SIGNIFICANT SHIPS OF 2024

A PUBLICATION OF THE ROYAL INSTITUTION OF NAVAL ARCHITECTS www.rina.org.uk/sigships

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AN YUN – Eco chemical/oil tanker for CPC Corporation

Shipbuilder:	**CSBC Corporation**
Designer:	**CSBC Corporation**
Vessel's name:	***An Yun***
Owner/Operator:	**CPC Corporation**
Country:	**Taiwan, China**
Flag:	**Republic of China**
Total number of sister ships already completed:	**0**
Total number of sister ships still on order:	**0**
Contract date:	**July 2022**
Delivery date:	**November 2024**

An Yun is a chemical/oil tanker that has been designed and constructed by CSBC and features energy-saving adaptations to enhance its performance.

One of the main energy-saving features of the vessel is at the ship's stern, which employs a self-developed and patented energy-saving T-Fin, which can save approximately 3% in fuel consumption at design draught, and about 2.8% when fully loaded. At a ship speed of 14knots (BF0) at design draught, the vessel has an endurance of approximately 17,000nm.

In addition, the vessel is equipped with a shore power system, allowing for the shutdown of onboard generators while docked to reduce air pollution within the harbour.

An Yun represents a new design that complies with the Common Structural Rules for Double Hull Tankers, with fuel tanks also utilising a double-hull structure for protection, meeting the latest pollution prevention and structural safety standards. HSVA in Germany conducted model testing for the vessel.

The main engine uses an electronically controlled ignition system, which is fuel-efficient and energy-saving. Both the main engine and generators meet the latest NOx emission control requirements. Additionally, the design employs a low-sulphur fuel system.

Further environmental adaptions have been made through the installation of a ballast water treatment system that effectively controls and treats seawater microorganisms and sediments for pollution prevention. An electric hydraulic cargo oil system helps the ship to meet low noise requirements for port operations. There is also a hydraulic system with independent cargo oil pumps (one pump per tank), and special coatings are applied inside the cargo oil tanks to further optimise the vessels energy efficiency.

Due to these adaptations, the vessel's Energy Efficiency Design Index (EEDI) can reach 30% below the baseline, complying with Phase III requirements, CSBC Corporation says.

With safety in mind, *An Yun* also carries a pair of 25-person lifeboats, manufactured by Qingdao BeiHai Boatbuilding Co, both powered by diesel engines.

TECHNICAL PARTICULARS

Length, oa	183.5m
Length, bp	175.44m
Breadth, moulded	32.2m
Depth, moulded	19.8m
Gross tonnage	31,024
Design draught	11m
Lightweight	50,000tonnes (approx.)
Service speed	14knots
Cargo capacity	53,784.13m^3 (liquid volume)

Main engine(s):

Design	MAN B&W
Model	5S50ME-C10.6
Manufacturer	HSD
Number	1
Output of each engine	6,850kW@117rpm

Propeller(s)

Material	Ni-Al-Bronze
Designer/Manufacturer	CSBC/ Nakashima Propeller Co
Number	1
Diameter	6.1m
Fixed/Controllable pitch	Fixed

Diesel-driven alternators:

Number	3
Engine make/type	6EY18ALW
Type of fuel	HFO
Alternator make/type	Yanmar
Output/speed of each set	720kW

Boilers:

Number	1
Type	Vertical oil-fired marine boiler
Make	Kangrim Heavy Industries
Output, each boiler	1,800kg/hr

