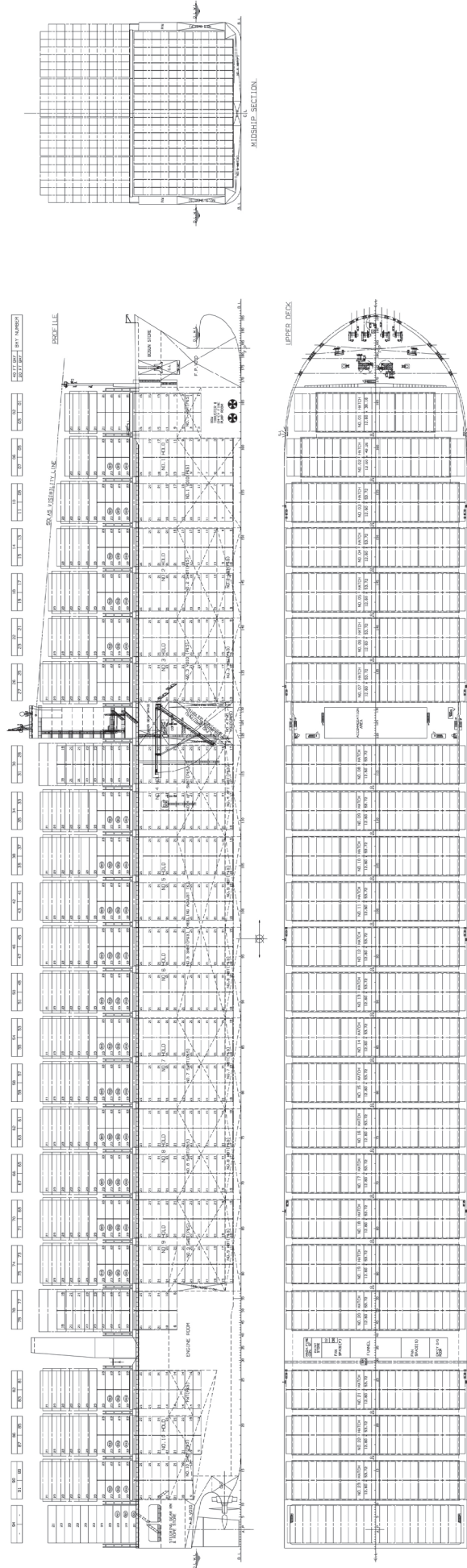
Passengers
 Total: 6

Stern appendages/special rudders: Mewis duct at twisted fin / Full spade rudder with twisted leading edge and rudder bulb

Bow thrusters
 Make: Kawasaki
 Number: 2
 Output (each): 2,500kW

Contract date: 2 April 2015
 Launch/float-out date: 19 August 2017
 Delivery date: 26 January 2018

21,000 TEU CLASS CONTAINER CARRIER





CMA CGM PREGOLIA: Feeder ship

Shipbuilder: **JinHai Intelligent Manufacturing Co. Ltd. (JHIM)**
 Vessel's name: **CMA CGM Pregolia**
 Hull No: **J0259**
 Owner/Operator: **CMA CGM**
 Country: **France**
 Designer: **Shanghai Merchant Ship Design & Research Institute (SDARI)**
 Country: **China**
 Model test establishment used: **SSRI**
 Flag: **Malta**
 IMO number: **9745500**
 Total number of sister ships already completed (excluding ship presented): **2**
 Total number of sister ships still on order: **0**

With so much attention having been focused on the larger sizes of container ships in recent years, it is important to remember that because there are fewer ports able to accommodate the giants, a new generation of feeder ships has become necessary.

CMA CGM Pregolia is one of the new generation and is significant for a variety of reasons. The SDARI-designed vessel is the first in a three-ship series of ice-classed 2,500teu feeder ships intended for service in Northern European and Baltic regions. It is also the first series of feeder container ships built by JinHai Intelligent Manufacturing Co. Ltd. although the builder is also responsible for the New Panamax 9,500teu MSC Desiree class.

The planned area of operation is within the two European ECAs where a sulphur limit of 0.1% is in place. To meet the SOx emission limits here and also outside of ECAs, CMA CGM has chosen to equip the vessels with hybrid scrubbers rather than opting for LNG or distillate fuels as some other operators have done. The scrubber selected is a Wärtsilä hybrid model that can operate as open or closed-loop, with sodium hydroxide being used to remove the sulphur in closed-loop mode.

The owner has anticipated a possible ban on discharge of waste water and a lack of reception facilities in some ports by equipping the vessel with a 700m³ sludge water storage tank capable of allowing around 290 hours of scrubber operation with the engine running on HFO. The ship's main engine is a MAN 6G60ME-C9 meeting NOx Tier II requirements. It produces 16,080kW of power to drive a 7m diameter fixed-pitch propeller giving a service speed of 19.8knots.

Winter operation in the Baltic is characterised by the need for ice navigation. CMA CGM Pregolia meets Finnish Swedish 1A Ice class permitting navigation in first-year ice up to 0.8m and is the first in the CMA CGM fleet to do so. The ship is winterised with fully enclosed bridge wings and wave shields. Escape

channels, fire-fighting equipment, air pipes and the like are equipped with electric heat systems to ensure that all important systems of the ship are available for normal operation under low temperature conditions.

A container capacity of 2,487teu – 916 under deck and 1,571 on deck – is more than adequate for a feeder vessel. Flexibility is increased with 700 reefer points and space for 270-unit pallet wide boxes on and under deck and general cargo in Bay 14.

TECHNICAL PARTICULARS

Length oa: 195.00m
 Length bp: 185.00m
 Breadth moulded: 32.20m
 Depth moulded
 To main deck: 17.00m
 Draught
 Scantling: 11.5m
 Design: 9.5m
 Gross: 29,316gt
 Deadweight
 Design: 24,487.8dwt
 Scantling: 34,350dwt
 Speed, service (90% MCR output): 19.8knots
 Bunkers
 Heavy oil: 3,980m³
 Diesel oil: 325m³
 Water ballast: 11,620m³
 Daily fuel consumption
 Main engine only: 57.76t/day

Classification society and notations: DNV GL + 100A5, E3, CONTAINER SHIP, DG, IW, BWM (D2), RSD (F25), NAV, LC + MC, E3, AUT, EP-D, CM-PS

Main engines
 Design: MAN
 Model: 6G60ME-C9.5 Tier II
 Manufacturer: Hyundai
 Number: 1
 Type of fuel: HFO, MDO, MGO
 Output of each engine: 16,080kW

Propellers
 Material: Ni-Al-Bronze
 Designer/Manufacturer: Wärtsilä CME Zhenjiang
 Number: 1
 Fixed/controllable pitch: Fixed
 Diameter: 7.0m
 Speed: 93.7rpm

Diesel-driven alternators
 Number: 4
 Engine make/type: Hyundai-HIMSEN 8H25/33 (HR)

Type of fuel: HFO, MDO, MGO
 Output/speed of each set: 2,421kW/900rpm
 Alternator make/type: HHI-EES HFJ7 716-84K
 Output/speed of each set: 2,300kW/900rpm

Exhaust-gas scrubbing equipment
 Manufacturer: Wärtsilä
 Type: Hybrid
 On main engines?: Yes
 On auxiliary engines?: Yes

Boilers
 Number: 1
 Type: PC1700001
 Make: Kangrim
 Output, each boiler: 2,500 / 2,000kg/h

Other cranes
 Number: 1
 Make: FUCHS Fördertechnik AG
 Type: Monorail
 Tasks: Provisions
 Performance: 4.0t x 5m SWL

Mooring equipment
 Number: for drums: fore 4, aft 4
 Make: Towimor S.A.
 Type: Electric

Special lifesaving equipment
 Number and capacity: 31 persons
 Make: Hatecke GmbH
 Type: Free-fall lifeboat

Hatch covers
 Design: TTS-Huahui
 Manufacturer: TTS-Huahui
 Type: Pontoon

Containers
 Total TEU capacity: 2,487
 On deck: 1,571
 In holds: 916
 Reefer plugs: 700unit
 Tiers/rows (maximum)
 On deck: 8/13
 In holds: 6/11
 Hold refrigeration system: Air-cooled

Water Ballast Treatment System
 Make: Wärtsilä Water System Ltd
 Capacity: 500m³/h

Complement
 Officers: 11
 Crew: 14
 Supernumeraries/Spare: 1
 Suez/Repair Crew: 6

Passengers
 Total: 5
 Number of cabins: 3

Stern appendages/special rudders: Full spade type rudder with twisted leading edge and optimised rudder bulb

Bow thrusters
 Make: Kawasaki Wuhan
 Number: 1
 Output (each): 1,500kW

Stern thrusters
 Make: Kawasaki Wuhan
 Number: 1
 Output (each): 1,000kW

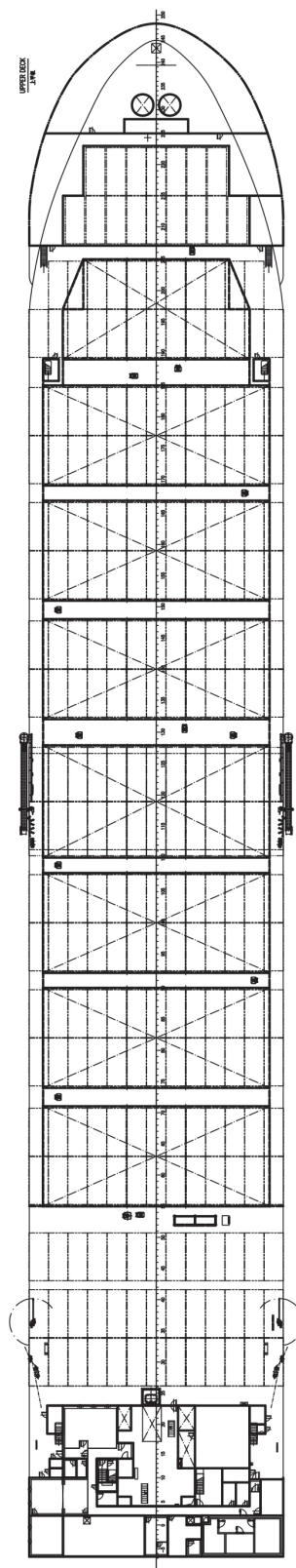
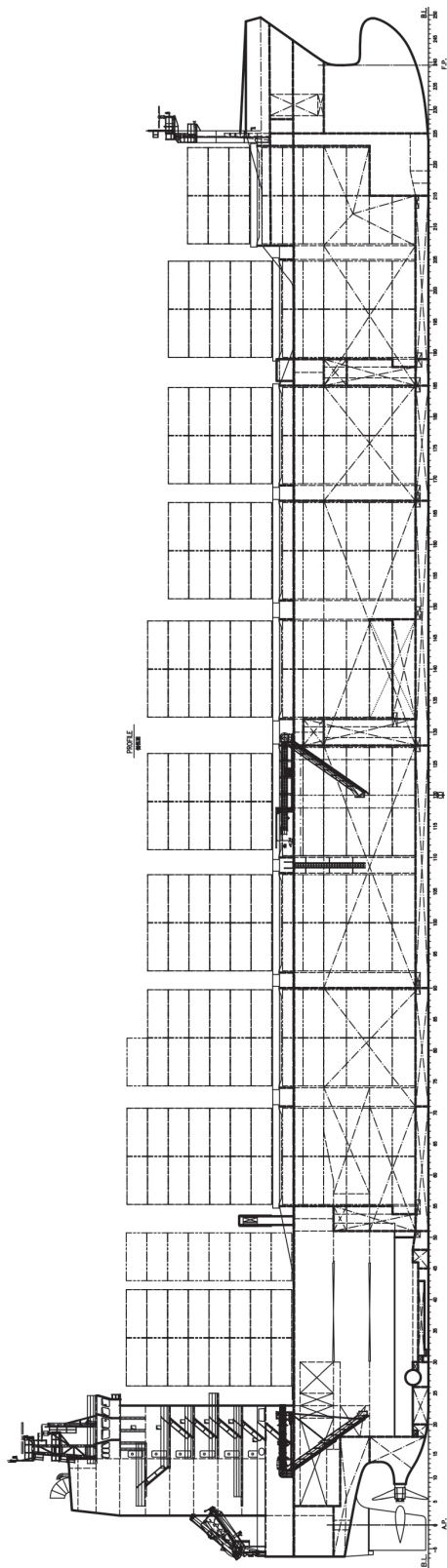
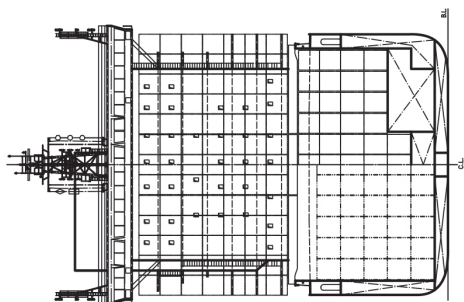
Bridge control system
 Make: Shanghai Hengyi
 One-man operation: Yes

Fire detection system
 Make: Consilium

Fire extinguishing systems
 Cargo holds: CO₂
 Make/Type: NK
 Engine room: CO₂
 Make/Type: NK

Radars
 Number: 3
 Make: Sperry
 Model(s): 65608A, 65606A, 65612A

Waste disposal plant
 Sewage plant
 Make: Hamworthy
 Model: STC06-13
 Launch/float-out date: 7 June 2017
 Delivery date: March 2018





DANIEL K INOUE: Container ship

Shipbuilder: **Philly Shipyard, Inc.**
 Vessel's name: **Daniel K. Inouye**
 Hull No: **029**
 Owner/Operator: **Matson Navigation, Co.**
 Country: **USA**
 Designer: **Korea Maritime Consultants, Co. LTD (KOMAC)**
 Country: **Korea**
 Model test establishment used: **HSVA**
 Flag: **USA**
 IMO number: **9719056**
 Total number of sister ships already completed (excluding ship presented): **nil**
 Total number of sister ships still on order: **1**

TECHNICAL PARTICULARS

Length oa: 260.3m
 Length bp: 248.5m
 Breadth moulded: 35.0m
 Depth moulded
 To main deck: 21.0m
 To upper deck: 21.0m
 Width of double skin
 Side: 2.07m
 Bottom: 2.0m
 Draught
 Scantling: 12.2m
 Design: 11.6m
 Gross: 48,409gt
 Displacement: 66,787t
 Lightweight: 19,475t
 Deadweight
 Scantling: 51,400dwt
 Block co-efficient: 0.65 at design draught
 Speed, service (87% MCR output): 23.5knots
 Bunkers
 Heavy oil: 2,602m³
 Diesel oil: 1,992m³
 Water ballast: 21,915m³
 Water ballast in loaded condition: 12,969t

Daily fuel consumption
 Main engine only: 127t/day
 Auxiliaries: 21t/day

Classification society and notations: ... DNV GL
 ✕100A5, Container Ship, ✕MC, AUT, RSD, NAV-INS, IW, BWM(D2), LC, EP-D, RSCS, DG, Gas ready (S, P, D, MEI, AEI)

% high-tensile steel used in construction: 65%
 % aluminium used in hull/superstructure: 0%
 Heel control equipment: Tanktech
 Anti-Heeling System

Main engines
 Design: 38,000kW
 Model: MAN B&W 7S90ME-C10.5-GI
 Manufacturer: Hyundai Heavy Industries
 Number: 1
 Type of fuel: HFO, MGO, LNG
 Output of each engine: 38,000kW

Propellers
 Material: Ni-Al-Bronze
 Designer/Manufacturer: Hyundai Heavy Industries
 Number: 1
 Fixed/Controllable pitch: Fixed
 Diameter: 8,700mm
 Speed: 84rpm

Diesel-driven alternators
 Number: 4
 Engine make/type: HHI / 2x 9H27DF,
 2x 6H27DF
 Type of fuel: HFO, MGO, LNG

Output/speed of each set: 2 @ 2,565kW;
 2 @ 1,710kW; 900rpm
 Alternator make/type: HHI-EMD
 Output/speed of each set: 2 @ 2,430kW,
 2 @ 1,620kW

Boilers
 Number: 2
 Type: 1x XS-2V Exhaust Gas Boiler;
 1x OS Auxiliary Boiler
 Make: Alfa-Laval/Aalborg
 Output, each boiler: 3,500kg/hr @ 7bar

Cranes
 Number: 1
 Make: Tech Flower
 Type: Monorail
 Tasks: Provisions, spares, stores
 Performance: 12.5t SWL

Mooring equipment
 Number: 7
 Make: Hatlapa/MacGregor
 Type: Electric

Special lifesaving equipment
 Number of each and capacity: 2x
 32-person lifeboats
 Make: Norsafe
 Type: Hinged gravity type davit

Hatch covers
 Design: Open pontoon type
 Manufacturer: MacGregor

Containers
 Lengths: 20', 40', 45', 53', 40' Flat Racks
 Heights: 8'-6", 9'-6"
 Cell guides: In all holds
 Total TEU capacity: 3,652
 On deck: 2,332
 In holds: 1,320
 Homogeneously loaded to 14t: The
 above capacities reflect homogeneously
 loaded to 10.25t / TEU per the
 contract specification.

Reefer plugs: 408
 Tiers/rows (maximum)
 On deck: 7 tiers, 14 rows
 In holds: 7 tiers, 12 rows
 Hold refrigeration system: None
 Special: ...Provisions for carriage of livestock
 containers on the aft deck

Water Ballast Treatment System
 Make: Panasia
 Capacity: GloEn-P700

Complement
 Officers: 14
 Crew: 18
 Supernumeraries/Spares: 0
 Suez/Repair Crew: 6
 Single/double/other rooms: 0
 Stern appendages/special rudders: Full
 spade with twisted leading edge, flap, and bulb
 (Van der Velden ART)

Bow thrusters
 Make: Rolls-Royce
 Number: 1
 Output (each): 1,500kW

Bridge control system
 Make: Kongberg
 Type: AutoChief 600
 One-man operation: Yes

Fire detection system
 Make: Consilium
 Type: Salwico Cargo addressable
 Fire extinguishing systems
 Cargo holds: CO₂
 Make/Type: NK/ANSUL
 Engine room: CO₂
 Make/Type: NK/ANSUL

Radars
 Number: 3
 Make: Furuno
 Model(s): ...FAR-3330S, FAR-3320, FAR-2827

Integrated bridge system: Yes
 Make: Furuno
 Model: FMD-3300 Alarm Management
 System & Conning Information Display System

Waste disposal plant
 Sewage plant
 Make: EVAC
 Model: MBR2KC

Contract date: 6 November 2013
 Launch/float-out date: 24 February 2018
 Delivery date: 31 October 2018

The first of US-based owner Matson's two new Aloha Class container ships, *Daniel K Inouye* was delivered by Philly Shipyard at the end of October. The vessel made immediate history as the largest Jones Act containership ever constructed. The order for the two vessels was made in 2015 and in mid-2017 it was reported that the yard could be building two more of the same type, but this has not been confirmed.

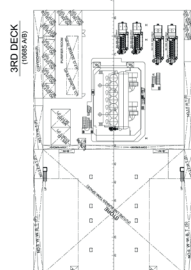
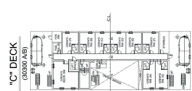
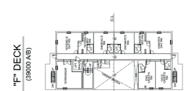
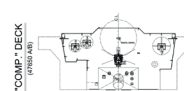
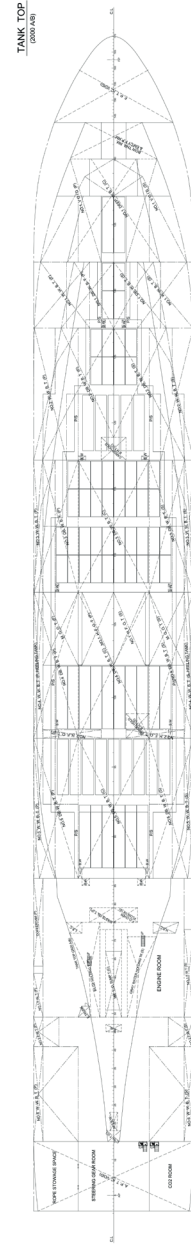
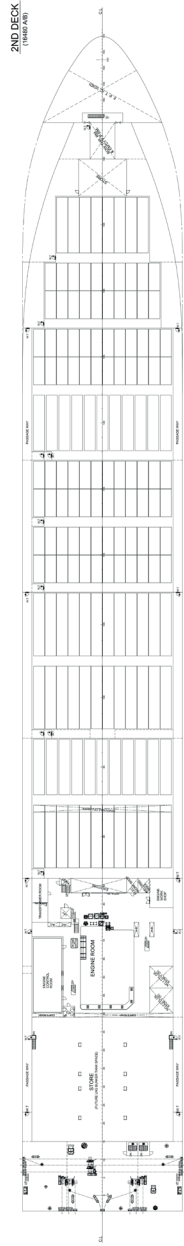
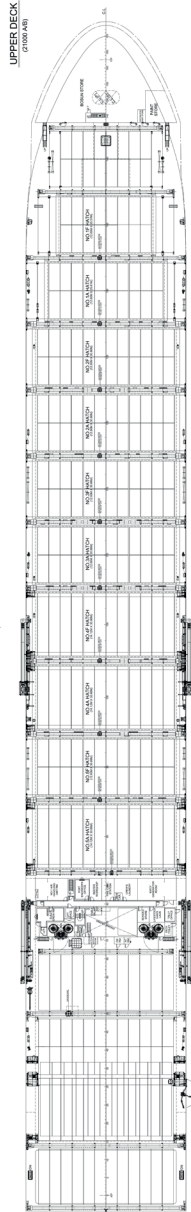
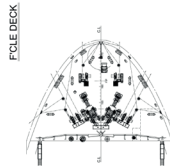
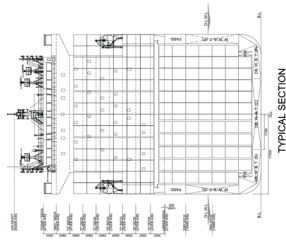
The 260.3m long, 3,652teu ship may be the largest US-built domestic box ship but the hull design is such that the ship, which is intended for the Hawaii trade, will also be able to navigate safely into some of the Pacific island state's smaller ports. The new ships are designed to accommodate the diversified mix of cargo needed to support the state's economy and will boost its owner's capacity for moving 45-foot containers and refrigerated cargo.

With the US having a wide variety of box sizes in common use, the fully cellular ship is able to accommodate 45' and 53' boxes as well as the more usual 20' and 40' units. There are 408 reefer plugs. The aft deck cargo space has also been specially provisioned for carrying livestock containers.

Daniel K Inouye has been described as an environmentally friendly vessel with a fuel-efficient hull design. The main engine is a single MAN B&W 7S90ME-C10.5-GI two-stroke unit producing 38,000kW, and there is direct mechanical drive to the single propeller giving the ship a service speed of 23knots.

As the GI suffix suggest, the engine is a dual-fuel model as are the four Himsen auxiliaries. These are a pair each of nine- and six-cylinder H27DF models. Although it has dual fuel engines, the ship is only 'gas ready' as it has not been fitted with an LNG fuel storage and delivery system.

To meet US ballast water management rules, the ship has a Panasia GloEn-P700 ballast treatment system. Panasia received US Coast Guard type-approval for the system in December 2018.





DHT BRONCO: Very large crude carrier

Shipbuilder: **Hyundai Heavy Industries**
 Vessel's name: **DHT Bronco**
 Hull No: **2957**
 Owner/Operator: **DHT**
 Country: **Norway**
 Designer: **Hyundai Heavy Industries**
 Country: **Republic of Korea**
 Flag: **Hong Kong**
 IMO number: **9822994**
 Total number of sister ships already completed (excluding ship presented): **1**
 Total number of sister ships still on order: **nil**

TECHNICAL PARTICULARS

Length oa: 333m
 Length bp: 327m
 Breadth moulded: 60m
 Depth moulded
 To main deck: 30.4m
 Draught
 Scantling: 22.6m
 Design: 21m
 Deadweight
 Scantling: 317,975dwt
 Speed, service: 14.8knots
 Cargo capacity
 Liquid volume: 353,900m³
 Bunkers
 Heavy oil: 5,500m³
 Diesel oil: 1,200m³
 Water ballast: 91,600m³
 Classification society and notations: ABS +A1(E), Oil Carrier, +AMS, +ACCU, ESP, CSR, AB-CM, UWILD, TCM, SPMA, CPS, VEC, BWE, BWT, RW, ENVIRO+, POT, IHM, NBLES, DWA
 Main engine:
 Model: 7G80ME-C9.5-HPSCR
 Manufacturer: Hyundai-MAN B&W
 Number: 1
 Type of fuel: HFO or MGO
 Output of each engine: 24,500kW x 66.1rpm
 Propeller(s)
 Material: Ni-Al-Bronze
 Designer/Manufacturer: Hyundai
 Number: 1
 Fixed/Controllable pitch: Fixed
 Diameter: 10.4m
 Diesel-driven alternators
 Number: 3
 Engine make/type: Hyundai, HIMSEN 7H21/32
 Type of fuel: HFO or MGO
 Output/speed of each set: 1,400kW x 900rpm
 Alternator make/type: Hyundai
 Output/speed of each set: 1,400kW x 900rpm
 Exhaust-gas scrubbing equipment:
 Manufacturer: Alfa Laval
 Type: Open loop

Boilers
 Number: 2
 Type: standard Vertical two-drum
 Make: Alfa Laval
 Output, each boiler: 40,000kg/h

Cargo cranes/cargo gear: .. Hose handling crane
 Number: 2
 Make: Oriental Precision
 Type: Electro-hydraulic
 Performance: 20t SWL

Other cranes
 Number: 2
 Make: Oriental Precision
 Type: Electro-hydraulic
 Tasks: Provision handling crane
 Performance: 10t SWL (port) / 3t SWL (stbd)

Mooring equipment
 Number: 2 windlass, 1 SPM winch, 8 mooring winch
 Make: MacGregor
 Type: Electro-hydraulic

Special lifesaving equipment
 Number of each and capacity: 2x 30 persons each
 Make: Hyundai Lifeboat
 Type: Conventional

Cargo tanks
 Number: COT-15EA / SLOP-2EA
 Grades of cargo carried: 3
 Product range: Crude oil

Cargo pumps
 Number: 3
 Type: Vertical, Centrifugal, Steam turbine driven
 Make: Shinko
 Stainless steel: Not applied
 Capacity (each): 5,000m³/h x 150mTH

Cargo control system
 Make: Nakakita
 Type: Hydraulic

Ballast control system
 Make: Nakakita
 Type: Hydraulic

Water ballast Treatment System
 Make: HiBallast (Hyundai)
 Capacity: 6,000m³/h

Complement
 Officers: 12
 Crew: 18

Bridge control system
 Make: Kongsberg
 One-man operation: Yes

Fire detection system
 Make: Consilium-Iljin
 Type: addressable

Fire extinguishing systems
 Cargo holds: Deck foam
 Make/Type: NK
 Engine room: H.P. CO₂
 Make/Type: NK

Radars
 Number: 2
 Make: JRC
 Model(s): JMR-9282-S for S-band / JMR-9225-6X for X-band

Integrated bridge system: Yes
 Make: JRC
 Model: JAN-9201

Contract date: 20 January 2017

Launch/float-out date: 11 May 2018

Delivery date: 27 July 2018

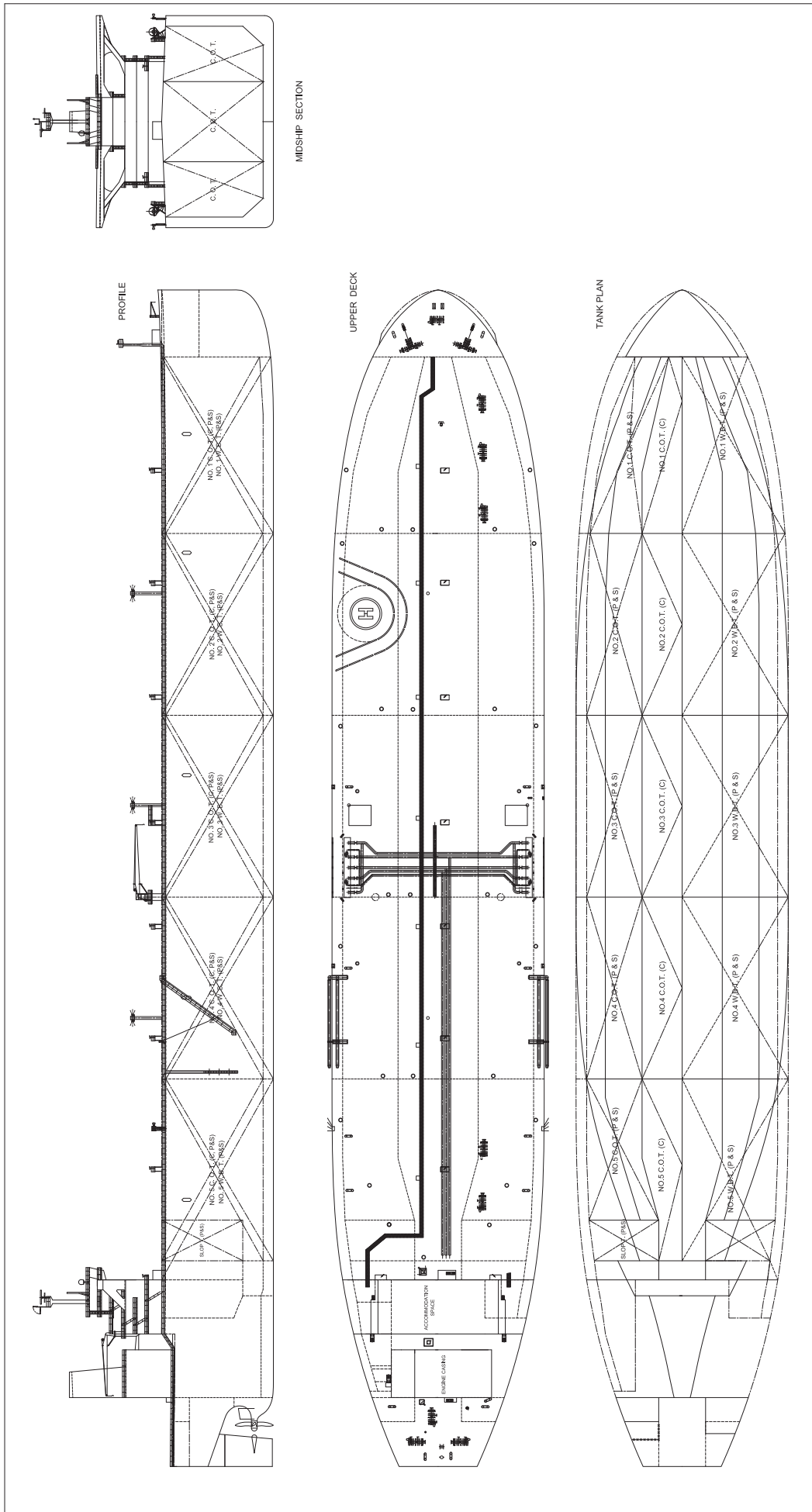
Hyundai Heavy Industries' first order of 2017 was for a pair of 319,000dwt VLCCs from DHT Holdings. The two vessels of which *DHT Bronco* was the first delivered are built to a Hyundai Heavy Industries design with a number of proprietary energy saving features.

DHT has decided on scrubbers as the solution to the 2020 sulphur cap and while most vessels in the DHT fleet are still to be retrofitted, *DHT Bronco* and its sister *DHT Mustang* were each delivered with an Alfa Laval PureSOx system installed. The scrubber treats exhausts from the main engine, auxiliary engines and the boilers. In case of scrubber failure the ship has a low-sulphur MGO tank. The ship's ballast treatment system is a 6,000m³/h Hyundai HiBallast which achieved US Coast Guard type-approval in October 2018 three months after *DHT Bronco* was delivered.

The main engine is a Hyundai-built MAN B&W 7G80ME-C9.5-HPSCR rated at 32,970kW at 72rpm. To meet NOx Tier III rules the engine – as the HPSCR suffix shows – is fitted with a high-pressure selective catalyst reduction system. The auxiliaries are a pair of HiMSEN 7H21/32, with an output of 1490kW at 900rpm.

To maximise the ship's fuel efficiency, the hull features a Hyundai Hi-Bow design which effectively reduces resistance in waves. At the aft of the ship the Hi-PSD propeller swirl duct generates additional thrust and compensates for propeller rotational energy losses by the pre-swirl flow in front of the propeller. The resulting uneven wake distribution to the propeller plane can also reduce the levels of hull vibration and propeller cavitation.

The cargo tank layout of 12 tanks – five centre tanks, five tanks on each side and two slop tanks – is a typical VLCC configuration. The tank coatings are Jotun's Jotacote Universal N10 epoxy paint over a standard primer. The cargo pumps supplied by Shinko Industries are rated at 5,000m³/hour, with two sets of cargo eductors running at 600m³. The pumps give *DHT Bronco* a maximum loading capacity of 20,500m³/hour and a discharge rate of 15,000m³/hour.





EAGLE BARCELONA: Crude oil tanker

Shipbuilder:**Samsung Heavy Industries Co., Ltd.**
 Vessel's name: **Eagle Barcelona**
 Hull No: **SN2195**
 Owner/Operator: **AET Inc. Limited**
 Country: **Singapore**
 Designer: **Samsung Heavy Industries Co., Ltd.**
 Country: **Republic of Korea**
 Model test establishment used: **Samsung Ship Model Basin**
 Flag: **Singapore**
 IMO number: **9795048**
 Total number of sister ships already completed (excluding ship presented): **1**
 Total number of sister ships still on order:..... **nil**

In 2015 AET, the tanker operating subsidiary of MISC in Malaysia, embarked on a fleet rejuvenation programme aimed at reducing the age of its tanker fleet and ensuring that it could meet the aims of its Green Sustainability Agenda.

Eagle Barcelona, delivered by Samsung Heavy Industries in January 2018, and its sister *Eagle Brisbane* which entered service three months later, are the first fruits of that decision. The two 113,327dwt Aframax crude carriers could potentially be the last newbuildings of the type with conventional HFO-fuel engines specified; the next two Aframax vessels ordered by AET from Samsung share the same hull design but are specified with dual-fuel engines.

The hull dimensions are typical for an Aframax being 250m in length and 43.8m beam. Draught of the 113,327dwt ship is 15.1m. *Eagle Barcelona* has six port side and six starboard side cargo tanks and two slop tanks. Cargo is discharged using three steam turbine pumps each with a 3,00m³/h capacity. There is also a ballast water treatment system, but the make has not been disclosed.

Eagle Barcelona is fitted with a Doosan-built MAN B&W 6G60ME-C9 engine developing 11,200kW at 77rpm, giving a service speed of 14knots. The specification from AET ensured that, despite the oil-fuelled engines, the ships would incorporate state-of-the-art environmental innovations. The vessels are fully compliant with incoming regulations, including ballast water management, sulphur emission control and the requirement for carbon monitoring, reporting and verification. They will qualify for the Green Passport notation.

The energy saving innovations come from an optimised hull design and a number of Samsung's own design innovations. These include the SAVER fin – a hull fin fitted to the skeg forward of the propeller to direct water flow, a SAVER Stator which optimises the water flow to the propeller, STAR (Samsung Tip Advanced Rake) propeller and SARB (Samsung Asymmetric Rudder Bulb). Samsung says that taken together these devices improve fuel efficiency by around 6%.

TECHNICAL PARTICULARS

Length oa: 250m
 Length bp: 243m
 Breadth moulded: 43.8m
 Depth moulded
 To main deck: 21.2 m
 Draught
 Scantling: 15.1m
 Design: 13.6m
 Gross: 61,000gt
 Deadweight
 Scantling: 113,000dwt
 Speed, service: 14.5knots

Cargo capacity
 Liquid volume: 130,000m³
 Bunkers
 Heavy oil: 2,000m³
 Diesel oil: 500m³
 Water ballast (m³): 39,000m³
 Tankers - percentage segregated ballast: 100%

Classification society and notations: ABS + A1, Oil Carrier, ESP, +AMS, +ACCU, CPS, CSR AB-CM, RRDA, SPMA, UWILD, TCM, EN-VIRO, CRC, BWT, RW, GP Service Restriction: Unrestricted Service

Main engines
 Model:MAN 6G60ME-C9.5
 Number: 1
 Type of fuel:..... HFO or MDO
 Propellers
 Material:Ni-Al-Bronze
 Number: 1
 Fixed/controllable pitch: Fixed
 Diesel-driven alternators
 Number: 3
 Type of fuel: HFO or MDO

Boilers
 Number: 2
 Type:Oil fired
 Cargo cranes/cargo gear
 Number: 1
 Type:Electro-hydraulic single jib
 Other cranes
 Number: 2
 Type:Electro-hydraulic single jib
 Tasks: Provision and equipment handling
 Mooring equipment
 Number: 10
 Type: Electro-hydraulic (High pressure)
 Special lifesaving equipment
 Number of each and capacity: 2
 Type: ... Totally enclosed, gravity type lifeboat
 Cargo tanks
 Number: 12
 Grades of cargo carried:Crude oil
 Cargo pumps
 Number: 3
 Type:Centrifugal, steam turbine driven
 Water Ballast Treatment System:Applied

Complement
 Officers: 14
 Crew: 14
 Supernumeraries/Spare: 2 (Pilot)
 Suez/Repair Crew: 6

Bridge control system
 Type:Applied
 One-man operation:No

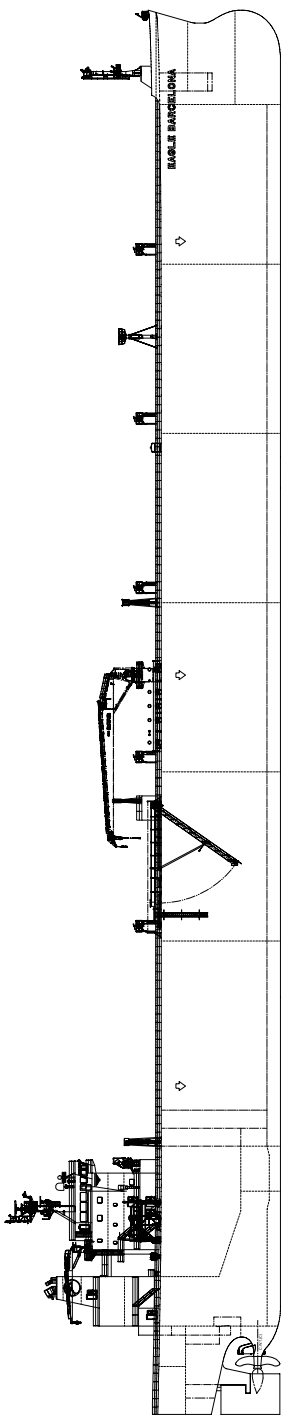
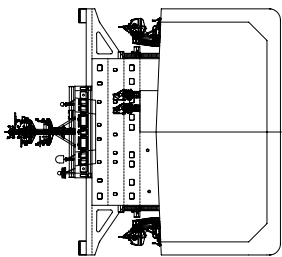
Fire detection system
 Make: Consilium
 Type: Salwico Fire Alarm System CCP
 Fire extinguishing systems

Engine room:
 Make/Type: High expansion foam
 Cabins:
 Make/Type: Fire hydrants
 Public spaces:
 Make/Type: Fire hydrants

Radars
 Number: 3 sets

Contract date: October 2015
 Delivery date: January 2018

EAGLE BARCELONA





EL COQUÍ: Con-ro

Shipbuilder: **VT Halter Marine**
 Vessel's name: **El Coquí**
 Hull No: **2022**
 Owner/Operator: **Crowley ConRo LLC**
 Country: **United States**
 Designer: **VT Halter Marine / Wärtsilä Ship Design**
 Country: **United States / Norway**
 Model test establishment used: **MARIN**
 Flag: **United States**
 IMO number: **9721968**
 Total number of sister ships already completed (excluding ship presented): **1**
 Total number of sister ships still on order: **nil**

When delivered in July by VT Halter Marine to US operator Crowley Maritime, *El Coquí* became the first of the owner's two Commitment class con-ro ships and the first combination container ro-ro ship anywhere to be powered by LNG.