Deck Machinery:
Mooring equipment

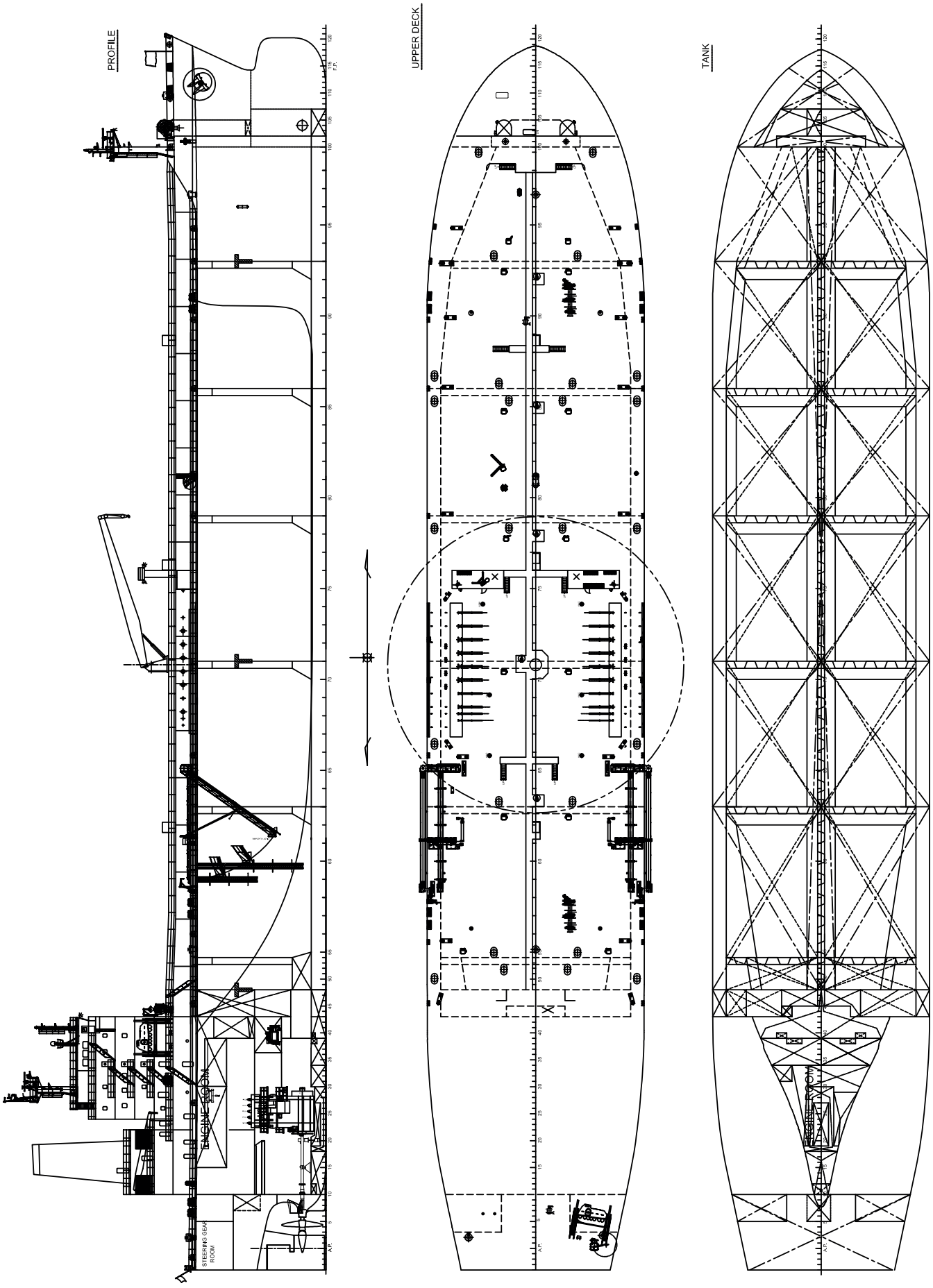
Number	7
Make	Flutek Ltd
Type	Electric

Complement

Number of officers	13
Number of crew	10
Number of passengers	0

Classification society	CR Class Society /Lloyd's Register
Notations	CR : 100+E, Oil / Chemical tanker(Type 3 Ship), CMS(CAU)+, PCM, PMS, CSR, ESP, PSPC, PMA, IWS, LCS, IGS, CCB, VEC, PP, SRE, NR-II
	LR : ✠100A1 Double Hull Oil and Chemical Tanker, Ship type 3, ESP, CSR, LI, *IWS, SHIPRIGHT (ACS (B), CM), ✠LMC, UMS, IGS, ECO, BWTS, SPM4

AN YUN



ANE MÆRSK – First methanol-fuelled containership for Maersk

Shipbuilder:..... **Hyundai Heavy Industries, Korea**
Designer:..... **Hyundai Heavy Industries, Korea**
Vessel's name:..... ***Ane Mærsk***
Owner/Operator:..... **Maersk**
Country:..... **Denmark**
Flag:..... **Denmark**
Total number of sister ships already completed:..... **9 (per Feb 2025)**
Total number of sister ships still on order:..... **2 (total series is 12 ships)**
Contract date:..... **August 2021**
Delivery date:..... **January 2024**

Ane Mærsk is the world's first dual-fuelled methanol mainliner container ship, having a nominal container capacity of 16,592TEU. It is the first in a series of 12 sister ships built at Hyundai Heavy Industries in Ulsan, Korea.