El Coquí and its sister *Taino* have been built specifically for the Puerto Rico trade from their homeport of Jacksonville on the US mainland. Their dimensions are a length of 219.5m and a beam of 32.24m. Draught is 10m on a deadweight of 26,410dwt.

The ships are highly flexible having been designed to accommodate the various container types used in the Americas. The range of containers extends from standard ISO types up to 53' by 102" wide types and over-height boxes up to 114.5". The nominal capacity is 2,400TEU of which 795TEU is under deck and 1,605TEU on deck. There is a total of 350 reefer plugs but only 200 can be used simultaneously.

In addition to the container capacity, *El Coquí* has four vehicle decks located aft. The fully enclosed and ventilated ro-ro garage is accessed via a port stern quarter ramp with internal ramps situated in the middle of each of the ro-ro decks. Above the uppermost car deck, up to five tiers of containers can be loaded. In all there is a total of 1,935 lane metres sufficient to accommodate 387 cars or higher vehicles.

The propulsion arrangements include a single 8S70ME-C8.2-GI engine of 26,160kW. As a low-speed dual-fuel engine there is no need for a gearbox and the engine drives a 7.4m Fixed pitch propeller in front of a Wärtsilä EnergoPac rudder with bulb. The arrangement allows for a service speed of 22knots with the engine running on LNG enabling the ship to meet all US ECA requirements. There is a single bow thruster to aid manoeuvrability. The ship is also obliged to meet US ballast treatment rules and to do this is fitted with two 600m³/h Hyde Marine ballast water management systems.

TECHNICAL PARTICULARS

Length oa: 219.5m
 Length bp: 208.6m
 Breadth moulded: 32.24m
 Depth moulded
 To main deck: 18m

Width of double skin
 Side: 2.55m
 Bottom: 1.80m
 Draught
 Scantling: 10.00m
 Design: 9.50m
 Gross Tonnage: 37,462gt
 Displacement: 42,449t @ 10m
 Lightweight: 16,038.28t
 Deadweight
 Design: 23,404dwt
 Scantling: 26,410dwt
 Block co-efficient: 0.6107 @ 10m draught
 Speed, service: 21.0knots @ 10m draught @ 76% MCR + 15% sea margin

Cargo capacity: 2,400TEU containers + 380 vehicles

Bunkers
 ULSMGO: 2,004m³
 LNG: 2,288m³
 Water ballast: 15,641m³
 Water ballast in loaded condition: 6,523t

Daily fuel consumption
 Main engine only: 77.4t/day LNG + 3.05t/day MGO
 Auxiliaries: 8.6t/day LNG + 1.4t/day MGO (average load round trip)

Classification society and notations: DNV
 * 1A1 General Cargo Carrier, CONTAINER, RO/RO, NAUTICUS (Newbuilding), GAS FUELLED, DG-P, BIS, TMON, BWM-T, EO, NAUT-OC, CLEAN, Statement of Voluntary Compliance for Green Passport
 % high-tensile steel used in construction: .. 40%
 Heel control equipment: Ballast tanks
 Roll-stabilisation equipment: Bilge keels only
 Main engines
 Design: MAN
 Model: 8S70ME-C8.2-GI
 Manufacturer: Mitsui
 Number: 1
 Type of fuel: LNG/MGO
 Output of each engine: 26,160kW

Propellers
 Material: Cu-Ni-Al
 Designer/Manufacturer: Wärtsilä
 Number: 1
 Fixed/Controllable pitch: Fixed
 Diameter: 7.4m
 Speed: 91rpm
 Special adaptations: Wärtsilä EnergoPac rudder

Diesel-driven alternators
 Number: 3
 Engine make/type: MAN 9L28/32DF
 Type of fuel: LNG/MGO
 Output/speed of each set: 1,740kW @ 720rpm

Alternator make/type:Hyundai HFC7 710-10P
 Output/speed of each set: 720rpm – 480 VAC, 60 Hz, 3 phase

Mooring equipment
 Number:3x single drum, 2x double drum, 2x anchor windlass with single drum mooring winch attached
 Make: Rolls-Royce
 Type: Electric

Special lifesaving equipment
 Number and capacity: 2 x 30 persons
 Make:Norsafe
 Type:JYN65 totally enclosed lifeboat
 Hatch covers
 Design: ...TTS Marine WT lift off hatch covers
 Manufacturer: TTS Marine
 Type: Main deck – steel – WT – lift off

Containers
 Lengths: 20ft, 40ft, 45ft, 53ft
 Heights: 102", 114", 114.5"
 Cell guides: 8 holds below main deck forward

Total TEU capacity:
 On deck: 1,605
 In holds: 795
 Homogeneously loaded to 14t: 1,992
 Reefer plugs: Total of 350 – only 200 powered at any given time

Tiers/rows (maximum)
 On deck: 6 / 12
 In holds: 6 / 10

Vehicles
 Number of vehicle decks: 4x fixed
 Total lane length: 1,935m
 Total cars: 387

Doors/ramps/lifts/moveable car decks
 Number of each: 1
 Type:Stern quartering ramp, fixed slewing
 Designer: TTS Marine

Ballast control system
 Make:Siemens
 Type: Custom
 Water Ballast Treatment System
 Make:Hyde
 Capacity: 2 @ 600m³/hr

Complement
 Officers: 8
 Crew: 10
 Single/double/other rooms: 19 single cabins & 4 double cabins
 Stern appendages/special rudders: Wärtsilä EnergoPac rudder

Bow thrusters
 Make:Wärtsilä CT-225H
 Number: 1
 Output (each): 1,515kW

Bridge control system
 Make: Mackay / Furuno
 One-man operation: Yes

Fire detection system
 Make: Hiller
 Type: Smoke and heat

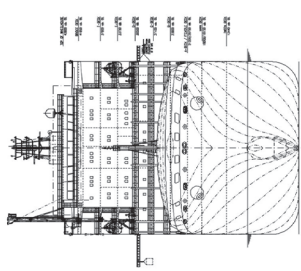
Fire extinguishing systems
 Cargo holds: CO₂
 Make: Hiller
 Engine room: CO₂/Water mist
 Make: Hiller
 Vehicle spaces: CO₂
 Make: Hiller
 Cabins: Portable
 Public spaces: Portable

Radars
 Number: 3
 Make: Furuno
 Model(s) 2 @ X Band FAR-3230 & 1 @ S Band FAR-3230

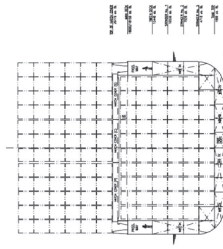
Integrated bridge system: Yes
 Make:Mackay

Waste disposal plant
 Sewage plant
 Make: EVAC
 Model: MBR 24 C

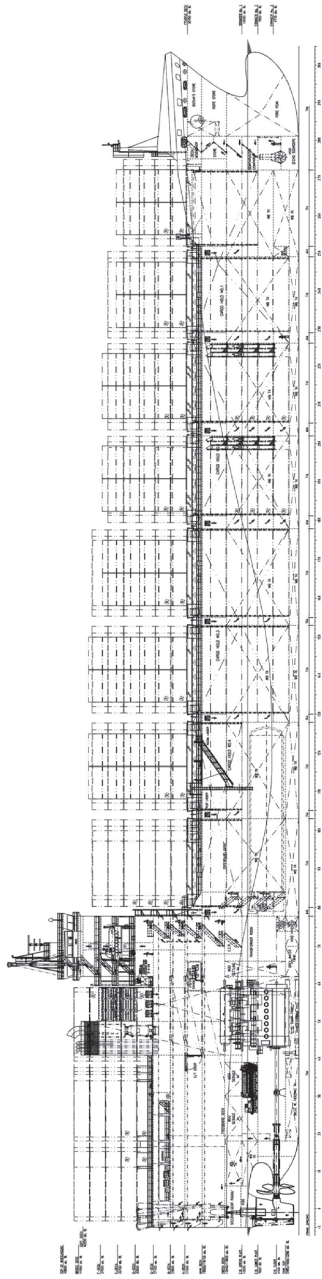
Contract date: 25 November 2013
 Launch/float-out date: 20 March 2017
 Delivery date: 18 July 2018



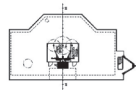
FRONT VIEW



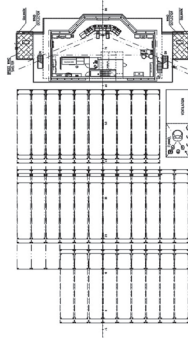
TYP. SECTION IN CARGO HOLD



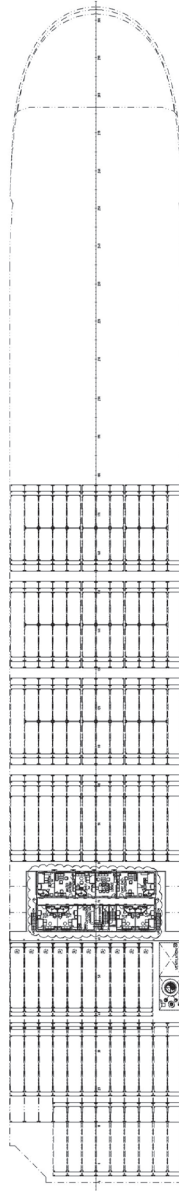
PROFILE SB



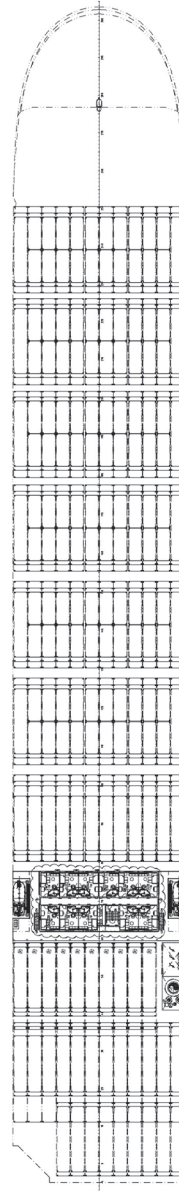
TOP OF WHEELHOUSE
12000' ab. RL.



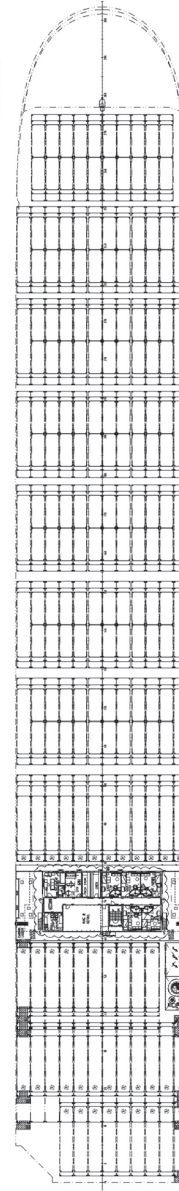
B-DECK
14200' ab. RL.



E-DECK
3700' ab. RL.



E-DECK
13750' ab. RL.



D-DECK
20550' ab. RL.

AS-BUILT



FLAVIN: Crude/product carrier

Shipbuilder: **Jiangsu New Hantong Ship Heavy Industry Co., Ltd**
 Vessel's name: **Flavin**
 Hull No: **HT-OT115-001**
 Owner/Operator: **Cardiff Marine**
 Country: **Greece**
 Designer: **Shanghai Merchant Ship Design and Research Institute (SDARI)**
 Country: **China**
 Model test establishment used: **HSVA**
 Flag: **Malta**
 IMO number: **9787912**
 Total number of sister ships already completed (excluding ship presented): **3**
 Total number of sister ships still on order: **1**

Built by Jiangsu New Hantong Ship Heavy Industry to a SDARI design as the first of four 115,126dwt Aframax tankers, *Flavin* features a number of energy saving measures that its owner is now installing or retrofitting to most of its fleet. Ordered by Cardiff Marine, *Flavin* and its three sisters are operated by group subsidiary TMS Tankers.

As a crude/product carrier, *Flavin* was designed to operate in a highly competitive sector where efficiency can mean the difference between success and failure. The six cargo and one slop tanks located along each side of the vessel is a typical layout for the type. The twelve cargo tanks allow for three grades to be carried simultaneously. Cargo pumps are three Shinko types each with a capacity of 3,000m³/h. The hull dimensions of 249.9m length and 44m beam are also typical for an Aframax type.

The significance of the ship is mainly hidden from view and centres on the operational performance. Its hull form was developed based on organic integration of SDARI's empirical method and numerical towing tank technology. The hull form has been optimised to achieve maximum energy efficiency over the range of speeds and draughts anticipated to operate in service. Further energy saving measures include a Mewis duct and the propeller is fitted with HVAF to recover the energy losses of the propeller hub vortex.

The main engine is a Doosan-built MAN B&W 6G50ME-C9.5-TII with an output of 12,400kW directly connected to the high-efficiency 8.15m fixed pitch propeller. Its service speed at design draught is 14.5knots at 85.5% SMCR.

Taken together, the engine and energy saving devices fitted have allowed *Flavin* to achieve an EEDI rating 24.15% below the base line. Since the ship is built well before the Phase II EEDI requirement of

20% reduction becomes effective in 2020, the achieved EEDI confirms the attractiveness of the ship to potential charterers.

TECHNICAL PARTICULARS

Length oa: 249.9m
 Length bp: 241.6m
 Breadth moulded: 44m
 Depth moulded
 To main deck: 21.5m
 Width of double skin
 Side: 2.2m
 Bottom: 2.3m
 Draught
 Scantling: 15m
 Design: 13.6m
 Gross: 64,321gt
 Displacement: 134,845t
 Lightweight: 19,719t
 Deadweight
 Design: 100,773dwt
 Scantling: 115,125dwt
 Block co-efficient: 0.8313 (15m)
 Speed, service: 14.5knots
 Cargo capacity
 Liquid volume: 133,100m³
 Bunkers
 Heavy oil: 2,750m³
 Gas oil: 730 m³
 Water ballast: 39,000m³
 Daily fuel consumption
 Main engine only: 45.66t/day
 Auxiliaries: 4.7t/day
 Classification society and notations: ABS +A1, (E), Oil Carrier, CSR, AB-CM, CPS, ESP, SPMA, UWILD, +AMS, +ACCU, BWT, TCM, NIBS, VEC-L, ENVIRO, IHM, RRDA, POT,RW,BWE
 % high-tensile steel used in construction: 65%

Main engines
 Model: 6G50ME-C9.5-TII
 Manufacturer: Doosan Engine Co., Ltd.
 Number: 1
 Type of fuel: HFO/MDO
 Output of each engine: 12,400kW

Propellers
 Material: Ni-Al-Bronze
 Number: 1
 Fixed/controllable pitch: Fixed
 Diameter: 8.15m
 Speed: 83.9rpm

Diesel-driven alternators
 Number: 3
 Engine make/type: Yanmar Co.,Ltd. / 6EY22ALW
 Type of fuel: HFO/MDO
 Output/speed of each set: 1,100kW
 Alternator make/type: Taiyo Electric Co., Ltd.
 Output/speed of each set: 1,020kW

Boilers
 Number: 2
 Type: Vertical with burner and feed water regulator
 Make: Alfa Laval
 Output, each boiler: 30,000kg/h

Cargo cranes/cargo gear
 Number: 2
 Make: Jiangsu Masada Heavy Industrie Co.,Ltd
 Type: Electro-hydraulic, luffing slewing and single jib type
 Performance: 15t SWL @ max. outreach

Other cranes
 Number: 1
 Make: Jiangsu Masada Heavy Industrie Co.,Ltd
 Type: ... Electro-hydraulic, luffing slewing and single jib type
 Tasks: Provision handling
 Performance: 4t SWL @ max. outreach
 Number: 1
 Make: Jiangsu Masada Heavy Industrie Co.,Ltd
 Type: ... Electro-hydraulic, luffing slewing and single jib type
 Tasks: Provision handling
 Performance: 2t SWL @ max. outreach

Mooring equipment
 Number: 6
 Make: Jiangsu Masada Heavy Industrie Co.,Ltd
 Type: Hydraulic

Special lifesaving equipment:
 Number and capacity: 2x 32 persons
 Make: Jianguyinshi Beihai LSA Co.,Ltd
 Type: Free-fall lifeboat

Cargo tanks
 Number: 12
 Grades of cargo carried: 3
 Product range: Crude oil

Cargo pumps
 Number: 3
 Type: ... Steam turbine driven centrifugal pump
 Make: Shinko Ind.Ltd
 Capacity (each): 3,000m³/h

Cargo control system
 Type: Hydraulic remote control

Ballast control system
 Type: Hydraulic remote control

Water Ballast Treatment System
 Make: SunRui Marine Environment Engineering Co.Ltd
 Capacity: 2 x 2,000m³/h

Complement
 Officers: 14
 Crew: 14
 Supernumeraries/Spare: 2
 Suez/Repair Crew: 6
 Single/double/other rooms: 30/0/1

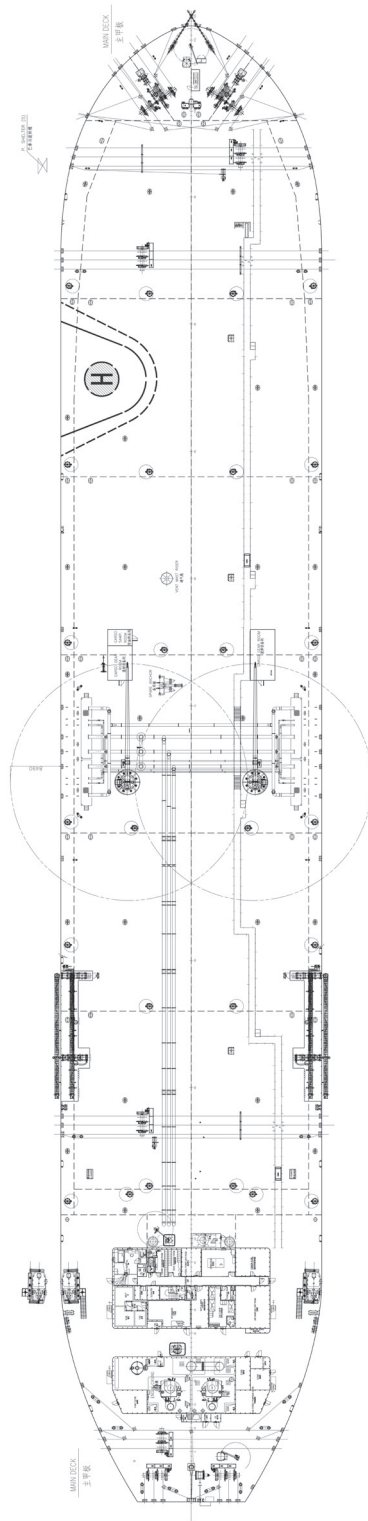
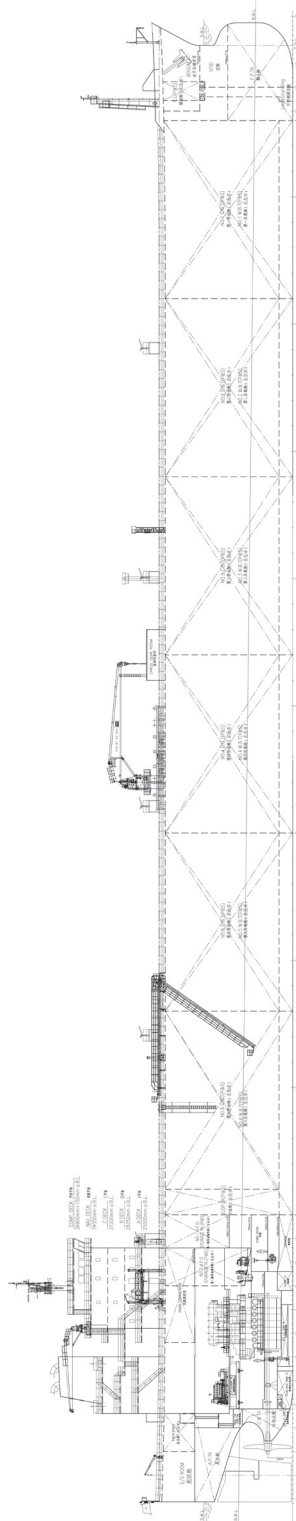
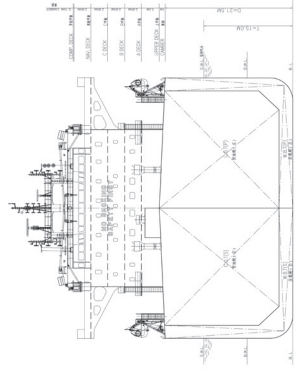
Bridge control system
 Make: Furuno

Fire detection system
 Make: Consilium
 Type: Salwico Cargo

Fire extinguishing systems
 Cargo holds: Deck foam
 Make/Type: Tyco
 Engine room: High expansion foam
 Make/Type: Tyco

Radars
 Number: 2
 Make: Furuno
 Model(s): FAR-3320&FAR-3330S-SSD

Integrated bridge system
 Make: Furuno
 Contract date: November 2015
 Launch/float-out date: September 2017
 Delivery date: March 2018





FURE VINGA: Chemical/product tanker

Shipbuilder: **AVIC Dingheng**
 Vessel's name: **Fure Vinga**
 Hull No: **AD0026**
 Owner/Operator: **Furetank Chartering**
 Country: **Sweden**
 Designer: **FKAB Sweden**
 Model test establishment used: **SSPA**
 Flag: **Sweden**
 IMO number: **9739800**
 Total number of sister ships already completed (excluding ship presented): **3**
 Total number of sister ships still on order: **2**

TECHNICAL PARTICULARS

Length oa: 149.9m
 Length bp: 146.64m
 Breadth moulded: 22.8m
 Depth moulded
 To main deck: 12.10m
 Draught
 Scantling: 9.36m
 Gross: 12,770gt
 Displacement: 24,484t
 Lightweight: 6,485t
 Deadweight
 Scantling: 17,999dwt
 Speed, service: 13knots

Cargo capacity
 Liquid volume: 19,246m³ @ 98%
 Bunkers: 1,294m³
 LNG: 619m³ (4 tanks on deck)
 Diesel oil: 153m³
 Water ballast: 7,400m³

Daily fuel consumption
 Main engine only: 8.8t/day

Classification society and notations: Bureau Veritas
 I Hull Mach Oil tanker CPS(WBT) ESP Chemical tanker ESP -dualfuel GREEN PASSPORT EU, AVM-APS , AUT-IMS (SS) , SYS-NEQ-1 (SS), MON-SHAFT , EWCT , BWT , CLEANSHIP, ICE CLASS IA , ERS-SJ , INWATERSURVEY, VCS , IG (SS) Service Restriction: Unrestricted navigation

Main engines
 Design: Wärtsilä
 Model: 9L34DF
 Number: 1
 Type of fuel: LNG/MDO
 Output of each engine: ... 4,500kW @ 750rpm

Gearboxes
 Make: Wärtsilä with PTI/PTO
 Model: SCV105-PDM63
 Output speed: 108.7rpm

Propellers
 Designer/Manufacturer: Wärtsilä
 Number: 1
 Fixed/controllable pitch: Controllable
 Diameter: 5.0m
 Speed: 108rpm

Main-engine driven alternators
 Number: Shaft generator
 Make/type: Marelli motor
 Diesel-driven alternators
 Number: 2
 Engine make/type: Wärtsilä (1x 4L20 and 1x 9L20)
 Type of fuel: MDO
 Output/speed of each set: 1x 688kW 1x 1,600kW
 Output/speed of each set: 1x 600kW 1x 1,500kW
 Boilers
 Number: 2
 Type: Steam
 Make: Aalborg

Cargo tanks
 Number: 12
 Grades of cargo carried: 12
 Coated tanks - make and type of coating: 12 epoxy phenolic

Cargo pumps
 Number: 12
 Type: Deepwell submersible
 Make: Wärtsilä Savnhøj
 Capacity: 300m³/h each

Ballast control system
 Make: Wärtsilä Svanehøj
 Water Ballast Treatment System
 Make: Alfa Laval PureBallast
 Capacity: 1,000m³/h

Complement: 19 persons
 Single/double/other rooms: 19
 Stern appendages/special rudders: Propeller duct

Bow thrusters
 Make: Brunvoll
 Number: 1
 Output (each): 850kW

Bridge control system
 Make: Wärtsilä
 Fire extinguishing systems
 Cargo holds:
 Make/Type: Powder and foam
 Engine room:
 Make/Type: CO₂ system

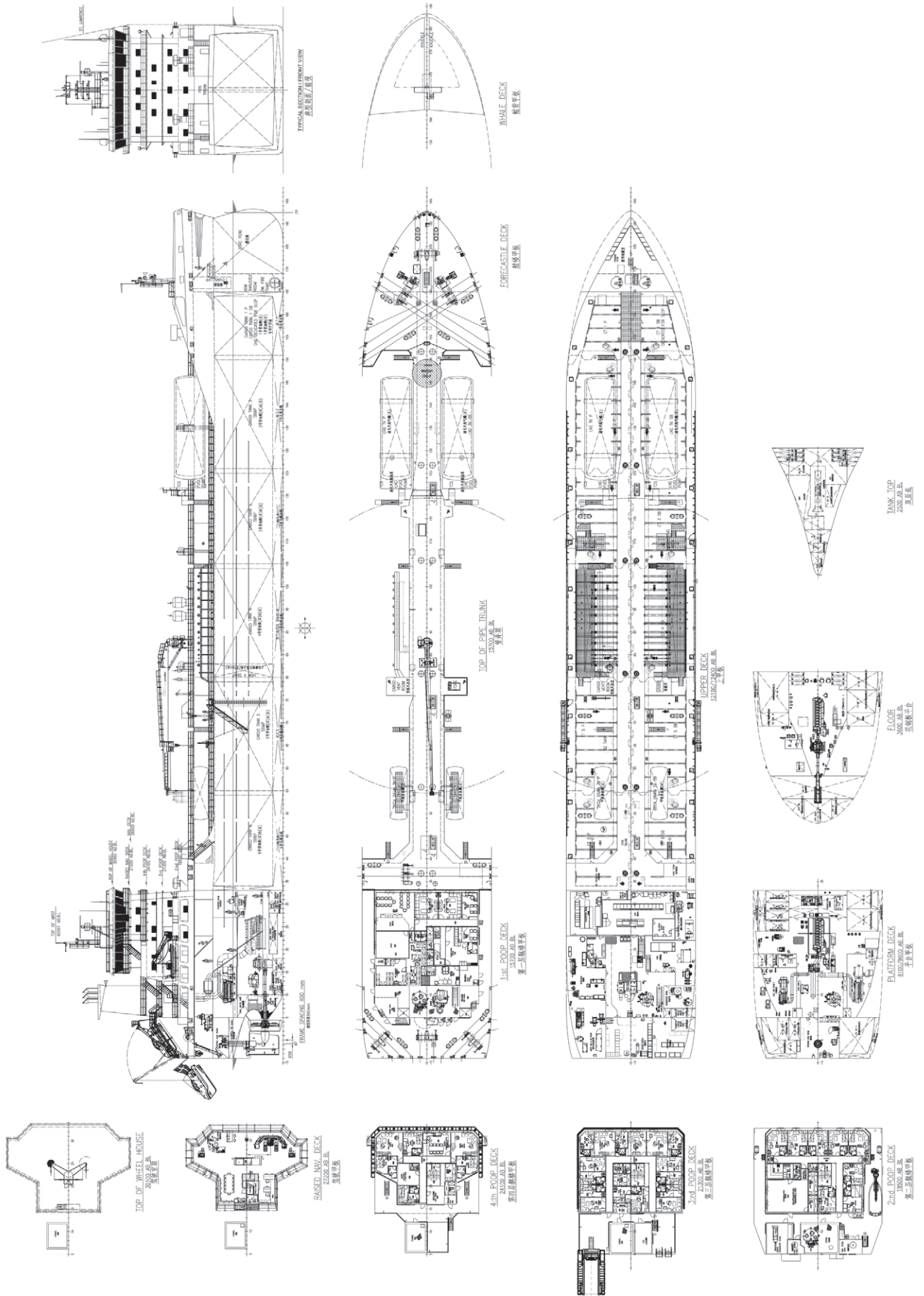
Contract date: 27 January 2014
 Launch/float-out date: 23 September 2017
 Delivery date: 4 April 2018

Fure Vinga is the first of six sister vessels that will operate under the Gothia Tanker Alliance banner. Built to the FKAB T24C1 design, three of the six 17,999dwt ships including *Fure Vinga* will be owned by Sweden-based Furetank and two/one respectively by fellow Swedish owners Älvtank and Thun Tankers. All six vessels were entrusted to Chinese builder Avic Dingheng Shipbuilding.

The vessels are 20,000m³ capacity, Tier III tankers for chemicals (IMO II and III) and oil products. There are 12 epoxy coated tanks in all, six along each side of the vessel. One tank has been dedicated for slops and there are two drain tanks on deck. Each cargo and slop tank has its own 300m³/h pump. The loading rate is 1,200m³/h per tank pair. *Fure Vinga* has been designed for efficiency and environmental performance with an operational area extending from Europe to the St Lawrence Seaway with ports having length restrictions below 150m and limited draughts. The ship has been assigned a Finnish Swedish 1A ice class notation.

The envisaged trading area means long periods in emission control areas and to meet SOx and NOx rules, the ship is powered by a dual-fuel Wärtsilä 9L34DF engine rated at 4,500kW. The engine has a box cooler to reduce pumping cooling water. LNG fuel is stored on deck in a pair of 300m³ cylindrical tanks. The engine is connected to the single controllable pitch propeller through a Wärtsilä reduction gearbox with PTI and PTO capability. There is also a shaft generator. With the PTI engaged, the ship's auxiliary engines, a Wärtsilä 9L20 and a smaller 4L20, give the ship a take home speed of 7knots.

Normal service speed is 13knots at draught 8.85m at 80% MCR with 15% sea margin and shaft generator output of 300kW. Fuel consumption at 13knots including shaft generator without sea margin is LNG 11.3t/day and pilot fuel of 0.13t/day.





GAGARIN PROSPECT: Aframax tanker

Shipbuilder: **Hyundai Samho Heavy Industries Co. Ltd.**
 Vessel's name: **Gagarin Prospect**
 Hull No: **S919**
 Owner/Operator: **Sovcomflot**
 Country: **Russia**
 Designer: **Hyundai Samho Heavy Industries Co. Ltd.**
 Country: **Republic of Korea**
 Model test establishment used: **Hyundai Maritime Research Institute**
 Flag: **Liberia**
 IMO number: **9826720**
 Total number of sister ships already completed (excluding ship presented): **nil**
 Total number of sister ships still on order: **5**

– a trio of Wärtsilä 8L20DF engines – and the ships boilers can also run on LNG.

Since the ships are intended mostly for carrying Russian cargoes from the Baltic, a high ice class was considered essential. The ships in the series have been assigned Ice Class IB (IA Hull) by DNV GL. While *Gagarin Prospect* was making history as the first tanker to run on LNG, its newly delivered sister *Lomonosov Prospect* began another noteworthy voyage using LNG fuel as its primary fuel, along the Northern Sea Route to deliver a cargo of petroleum products from South Korea to Northern Europe.

Following a joint venture agreement made by Hyundai Samho and the Russian Far Eastern Zvezda shipyard, series production of ships of the same design has begun in the Russian yard adding to the six built in South Korea.

TECHNICAL PARTICULARS

Length oa: 249.99m
 Length bp: 241m
 Breadth moulded: 44m
 Depth moulded
 To upper deck: 21.1m
 Width of double skin
 Side: 2.35m
 Bottom: 2.6m
 Draught
 Scantling: 15m
 Design: 14m
 Gross: 64,909gt
 Displacement: 126,658t
 Lightweight: 23,554t
 Deadweight
 Design: 103,128dwt
 Scantling: 113,170dwt
 Block co-efficient: 0.8301
 Speed, service: 14.68knots

Cargo capacity
 Liquid volume: 129,405m³
 Bunkers
 Heavy oil: 2,446m³
 Diesel oil: 582.8m³
 Gas: 1,701.4m³
 Water ballast: 42,794.5m³
 Fuel consumption
 Main engine only: 191.94g/kW-hr (MCR)
 Gas consumption
 Main engine only: 139.7g/kW-hr (MCR)

Classification society and notations: DNV GL
 ✱1A1, Tanker for oil, BIS, BWM (T), COAT-PSPC (B, C), CSR, EO, ESP, NAUT (AW), Recyclable, SPM, TMON, VCS (2), ICE (1B), BMON, CCO, CLEAN (Design, Tier III), Gas Fuelled, LCS, COMF (C-2), ECA (SOx-A) RS KMC (*), Oil Tanker, ESP, CSR, SPM, 1B, IWS, TMS, BWM (T), CCO, ECO-S, DE-Tier III, AUT1-ICS, GFS, OMBO, VCS

% high-tensile steel used in construction: . 43.76%

Main engines

Design: Hyundai-Wärtsilä
 Model: W7X62DF
 Manufacturer: Hyundai Heavy Industries Co., Ltd, Engine & Machinery Division
 Number: 1
 Type of fuel: HFO / MDO / Gas
 Output of each engine: 13,778kW

Propellers

Material: Ni-Al-Bronze
 Designer/Manufacturer: Hyundai Heavy Industries Co., Ltd, Engine & Machinery Division
 Number: 1
 Fixed/controllable pitch: Fixed
 Diameter: 8,000mm

Diesel-driven alternators

Number: 3
 Engine make/type: Wärtsilä / W8L200F
 Type of fuel: HFO / Gas
 Output/speed of each set: 1,480kW / 1,200rpm
 Alternator make/type: Hyundai Electric & Energy Systems Co., Ltd / HFJ7 566-06P
 Output/speed of each set: 1,675kW / 1,200rpm

Boilers

Number: 2
 Type: Steam boiler / PB0501AS18
 Make: Kangrim Heavy Industries Co., Ltd
 Output, each boiler: 30,000kg/hr x 2

Cargo cranes/cargo gear

Number: 2
 Make: Oriental Precision & Engineering Co., Ltd.
 Type: Electro-Hydraulic
 Performance: 15t SWL

Mooring equipment

Number: 9
 Make: MacGregor Norway AS
 Type: Hydraulic

Special lifesaving equipment

Number of each and capacity: 2 / 33 persons
 Make: Hyundai Lifeboats Co., Ltd.
 Type: Totally enclosed lifeboat

Cargo tanks

Number: 14
 Grades of cargo carried: Crude oil
 Coated tanks
 Make and type of coating: KCC / Pure epoxy with aluminium pigment

Cargo pumps

Number: 3
 Type: HCP-400
 Make: Hyundai Heavy Industries Co., Ltd, Engine & Machinery Division
 Capacity: 3,000m³/h each

Cargo control system

Make: Scana Korea Hydraulic Ltd.
 Type: Electro-hydraulic remote control

Ballast control system

Make: Scana Korea Hydraulic Ltd.
 Type: Hydraulic and remote control

Water Ballast Treatment System

Make: Techcross
 Capacity: 1,600m³/h x 2

Complement

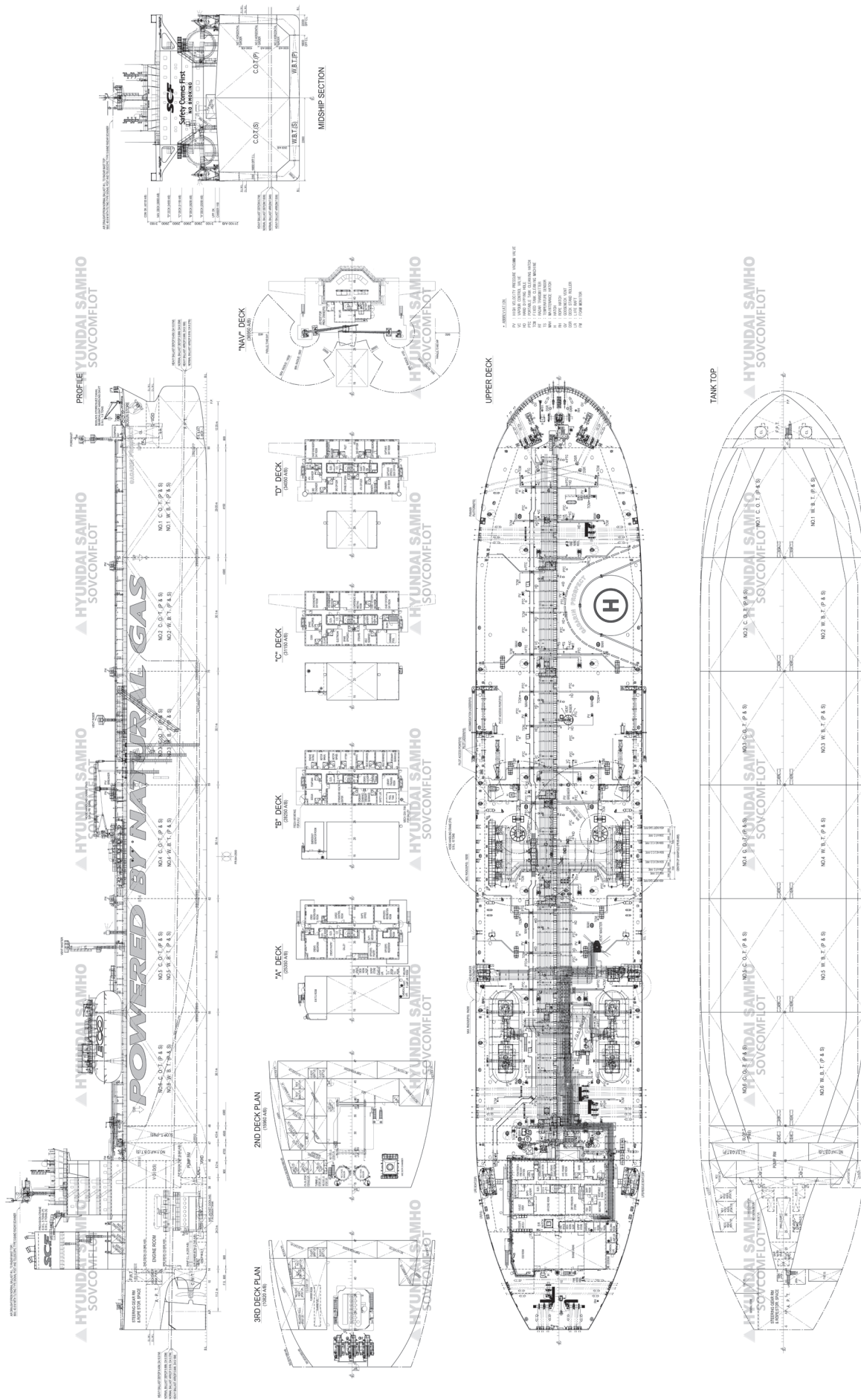
Officers: 15
 Crew: 15

Stern appendages/special rudders: Becker's Mewis-Duct / Rudder Bulb

Bridge control system

Make: Hyundai Electric & Energy Systems Co., Ltd.
 Type: Console
 One-man operation: Yes

Contract date: 3 February 2017
 Launch/float-out date: 4 May 2018
 Delivery date: 30 July 2018





GOLAR NANOOK: FSRU/LNG carrier

Shipbuilder: **Samsung Heavy Industries**
 Vessel's name: **Golar Nanook**
 Hull No: **2189**
 Owner/Operator: **Golar LNG Ltd.**
 Country: **United Kingdom**
 Designer: **Samsung Heavy Industries**
 Country: **Republic of Korea**
 Model test establishment used: **SSMB**
(Samsung Ship Model Basin)
 Flag: **Marshall Islands**
 IMO number: **9785500**

TECHNICAL PARTICULARS

Length oa: 305.8m
 Length bp: 281m
 Breadth moulded: 43.4m
 Depth moulded
 To upper deck: 26.6m
 Draught
 Scantling: 12.9m
 Gross: 107,049gt
 Deadweight
 Design: 81,747dwt
 Scantling: 92,000dwt
 Cargo capacity
 Liquid volume: 170,000m³
 Bunkers
 Heavy oil: 4,000m³
 Diesel oil: 1,000m³
 Water ballast: 58,000m³
 Classification society and notations: DNV GL
 ✱ 1A1 Tanker for liquefied natural
 gas BIS BWM(E(s)) COAT-PSPC(B)
 COMF(C-3, V-3) CSA(2) E0 Gas fuelled
 NAUTICUS(Newbuilding) Recyclable REGAS
 TMON
 Main engines
 Model: 8L50DF
 Manufacturer: Wärtsilä
 Number: 4
 Type of fuel: LNG, HFO or MDO
 Gearboxes
 Number: 2
 Propellers
 Material: Ni-Al-Bronze
 Number: 2
 Fixed/controllable pitch: Fixed
 Diesel-driven alternators
 Number: 4
 Type of fuel: LNG, HFO or MDO
 Boilers
 Number: 2
 Type: Oil-fired
 Cargo cranes/cargo gear
 Number: 2
 Type: Electro-hydraulic single jib

Other cranes
 Number: 4
 Type: Electro-hydraulic single jib
 Tasks: Provision and equipment handling
 / cargo machinery maintenance /
 re-gasification unit service crane
 Mooring equipment
 Number: 9
 Make: Flutek
 Type: Electro-hydraulic (High pressure)
 Special lifesaving equipment
 Number of each and capacity: 2
 Type: ... Totally enclosed, gravity type lifeboat
 Cargo tanks
 Number: 4
 Product range: LNG
 Coated tanks: Membrane tank
 Cargo pumps
 Number: 8
 Type: Centrifugal, submerged
 Complement
 Officers: 23
 Crew: 13
 Supernumeraries/Spare: 2 (Pilot)
 Suez/Repair Crew: 10
 Bridge control system: Applied
 One-man operation: Yes
 Fire detection system
 Make: Consilium
 Type: Salwico Fire Alarm System CCP
 Fire extinguishing systems
 Engine room:
 Make/Type: High expansion foam
 Cabins:
 Make/Type: Fire hydrants
 Public spaces:
 Make/Type: Fire hydrants
 Radars
 Number: 2
 Integrated bridge system: Yes
 Waste disposal plant
 Incinerator: Applied
 Sewage plant
 Type: Biological
 Contract date: July 2015
 Delivery date: September 2018

Among the most sophisticated of ship types being built today, FSRU/LNG carriers can both act as transports in carrier mode and as an inexpensive means of bringing storage and regasification to where it is most needed.