This vessel represents a significant step towards net-zero greenhouse gas emissions in container transport. When operating on green methanol, *Ane Mærsk* can save approximately 280tonnes of CO_2 per day compared to conventional vessels using heavy fuels. With all 12 sister ships in operation, the annual CO_2 savings will be around 1.5 million tonnes.

Ane Mærsk features an innovative design with accommodation at the bow and the funnel at the stern, a first for a container ship of this size. Despite similar dimensions to conventional 15,000teu vessels, she can carry over 1,000 additional teu, even after allocating one cargo hold bay for methanol storage tanks. The total methanol capacity is 16,000m^3 in two tanks forward of the engine room.

One challenge with the forward accommodation was ensuring the torsional strength of the 'open shoebox' hull. This was addressed in the structural design, resulting in deformation levels and hatch cover designs similar to conventional 15,000teu.

Transient vibrations from slamming impacts are mitigated by the bow shape with a vertical stem and the integrated design of bulwark and accommodation.

The main and auxiliary engines are methanol dual-fuel types. The main engine is a MAN 8G95ME-C10.5-LGIM, a significant upgrade from the previously largest methanol engine (G50). Electrical power is provided by a 4MW Wärtsilä shaft generator and four Himsen H32DF-LM generator sets, providing a total of 16.5MW. The vessel has 2,000 reefer plugs, approximately 40% of which are located in the holds, which are equipped with both air- and water-cooling systems.

Ane Mærsk is equipped with shore power connection (AMP), refrigerants with reduced global warming potential, enhanced insulation of external walls and windows, LED lights, VFD-control and high-efficiency electric motors. Manoeuvring capability is ensured by a large full-spade high-efficiency rudder and two 1,800kW tunnel thrusters at both bow and stern.

TECHNICAL PARTICULARS

Length, oa 350.6m
Length, bp 343.2m
Breadth, moulded 53.5m
Depth, moulded 33.2m
Gross tonnage 172,093
Displacement ..... 221,700m^3 (summer load)
Design, draught ..... 17m (summer load)
Design, deadweight ..... 174,000dwt (summer load)
Lightweight 47,700tonnes
Max speed 21knots
Range ..... 23,000nm (in methanol mode)

Propulsion
Main engine(s):
Number of engines 1
Make ..... MAN B&W
Model 8G95ME-C10.5-LGIM
Output of each engine 44,187kW

Propeller(s):
Number of propellers 1
Make ..... Nakashima
Model ..... Solid keyless
Diameter 10m
Material ..... Ni-Al-Bronze
Number of blades 5
Speed ..... 74.4rpm (corresponding to MCR)
Fixed/controllable pitch ..... Fixed
Open/nozzled ..... Open
Special adaptations ..... Pre-swirl device

Deck machinery and bridge electronics
Winch(es):
Number of winches ..... 8 fwd + 8 aft
Make ..... Flutek
Model EMWR/L300D1
Capacities ..... 30tonnes@15m/min

Other deck machinery/equipment: ..... 6 x 1tonne capstans

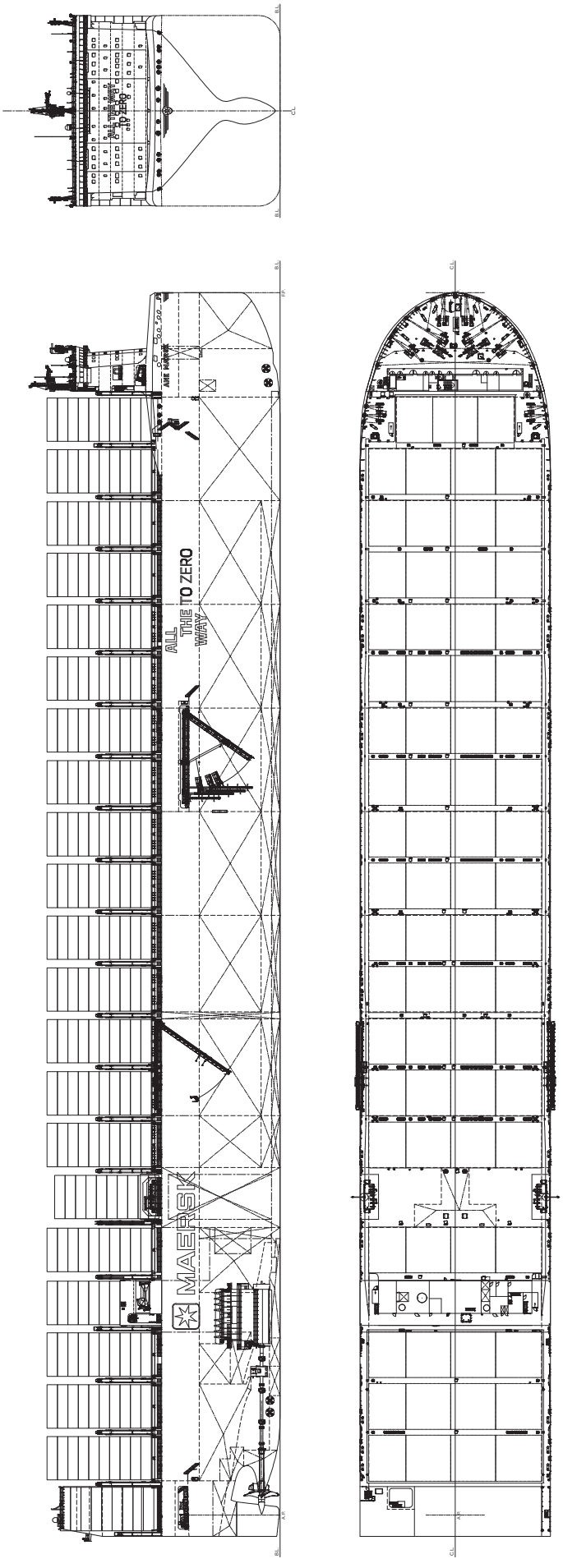
Bridge electronics
Radar(s) ..... JRC / JMR-9296-6X / JMR-9282-S
Autopilot ..... YDK / PT900A
GMDSS ..... JRC / JHS-800S / JSS-2250
GPS ..... SAAB / R6
Gyro ..... YDK / Dual FOG-50
Chart plotter ..... JRC / JAN471A NeCST
Engine monitoring system ..... Triton
Fire detection system ..... Consilium/ Salwico Cargo
Other communication systems ..... VSAT / Sailor 1000 XTR

Onboard capacities:
LFO/MGO/ULSFO ..... 6,200m^3
Methanol ..... 16,000m^3
Fresh water ..... 600m^3
Sullage ..... 72m^3 (treated sewage and grey water tank)
Ballast water ..... 49,600m^3

Complement:
Number of crew ..... 28 (+ 6 Suez Canal crew)
Number of passengers 0
Number of cabins 30

Classification
Classification society ..... ABS
Notations ..... ✠A1, Container Carrier, (E), ✠AMS, ✠ACCU, RW, SH, SHCM, SH-DLA, SFA(25), FL(25), CPS, TCM, ESA, NIBS, UWILD, RRDA,POT, FOC, CRC(SP), SLAM-B, SLAM-S, CS-Ready,LFFS(DFD-Methanol), IHM, EGC-EGR, Selev

Other important international regulations complied with:
IMO Res. MSC.391(95), International Code of Safety for Ships Using Gases or Other Low-Flashpoint Fuels (IGF code), IMO MSC.1/Circ.1621 Interim Guidelines for the Safety of Ships Using Methyl/Ethyl Alcohol as Fuel