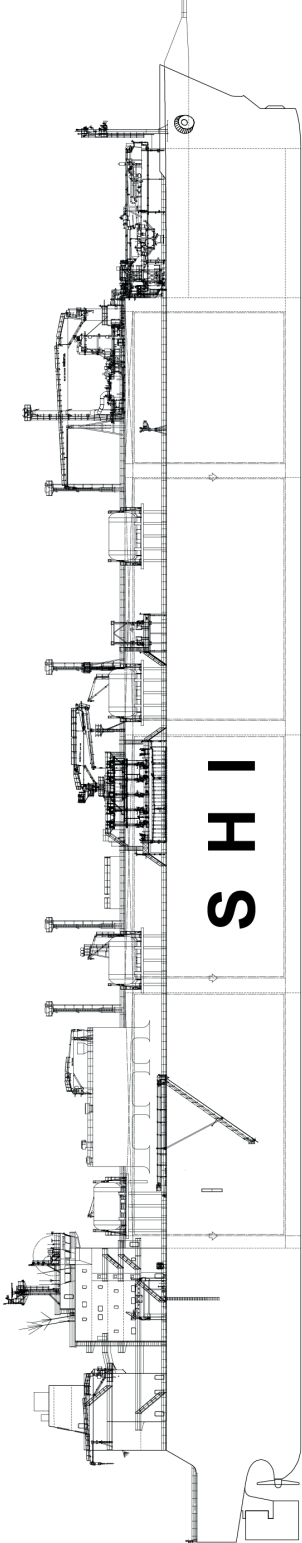
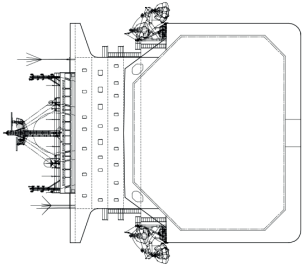
Golar Nanook is the eighth FSRU in Golar's fleet and the most up to date technically. Four of the others are converted LNG carriers and the other three are newbuildings of 2014 and 2015 vintage. The vessel was built by Samsung Heavy Industries and completed in October last year.

The hull dimensions are slightly larger than Golar's older newbuild FSRUs at 306m in length and with a beam of 43.4m. *Golar Nanook* has four GTT Mark III storage tanks for a total of 170,000m³ capacity, and features a sea water direct type re-gasification system of maximum 750mmscfd with flow variation range from 24% to 100% for each train and operation pressure range of 50barg to 100barg.

Although more sophisticated than conventional LNG carriers, some vessels of this type are currently used more for transport than in FSRU mode. That will not be the case for *Golar Nanook* which has been fixed on a 26-year contract to provide the regasification plant for a major energy project, the 1.5GW Porto de Sergipe I Power Project in Brazil, in which Golar has a 50% stake. The project will be the largest and most efficient thermoelectric power plant in Latin America and the Caribbean upon completion.

For its FSRU role, the ship features a yoke mooring system forward. It is also equipped with a quick release hook and four fenders for safe ship to ship LNG transfer and pull-in equipment for the yoke mooring system to improve mooring ability.

Power for the ship comes from a quartet of Wärtsilä 8L50DF four-stroke engines each producing 7,800kW. Although it is capable of self-propulsion by way of the twin propeller configuration, the ship will be stationary for most of its working life.





HMM PROMISE: Container ship

Shipbuilder: **HHIC-Phil Inc.**
 Vessel's name: **HMM Promise**
 Hull No: **NCP0117**
 Owner/Operator: **Hyundai Merchant Marine Co.,Ltd**
 Country: **Republic of Korea**
 Designer: **HHIC-Phil Korea / HHIC-Tech Inc**
 Country: .. **Republic of Korea / Republic of the Philippines**
 Model test establishment used: **KRISO**
 Flag: **Marshall Islands**
 IMO number: **9742168**
 Total number of sister ships already completed (excluding ship presented): **1**
 Total number of sister ships still on order: **nil**

Initially ordered by Greek interests in 2014 from HHIC-Philippines, *HMM Promise* and *HMM Blessing* have been built to a standard HHIC 11,000teu design and has earlier sisters operated by Greek and other interests.

HMM Promise was originally floated out in 2016 and tentatively named *Caravaggio* while its sister was initially named *Monet*. The two ships were sold to Hyundai Merchant Marine (HMM), South Korea's largest ocean carrier, in August 2017 in a deal that was said to be worth around \$162M for the pair. HMM said at the time that the price for the vessels was 10% lower than the then current market price. *HMM Promise* also represents the first large container ship delivered to HMM after its ownership was shifted into the hands of state-run Korea Development Bank in August 2016.

Ordinarily that start in life would not qualify the vessel for inclusion in this publication but before putting the vessels into service HMM had decided that its strategy for meeting the 2020 sulphur cap of 0.5% would involve installing scrubbers. Consequently, the two vessels were sent for a scrubber to be fitted immediately.

That on *HMM Promise* was completed first, allowing the ship to become the first container ship of 11,000teu to be fitted with an exhaust gas cleaning system. There are in fact two scrubbers fitted to each ship. Both are Wärtsilä open-loop types; a 34MW unit is fitted for the main engine and a smaller 15MW version to cater for the auxiliaries and boiler.

As with other ships of the type built by HHIC, *HMM Promise* is fitted with a single MAN B&W 8G95ME C9.5 main engine rated at 42,310kW at 77rpm. The drive is to a 9.7m propeller to give a service speed of 22knots at 80% MCR. The auxiliaries are a quartet of HMMSEN H32/40 engines of which two are 9-cylinder versions and the other two 8-cylinder models.

With hull dimensions of 330m length and 46.2m beam and a draught of 16m, the ship can enjoy

worldwide trading using the new Panama Canal locks. *HMM Promise* was put into service in July 2018 serving the Asia/East Coast of South America trade while its sister will be employed on the Asia West Coast South America route.

Nominal cargo capacity of the vessels is 11,167teu with 4,587 under deck and 6,580 on deck. At 14tonnes homogenous, the maximum capacity would be 8,300teu. *HMM Promise* has a fairly high reefer capacity with 1,453 plugs capable of accepting standard 40' reefer boxes.

TECHNICAL PARTICULARS

Length oa: 330m
 Length bp: 316.4m
 Breadth moulded: 48.2m
 Depth moulded
 To main deck: 27.2m
 To upper deck: 27.2m
 Width of double skin
 Side: 2.37m
 Bottom: 2.2m
 Draught
 Scantling: 16.0m
 Design: 13.0m

Gross: 114,000gt
 Deadweight
 Design: 94,800dwt
 Scantling: 134,869dwt
 Speed: 22knots
 Bunkers
 Heavy oil: 7,600m³
 Marine gas oil: 640m³
 Water ballast: 30,800m³
 Water ballast in loaded condition: 8,050t at 14t/TEU loaded in summer draught

Daily fuel consumption
 Main engine only: 163.99t/day
 Auxiliaries: 19.65t/day (9Cyl.) / 17.47t/day (8Cyl.)

Classification society and notations: Korean Register
 KRS1 CONTAINER SHIP LS(CL)
 SeaTrust(DSA2, FSA3) CLEAN2 IWS ERS CDG
 IHM LG LI UMA3 BWT STCM DPS(1)
 Heel control equipment: Anti heeling system
 Roll-stabilisation equipment: Bilge keel

Main engines
 Design: MAN Diesel Turbo
 Model: 8G95ME C9.5
 Manufacturer: Hyundai Heavy Ind.
 Number: 1
 Type of fuel: HFO or MGO
 Output of each engine: 42,310kW at 76.9rpm

Propellers
 Material: Ni-Al-Bronze
 Designer/Manufacturer: HHIC-Phil Korea / HHI
 Number: 1
 Fixed/controllable pitch: Fixed
 Diameter: 9,700mm
 Speed: 76.9rpm

Diesel-driven alternators
 Number: 4
 Engine make/type: Hyundai HMMSEN 9H32/40 (2) / 8H32/40 (2)
 Type of fuel: HFO or MGO
 Output/speed of each set: 4,500kW / 4,000kW at 720rpm
 Alternator make/type: Nishishiba / NTAKL / 89/90A1A
 Output/speed of each set: 4,320kW 720rpm x 2 / 3,840kW 720rpm x 2

Exhaust-gas scrubbing equipment
 Manufacturer: Wärtsilä Venturi(V-SOx)
 Type: Open loop
 On main engines?: .. 34MW(Scrubber unit for ME-EGC1)
 On auxiliary engines?: 15MW (Scrubber unit for GE&Boiler-EGC2)

Boilers
 Number: 2
 Type: Vertical smoke tube
 Make: Kangrim
 Output, each boiler: EGB 2,500kg/h / Aux. boiler 3,500kg/h

Mooring equipment
 Number: 9
 Make: Flutek
 Type: Electric motor driven

Special lifesaving equipment
 Number of each and capacity: 2 x 30
 Make: DSB Eng
 Type: Hinged gravity type

Hatch covers
 Design: MacGregor
 Manufacturer: HHIC-Phil Inc.
 Type: Lift-away

Containers
 Lengths: 20ft, 40ft, 45ft
 Heights: 20ft & 40ft, 45ft
 Cell guides: Fixed (150 x 150 x 15mm angles)
 Total TEU capacity: 11,167
 On deck: 6,580
 In holds: 4,587
 Homogeneously loaded to 14t: .. 8,300TEU
 Reefer plugs: 1,453FEU [948FEU on deck + 452FEU in hold + 53FEU socket only]

Tiers/rows (maximum)
 On deck: 10/19
 In holds: 10/17

Ballast control system
 Make: Emerson
 Type: Electro-hydraulic
 Water Ballast Treatment System
 Make: Erma First
 Capacity: 1,000m³/h

Complement
 Officers: 13
 Crew: 15

Stern appendages: Rudder bulb
 Bow thrusters

Make: Kawasaki
 Number: 1
 Output (each): 3,000kW

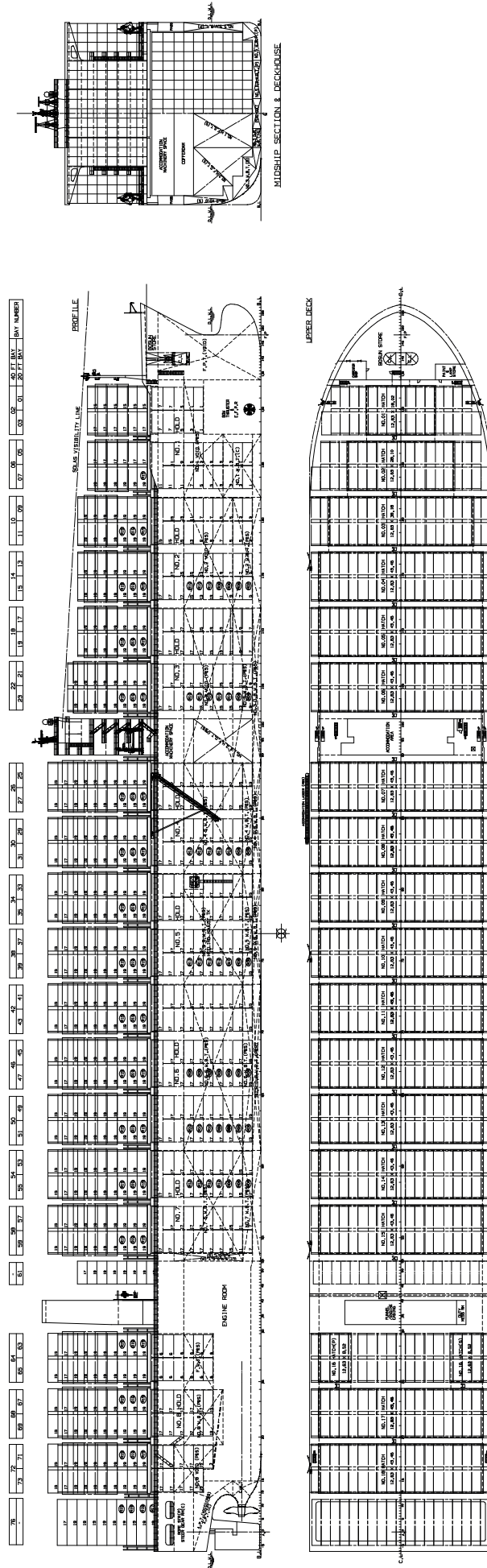
Bridge control system
 Make: Hyundai Electric
 Type: Integrated bridge console
 One-man operation: No

Fire detection system
 Make: Consilium
 Type: Salwico Cargo

Fire extinguishing systems
 Cargo holds: CO₂
 Make/Type: NK / Fixed high pressure
 Engine room: CO₂
 Make/Type: NK / Fixed high pressure

Contract date: 27 March 2014
 Launch/float-out date: 5 October 2016
 Delivery date: 23 June 2018

11,000 TEU CLASS CONTAINER CARRIER





HOEGH GANNET: FSRU/ LNG carrier

Shipbuilder: **Hyundai Heavy Industries**
 Vessel's name: **Hoegh Gannet**
 Hull No: **2909**
 Owner/Operator: **Hoegh**
 Country: **Norway**
 Designer: **Hyundai Heavy Industries**
 Country: **Republic of Korea**
 Flag: **Singapore**
 IMO number: **9822451**
 Total number of sister ships already completed
 (excluding ship presented): **nil**
 Total number of sister ships still on order: **nil**

Combined FSRU/LNG Carriers are the newest type of vessel in the energy transport and storage sector and the number in the world fleet is very small. Hoegh LNG controls half of all vessels operational or under construction with *Hoegh Gannet* being the ninth and largest in its fleet.

The vessel has an overall length of 294.07m, width of 46m and depth 26m with a design draught of 11.6m. The hull dimensions are not the distinguishing factor as they are a standard for Hyundai Heavy Industries' LNG carrier ships. It is the ship's regasification capacity that is its outstanding feature. At a regasification rate of 1,000mmcf/d compared to the more usual 750mmcf/d, *Hoegh Gannet* is the biggest FSRU/LNG carrier built to date in terms of capacity.

Hoegh Gannet has four GTT Mark III membrane cargo tanks with a combined 170,000m³. To handle the cargo the vessel is fitted with eight Shinko cargo pumps that have a 1,000m³/h capacity each, four spray pumps that have 50m³/h capacity each and a regas feed pump in each tank that has a 550m³/h capacity. The ship is able to send out regasified LNG through the manifold at the maximum rate of 1,000mmcf/d at the open loop based on the four regasification trains operating simultaneously.

The dual-fuel diesel-electric propelled vessel is powered by four Wärtsilä 50DF engines; three are eight cylinder in-line type producing 7,800kW each and the fourth a 6L50DF rated at 5,850kW. The owner has selected a single drive system with an 8.7m propeller with Hyundai's H-Fin boss cap connected to the electric motor drive through a Renk gearbox. In carrier mode, the service speed is 18knots.

As with the other FSRUs in the Hoegh fleet *Hoegh Gannet* has recondensers in each of the regasification trains for handling gas boil-off. The recondensers convert the excess boil-off back into the LNG tanks, producing important cost savings when operating in open-loop mode.

TECHNICAL PARTICULARS

Length oa: 294m
 Length bp: 282m
 Breadth moulded: 46m
 Depth moulded
 To main deck: 26m
 To upper deck: 26m

To other decks: 33m to trunk deck
 Width of double skin
 Side: 2.657m
 Bottom: 3.2m
 Draught
 Scantling: 12.6m
 Design: 11.6m
 Gross: 110,532gt
 Deadweight
 Design: 81,300dwt
 Scantling: 92,778dwt
 Speed, service: 18knots
 Cargo capacity
 Liquid volume: 170,000m³

Bunkers
 Diesel oil: 5,400m³
 Water ballast: 53,000m³
 Daily fuel consumption
 Main engine only: 112.7t/day
 Auxiliaries: included in DFDE

Classification society and notations: DNV-GL
 * 1A1, Tanker for Liquefied Gas, Ship
 Type 2G(-163 C, 500kg/m³, 25kPa), FSRU
 mode 2G(-163C, 500kg/m³, 70kPa),
 NAUTICUS(Newbuilding), REGAS, EO,
 CLEAN, OPP-F, BIS, CSA-FLS2, PLUS, COAT-
 PSPC(B), Recyclable, GAS FUELLED, TMON,
 NAUT-OC

Main engines:
 Design: Four stroke, single
 acting, trunk piston, turbocharged, intercooled,
 constant speed, non-reversible, dry sump, dual
 fuel burning
 Model: Wärtsilä 8L50DF / 6L50DF
 Manufacturer: Wärtsilä-Hyundai
 Number: 8L50DF x 3 / 6L50DF x 1
 Type of fuel: MDO / MGO / LNG
 Output of each engine: 8L50DF-7,800kW /
 6L50DF-5,850kW
 Gearboxes: Reduction gearbox
 Make: Renk
 Model: NDSH-3800
 Number: 1
 Output speed: 76.8rpm

Propellers
 Material: Ni-Al-Bronze
 Designer/Manufacturer: Hyundai Heavy
 Industries
 Number: 1
 Fixed/Controllable pitch: Fixed
 Diameter: 8,700mm
 Speed: 76.8rpm
 Diesel-driven alternators
 Number: 3 + 1
 Engine make/type: Hyundai+Wärtsilä, 3
 x 8L50DF + 1 x 6L50DF
 Type of fuel: MDO / MGO / LNG
 Output/speed of each set: 7,800kW x
 514rpm (8L50DF)

Output/speed of each set:5,850kW x
 514rpm (6L50DF)
 Alternator make/type: Hyundai Electric /
 synchronous AC generator
 Output/speed of each set:7,530kW x
 514rpm (8L50DF)
 Output/speed of each set:5,650kW x
 514rpm (6L50DF)

Boilers
 Number: 1
 Type: Automatic, forced draft, liquid and gas
 fuel burning, marine boiler
 Make: MHI
 Output, each boiler: 14,000kg/h

Cargo cranes/cargo gear: Hose handling crane
 Number: 2
 Make: TTS Offshore Solutions
 Type: Electro-hydraulic
 Performance: 10t SWL (port)/ 15t SWL
 (stbd)

Mooring equipment
 Number: 2 windlass, 8 mooring winch
 Make: MacGregor Norway
 Type: Electro-hydraulic

Special lifesaving equipment
 Number and capacity: 45 persons
 Make: Norsafe
 Type: Free-fall lifeboat

Cargo tanks
 Number: 4

Cargo pumps
 Number: 8 (2 per tank)
 Type: Vertical centrifugal, fixed
 Make: Shinko
 Stainless steel: Applied for ball bearing
 Capacity (each): 1,000m³/h x 170mlc

Cargo control system
 Make: Scana
 Type: Hydraulic remote control
 Make: Kongsberg
 Type: Integrated Automation System

Ballast control system
 Make: Scana
 Type: Hydraulic remote control
 Make: Kongsberg
 Type: Integrated Automation System

Water Ballast Treatment System
 Make: Techcross
 Capacity: 2,600m³/h x 2
 Complement
 Officers: 28
 Crew: 17
 Suez/Repair Crew: .. 1 cabin for 6 Suez crew

Bridge control system
 Make: GE
 Type: Remote control system for electric
 propulsion motor

One-man operation: Yes
 Fire detection system
 Make: Consilium
 Type: Addressable type Salwico fire
 detection system

Fire extinguishing systems
 Cargo decks:
 Make/Type: NK / Dry chemical
 powder system

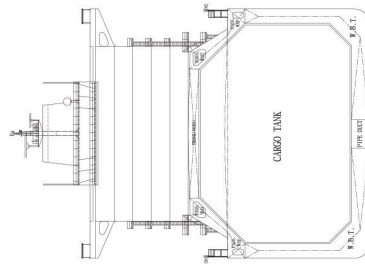
Engine room:
 Make/Type: NK / High pressure
 CO₂ system

Cabins:
 Make/Type: NK / Portable fire extinguisher
 Public spaces:
 Make/Type: NK / Portable fire extinguisher

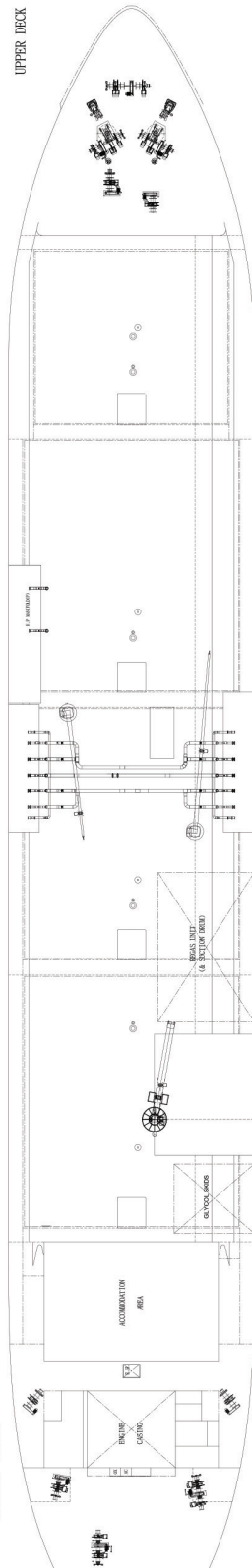
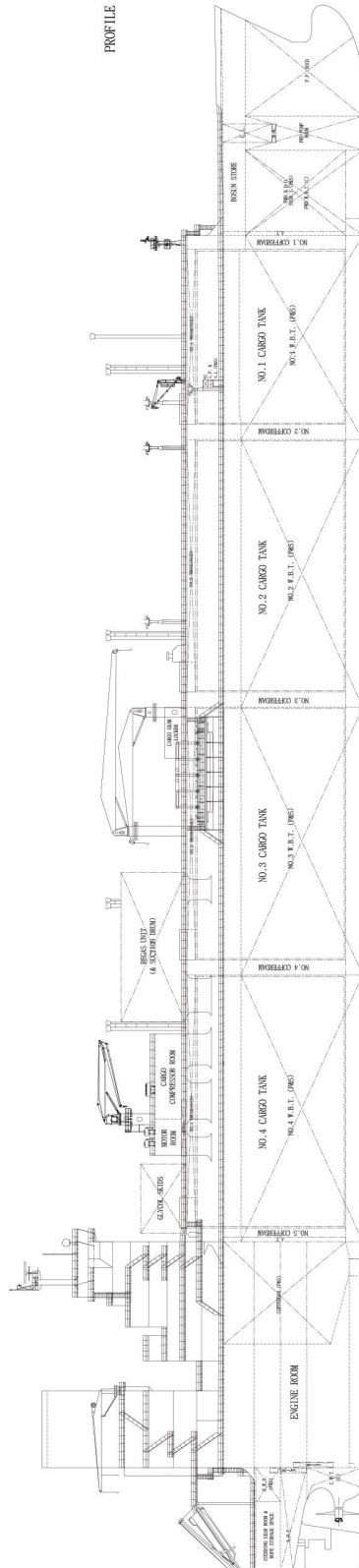
Radars
 Number: 2
 Make: Furuno
 Model(s) ..FAR-3330S for S-band / FAR-3320
 for X-band

Waste disposal plant
 Incinerator
 Make: Hyundai Marine Machinery
 Model: MAXI T150SL WS
 Sewage plant
 Make: IL SEUNG
 Model: ISS-43N

Contract date: 30 December 2016
 Launch/float-out date: 14 February 2018
 Delivery date: 06 December 2018



MIDSHIP SECTION





IBERIAN SEA: Tanker

Shipbuilder: **HHIC-Phil INC.**
 Vessel's name: **Iberian Sea**
 Hull No: **NTP0157**
 Owner/Operator: **Eastern Pacific Shipping Pte. Ltd**
 Country: **Singapore**
 Designer: **HHIC-Phil Korea / HHIC-Tech Inc**
 Country: **Republic of Korea / Republic of the Philippines**
 Model test establishment used: **KRISO**
 Flag: **Liberia**
 IMO number: **9815604**
 Total number of sister ships already completed (excluding ship presented): **nil**
 Total number of sister ships still on order: **3**

Iberian Sea is the first of a four-ship series of Aframax tankers built by Hanjin Heavy Industries & Construction – Philippines (HHIC-Phil) for Singapore-based Eastern Pacific Shipping.

The first two vessels were ordered in 2016 and the second pair some months later. Both pairs were constructed in parallel with the keels of the first pair laid down on 18 December 2017. The second ship in the series – *Levantine Sea* – was delivered just four days after its older sister. The third and fourth vessels – *Caspian Sea* and *Tyrrhenian Sea* – were delivered on 14 and 23 January 2019 respectively. Since taking the orders from eastern Pacific, HHIC-Phil has secured several more orders from other owners for essentially identical vessels.

Each of the tankers measures 249.8m in length and 44m in width. Deadweight is 114,218t – a size which has become very popular for Aframax tankers and which is towards the upper limit of the type. The hull dimensions allow passage through the new Panama locks adding to the flexibility of the ship. Cargo arrangements for the crude/product tankers comprise six port and six starboard epoxy coated cargo tanks and two slop tanks. There is three grade segregation and three Shinko steam cargo pumps, each with a capacity of 3,000m³/h.

The propulsion system features an STX-built MAN B&W 6G60ME-C9.5 main engine rated at 13,500kW @87rpm directly linked to an 8m propeller. The ship is also fitted with a Mewis duct and a semi-spade rudder with bulb. The arrangement gives a service speed of 14knots. Auxiliary engines are three MAN 6L23/30H models each rated at 960kW. On delivery of the first two vessels, the builder's announcement said the ships were equipped with exhaust gas scrubbing systems although the maker was not named.

As a newbuilding the ship is obliged to meet IMO ballast water convention requirements and to this end the ship has been fitted with a 3,000m³/h Evoqua SeaCURE system.

TECHNICAL PARTICULARS

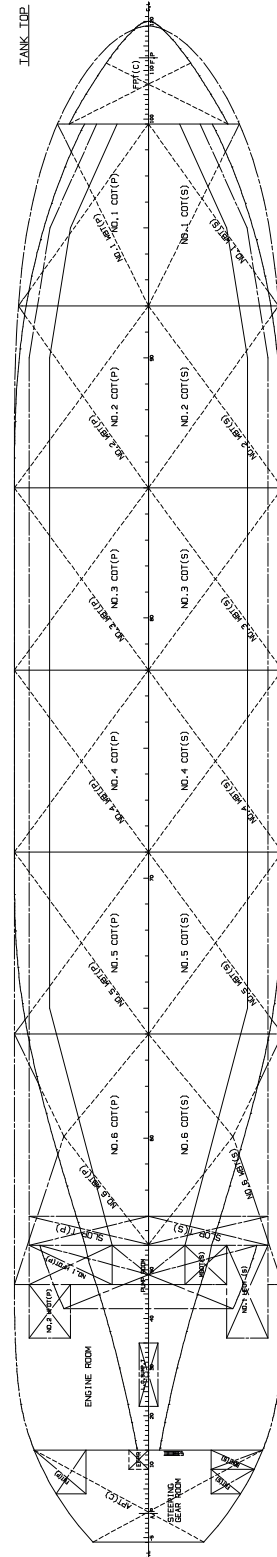
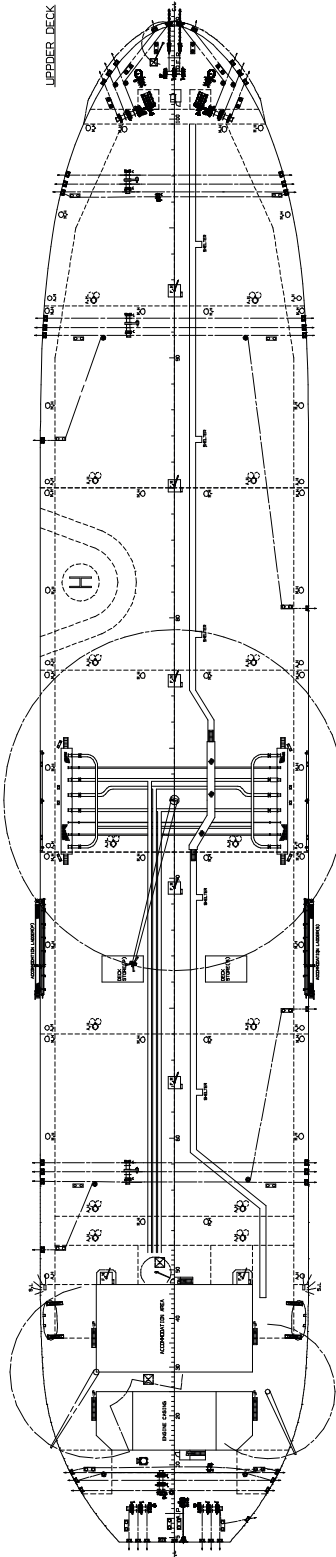
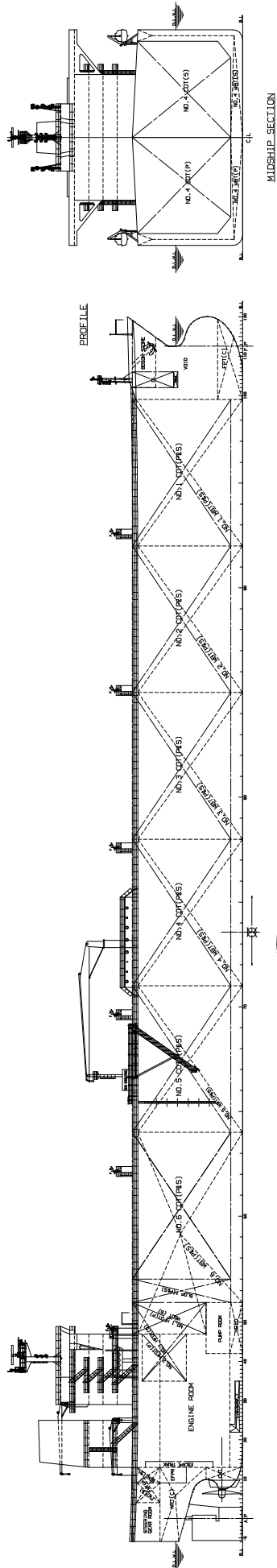
Length oa: 249.8m
 Length bp: 239.0m
 Breadth moulded: 44.0m
 Depth moulded
 To main deck: 21.35m
 To upper deck: 21.35m
 Width of double skin
 Side: 2.4m
 Bottom: 2.4m
 Draught
 Scantling: 15.1m (mld.)
 Design: 13.6m (mld.)
 Gross: 63,416gt
 Deadweight
 Design: 99,100dwt
 Scantling: 114,218dwt
 Speed, service (74.9% MCR output): 14.5knots

Cargo capacity
 Liquid volume: 130,200m³
 Bunkers
 Heavy oil: 2,880m³
 Diesel oil: 650m³
 Water ballast: 39,800m³
 Daily fuel consumption
 Main engine only: 39.0t/day
 Auxiliaries: 7.5 t/day (G/E x 2sets), 2.7t/day (G/E x 1set)

Classification society and notations: ABS +A1, E, Oil Carrier, +AMS, +ACCU, CSR AB-CM, CPS, SPMA, ESP, BWE, BWT, ENVIRO, TCM, VEC-L, IHM, RW, RRDA, CRC, UWILD, ICE CLASS IC
 Roll-stabilisation equipment: Bilge keel
 Main engines
 Design: MAN Diesel Turbo
 Model: 6G 60ME-C9.5
 Manufacturer: .. STX Heavy Industries Co., Ltd.
 Number: 1
 Type of fuel: HFO or MDO
 Output of each engine: .. 13,500kW at 87rpm
 Propellers
 Material: Ni-Al-Bronze
 Designer/Manufacturer: HHIC-Phil Korea / HHI
 Number: 1
 Fixed/Controllable pitch: Fixed
 Diameter: 8,000mm
 Speed: 87.0rpm/min

Diesel-driven alternators
 Number: 3
 Engine make/type: STX engine / STX-MAN 6L 23/30H
 Type of fuel: HFO or MDO
 Output/speed of each set: 960kW at 900rpm
 Alternator make/type: HHI-EES
 Output/speed of each set: 900kW/900rpm
 Boilers
 Number: 3
 Type: Large oil-fired boiler aux. boiler, Vertical composite smoke/smoke tube boiler
 Make: Alfa Laval
 Output, each boiler: Aux. boiler 25,000kg/h x 16kg/cm²(2sets), Composite boiler 1,500/800kg/h x 6kg/cm²
 Cargo cranes/cargo gear
 Number: 1
 Make: DMC
 Type: Electro-hydraulic driven
 Performance: 15t SWL
 Mooring equipment
 Number: 9
 Make: Flutek
 Type: Electro-hydraulic driven
 Special lifesaving equipment
 Number of each and capacity: 2 x 28 persons
 Make: DSB Eng.
 Type: Hinged gravity
 Cargo tanks
 Number: 14 (12 cargo tanks, 2 slop tanks)
 Grades of cargo carried: SEG.I, II, III
 Product range: Crude oil, petroleum Products in the list of oil (MARPOL 73/78 Annex I), Carbon black feed stock, production water
 Coated tanks: CMP and Epoxy paint
 Cargo pumps
 Number: 3
 Type: Steam turbine driven, vertical, centrifugal
 Make: Shinko
 Stainless steel: Impeller shaft & key, Seal rings, Springs
 Capacity (each): 3,000m³/h x 130 mTh
 Cargo control system
 Make: KSB Seal
 Type: Electro hydraulic
 Ballast control system
 Make: KSB Seal
 Type: Electro hydraulic
 Water Ballast Treatment System
 Make: Evoqua
 Capacity: 3,000m³/h
 Complement
 Officers: 15
 Crew: 13
 Stern appendages/special rudders: Mewis duct/Semi-spade rodder with rudder bulb
 Bridge control system
 Make: Hyundai Electric
 Type: Integrated bridge console
 One-man operation: No
 Fire detection system
 Make: Autronica
 Type: AutoSafe
 Fire extinguishing systems
 Engine room: Foam
 Make/Type: NK / High expansion foam
 Deck: Foam
 Make/Type: NK / Low expansion foam
 Radars
 Number: 2
 Make: Furuno
 Model(s): .. FAR-3220W-BB / FAR-3230W-BB
 Integrated bridge system: Yes
 Make: Furuno
 Model: FMD-3200-BB
 Waste disposal plant
 Waste handled: Partially handled
 Incinerator
 Make: HMMCO
 Model: MAXI NG 100SL WS
 Sewage plant
 Make: Il Seung
 Model: ISB-02V
 Contract date: 6 September 2016
 Launch/float-out date: 21 April 2018
 Delivery date: 17 November 2018

DWT 114,000 MT CLASS CRUDE/PRODUCT OIL TANKER





INDUSTRIAL COURAGE: Heavy lift vessel

Shipbuilder: **Guangzhou Wenchong Shipyard Co.,Ltd (China)**
 Vessel's name: **Industrial Courage**
 Hull No: **H5593**
 Owner/operator: **CSSC (Hong Kong) Shipping Co.,Ltd / International Fleet Chartering, LLC**
 Country: **China / USA**
 Designer: **Shanghai Merchant Ship Design & Research Institute (SDARI)**
 Country: **China**
 Model test establishment used: **HSVA and Shanghai Ship & Shipping Research Institute (CSSRI)**
 Flag: **Marshall Island**
 IMO number: **9810329**
 Total number of sister ships already completed (excluding ship presented): **3**
 Total number of sister ships still on order: **nil**

At 99.99m in overall length, *Industrial Courage* is at the lowest end of the scale for inclusion in this publication, but few would argue that, effectively, the ship meets 100m length criteria.

Industrial Courage, delivered in April, is the first in a series of four vessels built by Guangzhou Wenchong Shipyard in China to a SDARI design. Four of the vessels, *Industrial Courage*, *Industrial Constant*, *Industrial Confidence* and *Industrial Color* (currently trading as *Zea Color*) are operated by US-based Intermarine and managed by Hammonia in Germany. Intermarine describes the vessel as the leadship in the C-Class 300 series reflecting the fact that the ships have a heavy lift capacity of 300t achieved by using in tandem both of the 150t capacity cranes located on the port side of the vessel.

The 8,553dwt vessel has a beam of 20.5m and a maximum draught of 8.3m. Although currently employed on Intermarine's regular service operating between the north coast of South America, the Caribbean and Central America, the ship is lakes-fitted and suitable for operation in the Saint Lawrence, Welland Canal and US Great Lakes.

Although most attention is given to ships at the upper size limits, small multipurpose ships – especially those with a heavy lifting ability – are always in demand to serve the requirements of specialist cargoes and smaller and remote ports. *Industrial Courage* has a 60.9m long box-shaped cargo hold with a 9,633m³ bale capacity.

The pontoon tween deck in the hold can be adjustable on two height levels and the panels can be used as grain bulkheads in three positions in the hold. With the pontoons in place, the lower hold has a height of 5.5m and the upper hold 5.8m, hold width is 15.3m with a narrower section 10.2m at the forward end. The ship is

able to carry 431teu of which 249teu will be on deck and there are 50 reefer plugs.

The hull form allows operation at NAABSA berths and is optimised to achieve a high propulsive efficiency and low resistance with a rudder bulb as an additional energy saving device. The efficiency can be best judged by the fact that the ship's EEDI rating already meets the 2025 final Phase 3 requirements.

Propulsion arrangements include a single 6X35-B engine, the smallest low-speed two-stroke engine in WinGD's portfolio and specially designed for vessels with shallow draught requirements, compact engine room dimensions and simple engine operation. In order to increase the manoeuvrability performance, a skeg is in place before the 4.4m diameter propeller. Design service speed 12 14.2knots although the owner's own description reduces this to 13.5knots.