ALL THE WAY TO ZERO
MAERSK

ARTEMIS & MAY LOUISE – Compact but powerful tugboat duo

Shipbuilder:	**Master Boat Builders**
Designer:	**Robert Allan Ltd**
Vessel's name:	***Artemis* & *May Louise***
Owner/Operator:	**G&H Towing Company**
Country:	**US**
Flag:	**US**
Total number of sister ships already completed:	**2**
Total number of sister ships still on order:	**2**
Contract date:	**Unspecified**
Delivery date:	**June 2024 (*May Louise*) / August 2024 (*Artemis*)**

The tugs *Artemis* and *May Louise*, delivered to G&H Towing Company, over the summer of 2024, were designed by Robert Allan Ltd (RAL) and constructed by Master Boat Builders Inc, each designed to excel in its role thanks to several outstanding features. Measuring 30m in length, these tugboats are compact but incredibly powerful, making them ideal for a variety of maritime operations.

One of the most impressive and significant features of these tugboats is their bollard pull capability. With a bollard pull in excess of 85tonnes, *Artemis* and *May Louise* are capable of handling some of the most demanding towing tasks. For example, this immense power ensures that they can manoeuvre large vessels with ease, even in challenging weather conditions and sea states.

"The design has also proven to provide excellent escort performance in combination with superior seakeeping by the blending of two RAL innovations: the Z-Tech configuration and the RAstar class' sponsons," RAL says. The designer adds that the duo achieved a maximum escort braking force of 138tonnes and a maximum steering force of 97tonnes at an escort speed of 10knots. "These capabilities are crucial for ensuring the safe and efficient movement of vessels in congested or restricted waters," RAL says.

In addition to their towing and escorting capabilities, *Artemis* and *May Louise* are equipped with FiFi 1 capability, including foam fire suppression systems. This feature enhances their versatility, allowing them to respond to maritime emergencies and provide critical support in firefighting operations. The tugs are also outfitted with powerful electrical winches with brake holding loads of up to 315tonnes, to ensure optimal performance and safety. "The advanced navigation and communication systems, powerful engines and robust hull designs not only enhance the operational capabilities of the tugboats but also ensure the safety and comfort of the crew," says RAL.

TECHNICAL PARTICULARS

Length, oa	30m
Breadth, moulded	13m
Depth, moulded	5.08m
Gross tonnage	406
Displacement	820.3tonnes
Design, draught	4.07m
Design, deadweight	219tonnes
Lightweight	601.7tonnes
Deck space (total)	34m^2
Deck capacity	3tonnes/m^2
Service speed	13knots
Bollard pull	87tonnes
Range	2,300nm

Propulsion

Main engine(s):

Number of engines	2
Make	Caterpillar
Model	3516E
Output of each engine	2,610kW

Gearbox(es):

Number of gearboxes	2
Make	Lufkin
Model	MV1600S
Output speed	900rpm

Propeller(s):

Number of propellers	2
Make	Schottel
Model	SRP 510FP
Diameter	2.8m
Material	G-X2CrNi19-11
Number of blades	4
Speed	230rpm
Fixed/controllable pitch	Fixed
Open/nozzled	Nozzled

Winch(es):

Number of winches	1
Make	Markey
Model	DESF-48A-100
Capacities	Brake performance: 315tonnes at barrel layer

Bridge electronics:

Radar(s)	Furuno/FAR-1518
GMDSS	ICOM/IC-F6061D
GPS	Furuno/FA-170
Fire detection system	Fire Protection Service Inc.

Onboard capacities:

Fuel oil	160m^3
Fresh water	25m^3
Sullage	3.6m^3
Ballast water	110m^3

Complement:

Number of crew	6
Number of passengers	0
Number of cabins	4

Classification

Classification society	ABS
Notations	✠A1, Towing Vessel, Escort Vessel, FFV1 ✠ AMS, LEV(US)