TECHNICAL PARTICULARS

Length oa: 99.99m
 Length bp: 93.8m
 Breadth moulded: 20.5m
 Depth moulded
 To main deck: 12.0m
 To upper deck: 12.0m
 Draught
 Scantling: 8.40m
 Design: 7.20m
 Gross: 7,498gt
 Deadweight
 Design: 6,270dwt
 Scantling: 8,440dwt
 Speed, service (85 %CMCR output, with 15% SM): 14.2knots
 Bunkers
 Heavy oil: 430m³
 Diesel oil: 150m³
 Water ballast: 4,400m³
 Daily fuel consumption
 Main engine only: 13.3t/day
 Auxiliaries: 2.34t/day

Classification society and notations: DNV GL
 100 A5, E1, MULTI-PURPOSE DRY CARGO SHIP, LC, BC, EQUIPPED FOR CARRIAGE OF CONTAINERS, G, DG, DBC, STRENGTHENED FOR HEAVY CARGO, IW, BWM(D1, D2) * MC E1, AUT, EP-D, CM-PS
 % high-tensile steel used in construction: 60%

Heel control equipment: anti-heeling system 500m²/h

Main engines
 Design: WinGD
 Model: W6X35-B, Tier II

Manufacturer: Yichang Marine Diesel Engine Plant
 Number: 1
 Type of fuel: HFO, MDO, MGO
 Output of each engine: 3950kW x 158rpm
 Propellers
 Material: Cu-Ni-Al WP00 060 2
 Designer/Manufacturer: Wärtsilä-CME Zhenjiang Propeller Co.,Ltd.
 Number: 1
 Fixed/Controllable pitch: Fixed
 Diameter: 4.4m
 Speed: 158rpm
 Diesel-driven alternators
 Number: 3
 Engine make/type: Daihatsu Diesel Manufacturing Co., Ltd. / GDE-18
 Type of fuel: HFO, MDO, MGO
 Output/speed of each set: 680kW x 900rpm
 Alternator make/type: Hyundai / HFC7 456-8P
 Output/speed of each set: 630kW x 900rpm
 Boilers
 Number: 1
 Type: Composite boiler
 Make: Saacke
 Output, each boiler: 1,200kg/h of oil section, 590kg/h of exhaust gas section

Cargo cranes/cargo gear
 Number: 3
 Make: NMF
 Type: Electric-hydraulic wire luffing type
 Performance: 150t x 15m (main hoist), 45t x 26m (aux. hoist)

Mooring equipment
 Number: Fore: 2 windlass-mooring winches, aft: 2 mooring winches
 Make: MacGregor
 Type: Electric

Special lifesaving equipment
 Number and capacity: 20
 Make: Jiangyin Beihai
 Type: free-fall

Hatch covers:
 Design: TTS
 Manufacturer: Guangzhou Wenchong Shipyard
 Type: Pontoon

Containers:
 Lengths: 6.058m
 Heights: 2.591m
 Total TEU capacity: 431
 On deck: 249
 In holds: 182
 Homogeneously loaded to 14t: 285
 Reefer plugs: 50
 Tiers/rows (maximum)
 On deck: 4/8
 In holds: 4/6

Ballast control system
 Make: Hoppe
 Type: Pneumatic

Water ballast Treatment System
 Make: Alfa Laval
 Capacity: 500m³/h

Complement
 Officers: 10
 Crew: 6
 Suez/Repair Crew: 6
 Single/double/other rooms: 16 single rooms + 1 room for Suez
 Stern appendages/special rudders: 1 rudder

Bow thrusters
 Make: Wuhan Kawasaki Marine Machinery Co.,Ltd.
 Number: 1
 Output (each): 500kW

Bridge control system
 Make: SAM Electronics
 Type: PCS2200

Radars
 Number: 2
 Make: Sperry Marine
 Model(s): CAT1C 343/12/MK/VM2, CAT1C 342/8/MK/VM2

Contract date: 4 December 2015
 Launch/float-out date: 14 September 2017
 Delivery date: April 2018



INDUSTRIAL FAME: Heavy lift vessel

Shipbuilder: **Hudong-Zhonghua Shipbuilding (Group) Co., Ltd., / Guangzhou Wenchong Shipyard Co., Ltd.**
 Vessel's name: **Industrial Fame**
 Hull No: **H1685A**
 Owner/Operator: **CSSC (Hong Kong) Shipping Company Limited / Intermarine**
 Country: **China / USA**
 Designer: **Shanghai Merchant Ship Design & Research Institute (SDARI)**
 Country: **China**
 Model test establishment used: **HSVA**
 Flag: **Portugal**
 IMO number: **9785378**
 Total number of sister ships already completed (excluding ship presented): **1**
 Total number of sister ships still on order: **8**

Built to a SDARI design and ordered in 2015 as part of Houston-based Intermarine's fleet rejuvenation project, *Industrial Fame* is the first of 10 vessels of the Ecolift F900 type.

Intermarine's initial order was for six vessels but this was increased later to ten. Some of the vessels will sail under the Intermarine house flag and others under the joint venture Zeamarine formed last year by Intermarine and Zeaborn Group.

The 13,000dwt multi-purpose heavy lift vessels are characterised by a forward wheelhouse design where high project cargoes do not interfere with line of sight requirements. The 900 part of the design name reflects the fact that the ship is fitted with a pair of MacGregor 450t cranes that can operate in tandem to give a 900t lifting capacity at 17m outreach.

Behind the forward superstructure, the ship has a very flexible cargo arrangement of two cargo holds and a wide, open deck area. The two box-shape cargo holds, arranged within a double-skin hull, have dimensions of 7.50m x 20.00m (No.1 hold) and 105.45m/76.50m x 20.00m (No.2 hold) respectively. A movable tween deck allows for higher cargoes to be stowed under deck and for even higher cargoes the ship is classed as hatchcoverless, permitting sailing with the main deck covers open.

Four pairs of anti-heeling ballast water tanks are equipped to compensate for heeling during the loading or discharge of heavy cargoes. The cargo holds are fitted with a sprinkler system, smoke detectors, CO₂ fire extinguishing systems and high capacity ventilation system in order to accommodate a wide variety of dangerous goods.

Energy saving devices such as Hub Cap Fins and a twisted leading edge Becker rudder are installed. Taking operational profile into consideration, the

power performance was optimised by CFD. When the vessel is sailing at service speed 15.3knots, the daily fuel oil consumption of the main engine is decreased to 20.6t/day. The attained EEDI is 26% lower than baseline according to IMO rules.

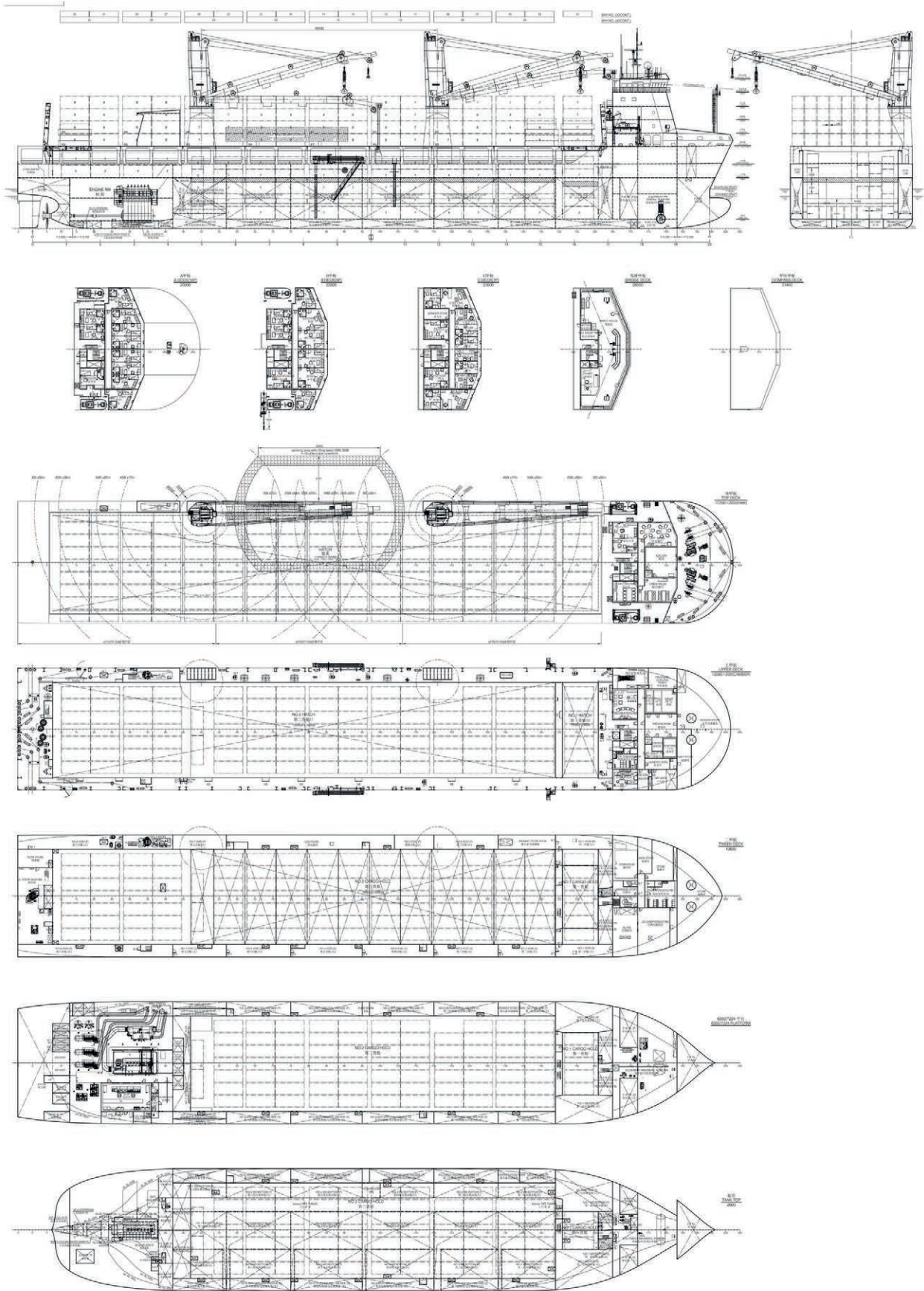
TECHNICAL PARTICULARS

Length oa: 149.99m
 Length bp: 142.00m
 Breadth moulded: 25.60m
 Depth moulded
 To main deck:to tween deck 10.65m
 To upper deck: 13.50m
 Width of double skin
 Side: 3.00m/s 2.60m(P&S)
 Bottom: 2.00m
 Draught
 Scantling: 8.30m
 Design: 6.80m
 Open top status: 6.60m
 Gross: 16,729gt
 Displacement: 23,477t
 Lightweight: 9,394t
 Deadweight
 Design: 9,096dwt
 Scantling: 14,083dwt
 Block co-efficient:
 Design: 0.7274
 Scantling: 0.757
 Speed, service (15% MCR output): 15.3knots

Cargo capacity
 Grain: 26,667m³
 Bunkers
 Heavy oil: 740m³
 Diesel oil: 340m³
 Water ballast: 8,871m³
 Daily fuel consumption
 Main engine only: 20.65t/day
 Auxiliaries: 3.68t/day

Classification society and notations: DNV GL
 100 A5, Multi-Purpose Dry Cargo Ship, E3, BC, G, IW, BWM(D1, D2), DG, DBC, Strengthened for Heavy Cargo, Equipped for Carriage of Containers, LC, CM-PS, HATCHCOVERLESS
 * MC E3 AUT, EP-D
 % high-tensile steel used in construction: ..57%
 Heel control equipment: Anti-heeling system with anti-heeling pump, capacity 800m³/h
 Main engines
 Design: MAN B&W
 Model: 7S40ME-B9.5 TII
 Manufacturer: Hudong Heavy Machinery Co., Ltd

Number: 1
 Type of fuel: ULSFO or MGO
 Output of each engine: ... 5,750kW x 111rpm
 Propellers
 Material: Ni-Al-Bronze
 Designer/Manufacturer: Wärtsilä
 Number: 1
 Fixed/Controllable pitch: Fixed
 Diameter: 5.3m
 Speed: 111.8rpm
 Diesel-driven alternators
 Number: 3
 Engine make/type: Daihatsu Diesel MFG. Co., Ltd / 6DE-18
 Type of fuel: ULSFO or MGO
 Output/speed of each set: .. 800kW x 900rpm
 Alternator make/type: Taiyo Electric Co., Ltd/FE
 Output/speed of each set: 750kW x 900rpm
 Boilers
 Number: 1
 Type: Cylindrical vertical smoke tube type boiler with rotary cup burner
 Make: Saacke
 Output, each boiler: Oil-fired section @ 2,000kg/h, Exhaust gas section; @ 700kg/h
 Cargo cranes/cargo gear
 Number: 2
 Make: MacGregor
 Type: Electro-hydraulic wire luffing
 Performance: ..Main hoist 450t x 17m / 250t x 30m; Whip hoist 60t x 25m.
 Mooring equipment
 Number: 2 sets comb. anchor-mooring winch and 2 sets mooring winch
 Make: MacGregor
 Type: Electric
 Special lifesaving equipment
 Number and capacity: 2
 Make: Fassmer
 Type: Gravity luffing arm type davit
 Hatch covers
 Design: TTS-HUAHAI
 Manufacturer: TTS-HUAHAI
 Type: folding and lifting type for weather deck / lifting type for tween deck
 Containers
 Lengths: 20/40'
 Heights: 8'6"/9'6"
 Total TEU capacity: 1,011
 On deck: 540
 In holds: 471
 Homogeneously loaded to 14t: 688
 Reefer plugs: 100
 Tiers/rows (maximum)
 On deck: 4/9
 In holds: 4/7
 Ballast control system
 Make: Pleiger
 Type: Electro-hydraulic (solenoid valve cabinet(s) to be provided)
 Water Ballast Treatment System
 Make: Headway
 Capacity: 600m³/h
 Complement
 Officers: 10
 Crew: 16
 Suez/Repair Crew: 6
 Single/double/other rooms: 26/0/1
 Stern appendages/special rudders: ..full spade rudder with twisted leading edge
 Bow thrusters
 Make: Kawasaki
 Number: 1
 Output (each): 900kW
 Bridge control system
 Make: SAM Electronics
 Type: PCS2200
 One-man operation? No
 Fire detection system
 Make: Consilium
 Type: Salwico Cargo
 Fire extinguishing systems
 Cargo holds: CO₂/Water mist
 Make/Type: NK Co., Ltd / Ilin and Co., Ltd
 Engine room: CO₂ / Fixed water mist
 Make/Type: NK Co., Ltd/ Minimax GmbH
 Delivery date: January, 2018





KAIROS: LNG bunker supply vessel

Shipbuilder: **Hyundai Mipo Dockyard Co., Ltd.**
 Vessel's name: **Kairos**
 Hull No: **8250**
 Owner/Operator: **B.Schulte / Blue LNG**
 Country: **Germany**
 Designer: **Hyundai Mipo Dockyard Co., Ltd.**
 Country: **Korea**
 Model test establishment used: **KRISO**
 Flag: **Cyprus**
 IMO number: **9819882**
 Total number of sister ships already completed (excluding ship presented): **nil**
 Total number of sister ships still on order: **nil**

TECHNICAL PARTICULARS

Length oa: 117.10m
 Length bp: 113.50m
 Breadth moulded: 20.0m
 Depth moulded
 To main deck: 10.30m
 To upper deck: 10.30m
 Width of double skin
 Side: 2.1m
 Bottom: 1.4m
 Draught
 Scantling: 5.30m
 Design: 5.20m

Gross: 8,070gt
 Displacement: 9,026t
 Deadweight
 Design: 4,360dwt
 Scantling: 4,572dwt

Speed, service (72.4% (SPP) MCR output): 12.5knots

Cargo capacity
 Liquid volume: 7,724.3m³

Bunkers
 Gas: 216.3m³
 Water ballast: 1,015.6m³

Daily fuel consumption
 Main engine only: 15.3t/day (Gas mode) with 0.5t/day (pilot MGO)
 Auxiliaries: 17.4t/day (MGO mode)

Classification society and notations: LR
 ✕100A1, Liquefied Gas Carrier, Ship Type 2G, Methane(LNG) in Independent Tanks Type C, Max. Vapour Pressure 3.75bar g, Min. Cargo Temp. -165°C, Ship Right(SDA, CM), *IWS, LI, Ice Class 1A FS, +LMC, UMS, NAV1, DP(AA) with the descriptive notes ShipRight(IHM, SERS)

Main engines
 Design: Four stroke, single acting, trunk piston, constant speed, non-reversible
 Model: 9L20DF
 Manufacturer: Wärtsilä
 Number: 3
 Type of fuel: MGO & GAS
 Output of each engine: 1,665kW x 1,200rpm

Azimuth thrusters
 Design: Rotatable through 360°, Hydraulically steerable, Z drive construction
 Designer/Manufacturer: Rolls-Royce
 Number: 2
 Input power/speed: 1,900kW x 1,200rpm
 Ducted/Open: Ducted
 Fixed/Controllable pitch: Fixed

Propeller speed: 227rpm (non-reversible, inboard rotation)
 Propeller diameter: 2,600mm
 Boilers
 Number: 1
 Type: Hot water heater
 Make: Alfa Laval
 Output, each boiler: 600kW

Cargo cranes/cargo gear
 Number: 2
 Make: TTS
 Type: Electro-hydraulic
 Performance: 3.3t SWL / Outreach: Max. 30m

Other cranes
 Number: 1
 Make: Oriental
 Type: Electro-hydraulic
 Tasks: E/R heavy spare parts handling
 Performance: 1.5t SWL / Outreach: Max. 20m

Mooring equipment
 Number: 4
 Make: MacGregor
 Type: Electric

Special lifesaving equipment
 Number and capacity: 2 / 21 persons
 Make: Oriental-Jianyan
 Type: Gravity

Cargo tanks
 Number: 2
 Grades of cargo carried: LNG
 Product range: LNG
 Coated tanks – make and type of coating: ...
 No coating inside
 Stainless steel – structure/piping: 9% nickel steel/SUS316L

Cargo pumps
 Number: 2 Main + 2 Aux. + 2 Fuel
 Type: Submerged
 Make: Ebara
 Capacity (each): 600m³/h(Main) + 50m³/h(Aux.) + 5m³/h(Fuel)

Cargo control system
 Make: Babcock
 Type: CNG compressing

Complement
 Officers: 8
 Crew: 10
 Suez/Repair Crew: 4
 Single/double/other rooms: 16 / 2 / 1

Bow thrusters
 Make: Kawasaki
 Number: 2
 Output (each): 320kW

Bridge control system
 Make: DP
 Type: Thruster Control and MP2
 One-man operation: Yes

Fire detection system
 Make: Consilium
 Type: Salwico Cargo

Fire extinguishing systems
 Cargo holds
 Make/Type: Fain/Dry powder system

Engine room:
 Make/Type: Fain/CO₂

Cabins:
 Make/Type: NK/Portable fire extinguisher

Public spaces:
 Make/Type: NK/Portable fire extinguisher

Radars
 Number: 3EA
 Make: JRC

Model(s): JMR-9230-S, JMR-9225-6X

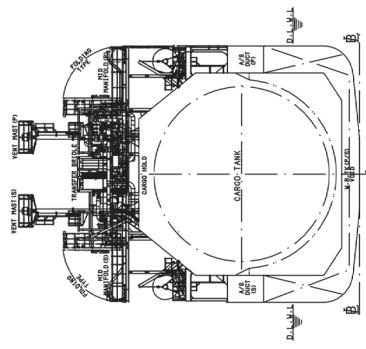
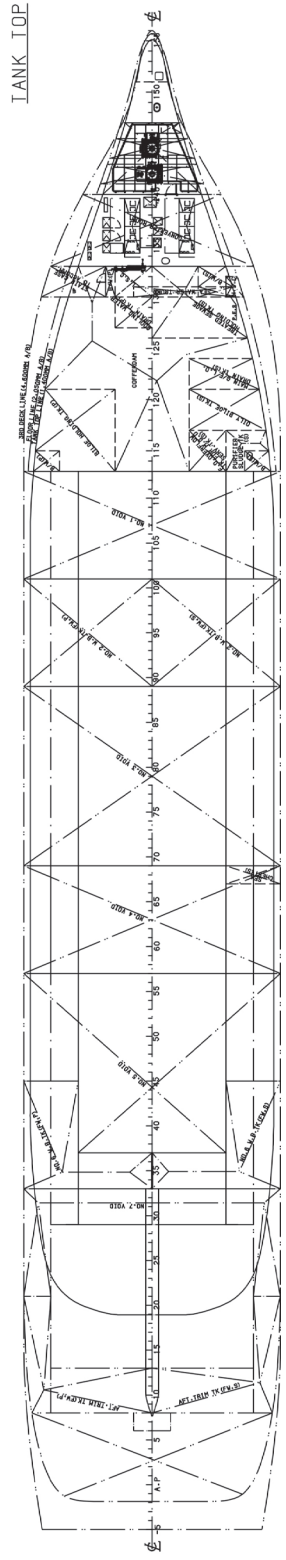
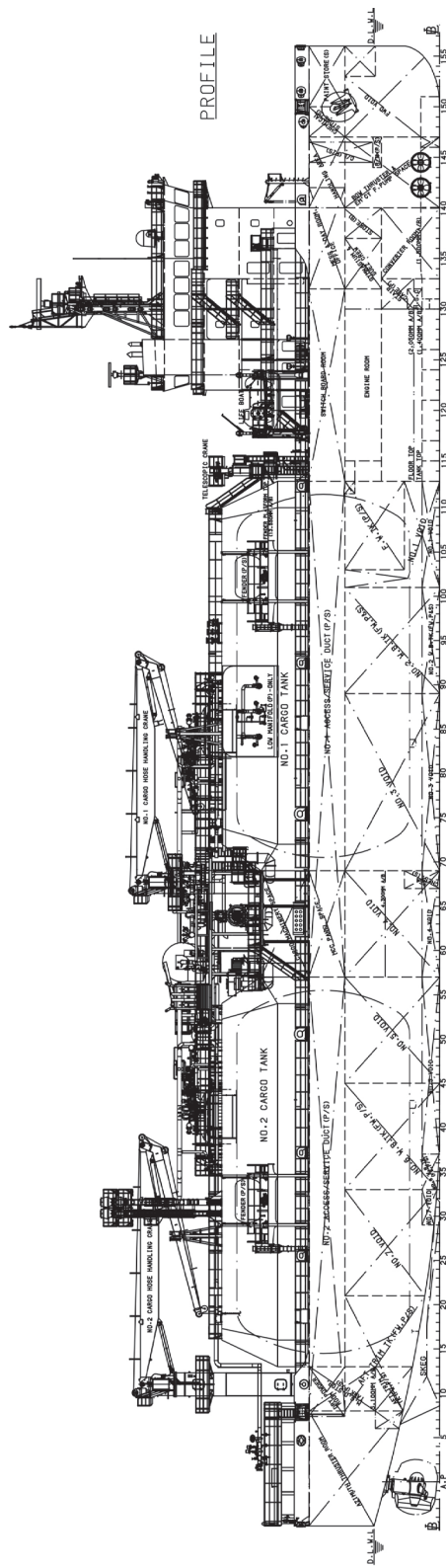
Waste disposal plant
 Waste compactor
 Make: HODU

Model: B3

Sewage plant
 Make: Il-Seung

Model: ISB-02

Contract date: 30 November 2016
 Launch/float-out date: 18 May 2018
 Delivery date: 16 October 2018





MARSHAL VASILEVSKIY: FSRU/LNG carrier

Shipbuilder: **Hyundai Heavy Industries**
 Vessel's name: **Marshal Vasilevskiy**
 Hull No: **2854**
 Owner/Operator: **Gazprom Flot**
 Country: **Russian Federation**
 Designer: **Hyundai Heavy Industries**
 Country: **Republic of Korea**
 Model test establishment used: **Hyundai Maritime Research Institute (HMRI)**
 Flag: **Panama**
 IMO number: **9778313**
 Total number of sister ships already completed (excluding ship presented): **nil**
 Total number of sister ships still on order: **nil**

One of a growing number of FSRU/LNG carriers in the world fleet, *Marshal Vasilevskiy* delivered to Gazprom by Hyundai Heavy Industries in October is significant for being Russia's first of the type.

The 294.7m long ship is able to operate in two modes either as a conventional LNG carrier or as a stationary floating storage and regasification unit. Vessels of this type are seen as providing an economical route to LNG-fuelled power in developing nations or remote locations. *Marshal Vasilevskiy* is currently employed in FSRU mode at the Russian port of Kaliningrad.

The ship is expected to be operating in some extreme conditions including in ice conditions. The vessel is dual classed – Lloyd's Register and Russian Maritime Register of Shipping – and has an ice class of 1A from LR and Arc 4 from RMRS. Appropriate winterisation of equipment is also a feature.

Marshal Vasilevskiy has four GTT Mark III Flex type cargo tanks giving a total gas capacity of 174,000m³. To handle the cargo all of the four tanks are fitted with two cargo pumps that have 1,800m³/h capacity each, a spray pump that has 50m³/h capacity and a regas feed pump that has 550m³/h capacity. The Wärtsilä regasification unit for use in FSRU mode, which has capacity of 750mmcf/d at peak, is located at the midship part of the vessel.

Because the ship is also designed for a role as an LNG carrier transporting cargo, it is provided with a diesel-electric propulsion system. It has a twin layout with each engine room equipped with a Wärtsilä 12V50DF engine and a 6L50DF engine. The engines provide a combined output of 17,650kW and the gensets 16,940kW. The two electric propulsion motors are each of 11,450kW. When operating in FSRU mode the main engines will be used as required for power production.

The configuration offers redundancy and allows for a service speed of 19.5knots. To increase efficiency the

propellers are fitted with Hyundai's Hi-Fin propeller boss cap fins and the rudders are Hyundai's Hi-Rudder T flow adopted twisted type with bulb.

TECHNICAL PARTICULARS

Length oa: 294.7m
 Length bp: 287.2m
 Breadth moulded: 46.4m
 Depth moulded
 To main deck: 26.4m
 To upper deck: 26.4m
 To other decks: 35m to trunk deck
 Width of double skin
 Side: 2.217m
 Bottom: 3.2m
 Draught
 Scantling: 12.5m
 Design: 11.5m
 Gross: 118,423gt
 Deadweight
 Design: 81,600dwt
 Scantling: 93,292dwt
 Speed, service: 19.5knots
 Cargo capacity
 Liquid volume: 174,000m³
 Bunkers
 Heavy oil: 4,800m³
 Diesel oil: 1,000m³
 Water ballast: 63,000m³
 Daily fuel consumption
 Main engine only: 125t/day
 Auxiliaries: included in main engine

Classification society and notations:
 Russian Maritime Register of Shipping : KM(★), Arc 4#, AUT1-ICS, OMBO, EPP, ANTI-ICE, CCO, LI, ECO-S, BWM(E-S), WINTERIZATION(-30), GFS, Gas carrier type 2G (methane)
 Lloyd's Register of Shipping : *100A1, Liquefied Gas Tanker, Ship Type 2G, Methane(LNG) in membrane tanks, Maximum Vapour Pressure in LNGC mode 0.25 bar g, Maximum Vapour Pressure in FSRU mode 0.7 bar g, Minimum Temperature Minus 163°C, ShipRight(SDA, FDA plus(40, WW), CM, ACS(B)), *IWS, LI, +LMC, UMS, NAV1, Lloyd's RGP(Regasification Plant) with descriptive notes "ShipRight(BWMP(T), IHM, SERS, SCM)"

Main engines
 Design: Four stroke, single acting, trunk piston, turbocharged, intercooled, constant speed, non-reversible, dry sump, tri fuel burning
 Model: Wärtsilä 12V50DF / 6L50DF
 Manufacturer: Wärtsilä-Hyundai
 Number: 12V50DF x 2 / 6L50DF x 2

Type of fuel: .. HFO / MDO / MGO / LS Hybrid fuel / LNG
 Output of each engine: 12V50DF 11,700kW / 6L50DF 5,850kW

Gearboxes: Reduction gearbox
 Make: Renk
 Model: RSH-2100
 Number: 2
 Output speed: 68.5rpm
 Propellers
 Material: Ni-Al-Bronze
 Designer/Manufacturer: Hyundai Heavy Industries
 Number: 2
 Fixed/Controllable pitch: Fixed
 Diameter: 8.2m
 Speed: 68.5rpm

Diesel-driven alternators
 Number: 2 + 2
 Engine make/type: Hyundai – Wärtsilä, 2 x 12V50DF + 2 x 6L50DF
 Type of fuel: .. HFO / MDO / MGO / LS Hybrid fuel / LNG
 Output/speed of each set: 11,700kW x 514rpm (12V50DF)
 Output/speed of each set: 5,850kW x 514rpm (6L50DF)
 Alternator make/type: Hyundai Electric / Synchronous AC generator
 Output/speed of each set: 11,290kW x 514rpm (12V50DF)
 Output/speed of each set: 5,650kW x 514rpm (6L50DF)

Boilers
 Number: .. 2 for aux. boiler / 2 for regas boiler
 Type: Automatic, forced draft, liquid and gas fuel burning, water tube
 Make: Saacke / MHI
 Output, each boiler: 25,000kg / h, 90,000kg/h

Cargo cranes/cargo gear: .. Hose handling crane
 Number: 2
 Make: DMC Co., Ltd
 Type: Electro-hydraulic
 Performance: 10t SWL (port & stbd)

Mooring equipment
 Number: 2 windlass, 8 mooring winch
 Make: Rolls-Royce
 Type: Electro-hydraulic type

Special lifesaving equipment
 Number and capacity: 41 persons
 Make: Norsafe
 Type: Free-fall

Cargo tanks
 Number: 4

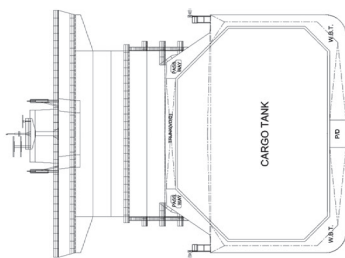
Cargo pumps
 Number: 8 (2 per tank)
 Type: Vertical centrifugal, fixed
 Make: Shinko
 Stainless steel: Applied for ball bearing
 Capacity (each): 1,800m³/h x 160mlc
 Cargo control system
 Make: KSB Seil
 Type: Hydraulic remote control
 Make: Kongsberg
 Type: Integrated Automation System

Ballast control system
 Make: KSB Seil
 Type: Hydraulic remote control
 Make: Kongsberg
 Type: Integrated Automation System

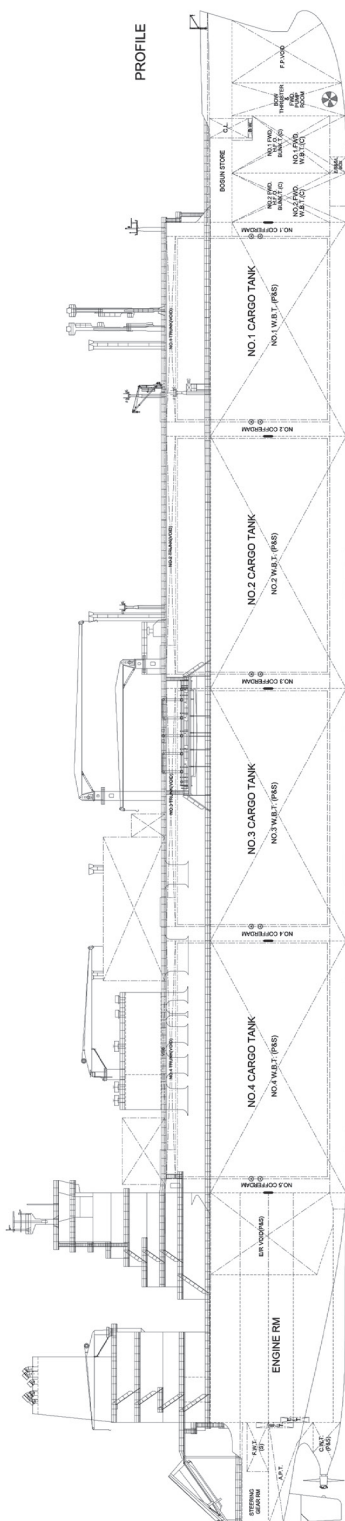
Water Ballast Treatment System
 Make: Techcross
 Capacity: 3,000m³/h x 2

Complement
 Officers: 24
 Crew: 17

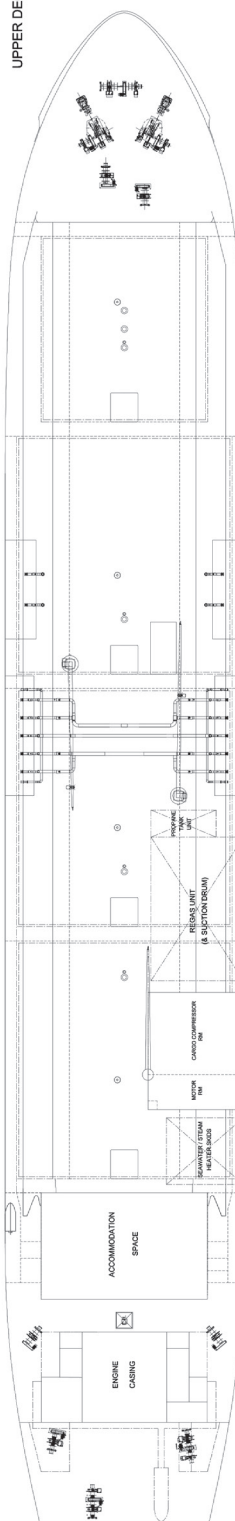
Bridge control system
 Make: General Electric Company
 Type: Remote control system
 One-man operation: Yes
 Order date 15 May 2015
 Launch date 7 January 2017
 Delivery date 31 October 2018



MIDSHIP SECTION



UPPER DECK





MARVEL EAGLE: LNG carrier

Shipbuilder: **Kawasaki Heavy Industries, Ltd. Sakaide Shipyard**
 Vessel's name: **Marvel Eagle**
 Hull No: **N1728**
 Owner/Operator: **Mitsui O.S.K. Lines, Ltd.**
 Country: **Japan**
 Designer: **Kawasaki Heavy Industries, Ltd.**
 Country: **Japan**
 Flag: **Panama**
 IMO number: **9759240**
 Total number of sister ships already completed (excluding ship presented): **1**
 Total number of sister ships still on order: **3**

TECHNICAL PARTICULARS

Length oa: 299.90m
 Length bp: 286m
 Breadth moulded: 48.90m
 Depth moulded
 To main deck: 27m
 To upper deck: 27m
 To other decks: 23.25m
 Width of double skin
 Side: 1.95m
 Bottom: 1.60m
 Draught
 Scantling: 11.80m
 Design: 11.05m
 Gross: 128,917gt
 Deadweight
 Design: 74,722dwt
 Scantling: 83,571dwt
 Speed, service (90% MCR output): 19.5knots with 21%SM
 Liquid volume: Refrigerated cargo: 156,059m³ (100% full at -163°C, excluding dome)
 Bunkers
 Heavy oil: 4,080m³
 Diesel oil: 1,090m³
 Water ballast: 62,200m³
 Tankers - percentage segregated ballast: 100%
 Fuel consumption: 114t/day
 Classification society and notations: ClassNK (LGC 2G, PS-DA&FA/35/North Atlantic, ECM/F, PSPC-WBT) (IWS) (PSCM) (EA)/MNS* (M0) with descriptive notes: Design Maximum Pressure 0.025 MPa / Minimum Temperature -163°C
 Main engines
 Model: Induction motor
 Manufacturer: GE Power Conversion
 Number: 2
 Output of each engine: 11,980kW x 512rpm at MCR
 Gearboxes
 Make: Kawasaki Heavy Industries, Ltd.
 Model: Double helical single reduction
 Number: 2
 Output speed: 57rpm at MCR
 Propellers
 Material: Ni-Al-Bronze
 Designer/Manufacturer: Nakashima Propeller Co., Ltd.
 Number: 2
 Fixed/Controllable pitch: Fixed
 Speed: 57rpm at MCR
 Diesel-driven alternators
 Number: 4
 Engine make/type: Wärtsilä / 2 x 9L50DF, 2 x 8L50DF
 Type of fuel: Fuel gas, HFO, MGO

Output/speed of each set: 8,400kW / 514rpm (9L50DF), 7,500kW / 514rpm (8L50DF)
 Alternator make/type: GE Power Conversion

Boilers
 Number: 2
 Type: Oil fired, cylindrical
 Make: Alfa Laval
 Output, each boiler: 5,000kg/h x 0.6MPa
 Cargo cranes/cargo gear
 Number: 2
 Make: Kyoritsu Kikai Co., Ltd.
 Type: Electro-hydraulic
 Performance: 5t
 Other cranes
 Number: 2 x Engine parts and provisions crane / 1 x Sub provisions crane
 Make: Kyoritsu Kikai Co., Ltd.
 Type: Electro-hydraulic / Fixed air motor
 Performance: 5t / 2t
 Mooring equipment
 Number: 2 x mooring winch / windlass, 8 x mooring winch
 Make: Kawasaki Heavy Industries, Ltd.
 Type: Electro-hydraulic

Special lifesaving equipment
 Number and capacity: 2 x 44 persons
 Make: Norsafe Japan, Ltd.
 Type: Totally enclosed type, fibreglass reinforced plastic boats, each driven by a sea water-cooled diesel engine

Cargo tanks
 Number: 4 x Spherical Moss Tank
 Grades of cargo carried: LNG
 Cargo pumps
 Number: 8
 Type: Electric motor driven, centrifugal submerged type
 Make: Shinko Ind., Ltd.
 Capacity (each): 1,500m³/h x 160m
 Cargo control system
 Make: Azbil Corporation
 Type: Integrated into IAS

Ballast control system
 Make: Azbil Corporation
 Type: Integrated into IAS
 Water Ballast Treatment System
 Make: NK
 Capacity: 6,000m³/h

Complement
 Officers: 10
 Crew: 19
 Supernumeraries/Spare: 15
 Bridge control system
 One-man operation: Yes

Fire detection system
 Make: Autronica
 Type: Addressable type
 Fire extinguishing systems

Cargo holds:
 Make/Type: Alfa Laval / Inert gas filling system

Engine room:
 Make/Type: Kashiwa Co., Ltd. / High expansion foam

Cabins:
 Make/Type: Shinko Ind., Ltd (fire pump only) Fire and wash deck system / Sanyo Trading Co., Ltd. / Portable fire extinguishers / Sanyo Trading Co., Ltd. / Fire hose

Radars
 Number: 3
 Make: Furuno
 Model(s): 1 x S-band, 2 x X-band
 Integrated bridge system: Yes
 Make: Furuno

Waste disposal plant
 Incinerator
 Make: Sunflame Co., Ltd.
 Model: OSV-900SAI

Sewage plant
 Make: Sasakura Engineering Co., Ltd
 Model: SD-6R

Contract date: 26 September 2014
 Launch/float-out date: 3 October 2016
 Delivery date: 19 October 2018

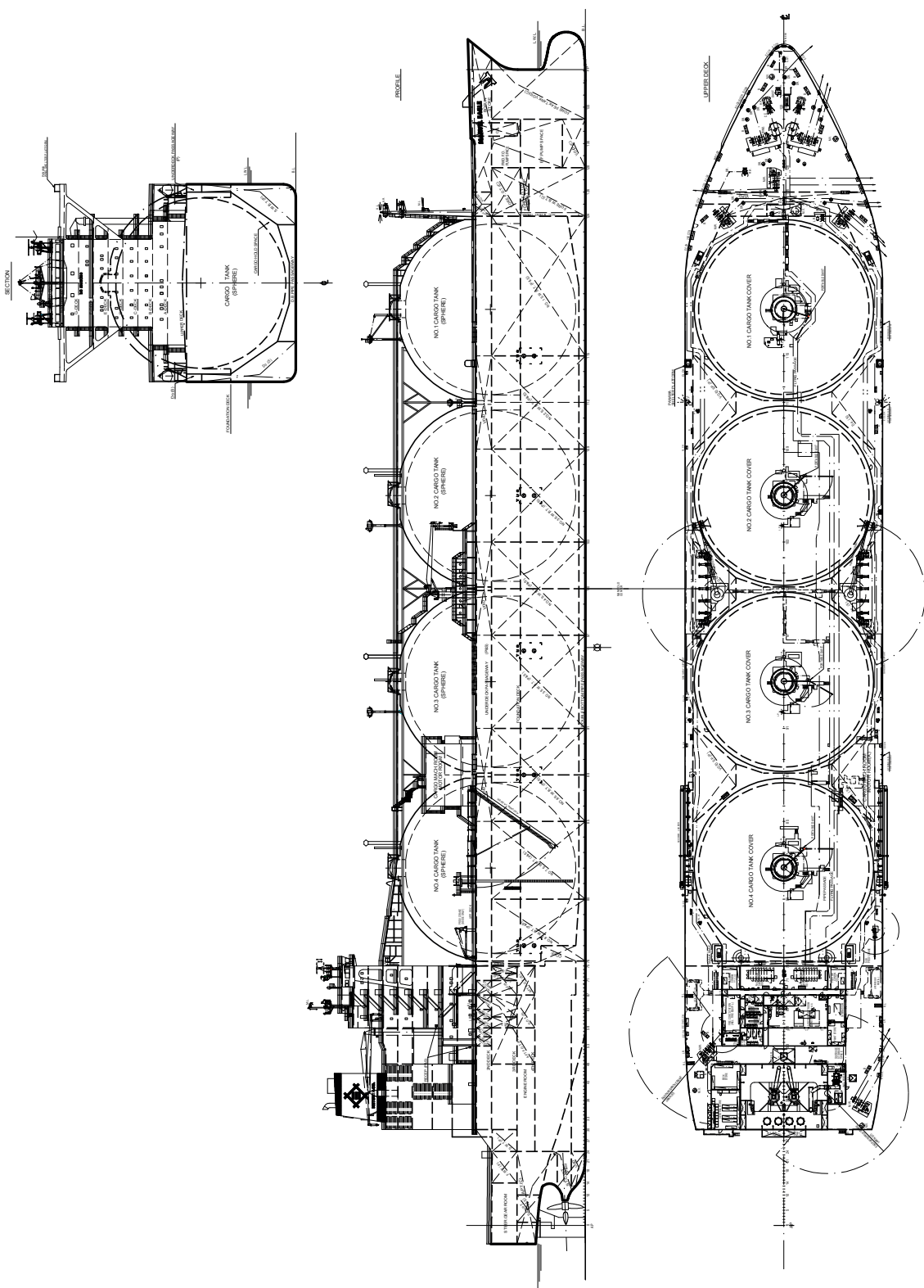
While many of the ships included in this edition of *Significant Ships* feature innovative designs or equipment portfolios, *Marvel Eagle's* claim to fame is less that it is the first in a three-ship series and more that it is the first vessel equipped with a high-performance ship operation data collection device, which serves as the foundation of its owner MOL's Fleet Optimal Control Unified System (FOCUS) project.

That said, the 299.9m LNG carrier built by Kawasaki in Japan is impressive enough in its own right. Its 156,059m³ capacity cargo system comprises of four standard spherical Moss tanks which give the ship the conventional profile for the type rather than the newer 'peas in a pod' arrangement. The ship will be used to service the Mitsui-backed Cameron LNG project in the US state of Louisiana.

The ship's dual-fuel propulsion system comprises of four Wärtsilä 50DF engines: a pair each of nine-cylinder and eight-cylinder in-line models. Each 17-cylinder combination has an output of 15,900kW which drives a GE motor rated at 11,980kW at 512rpm. Each motor subsequently drives its own dedicated propeller through a Kawasaki gearbox, this twin propeller arrangement giving the ship a service speed of 19.5knots.

MOL's FOCUS project is a joint undertaking between Mitsui E&S Shipbuilding and Weathernews that is planned to gather and apply ship operational data to ensure safer and more environmentally friendly ocean transport. In all some 150 vessels will be participating in the project. Detailed voyage and engine data on actual voyages will be collected from the vessels in operation and stored in a cloud-based data platform to develop applications for advanced ship operation monitoring and propulsion performance analysis.

The data will also be used for condition-based monitoring and realising 'visualisation at sea' by transmitting voice and visual information of vessels in operation to the shore side, optimising operation by applying artificial intelligence (AI) technology, and enhancing ship management by way of digital twins.





MARVEL FALCON: LNG carrier

Shipbuilder:**Samsung Heavy Industries Co., Ltd.**
 Vessel's name: **Marvel Falcon**
 Hull No: **SN2148**
 Owner/Operator: **NYK / Mitsui & Co., Ltd**
 Country: **Japan**
 Designer: **Samsung Heavy Industries Co., Ltd**
 Country: **Republic of Korea**
 Model test establishment used: **SSMB (Samsung Ship Model Basin)**
 Flag: **Singapore**
 IMO number: **9760768**
 Total number of sister ships already completed (excluding ship presented): **1**
 Total number of sister ships still on order: **1**

A significant number of LNG carriers – particularly in the larger sizes – were delivered in 2018. *Marvel Falcon* with a nominal capacity of 174,000m³ was one of those. The ship is the first in a series of three sisters built at Samsung Heavy Industries for NYK Line.

All three of the ships along with five others of similar size being built at other yards are to run on charter for Mitsui servicing the new Cameron LNG export terminal in Louisiana, USA. The first sister – *Marvel Hawk* – entered service in November and delivery of the third to be called *Marvel Kite* should take place in early 2019. The hull dimensions of 293.30m length, 45.8m beam and 12m draught are fairly typical for LNG carriers of this capacity.

In line with the trend for powering large LNG carriers by dual-fuel, low-speed two-stroke engines, *Marvel Falcon* is fitted with a pair of WinGD 6X62DF engines. Each of the engines has a power output of 12,540kW and each drives its own dedicated fixed pitch propeller at 90rpm. The final propulsion and steering arrangements incorporate some of Samsung's proprietary energy saving devices. There is a full spade rudder, STAR (Samsung Tip Advanced Rake) propeller and SARB (Samsung Asymmetric Rudder Bulb) which together improve fuel efficiency by a claimed 3%. Service speed is 15knots.

The engines are intended to use boil-off gas from the cargo tanks as fuel but the ship can also operate on HFO or MDO. The cargo containment system is a four-tank set-up using GTT Mark III membrane tanks. This generation of tanks has been adopted to reduce boil-off gas from cargo tanks, and allows for a daily boil-off rate of 0.09%V compared to the 0.15%V per day of the previous version.

In May 2018, the vessel made the news when, en

route from Panama to the LNG terminal in Louisiana, the crew rescued four persons from a small boat that had been drifting at sea for several days due to an engine breakdown.

TECHNICAL PARTICULARS

Length oa: 293m
 Length bp: 285m
 Breadth moulded: 45.8m

Depth moulded
 To main deck: 26.2m
 To upper deck: 26.2m

Draught
 Scantling: 12.5m
 Gross: 114,000gt
 Deadweight
 Scantling: 89,431dwt

Speed, service: 19.5knots

Cargo capacity
 Liquid volume: 174,000m³
 Bunkers
 Heavy oil: 5,000m³
 Diesel oil: 1,500m³
 Water ballast: 60,000m³

Classification society and notations: ABS

Main engines
 Design: WinGD
 Model: 6X62DF
 Number: 2
 Type of fuel: LNG, HFO or MDO

Propellers
 Material: Ni-Al-Bronze
 Number: 2
 Fixed/controllable pitch: Fixed

Diesel-driven alternators
 Number: 4
 Type of fuel: LNG, HFO or MDO

Boilers
 Number: 2
 Type: Oil fired

Cargo cranes/cargo gear
 Number: 1
 Type: Electro-hydraulic single jib

Other cranes
 Number: 2
 Type: Electro-hydraulic single jib
 Tasks: For provision and engine room equipment / cargo machinery maintenance
 Mooring equipment
 Number: 9
 Type: Electro-hydraulic (High pressure)

Special lifesaving equipment
 Number of each and capacity: 2
 Type: ... Totally enclosed, gravity type lifeboat

Cargo tanks
 Number: 4
 Product range: LNG
 Coated tanks – make and type of coating: Membrane Tank
 Stainless steel – structure/piping: Applied

Cargo pumps
 Number: 8
 Type: Centrifugal, submerged

Water Ballast Treatment System: Applied
 Complement

Officers: 19
 Crew: 19
 Suez/Repair Crew: 10

Bridge control system: Applied
 One-man operation: Yes

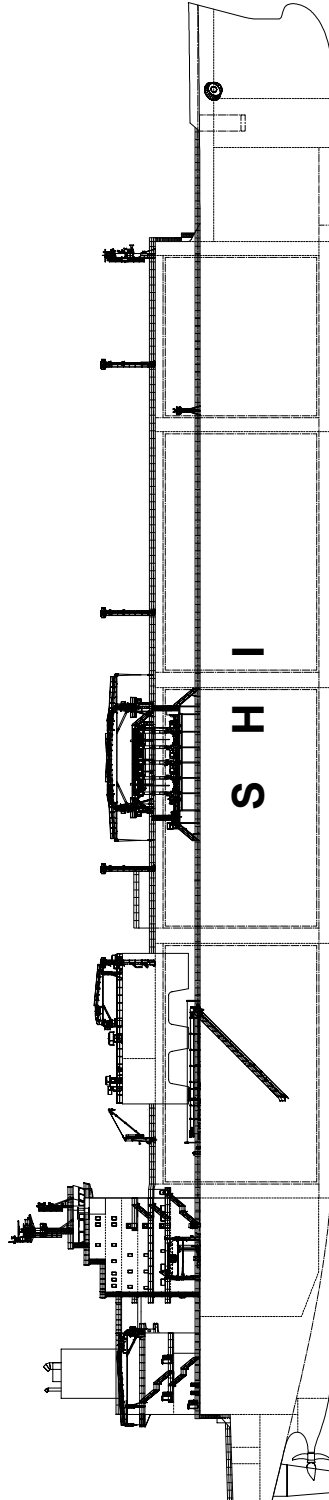
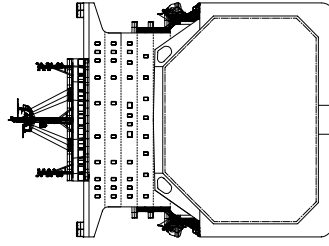
Fire detection system
 Make: Consilium
 Type: Salwico Fire Alarm System CCP
 Fire extinguishing systems

Engine room:
 Type: High expansion form
 Cabins:
 Type: Fire hydrants
 Public spaces:
 Type: Fire hydrants

Radars
 Number: 2
 Integrated bridge system: Yes

Waste disposal plant
 Incinerator: Applied
 Sewage plant
 Type: Biological

Contract date: September 2014
 Delivery date: April 2018





MORVIKEN: Crude oil tanker

Shipbuilder: **Samsung Heavy Industries Co., Ltd.**
 Vessel's name: **Morviken**
 Hull No: **SN2199**
 Owner/Operator: **Viken Crude AS**
 Country: **Norway**
 Designer: **Samsung Heavy Industries Co., Ltd.**
 Country: **Republic of Korea**
 Model test establishment used: ... **Samsung Ship Model Basin**
 Flag: **NIS**
 IMO number: **9817494**
 Total number of sister ships already completed (excluding ship presented): **1**

output is 16,400kW at 77rpm. The service speed is 15knots on a fuel consumption of around 60tonnes per day.

TECHNICAL PARTICULARS

Length oa: 274.3m
 Length bp: 267.0m
 Breadth moulded: 49m
 Depth moulded
 To upper deck: 23.3m
 Draught
 Scantling: 17.2m
 Gross: 81,000gt
 Deadweight
 Scantling: 157,610dwt
 Speed, service: 14.5knots
 Cargo capacity
 Liquid volume: 170,000m³
 Bunkers
 Heavy oil: 3,000m³
 Diesel oil: 300m³
 Water ballast: 49,000m³
 Tankers - percentage segregated ballast: 100%

Classification society and notations: Bureau Veritas
 I Hull Mach Oil tanker CSR CPS(WBT) ESP CPS(COT), VeriSTAR-HULL CM, AUT-UMS (SS), AUT-PORT (SS), SYS-NEQ-1 (SS), MON-SHAFT, GREEN PASSPORT, BWT, CLEANSHIP, ERS-S, SEEMP, INWATERSURVEY, SPM, VCS, CARGO-CONTROL, MANOVR, LI-HG-S3 Unrestricted navigation
 Main engines
 Model: MAN 6G70ME-C9.5
 Manufacturer: MAN Energy Solutions
 Number: 1
 Type of fuel: HFO or MDO
 Propellers
 Material: Ni-Al-Bronze
 Number: 1
 Fixed/controllable pitch: Fixed
 Diesel-driven alternators
 Number: 3
 Type of fuel: HFO or MDO
 Boilers
 Number: 2

Type: Oil fired
 Cargo cranes/cargo gear
 Number: 2
 Type: Electro-hydraulic single jib
 Other cranes
 Number: 2
 Type: Electro-hydraulic single jib
 Tasks: Provision and equipment handling crane
 Mooring equipment
 Number: 9
 Type: electro-hydraulic type (High pressure)
 Special lifesaving equipment
 Number of each and capacity: 2
 Type: Totally enclosed, gravity type lifeboat
 Cargo tanks
 Number: 12
 Grades of cargo carried: Crude oil
 Cargo pumps
 Number: 3
 Type: Centrifugal, steam turbine driven
 Water Ballast Treatment System: Applied
 Complement
 Officers: 14
 Crew: 12
 Suez/Repair Crew: 6
 Bridge control system
 Type: Applied
 One-man operation: Yes
 Fire detection system
 Make: Consilium
 Type: Salwico Fire Alarm System CCP
 Fire extinguishing systems
 Engine room
 Type: High expansion form
 Cabins
 Type: Fire hydrants
 Public spaces
 Type: Fire hydrants
 Radars
 Number: 3
 Integrated bridge system: Yes
 Waste disposal plant
 Incinerator
 Model: Applied
 Sewage plant
 Type: Biological
 Contract date: October 2016
 Delivery date: April 2018

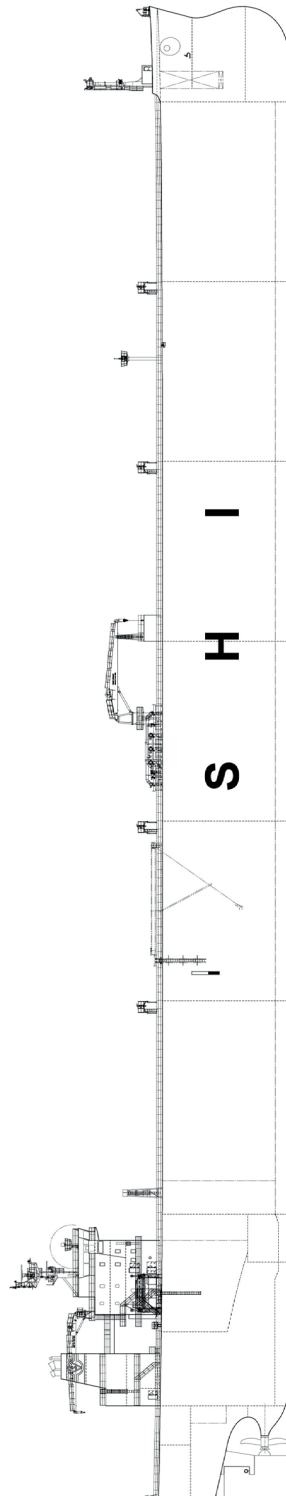
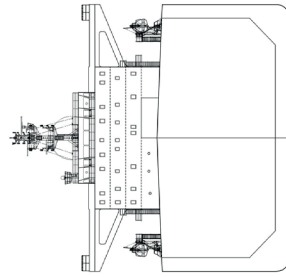
For crude oil tanker operators, 2018 was not the best of years from a commercial standpoint with freight rates mostly depressed. However, owners and operators have to take a longer view and for Bergen-based Viken Crude there was an even more pressing need. The company was only founded in 2015 and is gradually building a fleet presence.

The first new ships ordered by the joint venture (established by Steckmest's Viken Shipping and Frederik Mohn's Perestroika) were the 157,610dwt Suezmax crude carrier *Morviken* and its sister along with a pair of Aframaxes. The ships were ordered in 2016 with the contract bringing some relief to the then hard-pressed builder Samsung Heavy Industries. All four of Viken's newbuildings were fixed on long-term time charters to French oil major Total at the time of ordering in 2016.

There is a typical Suezmax tank layout comprising six pairs of port and starboard tanks along with a pair of slop tanks. The three cargo pumps are centrifugal steam turbine driven types, each able to pump at the rate of 3,800m³/h.

Morviken is 275m long making it at the very limit of the type's permitted dimensions but the beam of 49m is well inside the maximum allowing the ship to have a draught of 17.22m. The optimised hull form has been enhanced with Samsung's own in-house developed energy saving devices including the SAVER fin on the hull, a SAVER Stator to better direct the water flow to the propeller and STAR (Samsung Tip Advanced Rake) propeller and SARB (Samsung Asymmetric Rudder Bulb). The combination is expected to give the vessel a fuel efficiency saving of around 6%.

The new vessel is fitted with an electronically controlled MAN B&W 6G70ME-C two-stroke engine built by Hyundai Heavy Industries. Its power





NAUTICAL DEBORAH: Product tanker

Shipbuilder: **Jiangsu Hantong Ship Heavy Industry Co.Ltd.**
 Vessel's name: **Nautical Deborah**
 Hull No: **HT-OT74-007**
 Owner/Operator: **Reederei NSB**
 Country: **Germany**
 Designer: **Shanghai Merchant Ship Design & Research Institute (SDARI)**
 Country: **China**
 Flag: **Liberia**
 IMO number: **9794836**
 Total number of sister ships already completed (excluding ship presented): **1**
 Total number of sister ships still on order: **1**

Nautical Deborah is the first of three LR1 product tanker sisters ordered by German owner NSB in 2015. The ship was designed by SDARI and constructed by Jiangsu Hantong Shipyard. She was delivered in July 2018 and the second vessel in the series, *Nautical Janine*, was handed over in January 2019. *Nautical Deborah* and its sisters are managed by Conti in Germany and operate in Navig8's LR8 product carrier pool.

The 75,343dwt ships were among the first LR1 ships to be built with the new Panama Lock dimensions as a design factor. Consequently the 227.7m long ships feature a beam of 38.09m which fits easily in the new locks but is some 6m wider than the old Panamax dimensions would permit. The increased beam allows for the summer draught of 13.2m to be a little shallower than older vessels of similar deadweight.

The cargo space consists of six pairs of cargo oil tanks, one pair of slop tanks and one residual tank. Six pairs of segregated water ballast tanks and two fuel oil tanks are also fitted.

The hull form has been optimised to achieve maximum energy efficiency over the range of speeds and draughts anticipated to operate in service. Noticeably the bow form is vertical with no bulb. A less obvious energy saving feature is the propeller boss cap fins that are fitted. Fuel efficiency was a customer requirement and the attained EEDI 15.04% below base line demonstrates this has been achieved.

Nautical Deborah is propelled by a MAN B&W 6S60ME-C8 main engine built by Doosan. The engine is rated at 10,850kW at 91rpm and drives a single fixed pitch, 7.2m diameter propeller. This propulsion arrangement allows a service speed at design draught of 14knots at 64.1% SMCR power of the main engine with 15% sea margin. The fuel oil consumption of main engine at CSR is 26.25 t/day. The ship is fitted

with a Lanh Tech open loop scrubber serving the main and auxiliary engines.

TECHNICAL PARTICULARS

Length oa: 227.98m
 Length bp: 224.00m
 Breadth moulded: 38.00m
 Depth moulded
 To main deck: 19.80m
 To upper deck: 19.80m
 Width of double skin
 Side: 2.1m
 Bottom: 2.1m
 Draught
 Scantling: 13.20m
 Design: 12.20m
 Gross: 46,372gt
 Displacement: 91,341.9t
 Deadweight
 Design: 67,293.3dwt
 Scantling: 75,342.8dwt
 Block co-efficient: .. 0.7914 at scantling draught

Speed, service (73.6%MCR output): .. 14.0knots
 Bunkers
 Heavy oil: 1,890m³
 Diesel oil: 880m³
 Water ballast: 31,600m³

Fuel consumption
 Main engine only: 26.25 t/day

Classification society and notations:..... LR
 *100A1 Double Hull Oil Tanker, CSR, ESP, LI, IWS, Shipright(ACS(B), CM), SPM, ECO (BWT, IHM), With descriptive note "shipright (BWMP(S, T), SCM), ETA, COW" + LMC, UMS, IGS

% high-tensile steel used in construction: .. 80%

Main engines
 Design: MAN
 Model: 6S60ME-C8.5
 Manufacturer: DOOSAN
 Number: 1
 Type of fuel : HFO and MGO
 Output of each engine: SMCR 1,0850kW x 91.1rpm

Propellers
 Designer/Manufacturer: MMG
 Number: 1
 Fixed/Controllable pitch: Fixed
 Diameter: 7,200mm

Diesel-driven alternators
 Number: 3
 Engine make/type: CMP-MAN 6L23/30H
 Type of fuel: HFO and MGO
 Output/speed of each set: 960kW/900rpm
 Alternator make/type: HFJ6 506-84E
 Output/speed of each set: .. 850kW /900rpm
 Exhaust-gas scrubbing equipment
 Manufacturer: Lanh Tech
 Type: Open loop
 On main engines: Yes
 On auxiliary engines: Yes
 Boilers
 Number: 2
 Type: CMB-VS-2.0+1.04/6, FBM-VM-25/6
 Make: Saacke
 Output, each boiler: 2.0+1.04t/h, 25t/h
 Cargo cranes/cargo gear
 Number: 1
 Make: Jiangsu Masada
 Type: Hydraulic slewing crane
 Capacity: 15x25m
 Other cranes
 Number: 1
 Make: Jiangyin Safety Sea Marine Equipment Co., Ltd
 Type: Electric monorail type
 Tasks: Provision / engine parts crane
 Capacity: 4t
 Mooring equipment
 Number: 2 windlass & 4 mooring winch
 Make: MacGregor
 Type: Hydraulic

Special lifesaving equipment
 Number and capacity: 26 persons
 Make: Jiangsu Jiaoyan Marine Equipment Co., Ltd
 Type: Free-fall lifeboat

Cargo tanks
 Number: 14
 Grades of cargo carried: Crude oil and product oil
 Product range: listed in MARPOL 73/78 Annex I appendix I except asphalt solutions
 Coated tanks: Modified epoxy

Cargo pumps
 Number: 14
 Type: Hydraulic
 Make: Framo
 Stainless steel: 316L
 Capacity (each): ... 12x 750m³/h, 2x 300m³/h

Cargo control system
 Make: Framo
 Type: Hydraulic
 Ballast control system
 Make: Framo
 Type: Hydraulic
 Water Ballast Treatment System
 Make: Panasia
 Capacity: 2,000m³/h

Complement
 Officers: 12
 Crew: 14
 Suez/Repair Crew: 6
 Bridge control system
 Make: Furuno

Fire detection system
 Make: Consilium
 Type: Salwico cargo

Fire extinguishing systems
 Engine room: CO₂
 Make/Type: NK

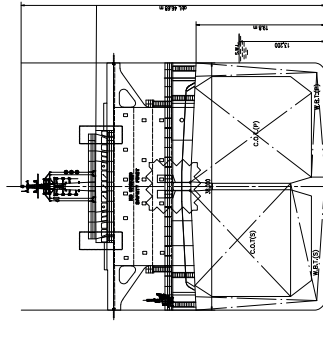
Radars
 Number: 2
 Make: Furuno
 Model(s): SN36AF PM-51/ XN24AF PM-31

Waste disposal plant
 Incinerator
 Make: Hansun
 Model: HSINC-50A

Waste compactor
 Make: Delitek As
 Model: DT-200MCP

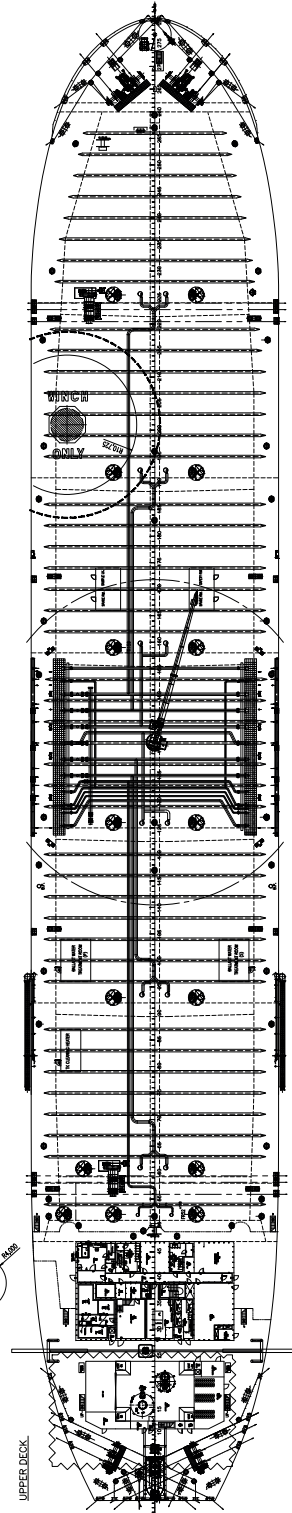
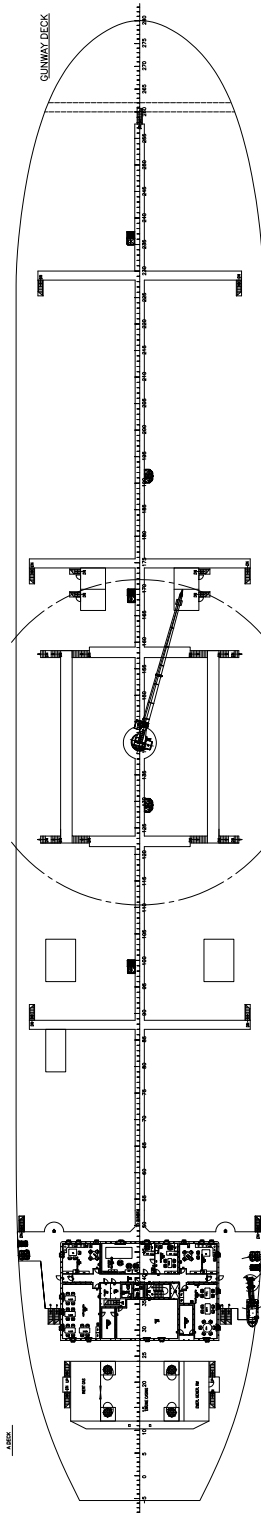
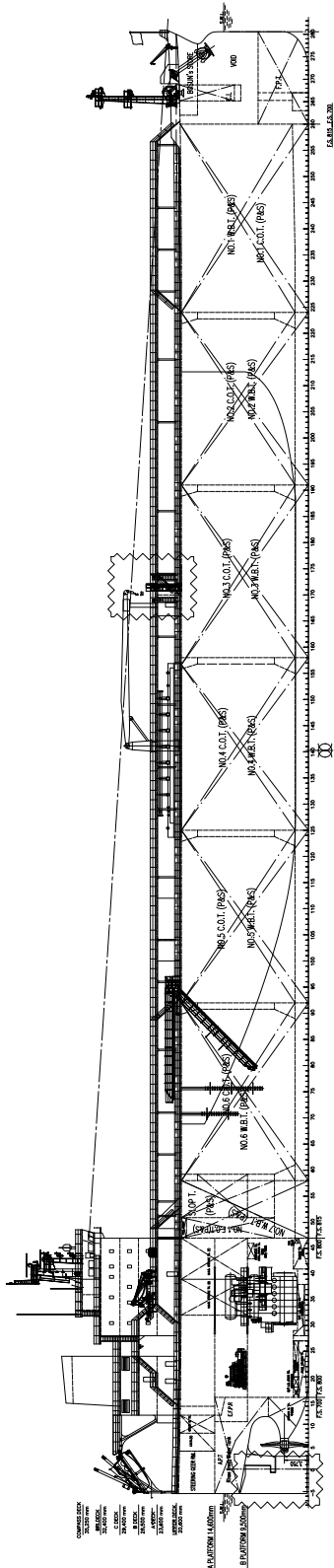
Sewage plant
 Make: Hansun
 Model: ST -30U

Contract date: 26 January 2015
 Launch/float-out date: 6 March 2018
 Delivery date: 28 July 2018



GENERAL PARTICULARS

NAME	NAUTICAL DEBORAH
TYPE	RESEARCH VESSEL
CLASS	RESEARCH VESSEL
DESIGN NO.	1000
DATE OF COMPLETION	1980
CONTRACT NO.	1000
OWNER	INDONESIA
OPERATOR	INDONESIA
REGISTRY	INDONESIA
REGISTRATION NO.	1000
REGISTRATION DATE	1980
REGISTRATION OFFICE	INDONESIA
REGISTRATION NO.	1000
REGISTRATION DATE	1980
REGISTRATION OFFICE	INDONESIA
REGISTRATION NO.	1000
REGISTRATION DATE	1980
REGISTRATION OFFICE	INDONESIA





NEW GOLDEN BRIDGE VII: Ro-pax

Shipbuilder: **Hyundai Mipo Dockyard Co., Ltd.**
 Vessel's name: **New Golden Bridge VII**
 Hull No: **8249**
 Owner/Operator: **Weidong Ferries**
 Country: **Korea & China**
 Designer: **Hyundai Mipo Dockyard Co., Ltd.**
 Country: **Korea**
 Model test establishment used: **KRISO**
 Flag: **Panama**
 IMO number: **9813254**
 Total number of sister ships already completed (excluding ship presented): **nil**
 Total number of sister ships still on order: **nil**

Delivered in October 2018 by Hyundai Mipo to the Chinese/South Korean joint venture Weidong Ferries, the 30,322gt *New Golden Bridge VII* can claim several firsts making it a worthy candidate as a significant ship.

It will represent the first passenger vessel built at Hyundai Mipo, the first vessel in the history of the owner founded in 1990 that is not Chinese-built, and it also allows Hyundai's in-house HiMSEN engine division to enter the passenger ship propulsion arena.

The ship is 196.1m in length, 27.0m in width and 32m in height. It is capable of accommodating 724 passengers and there are 124 cabins. It has 2,307 lane metres of vehicle capacity for 508 cars and 137 trucks and can also accommodate 325teu on deck where 100 reefer plugs are provided. The car decks are accessed by a stern quarter ramp and a side ramp under the wheelhouse, both at Deck 2 level on the starboard side of the vessel. Internal ramps allow access to Deck 4 for all types of vehicles and to Deck 1 in the midships part of the vessel for cars.

The propulsion system comprises a pair of HiMSEN 12 H46/60VP engines each with an output of 12,000kW @ 600rpm. Each engine is connected through its own Renk Gearbox to drive one of the ship's two 4.6m controllable pitch propellers located in front of one of the two full spade rudders. The engine rooms are laid out asymmetrically with the port side room being placed further forward than the starboard side.

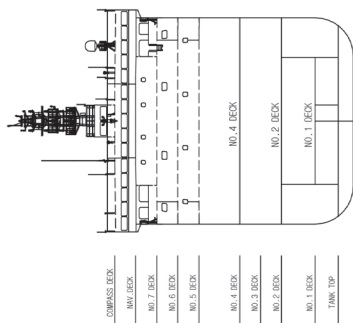
The propulsion arrangement allows for a service speed of 23knots. Manoeuvrability is provided by one forward 1,400kW and one aft 1,100kW tunnel thruster.

In service the vessel will sail between China and Korea and despite China's recent proposals to limit their use, the ship has been equipped with a Wärtsilä open loop scrubber. It also has a 600m³/h Techcross ballast treatment system.

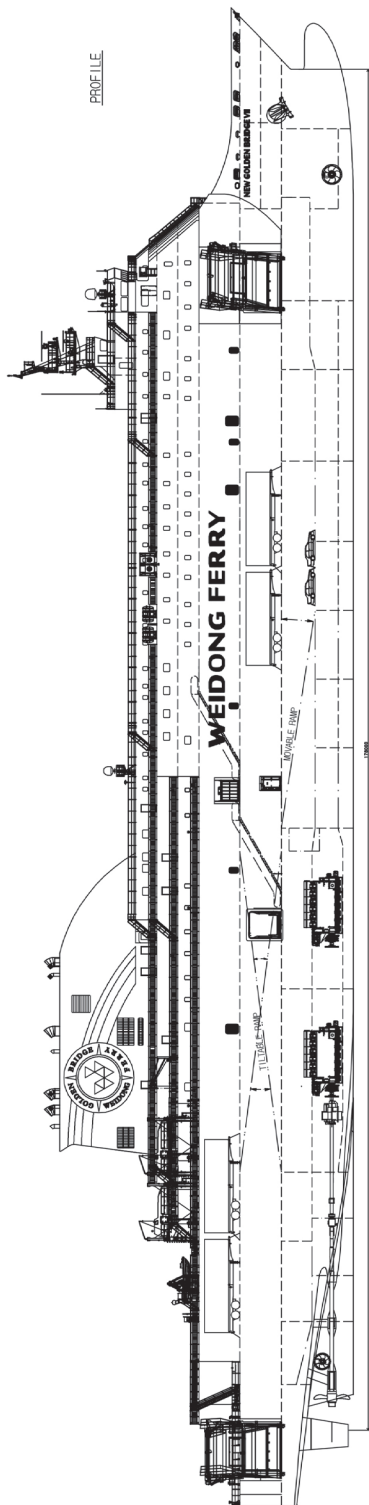
TECHNICAL PARTICULARS

Length oa: 196.13m
 Length bp: 178.00m
 Breadth moulded: 27.00m
 Depth moulded
 To main deck: 9.40m
 To upper deck: 14.85m
 Width of double skin
 Side: 5.10m
 Bottom: 2.00m
 Draught
 Scantling: 6.60 m
 Design: 6.60 m
 Gross: 30,322gt
 Displacement: 18,480t
 Deadweight
 Design: 7,241dwt
 Scantling: 7,241dwt
 Speed, service (85%MCR output): 23.50knots
 Bunkers
 Heavy oil: 720m³
 Diesel oil: 280m³
 Water ballast: 3,200m³
 Daily fuel consumption
 Main engine only: 86.7t/day
 Classification society and notations: Korean Register, +KRS1-Passenger Ship Container/RoRo, CLEAN1, PSPC, BWT, IAFS, LI +KRM1-CMA, BWT
 % high-tensile steel used in construction: 26
 Heel control equipment: Anti-heeling pump
 Roll-stabilisation equipment: Fin stabiliser
 Main engines
 Design: HiMSEN
 Model: 12H46/60VP(Tier II)
 Manufacturer: HHI Engine & Machinery Division
 Number: 2
 Type of fuel: HFO
 Output of each engine: 12,000kW
 Gearboxes
 Make: Renk
 Model: RSH-1060
 Number: 2
 Output speed: 170.4rpm
 Propellers
 Material: Ni-Al-Bronze
 Designer/Manufacturer: Wärtsilä
 Number: 2
 Fixed/controllable pitch: Controllable
 Diameter: 4.6m

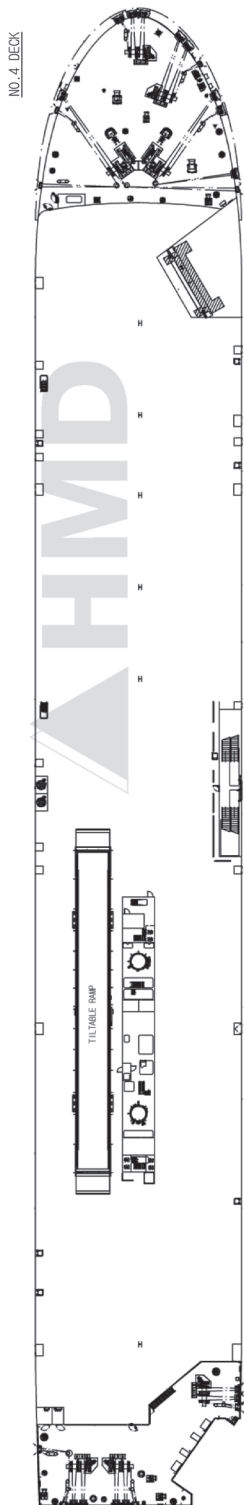
Speed: 170.4rpm
 Main-engine driven alternators
 Number: 2
 Make/type: HHI / HFC7 568-04P
 Output/speed of each set: 1,800rpm for both
 Diesel-driven alternators
 Number: 4
 Engine make/type: Yanmar
 Type of fuel: MDO
 Output/speed of each set: 1,300kW
 Alternator make/type: HHI
 Output/speed of each set: 1,200kW
 Exhaust-gas scrubbing equipment
 Manufacturer: Wärtsilä
 Type: Open loop SOx scrubber
 On main engines: To be applied
 On auxiliary engines: To be applied
 Boilers
 Number: 3
 Type: 1x Aux. boiler, 2x Exh.gas boiler
 Make: Kangrim
 Output, each boiler: Aux. boiler: 4,000kg/h, Exh. gas boiler: 2,000kg/h
 Mooring equipment
 Number: 7
 Make: Flutek
 Type: Hydraulic
 Special lifesaving equipment
 Number of each and capacity: 4x lifeboats, each 60 persons
 Make: DSB Engineering
 Type: Gravity luffing
 MES Vertical / sloping chutes: 2 x vertical
 Containers
 Total TEU capacity: 325
 On deck: 325
 Reefer plugs: 100
 Tiers/rows (maximum)
 On deck: 1
 Vehicles
 Number of vehicle decks: 3
 Total lane length: 2,307
 Total cars: 508 private cars, 137 trailers
 Doors/ramps/lifts/moveable car decks
 Number of each: 1 stern ramp, 1 side ramp, 1 moveable ramp, 1 tilttable ramp
 Type: Moveable ramp,
 Designer: MacGregor
 Water Ballast Treatment System
 Make: Techcross
 Capacity: 600m³/h
 Complement
 Officers: 16
 Crew: 56
 Passengers
 Total: 724
 Number of cabins: 122
 Stern appendages/special rudders: 2 full spade rudder
 Bow thrusters
 Make: KTE
 Number: 1
 Output (each): 1,400kW
 Stern thrusters
 Make: KTE
 Number: 1
 Output (each): 1,070kW
 Fire detection system
 Make: Consilium Marine
 Type: SG37260
 Fire extinguishing systems
 Vehicle spaces: Water spray /High pressure CO₂
 Make/Type: Iljin and Co. Ltd/ NK
 Engine room: Water mist
 Make/Type: Tyco
 Cabins: Auto sprinkler
 Make/Type: Iljin and Co. Ltd
 Public spaces: Auto sprinkler
 Make/Type: Iljin and Co Ltd
 Radars
 Number: 2
 Make: Furuno
 Model(s): FAR-2837S (S band radar), FAR-2837 (X band radar)
 Contract date: 22 July 2016
 Launch/float-out date: 27 April 2018
 Delivery date: 10 September 2018



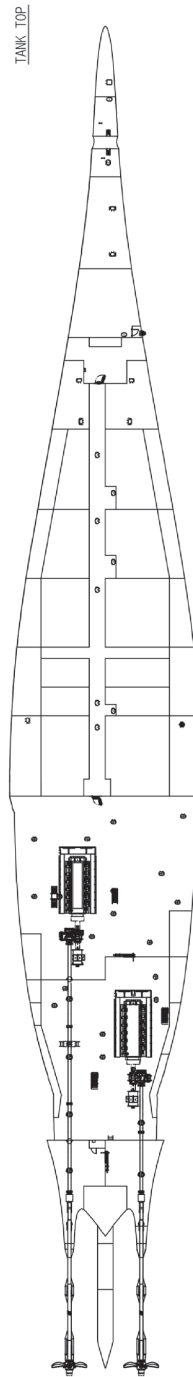
MIDSHIP SECTION



PROFILE



NO. 4 DECK



TANK TOP



NEW SHIDAO PEARL: Ro-pax

Shipbuilder: **Huanghai Shipbuilding Co., Ltd.**
 Vessel's name: **New Shidao Pearl**
 Hull No: **K29**
 Owner/Operator: **Shidao International Ferry Co., Ltd.**
 Country: **China**
 Designer: **Shanghai Merchant Ship Design & Research Institute (SDARI)**
 Country: **China**
 Model test establishment used: **MARIN**
 Flag: **Korea**
 IMO number: **9812767**
 Total number of sister ships already completed (excluding ship presented): **nil**
 Total number of sister ships still on order: **1**

New Shidao Pearl delivered in February 2018 is the first of a pair of ro-paxes designed by SDARI, constructed by Huanghai Shipbuilding and owned by Shidao International Ferry which operates between Shidao, China and Kunsan, South Korea.