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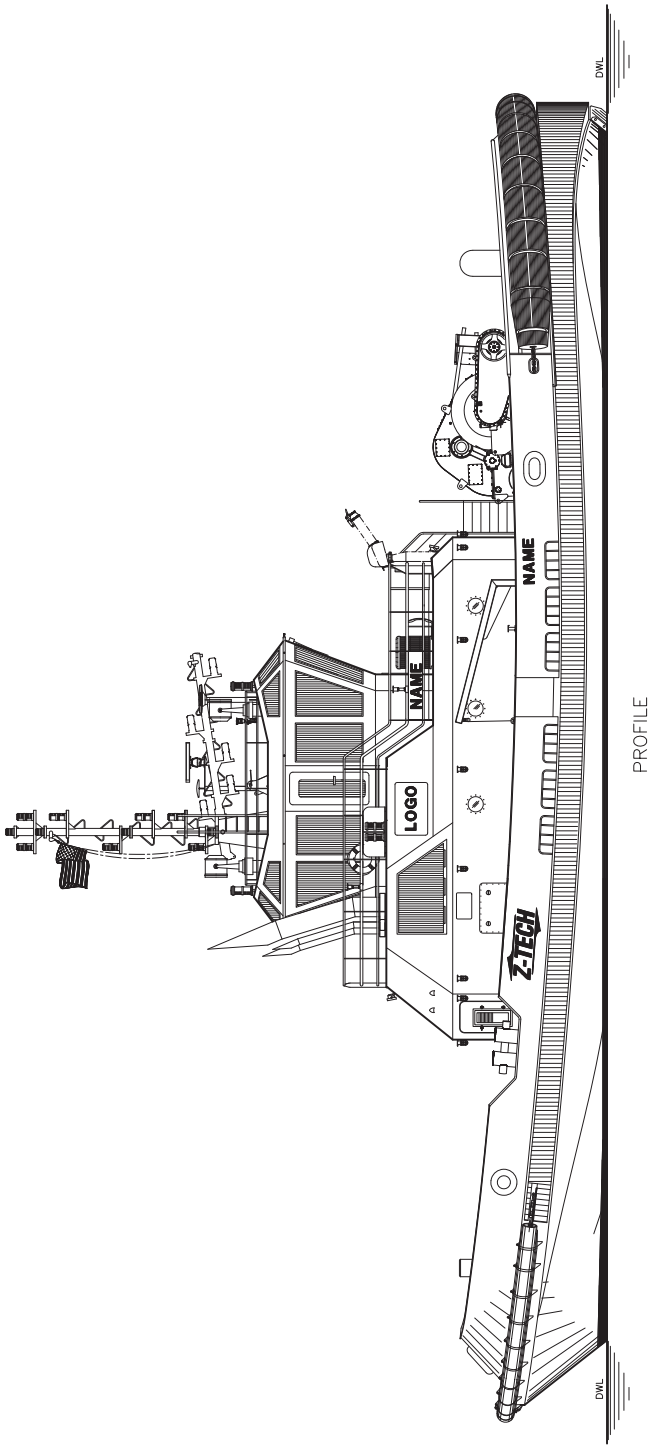
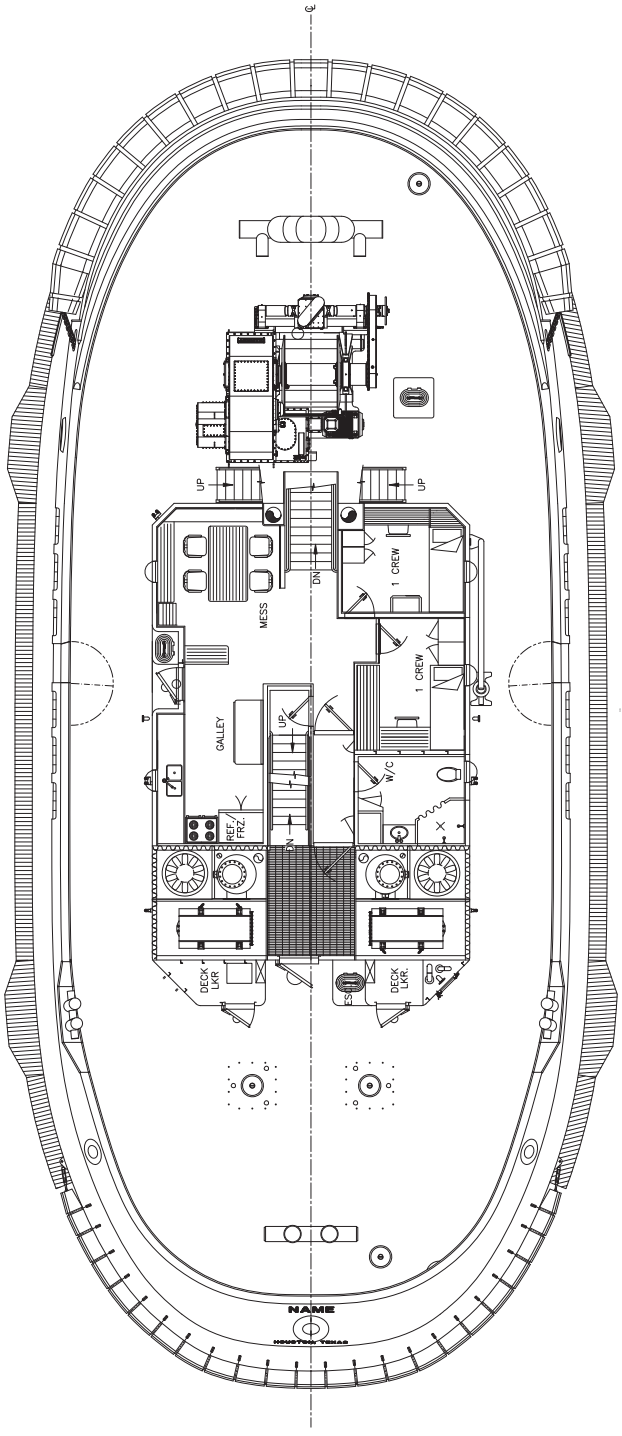
ARTEMIS & MAY LOUISE