The ship has a total length of 170m, moulded breadth of 26.2m and a gross tonnage of 19,988. The cabins and public spaces are arranged on six decks located at the forepart above the ro-ro garages. The ship can accommodate 1,200 passengers and is equipped with 227 passenger cabins. As well as the cabins, there is a forward-facing restaurant, numerous shops and a games room. It has been described in some local press reports as luxurious, which is of course subjective.

Nevertheless, when it comes to meeting its intended purpose the ship is very flexible and that is particularly true of the cargo carrying aspects. *New Shidao Pearl* can carry 126 trailers on two enclosed ro-ro decks and a weather deck that has a total lane length of 1,686m. The weather deck is also designed for alternate carriage of 200 containers in four tiers. Access to the ro-ro spaces is by a stern ramp located on the main deck and two tiltable interior ramps that lead to the upper and lower ro-ro deck.

New Shidao Pearl has a twin propeller propulsion system with each of the propellers powered by a 6,960kW four-stroke 12V32E Wärtsilä engine through a Wärtsilä reduction gearbox. The arrangement gives the ship a service speed of 20.3knots. The engine rooms are located on each side of the vessel towards the stern with the stack casings flanking the cargo weather deck. The location of the engine rooms allows for redundancy and for the ship to meet safe return to port requirements. Also, being well aft there is improved comfort and less noise and vibration in the ship's passenger accommodation areas.

TECHNICAL PARTICULARS

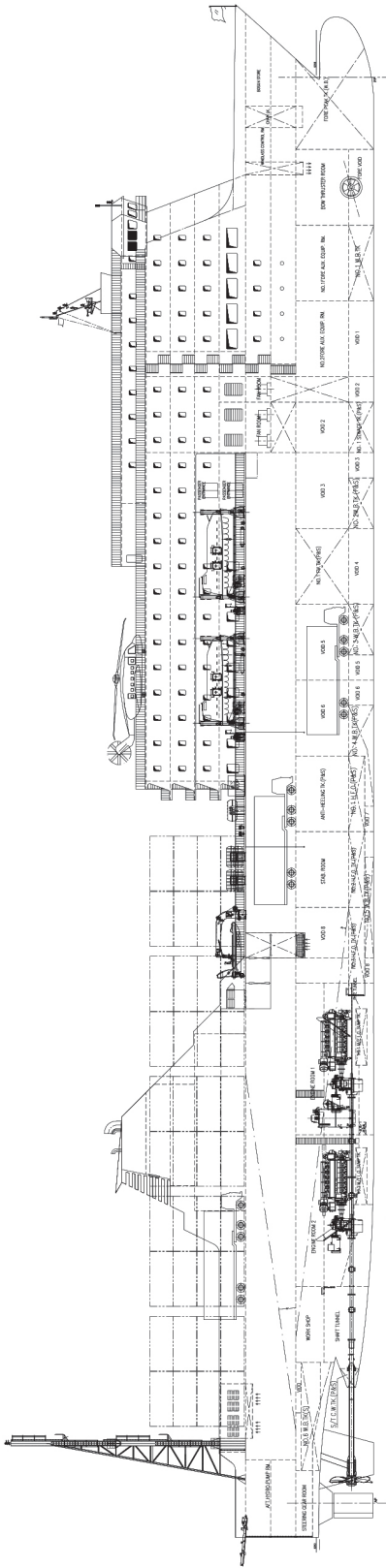
Length oa: 169.90m
 Length bp: 157.16m
 Breadth moulded: 26.20m
 Depth moulded
 To main deck: 8.60m
 To upper deck: 14.20m
 To other decks: 27.90m
 Width of double skin
 Side: 3.95m
 Bottom: 2.80m
 Draught
 Scantling: 6.00m
 Design: 6.35m
 Gross: 19,988gt
 Displacement: 16,728t
 Lightweight: 9,136t
 Deadweight
 Design: 6,344dwt
 Scantling: 7,592dwt
 Block co-efficient: 0.606
 Speed, service (90%MCR output): 20.3knots

Bunkers
 Heavy oil: 819m³
 Diesel oil: 230m³
 Water ballast: 2,137m³
 Daily fuel consumption
 Main engine only: 55t/day

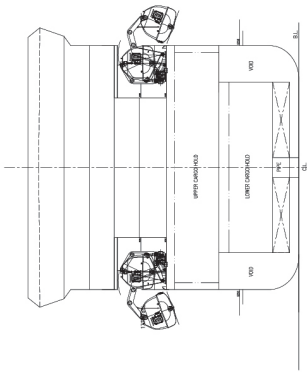
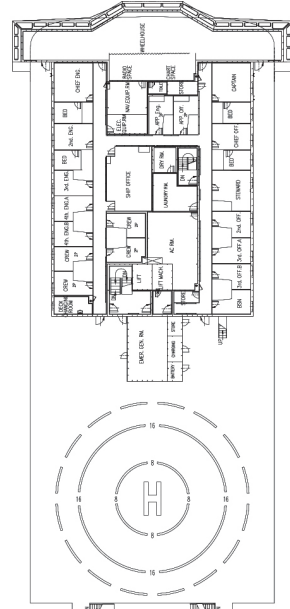
Classification society and notations: Korean Register
 + KRS 1 PASSENGER SHIP, CONTAINER RORO, PSPC, ENV(IBWM, IAFA), ICE CLASS IE + KRM 1 CMA STCM
 Heel control equipment: Anti-heeling pumps
 Roll-stabilisation equipment: Fin-stabilizer

Main engines
 Design: Wärtsilä
 Model: 12V32E
 Manufacturer: Wärtsilä
 Number: 2
 Type of fuel: HFO and MDO
 Output of each engine: 6,960kW
 Gearboxes
 Make: Wärtsilä
 Model: SV112-P60
 Number: 2
 Output speed: 124.1rpm
 Propellers
 Material: Ni-Al-Bronze
 Designer/Manufacturer: Wärtsilä
 Number: 2
 Fixed/controllable pitch: Controllable

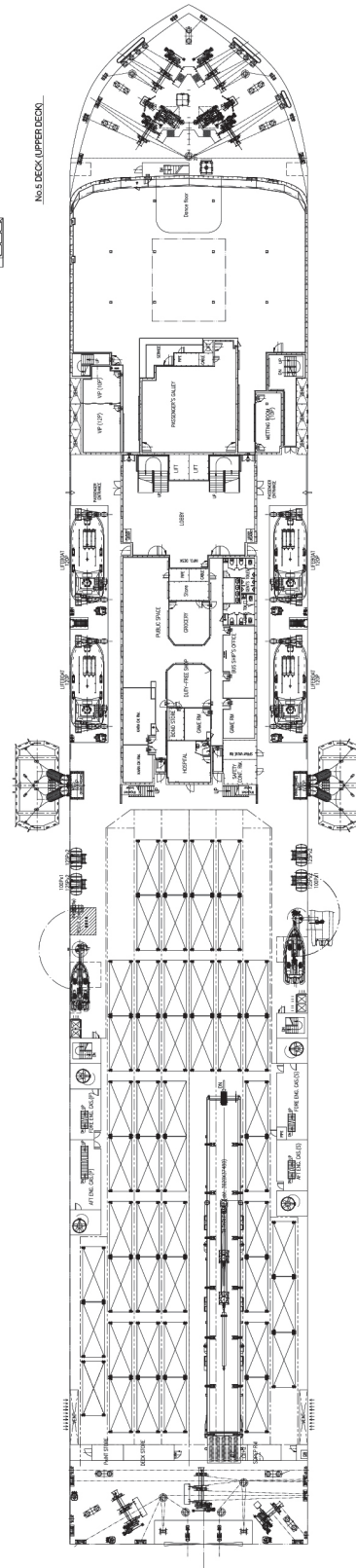
Diameter: 4.8m
 Speed: 124rpm
 Main-engine driven alternators
 Number: 2
 Make/type: Nanchang Kangfu Sci-tech Co., Ltd / SB-HW4-1600-6P
 Output/speed of each set: 1,600kW
 Diesel-driven alternators
 Number: 3
 Engine make/type: Yanmar / 6EY18ALW
 Type of fuel: HFO and MDO
 Output/speed of each set: 800kW
 Alternator make/type: Taiyo Electric Co., Ltd.
 Output/speed of each set: 750kW
 Boilers
 Number: 1
 Type: Aalborg OS-TCi
 Make: Alfa Laval
 Output, each boiler: 3,000kg/h
 Mooring equipment
 Number: 7
 Make: Wuhan Marine Machinery Plant Co.,Ltd.
 Type: Electro-hydraulic
 Special lifesaving equipment
 Number of each and capacity: 2 / 600 persons
 Make: Jiangsu Haining Marine Equipment Co.,Ltd
 Type: HN-MES-VP-600
 MES Vertical / sloping chutes: Vertical
 Containers
 Total TEU capacity: 200
 On deck: 200
 Tiers/rows (maximum)
 On deck: 4/6
 Vehicles
 Number of vehicle decks: 3 fixed
 Total lane length: 1,686m
 Doors/ramps/lifts/moveable car decks
 Number of each: 1 stern inner door, 1 stern ramp, 1 movable ramp/cover, 1 fixed ramp cover
 Type: Electro-hydraulic
 Designer: Navim
 Ballast control system
 Make: Sealantern Electronics Co.,Ltd.
 Type: Hydraulic oil system
 Water Ballast Treatment System
 Make: Wuxi Brightsky Electronic Co.Ltd.
 Capacity: 300m³/h
 Complement
 Officers: 9
 Crew: 71
 Single/double/other rooms: 16 x single / 14 x double / 9 x 4P
 Passengers
 Total: 1,200
 Number of cabins: 227
 Bow thrusters
 Make: Kawasaki-KWJ
 Number: 1
 Output (each): 1,300kW
 Bridge control system
 Make: Furuno
 Fire detection system
 Make: Apollo
 Type: Addressable
 Fire extinguishing systems
 Engine room: CO₂
 Make/Type: Shanghai Xiao Xiang, high pressure
 Vehicle spaces: Water spray
 Make/Type: Shanghai Xiao Xiang, low pressure
 Cabins: Sprinkler
 Make/Type: Shanghai Xiao Xiang, low pressure
 Public spaces: Sprinkler
 Make/Type: Shanghai Xiao Xiang, low pressure
 Radars
 Number: 3
 Make: Furuno
 Model(s): SN36AFx1 XN24AFx2
 Waste disposal plant
 Sewage plant
 Make: Jiangsu Nanji Machinery Co., Ltd.
 Model: WCMBR-300(U)
 Contract date: 10 December 2015
 Launch/float-out date: 2 July 2017
 Delivery date: 10 February 2018



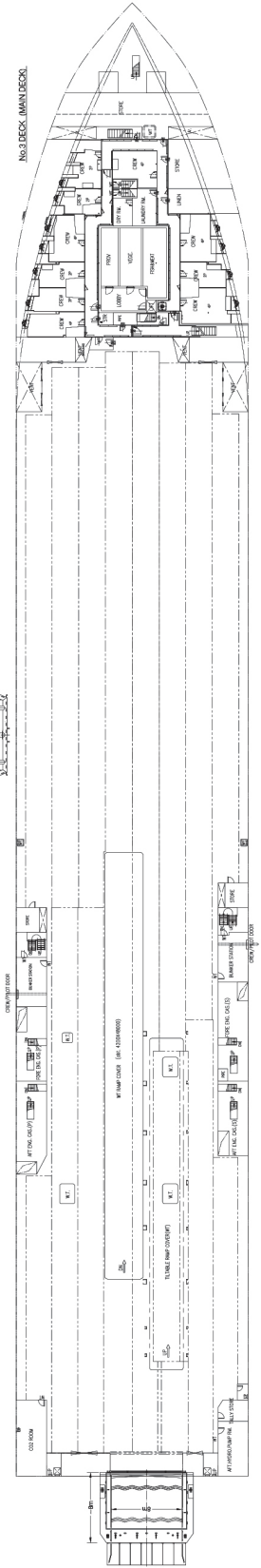
No. 0 DECK



No. 5 DECK (UPPER DECK)



No. 3 DECK (MAIN DECK)





POLA MAKARIA: Multi-purpose dry cargo vessel

Shipbuilder: **OJSC Shipyard Krasnoye Sormovo**
 Vessel's name: **Pola Makaria**
 Hull No: **06001**
 Owner/Operator: **Pola Group**
 Country: **Russian Federation**
 Designer: **Marine Engineering Bureau Ukraine**
 Country: **Ukraine**
 Flag: **Russian Federation**
 IMO number: **9849423**
 Total number of sister ships already completed (excluding ship presented): **4**
 Total number of sister ships still on order: **9**

Russia's vast territories are well served by rivers and canals providing a means for transporting all kinds of goods and commodities. Many of the vessels are deemed sea/river ships meaning they can navigate the river and canal system as well as navigate in open seas albeit with some restrictions as to distance allowed from a port of refuge.

The 7,679dwt *Pola Makaria* is the first of a new design labelled Project RSD59 developed by Marine Engineering Bureau-Design in Saint Petersburg. So far 10 of the type have been contracted at Krasnoye Sormovo shipyard and another five at Nevsky shipyard. Developed from the earlier RSD49 type, *Pola Makaria* and her sisters are the biggest multipurpose dry cargo vessels able to transit the Volga-Don canal. They have a length of 141m, a beam of 16.9m and a salt water draught of 4.53m. In comparison with the RSD49 projects, the newbuild RSD59 have an increased deadweight of 535tonnes at sea and 765tonnes in fresh water.

Pola Makaria is intended for carrying a wide range of cargoes from general cargoes and containers to bulk cargoes and large project cargoes. The ships have two cargo holds, the longest of which is 77.35m, and a hold height of 9m through the coamings to hatches. The former allows for carrying heavy and long project cargoes particularly to Caspian Sea energy projects, and the height permits three ties of over-height 9' 6" containers to be loaded. The holds are covered with pontoon type removable hatch covers. Opening and closing of each section is carried out using a special gantry crane, which when stowed is located in the bow bulkhead deckhouse.

Propulsion is by a pair of Wärtsilä 6L20 four-stroke engines of 1,200kW each. All of the sea/river types are highly manoeuvrable and *Pola Makaria* is no exception being fitted with a pair of fully azimuthing Schottel rudder propellers.

TECHNICAL PARTICULARS

Length oa: 140.88m
 Length bp: 137.08m
 Breadth moulded: 16.90m
 Depth moulded
 To main deck: 6.00m
 Width of double skin
 Side: 2.33m
 Bottom: 0.98m
 Draught
 Scantling: 4.53 (at sea)
 Design: 3.60 (in river)
 Gross: 6,266gt
 Displacement: 10,395t
 Lightweight: 2,716t
 Deadweight
 Design: 5,272dwt (in river at draught of 3.60m)
 Scantling: 7,679dwt (at sea)
 Block co-efficient: 0.940 (draught 4.53m)
 Speed, service: 10knots

Cargo capacity
 Bale: 11,292m³
 Grain: 11,292m³
 Bunkers
 Heavy oil: 365.3m³
 Diesel oil: 48.6m³
 Water ballast: 4,712m³
 Daily fuel consumption (tonnes/day)
 Main engine only: 8t/day
 Auxiliaries: 0.5t/day

Classification society and notations: Russian Maritime Register of Shipping (RS) KM (★) Ice2 R2 AUT1-ICS CONT (deck, cargo holds Nos.1,2) DG (bulk, pack)

% high-tensile steel used in construction: 80% (hull = 100%)

Main engines
 Design: Diesel engine
 Model: 6L20
 Manufacturer: Wärtsilä
 Number: 2
 Type of fuel: HFO
 Output of each engine: 1,200kW

Gearboxes
 Output speed: 1,000rpm (direct ME to rudder-propeller)

Propeller(s)
 Designer/Manufacturer: Schottel SRP 340FP
 Number: 2

Fixed/controllable pitch: Fixed
 Diameter: 1,900mm
 Speed: 307rpm
 Diesel-driven alternators
 Number: 2
 Engine make/type: Volvo Penta / D13
 Type of fuel: MDO
 Output/speed of each set: 332kW / 1,500rpm
 Output/speed of each set: 332kW / 1,500rpm

Boilers
 Number: 1
 Type: Steam boiler
 Make: Aalborg CHB-750
 Output, each boiler: 0.75t/h

Other cranes
 Number: 1
 Make: Sormec
 Type: Gantry crane
 Tasks: Cargo holds hatch covers

Mooring equipment
 Number: 2 anchor-mooring bow winches, 1 aft anchor-mooring winch
 Make: Adria Winch
 Type: Electro-hydraulic

Special lifesaving equipment
 Number of each and capacity: 1 x 14 persons
 Make: Davit International
 Type: Free-fall lifeboat

Hatch covers
 Design: Marine Engineering Bureau
 Manufacturer: OJSC Shipyard
 Type: Pontoon type moving by gantry crane

Containers
 Lengths: 20'/40'
 Heights: 9.5'
 Total TEU capacity: 248
 On deck: 56
 In holds: 192
 Homogeneously loaded to 14t: 248
 Tiers (maximum)
 On deck: 1
 In holds: 3

Ballast control system
 Make: Valcom
 Type: TSS/Control
 Water Ballast Treatment System
 Make: Alfa Laval, PureBallast 3.1
 Capacity: intake 125 – 500m³/h, discharge 60 – 500m³/h

Complement
 Officers: 6
 Crew: 5
 Supernumeraries/Spare: 3
 Single/double/other rooms: 11/reserve berth 3/pilot

Stern appendages/special rudders: 2 full-revolving rudder propellers with fixed-pitch propellers in nozzles SRP-340FP Schottel

Bow thrusters
 Make: Schottel STT 0170 FP
 Number: 1
 Output (each): 230kW

Fire detection system
 Make: MRS Electronics
 Type: PS-220-5A

Fire extinguishing systems
 Cargo holds: CO₂
 Make/Type: Wilhelmsen
 Engine room: CO₂
 Make/Type: Wilhelmsen
 Cabins: Water
 Public spaces: Water

Radars
 Number: 2
 Make: JRC
 Model(s): JMA-5300MKII
 Integrated bridge system: Yes
 Make: Valcom
 Model: TSS/Bridge alarm

Waste disposal plant
 Sewage plant
 Make: JOWA
 Contract date: 05 September 2017
 Launch/float-out date: 20 April 2018
 Delivery date: 24 May 2018



SABRE TRADER: Container vessel

Shipbuilder: **Yangzijiang Shipbuilding Group / COSCO Shipping Heavy Industry (Guangdong)**
 Vessel's name: **Sabre Trader**
 Hull No: **N2316**
 Owner/Operator: **Lomar Shipping**
 Country: **United Kingdom**
 Designer: **Shanghai Merchant Ship Design & Research Institute (SDARI)**
 Country: **China**
 Model test establishment used: ... **HSVA/SSRI**
 Flag: **Malta**
 IMO number: **9817884**
 Total number of sister ships already completed (excluding ship presented): **1**
 Total number of sister ships still on order: **7**

and a Panasia ballast treatment system for compliance with the 2004 Ballast Convention.

TECHNICAL PARTICULARS

Length oa: 172m
 Length bp: 164m
 Breadth moulded: 28.4m
 Depth moulded
 To main deck: 14.2m
 Draught
 Scantling: 9.50m
 Design: 8.50m
 Gross: 19,035gt
 Deadweight
 Design: 19,394.4dwt
 Scantling: 23,439.1dwt
 Speed, service (90 %MCR output): 18.5knots

Bunkers
 Heavy oil: 1,375m³
 Diesel oil: 215m³
 Water ballast: 8,460m³
 Daily fuel consumption
 Main engine only: 38.7t/day

Classification society and notations: LR
 ✳ 100A1 Container Ship, ShipRight (SDA,CM,ACS(B)), LI, *IWS, ECO (BWT, IHM,EEDI), +LMC, UMS, NAV1, with descriptive notes: ShipRight (BWMP(F+D,T),SCM,SERS)

Main engines
 Model: WinGD 6RT-Flex58T-E
 Manufacturer: HHM
 Number: 1
 Type of fuel: HFO or MGO
 Output of each engine: 11,150kW

Propellers
 Material: Ni-Al-Bronze
 Designer/Manufacturer: Changzhou Zhonghai Marine Propeller Co., Ltd.
 Number: 1
 Fixed/Controllable pitch: Fixed
 Diameter: 6.60m
 Speed: 95.6rpm

Diesel-driven alternators
 Number: 4
 Engine make/type: Yanmar / 6EY22ALW
 Type of fuel: HFO or MGO
 Output/speed of each set: 1,370kW x 900rpm
 Alternator make/type: Taiyo / FE553D-8
 Output/speed of each set: 1,290kW x 450V x 60Hz

Boilers
 Number: 1
 Type: Aalborg OC-TCi
 Make: Alfa Aalborg
 Output, each boiler:
 Steam output, oil fired section: 1,800kg/h;
 Steam output, exhaust gas section: ... 1,300+ 360+360kg/h;
 Working pressure: 7.0bar

Other cranes
 Number: 1
 Make: Jiangsu Masada Heavy Industries Co.,Ltd
 Type: Electric motor driven monorail type
 Tasks: ... Provision and engine parts handing crane
 Performance: 4t SWL

Mooring equipment
 Number: 4
 Make: Jiangsu Masada Heavy Industries Co.,Ltd
 Type: Electric motor

Special lifesaving equipment
 Number of each and capacity: 1x 26 persons
 Make: Norsafe
 Type: GES-21 MKI - Free-fall lifeboat
 Hatch covers
 Design: MacGregor
 Type: Pontoon

Containers
 Total TEU capacity: 1,774
 On deck: 1,106
 In holds: 668
 Reefer plugs: 492FEU
 Tiers/rows (maximum)
 On deck: 8/11
 In holds: 5/10
 Hold refrigeration system: Air-cooled

Ballast control system
 Make: Hoppe
 Type: Electro-hydraulic
 Water Ballast Treatment System
 Make: Panasia
 Capacity: 350m³/h

Complement
 Officers: 13
 Crew: 13
 Suez/Repair Crew: 6

Stern appendages/special rudders: Full spade type rudder with twisted leading edge and optimised rudder bulb

Bow thrusters
 Make: Nakashima
 Number: 1
 Output (each): 1,200kW

Bridge control system
 Make: JRC
 One-man operation: Yes

Fire detection system
 Make: Tyco
 Type: T2000
 Fire extinguishing systems
 Cargo holds: CO₂
 Make/Type: NK
 Engine room: LPWMS/CO₂
 Make/Type: Firetec/NK

Radars
 Number: 3
 Make: JRC
 Model(s): X BAND:NKE-1125-9 NKE-1125-6 / S BAND: NKE-1130

Waste disposal plant
 Incinerator
 Make: Luzhou TeamTec
 Model: OG200CS
 Sewage plant
 Make: Il Seung
 Model: ISB-04
 Launch/float-out date: 24 May 2018
 Delivery date: September 2018

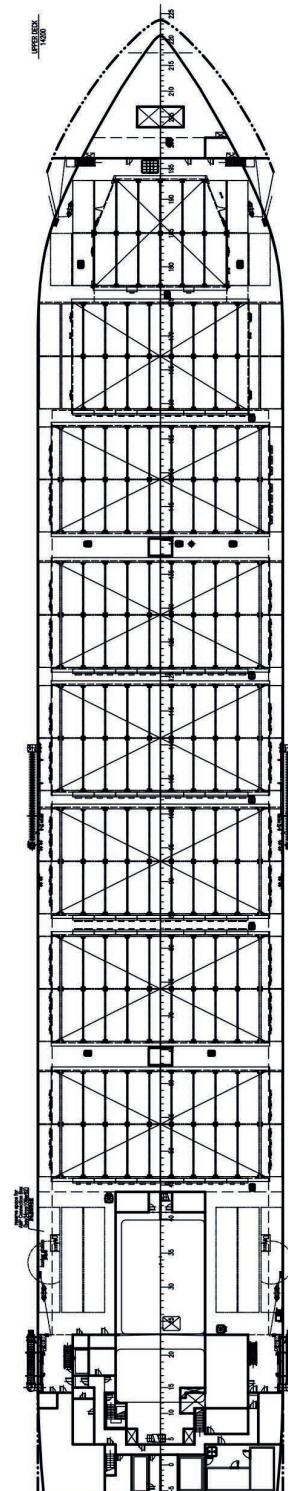
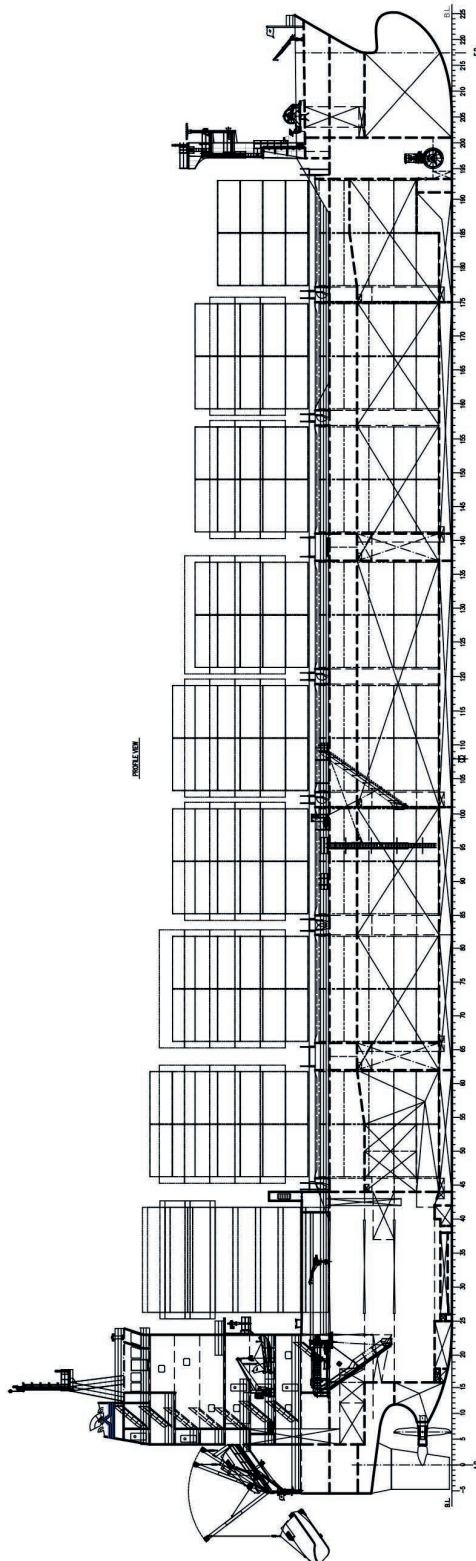
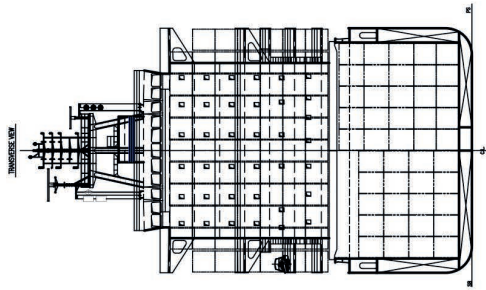
In recent years, the main focus of interest in the container ship sector has been the increasing size of the ultra large ships. For UK-based Lomar Shipping it is the potential at the lower end of the scale that is most promising.

In 2012, the Libra Group subsidiary began ordering new container ships of 1,100 and 2,200teu from Chinese yards. In 2016 it made its first order for the SDARI-designed Bangkok-max 1800teu feeder vessel. Over the next two years, Lomar returned to exercise options and place further orders to the point where it has 18 ships contracted – nine each at Yangzijiang Shipbuilding Group and COSCO's Guangdong yards. *Sabre Trader* was delivered in September as the first of the series from Yangzijiang. The ship was immediately placed into a short-term time charter with Rizhao Haitong based in China.

Nominally a 1,800teu ship, *Sabre Trader* actually has a capacity of 1,770teu of which 664 are under deck and 1,104 on deck. It boasts a high level of reefer containers with up to 492 plugs, satisfying the growing need for cold chain logistics. The ship was delivered as gearless but there is the possibility to retrofit three 45tonne cranes if the ship is employed in areas with poor facilities.

The 172m loa and 28.4m beam ship benefits from an optimised hull form and has a conventional direct drive propulsion system powered by an 11,150kW WinGD 6RT-flex58T-E engine. It has a 6.6m high-efficiency propeller and energy saving devices such as a full spade twisted rudder and rudder bulb. The ship is able to meet the EEDI Phase 3 ratings some 12 years before those requirements become mandatory.

Sabre Trader has a number of environmental features including an AMP shore connection system to reduce emissions in ports, an open loop scrubber system that can be retrofitted to hybrid configuration,





SAINT JOHN PAUL II: High-speed ferry

Shipbuilder: **Incat Tasmania Pty Ltd**
 Vessel's name: **Saint John Paul II**
 Hull No **089**
 Owner/Operator: **Virtu Wavepiercer Limited**
 Country: **Malta**
 Designer: **Revolution Design**
 Country: **Tasmania**
 Model test establishment used: **QinetiQ,**
under consultation of Seaspeed Marine
Consulting
 Flag: **Valletta**
 IMO number: **9817274**
 Total number of sister ships already completed
 (excluding ship presented): **nil**
 Total number of sister ships still on order: **nil**

ZF reduction gearbox to one of the four Wärtsilä Lips LJX 1500SR waterjets that propel the vessel.

TECHNICAL PARTICULARS

Length oa: 110.6m
 Length bp: 100.6m
 Breadth moulded: 28.2m
 Draught:
 Design: 4.435m
 Gross: 9,044t
 Displacement: 2,490t
 Lightweight: 1,474t
 Deadweight
 Design: 1,000dwt
 Speed, service (85% MCR output):37.5knots
 Bunkers
 Diesel oil:266,008 Litres + 296,000 Litres
 in Long Range Tanks.
 Classification society and notations: DNV GL
 * 1A HSLC Ferry (B) E0 R1
 % aluminium used in hull/superstructure: 100%
 Heel control equipment: 2 x active Trim tabs
 Roll-stabilisation equipment: 2 x active T-foils
 Main engines
 Model:MTU 20V 8000 Series M71L
 Manufacturer:MTU Germany
 Number: 4
 Type of fuel: MDO
 Output of each engine: 9,100kW
 Gearboxes
 Make: ZF
 Model: ZF 60000 NR2H
 Number: 4
 Propulsion
 Type: Waterjets
 Designer/Manufacturer: Wärtsilä Lips LJX
 1500SR Waterjets
 Number: 4
 Fixed/controllable pitch: Fixed
 Diesel-driven alternators
 Number: 4
 Engine make/type: MTU 8V2000 M51A
 Type of fuel: MDO
 Alternator make/type: Leroy Somer LSAM
 47.2M7 C
 Mooring equipment
 Number: 4
 Make: Capstans
 Type: Hydraulic
 Special lifesaving equipment
 Number of each and capacity: 4x MES &
 11 x 100-person liferaft

Make: Life Systems Australia
 Type: 4 x MES complete with escape
 slide and 100-person canopied, self-righting
 liferafts & 7 x 100-person canopied, self-right-
 ing liferafts

MES Vertical / sloping chutes: Sloping
 slide

Vehicles

Number of vehicle decks:Fixed
 main deck
 Total lane length: 490 truck lane meters
 Total cars: 167
 Total freight units (specify size):20 x
 16m trucks

Doors/ramps/lifts/moveable car decks

Number of each:2 ramps, located stern and
 port side
 Type: Single leaf vehicle ramps
 Designer: Revolution Design

Complement

Officers:..... 5
 Crew: 6

Passengers

Total: 900
 Stern appendages/special rudders: Yaw
 stabiliser fin

Bridge control system

Type: Ship's Information and Control System

Fire detection system

Make: Consilium
 Type: Salwico

Fire extinguishing systems

First Level: ..Handheld portable extinguishers
 Second Level:Fire hydrant system
 Third Level:Sprinkler system for
 passenger & vehicle decks & carbon dioxide
 fire suppression coving engine rooms, along
 with water cooling of the bulkhead seals

Radars

Number: 2
 Make: Furuno
 Model(s): Furuno X Band, FAR3210BB,
 12kW Furuno S Band, FAR3230S-SSD-BB,
 S-250W

Waste disposal plant

Sewage plant
 Make:Hamann
 Model: HL Cont Plus 10

Contract date: 5 October 2016
 Launch/float-out date: 22 December 2018
 Delivery date: 4 January 2019

Although delivered to its owner Malta's Virtu Ferries in December 2018, the Incat-built *Saint John Paul II* will not enter service until March 2019 as it has to complete sea trials and make its way from Tasmania to the Mediterranean first.

The new ship gives Virtu Ferries a distinction that no other owner can match, as the saint after which it was named actually travelled on one of their vessels. Pope John Paul II, who was canonised and made a saint in 2013, travelled on a Virtu ferry on a round trip from Valetta to Gozo in 1990.

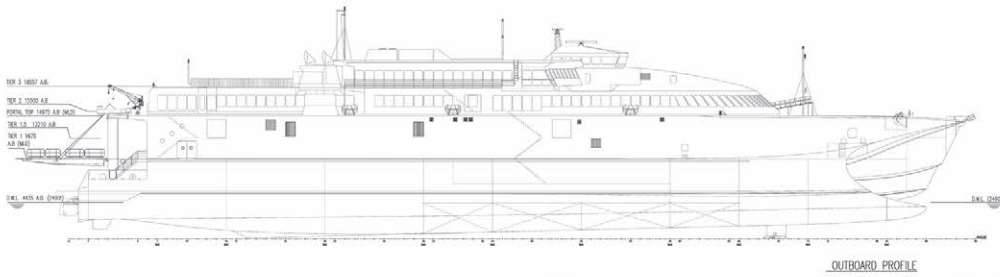
The new 110m wave piercing catamaran will be the 15th fast ferry Virtu has acquired over time but when in service it will be the largest high-speed catamaran in the Mediterranean and the second largest in the world eclipsing its owner's current flagship, the 2010-built *Jean De La Valette*.

Saint John Paul II is based on Incat's standard catamaran configuration but for this vessel the Wavepiercer Hull design was modified by Incat's associate Revolution Design and UK-based Seaspeed Consulting, and then extensively tank tested and optimised at QinetiQ – the UK MoD establishment in Hampshire.

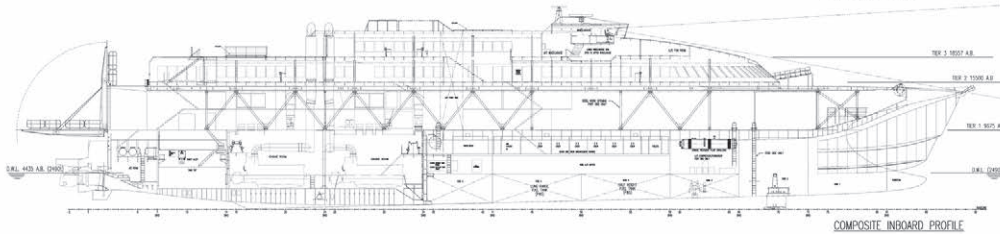
The vessel will operate between Malta and Sicily and gives a significant boost in capacity for the service. *Saint John Paul II*'s 490 truck lane metres give 43% more truck capacity, allowing for 20 trucks, 15% more passenger capacity, allowing for 900 persons, and 7% more car capacity, allowing for 167 cars. There are more than 1,100 seats around the vessel including in the five lounges and an outdoor seating area aft.

A service speed of 38knots means the vessel can complete the crossing berth to berth in around 90 minutes. *Saint John Paul II* is powered by four MTU 20V 8000 Series M71L main engines generating a total of 36.4MW. Each engine is connected through a dedicated

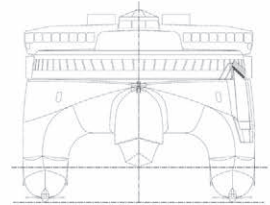
SAINT JOHN PAUL II



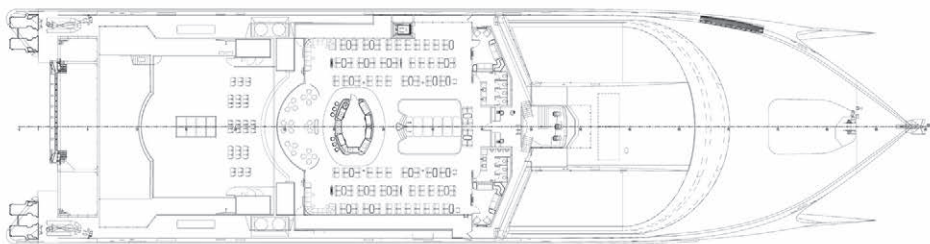
OUTBOARD PROFILE



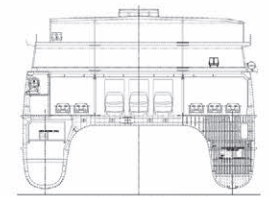
COMPOSITE INBOARD PROFILE



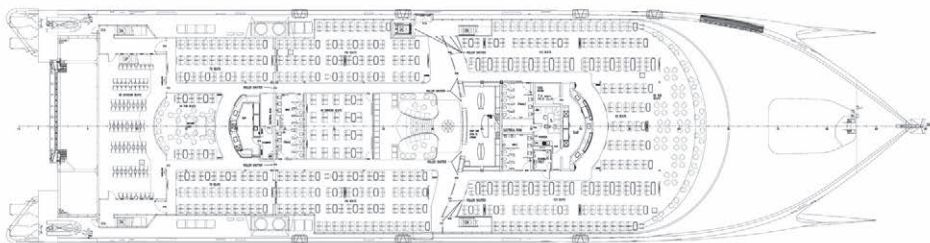
VIEW FROM FWD



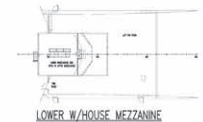
TIER 3 AND WHEELHOUSE



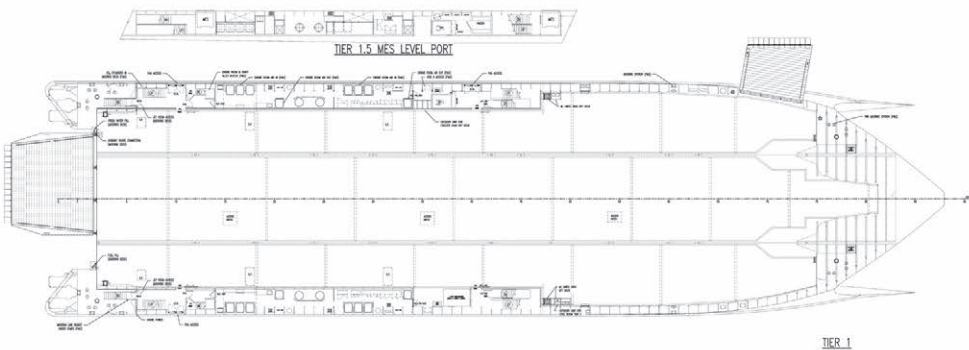
WORKING MID SHIP SECTION



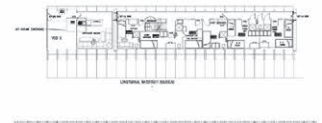
TIER 2



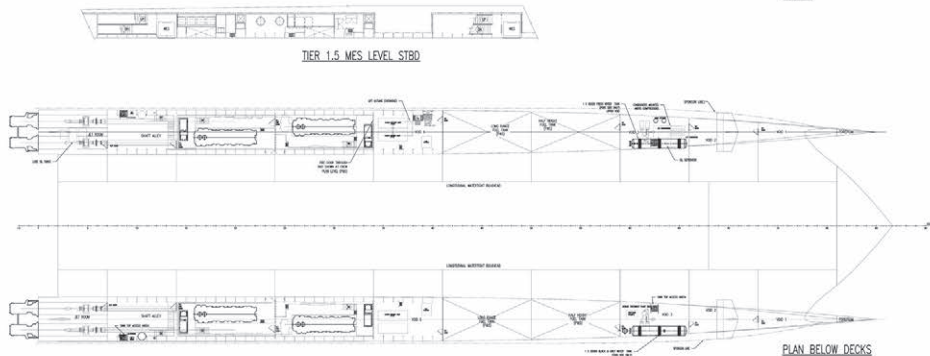
LOWER W/HOUSE MEZZANINE



TIER 1



CREW ACCOMMODATION BELOW DECK 6745 A.B.



PLAN BELOW DECKS



SAO DIANA: Ore carrier

Shipbuilder: **Hyundai Heavy Industries**
 Vessel's name: **Sao Diana**
 Hull No: **2947**
 Owner/Operator: **Polaris Shipping**
 Country: **Republic of Korea**
 Designer: **Hyundai Heavy Industries**
 Country: **Republic of Korea**
 Flag: **Marshall Islands**
 IMO number: **9822255**
 Total number of sister ships already completed (excluding ship presented): **2**
 Total number of sister ships still on order: **1**

TECHNICAL PARTICULARS

Length oa: 333m
 Length bp: 323.10m
 Breadth moulded: 60m
 Depth moulded
 To main deck: 29.8m
 Draught
 Scantling: 22.7m
 Design: 22.7m
 Deadweight
 Design: 326,107dwt
 Speed, service: 14.5knots
 Cargo capacity
 Bale: 180,000m³
 Bunkers
 Heavy oil: 7,000m³
 Diesel oil: 600m³
 Water ballast: 188,000m³
 Classification society and notations: Korean Register
 +KRS1-Ore Carrier 'ESP', Sea Trust(DSA1, FSA1, HCM), IWS, ERS, GRAB[40], IHM, CLEAN1, BLU, LNG READY (SR, ME-c, AE-c, B-c), LG, LI, +KRM1-UMA, STCM, BWT.
 Main engines
 Model: Hyundai-MAN B&W 7G80ME-C9.5
 Manufacturer: MAN Energy Solution
 Number: 1
 Type of fuel: HFO or MGO
 Output of each engine: 23,390kW x 65.1rpm
 Propellers
 Material: Ni-Al-Bronze
 Designer/Manufacturer: Hyundai
 Number: 1
 Fixed/controllable pitch: Fixed
 Diameter: 10.4m
 Diesel-driven alternators
 Number: 3
 Engine make/type: Hyundai, HiMSEN 7H21C
 Type of fuel: HFO or MGO
 Output/speed of each set: 1,500kW x 900rpm
 Alternator make/type: Hyundai
 Output/speed of each set: 1,410kW x 900rpm
 Boilers
 Number: 1
 Type: Automatic
 Make: KangRim

Output, each boiler: 6,000kg/h
 Other cranes
 Number: 2
 Make: Dongnam Marine Crane
 Type: Electro-hydraulic
 Tasks: Provision crane
 Performance: 10t SWL (port) / 4t SWL (stbd)
 Mooring equipment
 Number: 2 windlass, 8 mooring winch
 Make: MIRAE Industries
 Type: Electro-hydraulic
 Special lifesaving equipment
 Number of each and capacity: 1x 25 persons
 Make: Norsafe
 Type: Free-fall
 Hatch covers
 Manufacturer: MacGregor
 Type: Side rolling type, operated by hydraulic motor with rack and pinion mechanism
 Ballast control system
 Make: Hanla IMS
 Type: Hydraulic
 Complement
 Officers: 11
 Crew: 14
 Suez/Repair Crew: .. 1 cabin for 6 Suez crew
 Bridge control system
 Make: Kongsberg
 One-man operation: Yes
 Fire detection system
 Make: B-1 industrial
 Type: Addressable
 Fire extinguishing systems
 Engine room: H.P. CO₂
 Make/Type: NK
 Radars
 Number: 2
 Make: JRC
 Model(s): JMR-9282-S for S-band / JMR-9225-6X for X-band
 Integrated bridge system: Yes
 Make: JRC
 Model: JAN-9201
 Contract date: 29 December 2016
 Launch/float-out date: 28 April 2018
 Delivery date: 2 August 2018

Shipping practitioners are fond of naming ship types based upon their being the largest vessels that can enter a specific port or pass through a canal. While many ships will bear the labels, only one can be the first of each type.

Sao Diana, a 325,000dwt ore carrier built by Hyundai Heavy Industries for Polaris Shipping, is one of those vessels. The ship, which is part of its owner's fleet replacement programme, is the very first of the Guaibamax type of ore carrier named after the Guaiba Island ore loading terminal in southern Brazil's Sepetiba Bay.

It is the first of 18 vessels contracted by Polaris that will be chartered to the Brazilian ore giant Vale, but the Guaibamax label is also being applied to ships built for other owners and at other yards. Around 50 of the type are said to have been contracted at various yards all of which will be operating under Vale contracts.

The vessel has an overall length of 333.07m, width of 60m and depth of 29.8m with a design draught of 22.7m. It has seven cargo holds of 180,000m³ capacity and seven cargo hatch covers. An unusual feature is the space between holds 4 and 5 for a future LNG tank retrofit.

The vessel has a service speed of 14.5knots and is propelled by a Hyundai-built MAN B&W 7G80ME-C9.5 engine rated at 23,390kW driving a 10.4m diameter propeller. Currently the ship runs on HFO but in accordance with the contract with Vale, it must have the capability to be converted to LNG hence the space for the LNG fuel system.

Vale is clearly hedging its bets as to the best way to comply with the 2020 sulphur cap because as well as requiring engines that can burn LNG, the contract also stipulates that the ship must have a scrubber installed, which was the case when *Sao Diana* was delivered.



RRS SIR DAVID ATTENBOROUGH: Research vessel

Shipbuilder: **Cammell Laird**
 Vessel's name: ... **RRS Sir David Attenborough**
 Hull No: **1390**
 Owner/Operator: **UKRI – United Kingdom
 Research and Innovation / BAS – British
 Antarctic Survey**
 Country: **United Kingdom**
 Designer: **Rolls Royce Marine AS**
 Country: **Norway**
 Model test establishment used: **HSVA**
 Flag: **Falkland Islands**
 IMO number: **9798222**
 Total number of sister ships already completed
 (excluding ship presented): **nil**
 Total number of sister ships still on order: **nil**

Although not fully completed by January 2019, the *RRS Sir David Attenborough* is included here because of the attention it has received throughout 2018.

The polar research vessel, which will have a PC4 ice class and winterisation to -35°C, is being built at the UK's Cammell Laird yard in Birkenhead for the UK Government agency the Natural Environment Research Council. The ship will be the first British-built polar research vessel with a heli-deck and will replace two existing ice-classed research vessels operated by the British Antarctic Survey which are nearing the end of their planned 25-year lifespan.

When completed the 128m-long hybrid vessel will be one of the most advanced scientific maritime ships in the world, capable of spending 60 days at sea without resupply, and with a range of almost 19,000 nautical miles (35,000km). The hull has an ice-breaker bow which can break ice up to 1.5m thick. Because it is intended to operate in very remote areas, the communication system allows for full remote monitoring of the ship's systems.

The heli-deck is located on the deck forward of the accommodation and superstructure. There are ROV hangers amidships and an open deck area aft with a moon pool where research equipment can be operated from. Placing the accommodation and laboratories in the central area of the ship will minimise dynamic movement and acceleration and improve comfort for the crew and research community on board.

Four Rolls-Royce Bergen B33:45 engines (two each of 9-cylinder and 6-cylinder versions) will provide a total of 21,600kW for both mechanical propulsion and electric power generation on board. The *RRS Sir David Attenborough* will be fitted with two Rolls-Royce Promas integrated rudder and propeller systems.

The vessel has two Saft battery packs able to give 5MW peak effect battery capacity. The batteries will allow for silent operation and vibration-free sailing when required. To meet NOx Code requirements the ship's main engine exhausts are connected to a Yara Industries SCR system.

TECHNICAL PARTICULARS

Length oa: 128.90m
 Length bp: 121.75m
 Breadth moulded: 24.00m

Depth moulded
 To main deck: Deck 3 – 11.00m
 To upper deck: Deck 6 – 20.50m
 To other decks: Deck 12 – 37.35m

Width of double skin
 Side: 2.4m
 Bottom: 1.2m

Draught
 Scantling: 7.50m
 Design: 7.00m

Gross: 15,984gt
 Displacement: 16,582t
 Lightweight: 10,420t
 Deadweight
 Design: 6,162dwt
 Block co-efficient: 0.736 (7.5m)

Operational Mode:
 13knots (Transit) / 2 generators running / no thrusters
 6-8knots (Survey) / 1 generators running / no thrusters
 11knots (Survey) / 2 generators running / no thrusters
 Ice Breaking / 4 generators running / no thrusters
 DP Condition 1/2 / 4 generators running / all thrusters

Cargo capacity
 Bale: 2,180m³
 Liquid volume: Avtur Heli Fuel - 660m³
 (Bulk Tanks) / 2,000 x 208 litre (Drums)
 Refrigerated cargo: 125m³ (Science
 Freezers / Refrigerated Spaces)
 Bunkers
 Diesel oil: 2,290m³
 Water ballast: 3,346m³
 Daily fuel consumption (tonnes/day)
 Auxiliaries: 37t/day (2 x 6 cylinder
 DG's running @ 98% MCR)

Classification society and notations: LR
 *100A1 Polar Research Vessel, *LMC, CAC1,
 LFPL, LI, UMS, DP(AA), IBS, NAV1, PSMR*,
 ECO (BWT, GW, OW, P, NOx3, SOx, IHM, R),
 Helicopter Landing Area, PC5 – Hull and Rudder
 PC4, Winterisation D(-35) H(-35), IWS

% high-tensile steel used in construction: 100%
 % aluminum used in hull/superstructure: .. 1-2%
 main mast only

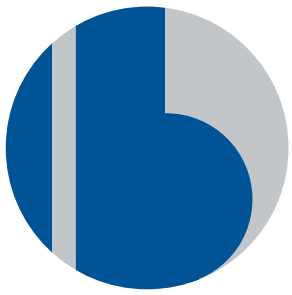
Heel control equipment:
 Hoppe Marine: 2 x Anti-toll tanks,
 with anti-heeling blowers and ice heeling
 system fitted

Main drive motors
 Design: Alconza
 Models: QD 1250 L2-20FW
 Manufacturer: Alconza
 Number: 2 (2x2 Asynchronous motors
 per unit)
 Motor power output (each): 2,750kW
 @ 140rpm

Diesel-driven Generators
 Number: 4
 Engine make/type: RRM Bergen / 2 x
 B33-45 L9A / 2 x B33-45 L6A
 Type of fuel: MDO
 Engine Output: B33-45 L9A – 5,400kW
 @ MCR / B33-45 L6A – 3,600kW @ MCR
 Alternator make/type: Marelli / 2 x MJRM
 800 LD 10 / 2 x MJRM 8710 LD 10
 Output/speed of each set: B33-45 L9A –

RRS SIR DAVID ATTENBOROUGH

6,480kVA @ 720rpm / B33-45 L6A – 4,320kVA @ 720rpm	Type: HLRM 170-4SL Telescopic knuckle boom crane	Complement
Energy Storage System	Tasks: Scientific support	Total: 90
Number: 2	Performance: Max lift 5,000kg / Max reach 16.54m	Officers: 11
Battery make: Saft		Crew: 17
Cell type: Rechargeable Lithium-Ion		Scientists / Persons in Transit: 60
Battery qty per ESU: .. 14 x Seenergy battery modules each containing 28 cells	Stern A-Frame	Additional: 2
Battery voltage: . Nominal 878V / Max 1,010V	Number: 1	Single/double/other rooms: 65 cabins
Battery current: ... Max continuous - 150A co	Make: RRM Odim	
Battery cooling: Fresh water with glycol	SWL: Static 300kN / Luffing 150kN	Stern appendages/special rudders: .. 2 x CM-P, Promas, Twisted leading edge (PC4)
Transformer qty: ... 2 (1 transformer per ESU)	Side A-Frame	
Transformer capacity: ... 550/690V, 1,250kVA	Number: 1	Bow thrusters
System capacity: 2 x (1,500/2,500kW, 500kWh, 690V, 60 Hz)	Make: RRM Odim	Make: Tees White Gill
	SWL: Static 300kN / Luffing 150kN	Number: 2
		Output/speed of each set: 1,576kW / 0 – 1,197rpm
Propellers	Moonpool curser system	Drive motor Make/type: ...Marelli / B5J 500 LC6
Material: Hub – Ni-Al-Bronze / Blades – stainless steel	Number: 1	
Designer/Manufacturer: RRM / Kamewa	Make: RRM	Stern thrusters
Number: 2 x 5 blades	SWL: 50kN	Make: Tees White Gill
Fixed/controllable pitch: Controllable		Number: 2
Diameter: 4,500mm	Science hangar overhead crane	Output/speed of each set: 1,576kW / 0 – 1,197rpm
Speed: 140rpm @ 100% MCR	Number: 1	Drive motor Make/type: ..Marelli / B5J 500 LC6
Special adaptations: Promas Propeller Assembly	Make: Seaonics	
	SWL: 8t	
Harbour generator	Mooring equipment	Bridge control system
Number: 1	Forward	Make: Rolls-Royce Marine
Engine make/type: ... Cummins / KTA38-DM1	Number: 2 x combined mooring winch / anchor windlass:	Type: Unified Bridge
Alternator model: PM734B2	Make: RRM Rauma Winches	One-man operation: Yes - BNWAS fitted
Type of fuel: MDO	Type: Electric	
Cooling: Heat exchanger	Aft	Fire & Gas detection system
Starting: Air	Number: 2 x mooring winch	Make: Consilium / Salwico
Generator Output: 1,062kVA, 850kW @ 1,800rpm	Make: RRM Rauma Winches	Type: Analog addressable
	Type: Hydraulic	
Emergency generator	Special lifesaving equipment	Fire extinguishing systems
Number: 1	Number of each and capacity: 2 lifeboats (90 persons each)	All Areas:
Engine make/type: ... Cummins / KTA38-DM1	Make: Norsafe	Make/Type: .Yard – SW Fire Main with Hoses
Alternator model: HCM634K1	Type: Totally enclosed lifeboat / Davit launched	Cargo holds:
Type of fuel: MDO		Make/Type: ...Marioff – HiFog (Water Mist)
Cooling: Radiator	Auxiliary Vessels	Machinery spaces:
Starting: Electrical + hydraulic	1 x Cargo tender (Exeter Fabrications)	Make/Type: ...Marioff – HiFog (Water Mist)
Generator Output: 1,062kVA, 850kW @ 1,800rpm	1 x Rigid hull workboat (Mainstay)	Cabins:
	2 x Inflatable hull workboats /FRC (Humber)	Make/Type: ...Marioff – HiFog (Water Mist)
Exhaust-gas SCR system	Hatch covers	Public spaces:
Designer: Rolls-Royce Marine	Design: SP Hatches	Make/Type: ...Marioff – HiFog (Water Mist)
Supplier: Yarra Industries	Manufacturer: SP Hatches	Galley:
Fitted to all engine exhausts?: Yes	Type:	Make/Type: CO ₂
Fitted to incinerator?: Yes	Deck 3: 2 x Weathertight folding, flush fitting hatches	Heli Handling:
Fitted to hot water heaters?: Yes	Deck 2: 2 x Non-Weathertight folding, flush fitting hatches	Make/Type: ..Matre – Foam DIFFS / DAHR
Hot water heaters	Moonpool: 1 x bottom door watertight / 1 x upper door – non-watertight	Radars
Number: 2	Deck 3/6: 4 x weathertight hinged hatch covers	Number: 3
Type: Oil fired		Make: 2 x Furuno (Navigation Radars), 1 x Rutter (Ice Radar)
Make: Ulmatec Pyro	Cargo (Avtur) tanks	Model(s): Furuno - 1 x ARPA X-band 8ft / 1 x ARPA S-band 12ft
Output, each hot water heater: 2,000kW @ 6bar	Number: 2	Rutter – 1 x XN-20AF: 2040 80.3"
Cargo crane	Grades of cargo carried: Bulk Avtur – Commercial aviation kerosene	Integrated bridge system: Yes
Number: 1	Coated tanks: Interline 704 Epoxy	Make: Rolls-Royce Marine
Make: Heila	Stainless steel – structure/piping: Piping	Model: Unified Bridge
Type: Knuckle boom offshore crane (HR 2050-35-2BJ)	Containers: Cargo 20t / Science 10t	Waste disposal plant
Performance: Main winch capacity 50t	Total TEU capacity: 57	Waste handled: Food / dry solid waste, Incinerator
Provisions store crane	On deck: Cargo 30 x 20t	Make: Atlas
Number: 1	In holds: Cargo 17 x 20t	Model: Atlas 600
Make: Heila	Other Areas: 10 x 10t	Waste compactor
Type: HR 200-16-2BJ		Make: Usan Marine
Tasks: Scientific support	Cargo (Avtur) pumps	Model: U MCC
Performance: Max lift 5,000kg / Max reach 16.54m	Number: 2	Waste shredder
Deck service crane 1	Type: Variable speed scroll pumps	Make: Usan Marine
Number: 1	Make: Behrens 2SP 110-075 L2 TS	Model: UMS-2530
Make: Heila	Capacity (each): 50.4m ³ /h @ 10bar	Glass Crusher
Type: HLRM 170-4SL Telescopic knuckle boom crane		Make: Usan Marine
Tasks: Aft deck port general service	Loading control system	Model: U-80
Performance: Max lift 5,000kg / Max reach 16.54m	Supplier: RRM	Food Macerator
Deck service crane 2	Type: Autoload - part of the Integrated Automation System	Make: Usan Marine
Number: 1		Model: OWMS
Make: Heila	Ballast control system	Grease Separator
Type: HR300 Knuckle boom	Supplier: RRM	Make: Usan Marine
Performance: Max lift 8,000kg / Max reach 21.00m	Type: Part of the Integrated Automation System	Model: UGS M1-M6
Science cranes	Ballast Water Treatment System	Sewage plant
Number: 2	Make: Alfa Laval - PureBallast	Make: Wärtsilä
Make: Heila	Capacity: (Ballast) 50 – 170m ³ /h – (Deballast) 17 - 170m ³ /h	Model: STC06-13 (x2)
		Contract date: November 2015
		Launch/float-out date: July 2018
		Delivery date: 2019



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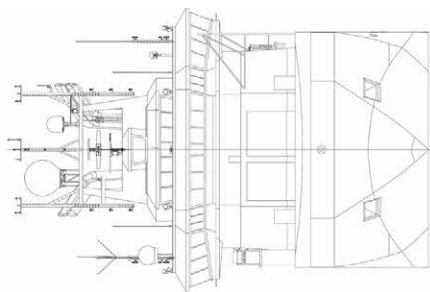
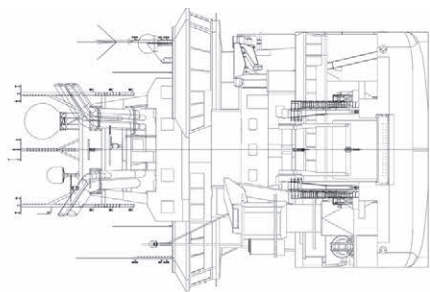
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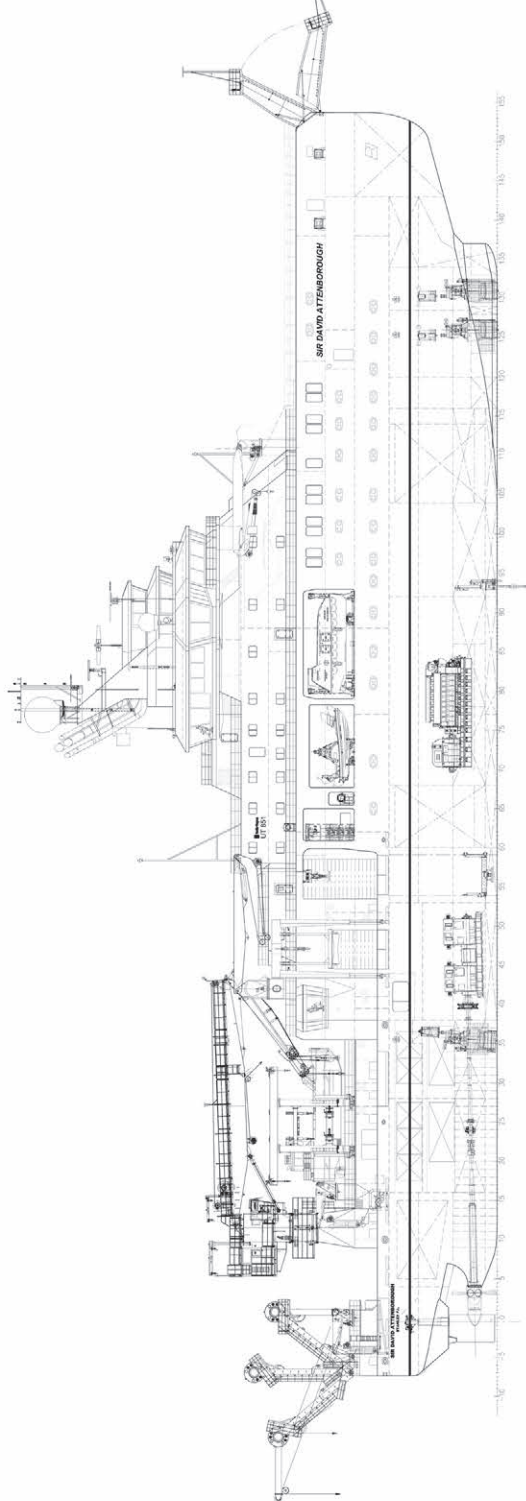
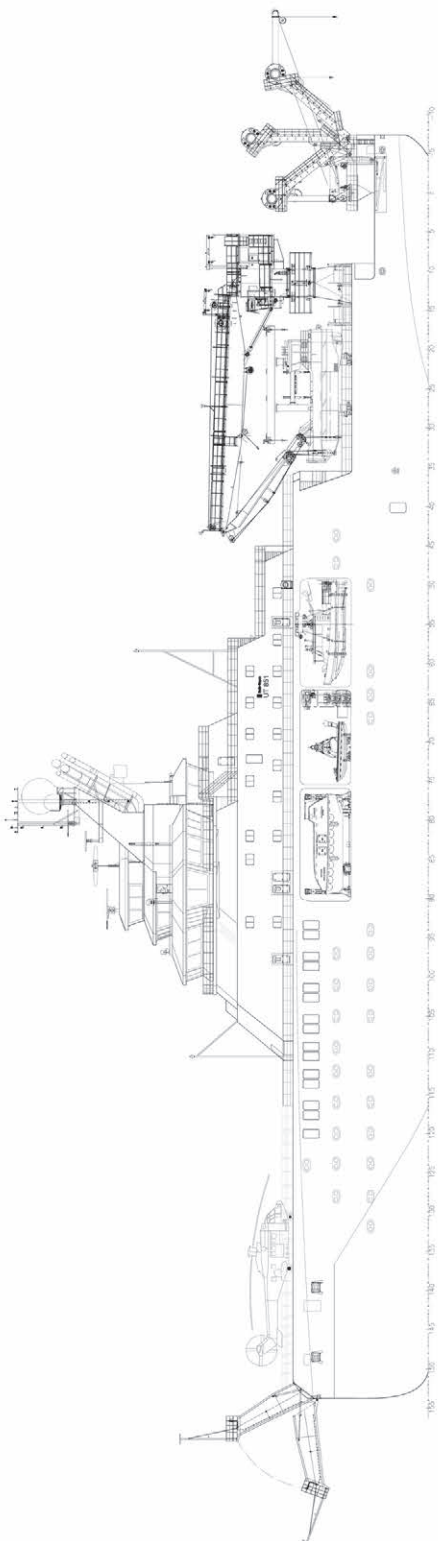
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RRS SIR DAVID ATTENBOROUGH



DECK 12
 DECK 11
 DECK 10
 DECK 9
 DECK 8
 DECK 7
 DECK 6
 DECK 5
 DECK 4
 DECK 3
 DECK 2
 DECK 1
 TANK TOP



DECK 3



SUNFLOWER SATSUMA: Ro-pax

Shipbuilder: **Japan Marine United Corporation**
 Vessel's name: **Sunflower Satsuma**
 Hull No: **5138**
 Owner/Operator: **Ferry Sunflower Ltd.**
 Country: **Japan**
 Designer: **Japan Marine United Corporation**
 Country: **Japan**
 Flag: **Japan**
 IMO number: **9797010**
 Total number of sister ships already completed (excluding ship presented): **1**
 Total number of sister ships still on order: **nil**

Built at Yokohama Shipyard Isogo Works, the 13,659gt ro-pax *Sunflower Satsuma* was delivered by Japan Marine United Corporation in April.

Outwardly the new *Sunflower Satsuma* operated by MOL subsidiary Ferry Sunflower Ltd. looks little different from the 1993-built vessel of the same name that it has replaced. Both feature the traditional Japanese ferry profile with a stern ramp and a forward side ramp although on the new vessel this has shifted from the starboard to the port side.

The vessel, which is the first of a pair, has much improved performance and has been specifically designed to help accommodate a modal shift from road to sea as Japan seeks to improve the country's environmental footprint and to deal with a national shortage of truck drivers.

Sunflower Satsuma is 192m long and 27m wide with a 6.8m draught, representing a 6m length increase and slightly larger other dimensions than the ship it replaces. The increase in hull size has allowed the vessel to accommodate 20% more trucks than the previous ship. The interior public spaces appear to have been heavily influenced by Western cruise ship design, evidenced by a large and open entrance lobby comprising a three-floor atrium, a restaurant and public baths. There is also an increased number of private cabins and luxury suites designed to attract casual cruisers. Total capacities are 709 passengers, 121 trucks and 134 cars.

The vessel has hybrid diesel/diesel-electric propulsion system that drives the ship's single contra-rotating fixed-pitch propeller using the main engines and/or electric motors. At sea the

drive is direct through a gearbox from the two SEMT-Pielstick12PC2.6B engines each rated at 8,800kW. When manoeuvring in port, the propeller is driven by two electric motors and the side thrusters are driven by power feeding from shaft generators, powered by the two main engines. The arrangement gives the ship a service speed of 23knots – the same as the ship it replaced but with a near 30% lower power and fuel requirement.

TECHNICAL PARTICULARS

Length oa: 192m
 Breadth moulded: 27m
 Depth moulded
 To main deck: 15m
 Draught
 Scantling: 6.80m
 Gross: 13,659 (Japanese)
 Deadweight
 Scantling: 5,780dwt
 Speed, service: 23.0knots

Heel control equipment:Auto heeling system
 Roll-stabilisation equipment: Fin stabiliser

Main engines
 Design: SEMT-Pielstick
 Model: 12PC2.6B
 Manufacturer:JFE Engineering Corporation
 Number: 2
 Type of fuel: HFO or MDO
 Output of each engine: 8,800kW

Propellers
 Material: Ni-Al-Bronze
 Designer/Manufacturer: Japan Marine United Corporation / Nakashima Propeller Co., Ltd
 Number: 1 x contra-rotating propeller
 Fixed/controllable pitch: Fixed
 Propulsive motors
 Number: 2
 Make/type: Nishishiba Electric Co., Ltd.

Main-engine driven alternators (for side thrusters)
 Number: 2
 Make/type: Nishishiba Electric Co., Ltd.

Diesel-driven alternators
 Number: 4
 Engine make/type: Daihatsu Diesel MFG.Co.,Ltd

Type of fuel: HFO or MDO
 Alternator make/type: Nishishiba Electric Co., Ltd.

Mooring equipment
 Number: 2 x Windlass & mooring winch, 4 x mooring winch

Make: Manabe Zoki Co., Ltd.
 Type: Electro-hydraulic driven

Vehicles
 Total cars: Trucks 121, Private cars 134
 Doors/ramps/lifts/moveable car decks

Number of each: 1 x fore side ramp, 1 x stern side ramp, 2 x removable ramp, 3 x fixed ramp

Complement
 Officers: 9
 Crew: 18
 Supernumeraries/Spare: 14

Passengers
 Total: 709
 Number of cabins: 184

Bow thrusters
 Make: Kawasaki Heavy Industries, Ltd.
 Number: 2

Stern thrusters
 Make: Kawasaki Heavy Industries, Ltd.
 Number: 2

Fire detection system
 Make: Consilium Nittan Marine Ltd.
 Fire extinguishing systems

Engine room:
 Make/Type: Kashiwa Co., Ltd. / High expansion foam

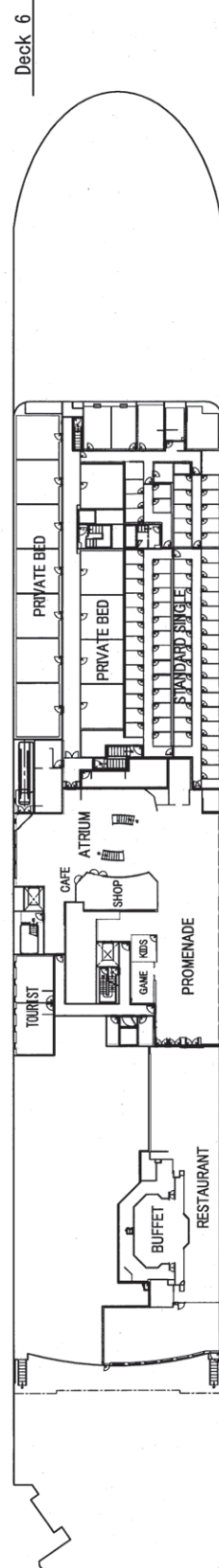
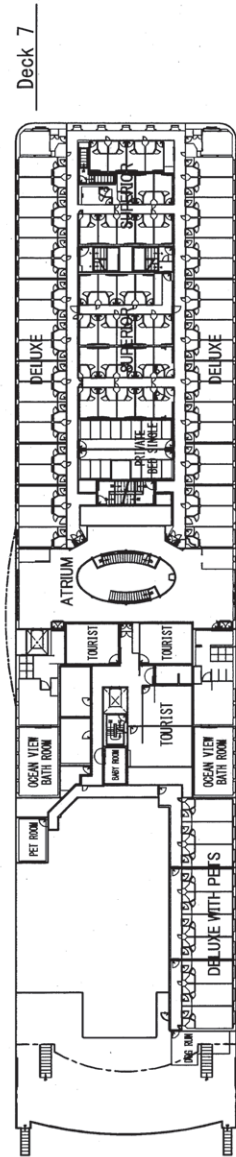
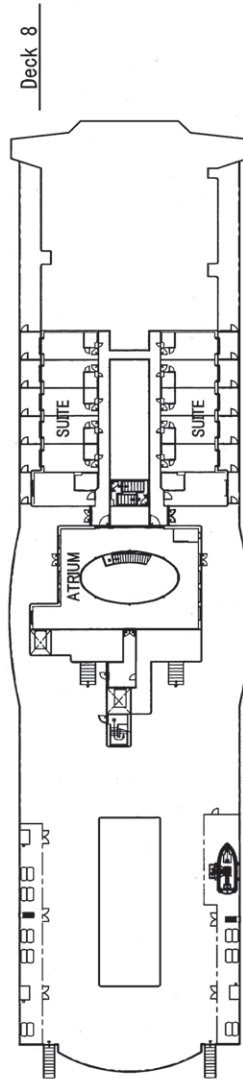
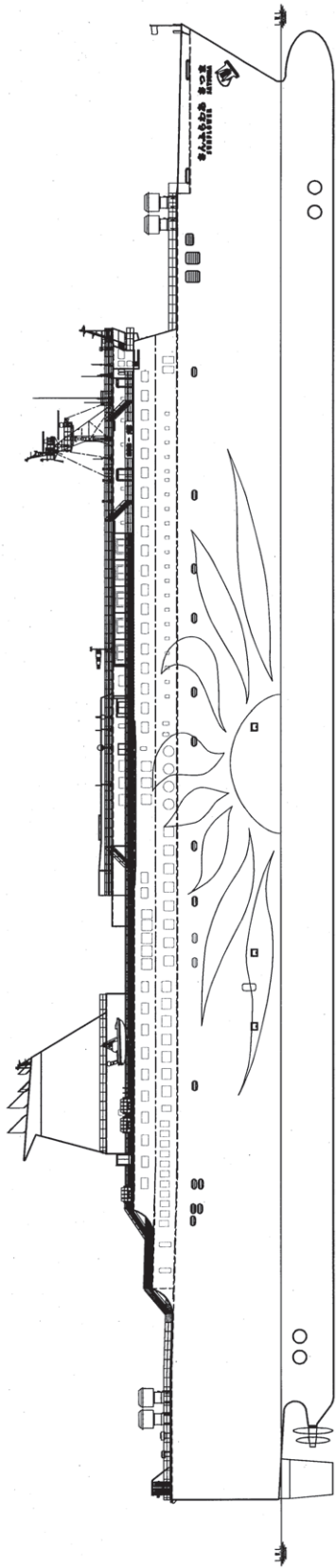
Vehicle spaces (trucks):
 Make/Type: Kashiwa Co., Ltd. / High expansion foam

Vehicle spaces (private cars):
 Make/Type: Nohmi Bosai Ltd. / Fixed water-based

Cabins:
 Type: Sea water and portable
 Public spaces:
 Type: Sprinkler sea water and portable

Radars
 Number: 2
 Make: Furuno Electric Co., Ltd
 Delivery date: 27 April 2018

SUNFLOWER SATSUMA





TITUS: Car carrier

Shipbuilder: **Tianjin Xingang Shipbuilding Heavy Industry Co., Ltd.**
 Vessel's name: **Titus**
 Hull No: **NB005-1**
 Owner/Operator: **Wallenius Wilhelmsen Ocean**
 Country: **Norway**
 Designer: **Deltamarin Ltd**
 Country: **Finland**
 Model test establishment used: **SSPA Gothenburg, Sweden**
 Flag: **Malta**
 IMO number: **9700512**
 Total number of sister ships already completed (excluding ship presented): **nil**
 Total number of sister ships still on order: **3**

When delivered by CSIC Tianjin Xingang Shipbuilding to Wallenius Wilhelmsen Ocean at the end of May, *Titus* became not only the first in its owner's new four-ship HERO series, but also the first car carrier built by the yard and the first Chinese-built car carrier in the owner's fleet.

The HERO (High Efficiency Ro-ro) class is aimed at reducing energy consumption by dramatically improving the cargo to ballast ratio. The hull form designed by Deltamarin is optimised for a service speed of 16-18knots, but an increase to 23knots is possible.

The 199.9m ship has a battleship bow form and a widened beam of 36.5m. The wider beam may not be immediately obvious but it adds stability – important in high-sided vessels such as *Titus* which has an overall height of 52m – and also allows for a lower ballast capacity increasing carrying capacity. The additional beam in relation to older Panamax designs also allows for an increase in cargo capacity from 6,500CEU to 8,000CEU with a consequent fuel cost saving of 10-15% per cargo unit.

Titus is designed to be flexible in terms of cargo types with its two-pillar hold layout, a 6.5m main deck height and a 12m wide stern ramp with a capacity of 320tonnes allowing for high and heavy vehicles and breakbulk as well as cars. There is a total of 13 car decks of which five are movable to accommodate the larger cargo types that may be carried.

The MAN B&W 8S60ME-C8.2 main engine has a power output of 14,100kW and has been tuned for low-load operation to reduce the specific fuel consumption in normal operation. The engine is directly linked to a 7.3m diameter fixed pitch propeller. A permanent magnet type shaft generator – an unusual feature on any ship – complements the three auxiliary engines; two MAN 9L21/31 units and a smaller five-cylinder model of the same bore and stroke.

TECHNICAL PARTICULARS

Length oa: 199.9m
 Length bp: 196.2m
 Breadth moulded: 36.5m
 Depth moulded
 To main deck: 14.3m
 To upper deck: 37.7m

Draught
 Scantling: 11.0m
 Design: 9.2m
 Gross: 73,358gt
 Lightweight: 22,500t
 Deadweight
 Design: 13,500dwt
 Scantling: 23,900dwt
 Block co-efficient: 0.53 at 9.2m
 Speed, service (100% MCR output): 20.0knots

Bunkers
 Heavy oil: 3,300m³
 Diesel oil: 1,400m³
 Water ballast: 8,600m³
 Classification society and notations: LR
 *100A1, Vehicle Carrier, Movable Decks, Decks no: 1, 3, 5 and 8 strengthened for the carriage of Roll on/Roll off cargoes, ShipRight (SDA, FDA, CM, ACS (B)), LI, *IWS, ECO (BWT, IHM), LMC, UMS, NAV1, IBS
 Heel control equipment: Heeling tanks, Alfa Laval Framo pumps

Main engines
 Design: MAN B&W
 Model: 8S60ME-C8.2
 Manufacturer: Yichang Marine Diesel Engine Co., Ltd.
 Number: 1
 Type of fuel: HFO or MDO
 Output of each engine: 14,100kW
 Propellers
 Material: Ni-Al-Bronze
 Designer/Manufacturer: Rolls-Royce Kamewa / Dalian Marine Propeller

Number: 1
 Fixed/controllable pitch: Fixed
 Diameter: 7,300m
 Special adaptations: Promas hub cap
 Main-engine driven alternators

Number: 1
 Make/type: We Tech Solutions Oy / NXA1450D
 Output/speed of each set: 1,500kW

Diesel-driven alternators
 Number: 3
 Engine make/type: 2 x MAN 9L21/31, 1 x MAN 5L21/31

Type of fuel: HFO/MDO
 Output/speed of each set: 2x 1,980kW / 900rpm, 1x 1,000kW/900rpm
 Alternator make/type: ABB
 Output/speed of each set: 2x 1,800kW / 1x 950kW

Boilers
 Number: 4
 Type: 1x OS / 1x Economizer ME XS-7H / 2x Economizer AE XS-TC7A
 Make: Alfa Laval (Shanghai) Aalborg
 Output, each boiler: 1x 2,000kg/h / 1x 1,500kg/h / 2x 400kg/h

Mooring equipment
 Number: 4 fwd, 4 aft
 Make: Rolls-Royce Brattvaag

Type: Electric pole-change type
 Forward mooring deck:
 2 x Windlass combined with single mooring drum and warping head
 2 x Mooring winches with double mooring drums and warping head
 Total 6 mooring drums
 Aft mooring deck:
 2 x Moring winches with double mooring drums and warping head
 2 x Mooring winches with single mooring drums and warping head
 Total 6 mooring drums

Special lifesaving equipment
 Number of each and capacity: 1 x 40
 Make: Norsafe
 Type: GES-40

Vehicles
 Number of vehicle decks: 13/5
 Total cars: 8,000 CEU
 Doors/ramps/lifts/moveable car decks
 Number of each: Quarter ramp
 320t, opening 12 x 6.5m. 5 movable car decks:
 2 wire hoisted
 Designer: TTS Marine AB

Ballast control system
 Make: Kongsberg
 Water Ballast Treatment System
 Make: Alfa Laval PureBallast 3.0
 Capacity: 600m³/h

Complement
 Officers: 14
 Crew: 10
 Supernumeraries/Spare: 14
 Suez/Repair Crew: 6

Bow thrusters
 Make: Nakashima Propeller Co., Ltd.
 Number: 1
 Output (each): 2,000kW

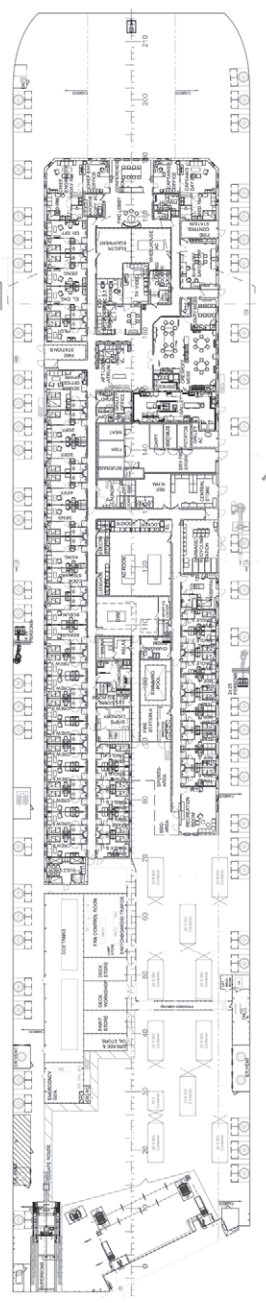
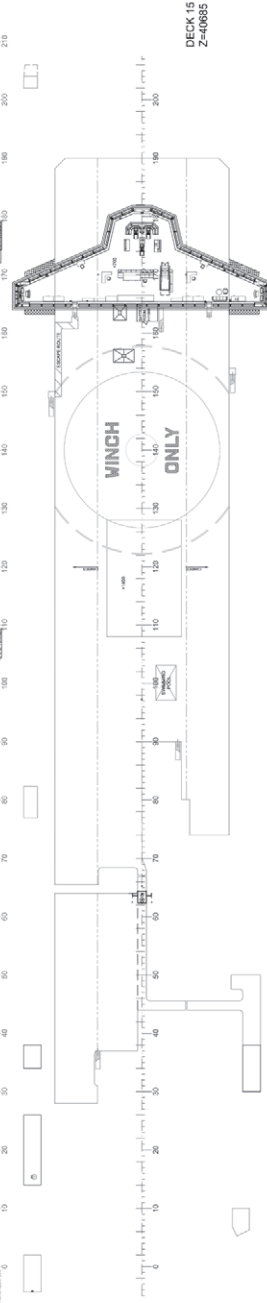
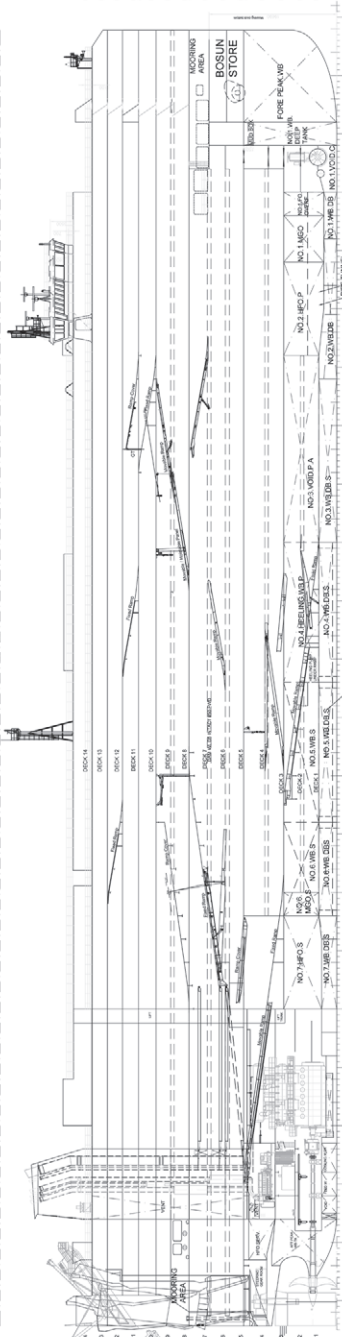
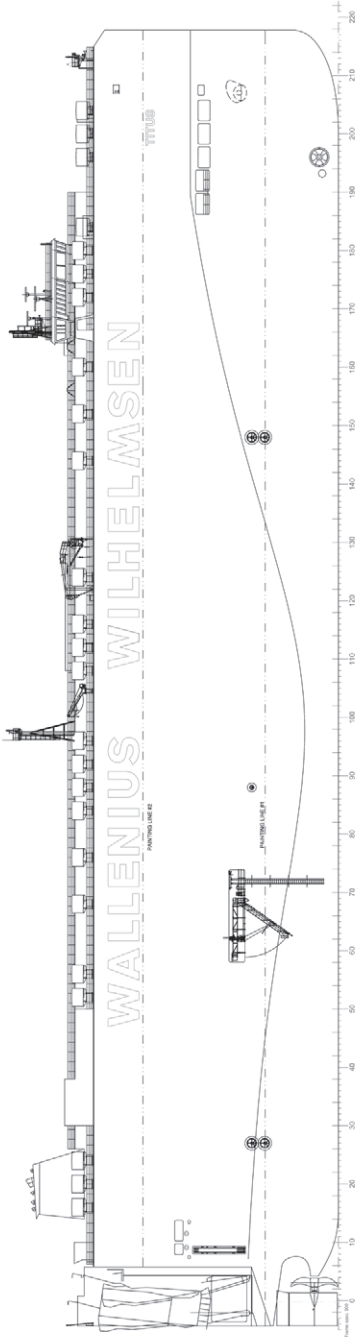
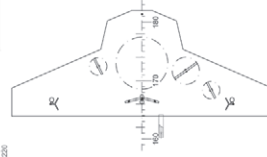
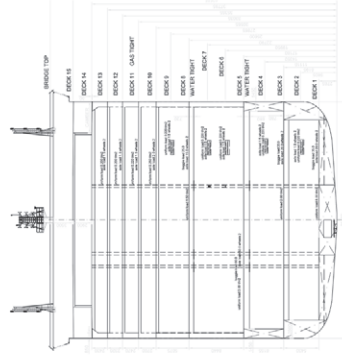
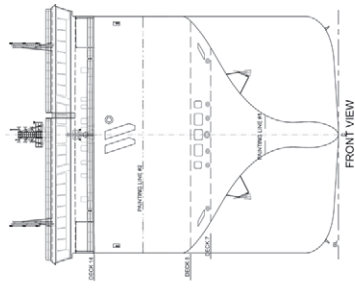
Bridge control system
 Make: Furuno
 One-man operation: Yes

Fire detection system
 Make: Consilium
 Type: Salwico

Fire extinguishing systems
 Engine room: CO₂
 Make/Type: Semco
 Vehicle spaces: CO₂
 Make/Type: Semco

Radars
 Number: 3
 Make: Furuno
 Model(s): 2 x XN24AF, 1 x SN36AF
 Integrated bridge system: Yes
 Make: Furuno

Contract date: 20 June 2013
 Launch/float-out date: 15 April 2016
 Delivery date: 31 May 2018





TROPIC HOPE: Feeder container ship

Shipbuilder: **Guangzhou Wenchong Shipyard Co., Ltd., China**
 Vessel's name: **Tropic Hope**
 Hull No: **H5629**
 Owner/Operator: **Tropical Shipping LLC, USA**
 Country: **USA**
 Designer: **Shanghai Merchant Ship Design & Research Institute (SDARI)**
 Country: **China**
 Model test establishment used: **HSVA**
 Flag: **Panama**
 IMO number: **9809904**
 Total number of sister ships already completed (excluding ship presented): **1**
 Total number of sister ships still on order: **2**

Regional container line operations do not need the leviathans that usually make the headlines. *Tropic Hope*, the first in the four-ship series of Tropical Shipping's new Carib class, is an 1,100teu SDARI feeder design which may be small by modern standards but is larger than the older vessels the new ships will replace.

Tropical Shipping claims to be the primary 'reefer-carrier' serving the Caribbean region and *Tropic Hope* and its sisters will significantly increase Tropical Shipping's capacity to bring temperature-controlled cargo to the service that connects Halifax, Palm Beach, Fla., Puerto Rico, the Eastern Caribbean and the Virgin Islands.

Containers used in the Americas are often different from the standard 20' and 40' boxes so *Tropic Hope* has been designed with this in mind. While the capacity is quoted as 1,148teu, 45' containers can be carried on the hatch covers from the third tier and 45'/49' containers can be carried on deck. The cargo hold can accommodate six tiers of 9'6" high-cube containers. Reefer containers can be stowed up to two tiers on deck and four tiers in holds; there is a total of 260 reefer plugs.

The double skin hull includes four cargo holds closed by lift-away pontoon hatch covers. An eight tiers superstructure containing the crew accommodation and wheelhouse is arranged at stern above the engine room. With cargo handling facilities at some ports being limited, the ship is equipped with two MacGregor 45-tonne cranes located on the port side.

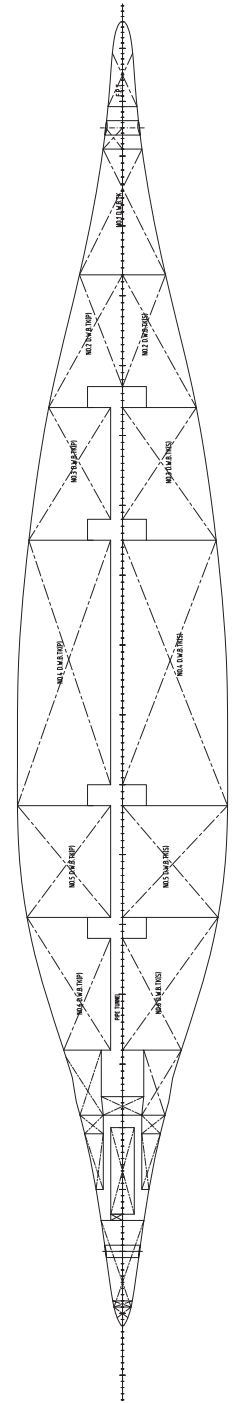
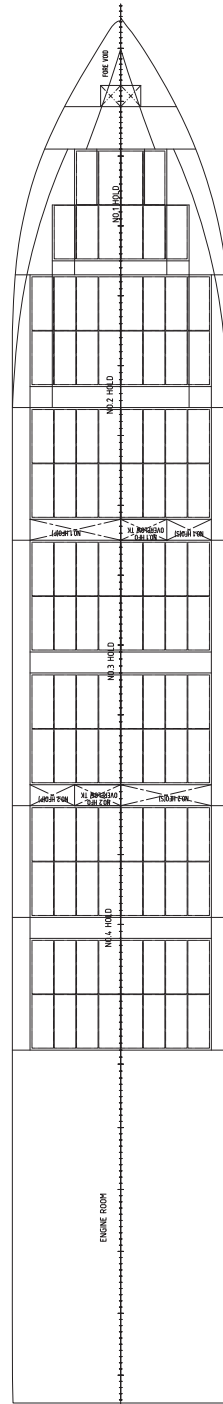
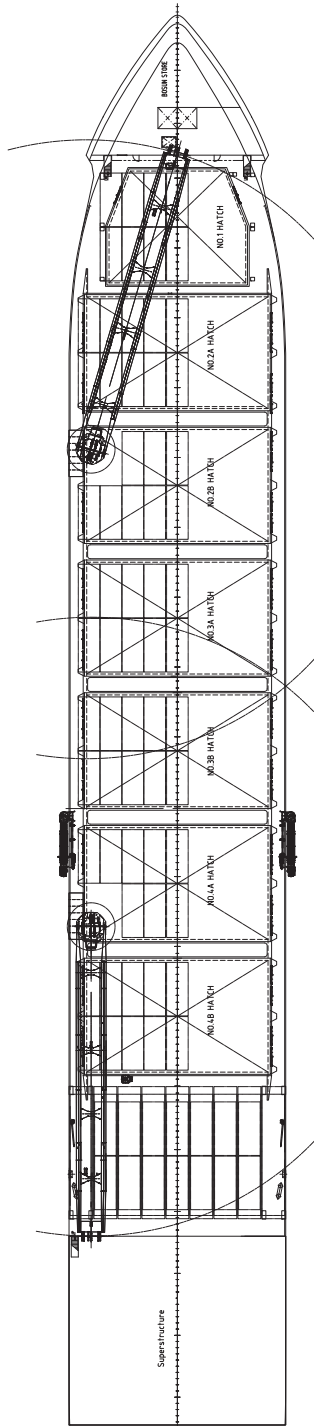
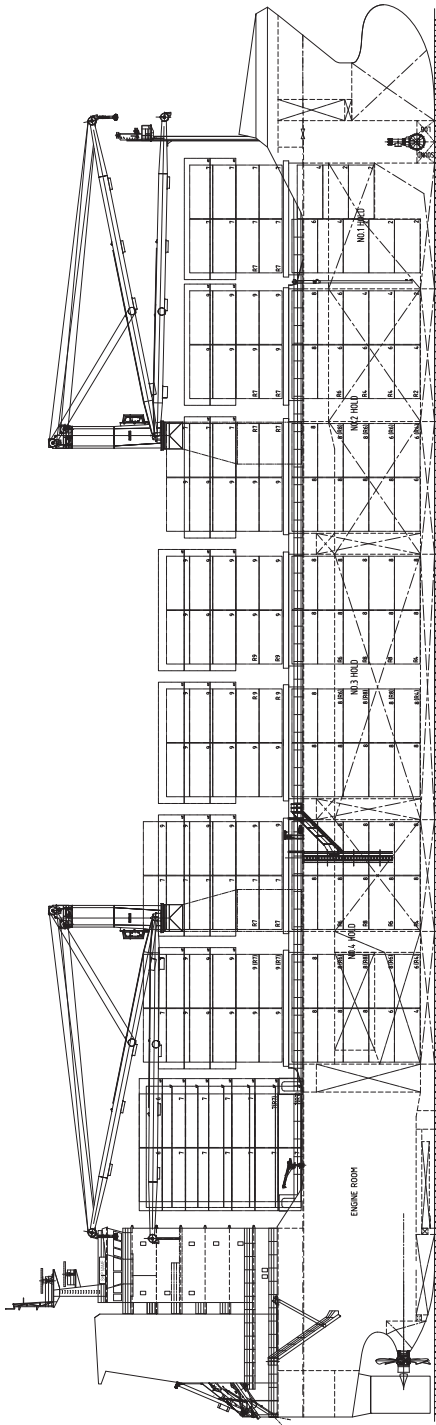
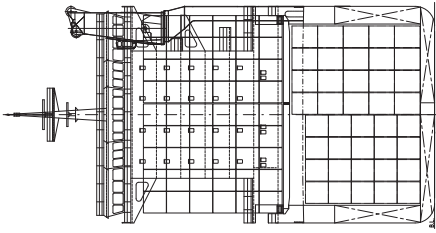
The ship is fitted with a single-acting two-stroke low-speed MAN B&W 6S60ME-C8.5 engine. A shaft generator provides electric power and with a power take in arrangement also acts as an emergency take home system. As operations are mainly inside the two US ECAs, meeting Tier III NOx levels is imperative; to achieve this the ship has a high-pressure SCR system.

Service speed is 20knots at CSR with 15% sea margin at the design draught of 8.25m.

TECHNICAL PARTICULARS

Length oa: 159.73m
 Length bp: 150m
 Breadth moulded: 24.50m
 Depth moulded
 To main deck: 14.80m
 Width of double skin
 Side: 2.00m
 Bottom: 1.60m
 Draught
 Scantling: 10.50m
 Design: 8.25m
 Gross: 15,215gt
 Displacement: 27,546t
 Lightweight: 7,220t
 Deadweight
 Design: 13,038dwt
 Scantling: 20,326dwt
 Block co-efficient: 0.6500 (design); 0.6947 (scantling)
 Speed, service (10% MCR output): 20.0knots
 Cargo capacity
 Grain: 24,735m³
 Bunkers
 Heavy oil: 1,250m³
 Diesel oil: 300m³
 Water ballast: 7,142m³
 Water ballast in loaded condition: 2,100m³
 Daily fuel consumption
 Main engine only: 51.80t/day
 Auxiliaries: 4.18t/day
 Classification society and notations: Bureau Veritas I, Container ship, Unrestricted Navigation, *Hull, *Mach, Ice Class IC, Cold DI, Manovr, SYS-NEQ-1, *AUT-UMS, AVM-APS, AUT-CCS, Comf-vib 3, Comf-noise 3, Lashing, Mon-Shaft, IN WATER SURVEY, BWT
 % high-tensile steel used in construction: 50%
 Heel control equipment: Anti-heeling system with anti-heeling pump, capacity 600m³/h
 Main engines
 Design: MAN B&W
 Model: 6S60MEC8.5 TIER II with HPSCR
 Manufacturer: Hudong Heavy Machinery Co., Ltd
 Number: 1
 Type of fuel: HFO or MGO
 Output of each engine: 14,280kW x 105rpm

Gearboxes:
 Make: Renk
 Model: SHH II-1430/985
 Number: 1
 Output speed: 71rpm (PTO), 54.8rpm (PTH)
 Propellers
 Material: Ni-Al-Bronze
 Designer/Manufacturer: MAN
 Number: 1
 Fixed/controllable pitch: Controllable
 Diameter: 6.2m
 Speed: 105rpm
 Main-engine driven alternators:
 Number: 1
 Make/type: VEM
 Output/speed of each set: 2,000kW x 1,800rpm (PTO), 1,370kW x 1,118rpm (PTH)
 Diesel-driven alternators
 Number: 3
 Engine make/type: CSSC Marine Power Co., Ltd/MAN 6L23/30H
 Type of fuel: HFO or MGO
 Output/speed of each set: 1,050kW x 900rpm
 Alternator make/type: Zhenjiang China Marine-Xiandai Generating Co., Ltd./HFC6 564-84K
 Output/speed of each set: 998kW x 900rpm
 Exhaust-gas scrubbing equipment: Yes
 Boilers
 Number: 1
 Type: Cylindrical horizontal with high pressure atomizer burner
 Make: Heatmaster
 Output, each boiler: 1,250kW
 Cargo cranes/cargo gear
 Number: 2
 Make: MacGregor
 Type: Electro-hydraulic wire luffing
 Performance: 45t x 35m
 Mooring equipment
 Number: 2 sets comb. anchor-mooring winch and 2 sets mooring winch
 Make: MacGregor Hatlapa
 Type: Hydraulic
 Special lifesaving equipment
 Number of each and capacity: 1
 Make: CSSC Lvzhou
 Type: Free-fall
 Hatch covers
 Design: TTS Hua Hai
 Manufacturer: Wen Chong shipyard
 Type: Lifting pontoon type
 Containers
 Lengths: 20'/40'/45'/49'
 Heights: 8'6"/9'6"
 Cell guides: In all the holds
 Total TEU capacity: 1,148
 On deck: 684
 In holds: 464
 Homogeneously loaded to 14t: 790
 Reefer plugs: 260
 Tiers/rows (maximum)
 On deck: 7/9
 In holds: 5/8
 Hold refrigeration system: nil
 Ballast control system
 Make: Emerson
 Type: Electro-hydraulic
 Water Ballast Treatment System
 Make: Headway
 Capacity: 600m³/h
 Complement
 Officers: 7
 Crew: 14
 Stern appendages/special rudders: Becker twisted trailing edge rudder with a bulb
 Bow thrusters
 Make: Brunvoll
 Number: 1
 Output (each): 800kW
 Stern thrusters
 Make: Brunvoll
 Number: 1
 Output (each): 600kW
 Contract date: May 2016
 Launch/float-out date: January 2018
 Delivery date: November 2018





W B YEATS: Cruise ferry

Shipbuilder: **Flensburger Schiffbau-Gesellschaft mbH & Co. KG**
 Vessel's name: **W B Yeats**
 Hull No: **771**
 Owner/Operator: **Irish Ferries Limited**
 Country: **Ireland**
 Designer: **FSG / OSK ShipTech (Interior) / Minima, Ireland (Colour, Restaurant)**
 Country: **Germany / Denmark / Ireland**
 Model test establishment used: **HSVA, Hamburg, Germany**
 Flag: **Cyprus**
 IMO number: **9809679**
 Total number of sister ships already completed (excluding ship presented): **nil**
 Total number of sister ships still on order: **nil**

Irish Ferries, the owner of the 51,388gt *W B Yeats*, like to set records although it has been a long time since its previous flagship *Ulysses* was delivered in 2001 as the largest car ferry in the world.

W B Yeats cannot claim that distinction, but it is currently the largest – and its owner claims most luxurious – ferry operating in the Irish Sea. By gross tonnage it is also the largest vessel built at Germany's Flensburger yard. Holding those two titles may be a short-lived claim to fame as six months before *W B Yeats* was due to be delivered, its owners placed an order at Flensburger for a 67,300gt cruise ferry. The finished height of the vessel meant that it was too high to be built entirely under cover so the superstructure above the main deck was built after launching.

The ship is 194.8m in length and has a beam of 31.6m. From the keel to deck 13, the ship is 38.9m high. There are two ramps: one at the stern and one at the bow. In all there are 2,800 lane meters of ro-ro capacity spread over four decks allowing for 486 cars and 187 trailers. Passenger capacity is 1,800 and in keeping with its cruise ferry status there are 435 cabins including 177 superior exterior cabins with private balconies. Other facilities include restaurants, shops and a cinema. When ordered in 2016, reports suggested the vessel would be ice-classed but the DNV GL notations given on delivery of the vessel in December do not confirm this.

The propulsion system of the vessel is powered by a quartet of MaK 8M43C medium speed engines each producing 8,000kW at 500rpm. Transmission to the twin 5.4m propellers is through two Siemens GVL 1700 gearboxes. Auxiliary power comes from four MaK 8M20C gensets each producing 1,520kW. All engines can run on HFO as the vessel is fitted with an Alfa Laval hybrid scrubber system.

TECHNICAL PARTICULARS

Length oa: 194.80m
 Length bp: 186.50m
 Breadth moulded: 31.60m
 Depth moulded
 To main deck: 10.0m
 To upper deck: 15.85m

to other decks: 7 – 21.7m, 8 – 24.5m,
 9 – 27.45m, 10 – 30.4m, 11 – 33.7m,
 12 – 37.0m, 13 – 38.9m

Width of double skin
 Side: B/5
 Bottom: B/10
 Draught
 Scantling: 6.70m
 Design: 6.50m
 Gross: 51,388gt
 Displacement: 25,315.97t
 Lightweight: 17,456.91t
 Deadweight
 Design: 7,445dwt
 Scantling: 7,859.06dwt
 Block co-efficient: 0.62
 Speed, service (84.4% MCR output): 22.5
 Bunkers
 Heavy oil: 1,225.9m³
 Diesel oil: 478.5m³
 Water ballast: 2,925.4m³
 Fuel consumption
 Main engine only: 96t/day
 Auxiliaries: 10t/day (full working load)

Classification society and notations: DNV-GL
 ✕1A Ferry(A), BIS DG(P), E0 NAUT (AW), TMON
 Heel control equipment: Yes
 Roll-stabilisation equipment: Yes

Main engines
 Design: Medium-speed diesel engine
 Model: 8M43
 Manufacturer: MaK
 Number: 4
 Type of fuel: HFO / MDO / MGO
 Output of each engine: 8,400

Gearboxes
 Make: Siemens
 Model: GVL 1700
 Number: 2
 Output speed: 129.2rpm

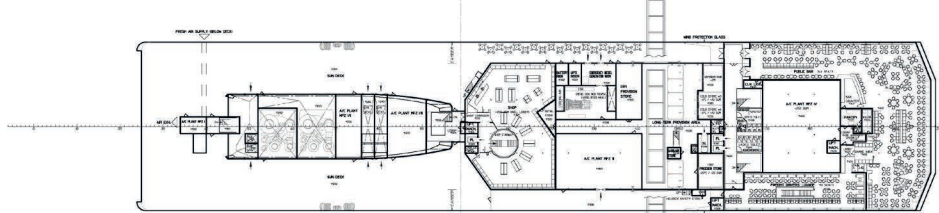
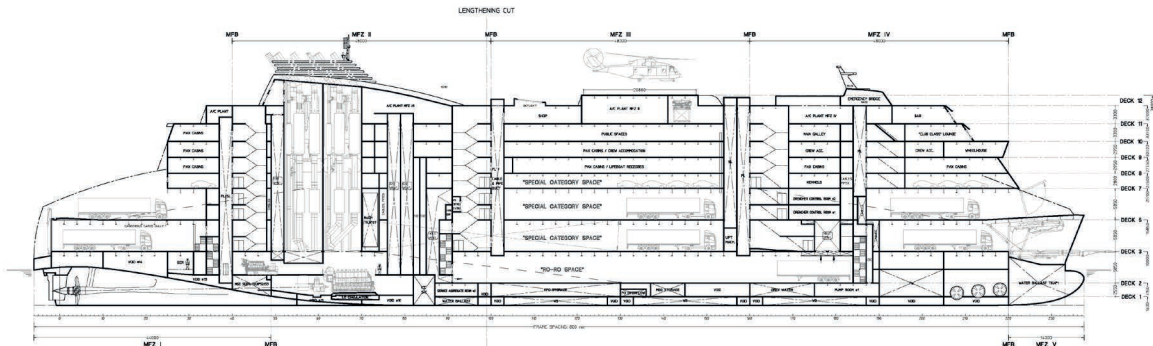
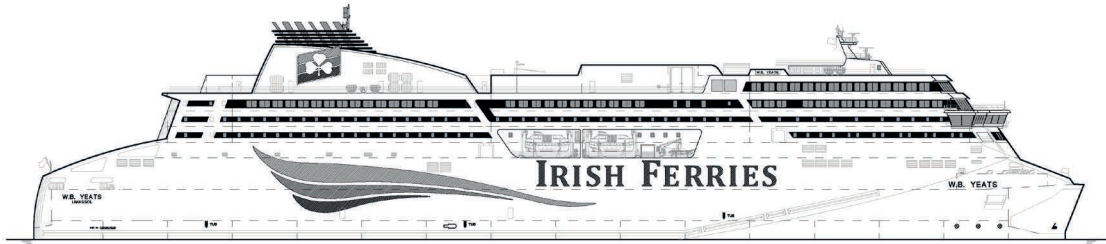
Propellers
 Material: Bronze
 Designer/Manufacturer: Caterpillar
 Propulsion

Number: 2
 Fixed/controllable pitch: Controllable
 Diameter: 5,400mm
 Speed: 129rpm

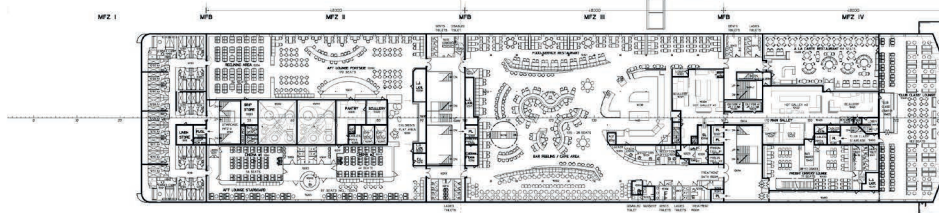
Main-engine driven alternators
 Number: 3
 Make/type: Siemens / 1DC0826-8AV02-Z
 Output/speed of each set: 2,500kVA /
 1,500rpm

Diesel-driven alternators
 Number: 4
 Engine make/type: MaK / 8M20C
 Type of fuel: HFO / MDO / MGO
 Output/speed of each set: 1,520kW /
 1,000rpm
 Alternator make/type: Leroy Somer / LSA
 53.1 S75/6P

Output/speed of each set: 1,800kVA / 100rpm
 Exhaust-gas scrubbing equipment
 Manufacturer: Alfa Laval
 Type: PureSOx U-type Hybrid System
 On main engines: Yes
 On auxiliary engines: Yes
 Boilers
 Number: x 1 Thermal Oil Heater
 Type: KOH 2.5 / 50
 Make: Konutherm
 Output, each boiler: 3,650
 Mooring equipment
 Number: 8
 Make: MacGregor / Hatlapa
 Type: Electric
 Special lifesaving equipment
 Number of each and capacity: 4 MES incl.
 150 person self-righting raft per station
 6 (150 person) additional self-righting rafts
 2 (100 person) additional self-righting rafts
 2 (50 person) additional self-righting rafts
 Make: Viking
 Type: VEMC
 MES Vertical / sloping chutes: Vertical
 Vehicles
 Number of vehicle decks: 4
 Total lane length: 2,800 (excluding dedicated car deck)
 Total cars: 486 (incl. 2 x 96 with hoistable car decks employed reducing 868lm)
 Total freight units (specify size): 187 drop trailers (13.5m)
 Doors/ramps/lifts/moveable car decks
 Number of each: 4 / 4 / 7 / 1
 Type: shell/3 fixed, 1 tilttable/passenger & service/hoistable
 Designer: MacGregor/Lutz
 Water ballast Treatment System
 Make: Optimarin
 Capacity: 500m³/h
 Complement
 Officers: 20
 Passengers
 Total: 1,800
 Number of cabins: 435
 Percentage/number outboard: 177
 Stern appendages/special rudders: 2 flap-type rudders
 Bow thrusters
 Make: Brunvoll
 Number: 3
 Output (each): 1,800kW
 Bridge control system
 Make: Kongsberg
 Type: K-bridge
 Fire detection system
 Make: Consilium
 Type: Salwico Cruise
 Fire extinguishing systems
 Cargo holds: Water drenching
 Make/Type: FSG
 Engine room: Water mist
 Make/Type: HiFog
 Vehicle spaces: Water drenching
 Make/Type: FSG
 Cabins: Water mist
 Make/Type: HiFog
 Public spaces: Water mist
 Make/Type: HiFog
 Radars
 Number: 2
 Make: Kongsberg
 Model(s): X-band and S-band
 Integrated bridge system: Yes
 Make: Kongsberg
 Model: K-bridge
 Waste disposal plant
 Waste compactor
 Make: Delitek
 Model: DT-200MCP
 Waste shredder/crusher
 Make: Delitek
 Model: DT-200GCP
 Sewage plant
 Make: Hamann
 Model: HL-Cont PLUS 80 & HL-Cont PLUS 40
 Contract date: 26 May 2016
 Launch/float-out date: 19 January 2018
 Delivery date: 12 December 2018

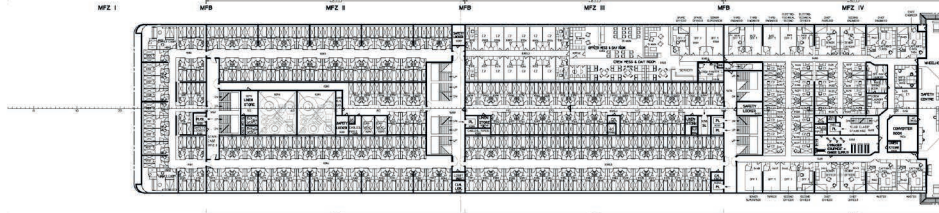


TYPE	QTY
PERIST GALLERY (LOUNGE UPPER LEVEL)	100 m ²
PUBLIC AREA	344 m ²
TOTAL SEATING CAPACITY	434 m ²
NOOP	>1000 m ²



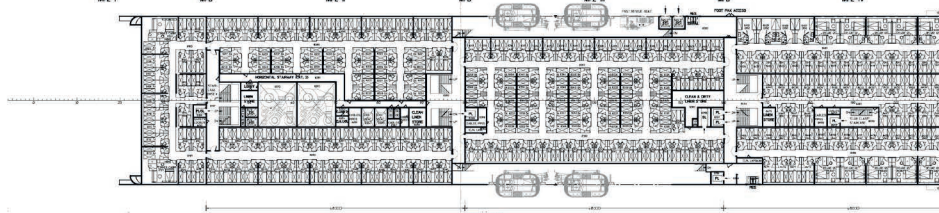
TYPE	QTY
YOUNG SLAUGHT LOUNGE	102 m ²
PERIST GALLERY (LOUNGE LOWER LEVEL)	74 m ²
A LA CARTE RESTAURANT	100 m ²
FOOD SERVICE RESTAURANT	104 m ²
BAR TERRACE / CAFE AREA	128 m ²
ART LOUNGE PORTICUS	102 m ²
INCLUDING AREA	98 m ²
ART LOUNGE STAIRWELL AND TERRACE AREA	97 m ²
CORRIDOR	100 m ²
TOTAL SEATING CAPACITY DECK 10	1088 m ²

TYPE	QTY
4-BEDDTH PASSENGER CABINS OUTSIDE	19 m ²
2-BEDDTH PASSENGER CABINS OUTSIDE	7 m ²
4-BEDDTH PASSENGER CABINS INSIDE	6 m ²

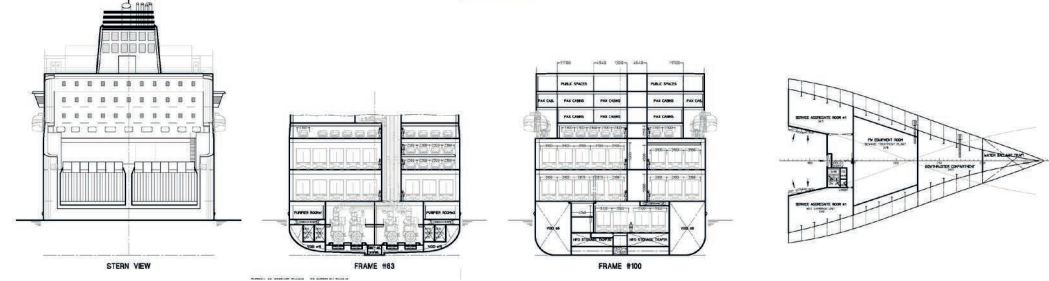


TYPE	QTY
CAPTAINS CLASS CABINS	4 m ²
OWNER OFFICER CABINS	4 m ²
OFFICER CABINS	10 m ²
STEWARDS DECK CABINS (SMALL BERTHS)	25 m ²
STEWARDS DECK CABINS (DOUBLE BERTHS)	25 m ²

TYPE	QTY
4-BEDDTH PASSENGER CABINS OUTSIDE	48 m ²
4-BEDDTH PASSENGER CABINS INSIDE	8 m ²
2-BEDDTH PASSENGER CABINS OUTSIDE	7 m ²
2-BEDDTH PASSENGER CABINS INSIDE	12 m ²



TYPE	QTY
4-BEDDTH PASSENGER CABINS OUTSIDE	79 m ²
4-BEDDTH PASSENGER CABINS INSIDE	8 m ²
2-BEDDTH PASSENGER CABINS OUTSIDE	7 m ²
2-BEDDTH PASSENGER CABINS INSIDE	15 m ²
DISABLED PASSENGER CABINS	4 m ²
OFFICER CABINS	10 m ²
PRESIDENTIAL SUITES	3 m ²





YUAN HE HAI: Very large ore carrier

Shipbuilder: **Shanghai Waigaoqiao Shipbuilding Co., Ltd.**
 Vessel's name: **Yuan He Hai**
 Hull No: **H1438**
 Owner/Operator: **China Ore Shipping**
 Country: **China**
 Designer: **Shanghai Merchant Ship Design & Research Institute (SDARI)**
 Country: **China**
 Model test establishment used: **SINTEF in Norway**
 Flag: **Singapore**
 IMO number: **9806873**
 Total number of sister ships already completed (excluding ship presented): **20**
 Total number of sister ships still on order: **30**

strength was specially designed as per IMSBC code and Class requirements.

TECHNICAL PARTICULARS

Length oa: 361.90m
 Length bp: 355m
 Breadth moulded: 65m
 Depth moulded
 To main deck: 30.40m
 To upper deck: 30.40m
 Draught
 Scantling: 23m
 Design: 23m
 Gross: 203,403gt
 Displacement: 453,463.2t
 Lightweight: 54,868.0t
 Deadweight
 Design: 398,595.2dwt
 Scantling: 398,595.2dwt
 Block co-efficient: 0.8323 @ 23.0
 Speed, service (85% MCR output): 14.5knots

Cargo capacity
 Grain: 212,627.7m³
 Bunkers
 Heavy oil: 8,490.3m³
 Diesel oil: 1,493.3m³
 Water ballast: 267,811.2m³
 Daily fuel consumption
 Main engine only: 79.5t/day
 Auxiliaries: 6.6t/day

Classification society and notations: . DNV & CCS
 DNV GL: ✕ 1A1 Ore carrier BIS BWM(E(s), T)
 Clean COAT-PSPC(B; D) CSA(2) E0 EL(2) ESP
 Gas ready(D, MEC, S) HMON(A1, C, E1, G4, O1, S1, W1) IB-3 NAUT(OC) NAUTICUS(Newbuilding)
 OPP-F Shore power TMON / CCS: ★CSA Ore Carrier Crew Accommodation (MLC); FL(25); HMS; Grab*(30); DFDR(H,m); EL100; TOFD/PAUT (40%); FTP; ESP; In-Water Survey; ERS; Strengthened for Heavy Cargoes; BWMP; Loading Computer (S, I); COMPASS (R,D,F); PSPC(B,D); CM;AMPS; BWMS; EEDI(I) VL

% high-tensile steel used in construction: about 88%

Main engines
 Design: MAN B&W
 Model: 7G80ME-C9.5-TII
 Manufacturer: CSSC-MES Diesel Co.,Ltd.
 Number: 1
 Type of fuel: HFO/MDO/MGO
 Output of each engine: ... 24,200kW x 58rpm

Propellers
 Material: Ni-Al-Bronze
 Designer/Manufacturer: Shanghai Marine Propeller Design Co., Ltd.
 Number: 1
 Fixed/controllable pitch: Fixed
 Diameter: 11.20

Diesel-driven alternators
 Number: 3
 Engine make/type: Anqing CSSC Diesel Engine Co.,Ltd
 Type of fuel: HFO/MDO/MGO
 Output/speed of each set: 1,345kW/900rpm
 Alternator make/type: ZhenJiang China Marine-XianDai Generating Co.,Ltd
 Output/speed of each set: 1,250kW/900rpm

Boilers
 Number: Steam Boiler: 1 x Exhaust Gas Boiler, 1 x Oil Fired Boiler
 Type: Smoke tube; water tube
 Make: Jiujiang Haitan Equipment Manufacture Co., Ltd
 Output, each boiler: E/G boiler: 2,226kg/h (at NCR of M/E and one A/E at normal under ISO condition); O/F boiler: 3,500kg/h

Other cranes:
 Number: 2
 Make: Weihe Marine Equipment Co.,Ltd.
 Type: C004-00
 Tasks: Provision crane
 Performance: 10t 4.4-22m

Mooring equipment
 Number: 10
 Make: WMMP
 Type: Electro-hydraulic

Special lifesaving equipment
 Number of each and capacity: ... 1, 33 persons
 Make: ZheJiang HengXin Ship Equipment Co.,Ltd
 Type: Free-fall lifeboats

Hatch covers
 Design: TTS Hua Hai
 Manufacturer: TTS Hua Hai Ships Equipment Co., Ltd
 Type: Side rolling type

Cargo tanks
 Number: 7
 Ballast control system
 Make: Jiangsu Nanji Machinery Co.,Ltd.
 Type: NB-3000
 Water ballast Treatment System
 Make: Jiangsu Nanji Machinery Co.,Ltd.
 Capacity: 3,000m³/h
 Complement
 Officers: 17
 Crew: 15
 Suez/Repair Crew: 6

Bridge control system
 Make: JRC
 One-man operation: Yes

Fire detection system
 Make: Tyco

Fire extinguishing systems
 Engine room: ... HiFoam system / Local water mist system
 Make/Type: Wilhelmsen Technical Solutions/High expansion foam.
 Seaplus Co.,Ltd./ Fixed water-based local application

Cabins: CO₂
 Make: Seaplus Co.,Ltd.

Radars
 Number: 2
 Make: JRC
 Model(s): JMR-9230
 Integrated bridge system: Yes
 Make: JRC

Waste disposal plant
 Incinerator
 Make: Sunflame Co. Ltd.
 Model: OSV-900SAI

Sewage plant
 Make: CSSC Nanjing Luzhou Machine Co.,Ltd
 Model: STC-3
 Contract date: 31 March 2016
 Launch/float-out date: 29 September 2017
 Delivery date: 18 January 2018

SIGNIFICANT SHIPS OF 2019

A publication of The Royal Institution of Naval Architects

The thirtieth edition of our annual Significant Ships series, *Significant Ships of 2019*, will be published in February 2020. As in previous editions we shall be including up to 50 of the most innovative and interesting commercial ship designs (of mostly 100m length and above) which will be delivered during the forthcoming year.

The Editor invites shipbuilders, designers and owners to submit details of vessels for possible inclusion in *Significant Ships of 2019*. Presentation will follow on the established two-page format, with a colour photograph, descriptive text and tabular details (including major equipment suppliers) on the first page, followed by a full page of technical general arrangement plans. Initial potential entries should comprise a short technical description (100 words) of the proposed vessel highlighting the special features and the delivery date.

All entries should be addressed to:

Editor, *Significant Ships of 2019*,
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Tel: +44 (0) 20 7235 4622 Fax: +44 (0) 20 7245 6959 Email: editorial@rina.org.uk

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VIKING LifeCraft™



VIKING Norsafe E-GES



VIKING VEC Plus™



VIKING SES-2A, 81 m

New evacuation choices?

Talk to the innovation experts

We pride ourselves on leading the race to design better evacuation systems. And we've got the products to prove it.

Like the modular design and reliability of VEC Plus™ evacuation systems for passenger ships. Or the SES offshore systems for evacuation up to 80 meters high.

Or what about extra-safe, electrically powered lifeboats like the VIKING Norsafe E-GES or the revolutionary VIKING LifeCraft™ System that combines the best of lifeboats and liferafts in one?

And of course, every VIKING evacuation solution is fully documented and backed by certified, OEM-approach service capabilities.

Contact your local VIKING representative today to learn more.



VIKING LIFE-SAVING EQUIPMENT

- Protecting people and business

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