PROFILE



MAIN DECK PLAN

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Ultra-low Sulphur Marine Gas Oil (MGO)

DMA Distillate

CAT 6 turbo 3516E main engine
& SY-M propulsion system

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BB ELECTRA – Northern Europe's first fully electric tug

Shipbuilder:.....**Sanmar Shipyyards**
Designer:.....**Robert Allan Ltd**
Vessel's name:.....***BB Electra***
Owner/Operator:.....**Buksér og Berging**
Country:.....**Norway**
Flag:.....**Norway**
Total number of sister ships already completed (excluding ship presented):.....**0**
Total number of sister ships still on order:...**0**
Country:.....**Unspecified**
Country:.....**February 2024**

Designed by Canada's Robert Allan Ltd (RAL) and built by Turkey's Sanmar Shipyards, *BB ElectRA* has been hailed as Northern Europe's first fully electric tug. The Sanmar ElectRA 2200-SX design, part of RAL's successful battery-electric ElectRA series, was delivered to Norway-headquartered operator Buksér og Berging, and is based at the Port of Oslo, replacing an older, diesel-powered tug and providing general tug support for vessels navigating through the Port of Oslo and the inner Oslofjord.

The ElectRA 2200-SX design is optimised for emissions-free/low-emission ship-assist and towing operations. With two Schottel SRP340 LE L-drives, it delivers in excess of 45tonnes of bollard pull and can reach speeds up to 12knots. The compact hullform and skeg are based on the RAL-designed and Sanmar-built RAmparts 2200-SX Sirapinar series, of which there have been over 20 deliveries and counting.

Making use of 1,718kWh of Corvus Orca lithium-ion batteries, the vessel can operate continuously on battery power for up to four hours, and is expected to reduce annual CO_2 emissions by as much as 22tonnes. The Port of Oslo has installed a dedicated shore charging facility at Sjursøya which can charge the batteries in less than three hours, reducing downtime and allowing optimal tug utilisation.

The vessel is fitted with a single 940kWe Caterpillar C32 marine generator set. This genset provides back-up propulsive power for extended operations and also acts as the primary power source for the tug when engaged in its secondary role: firefighting operations. The tug is equipped with two firefighting monitors, each capable of discharging 600m^3/hour of water or 150m^3/hour of firefighting foam. RAL says that it hopes *BB ElectRA* will "inspire other operators to follow suit".

TECHNICAL PARTICULARS

Length, oa.....22.4m
Breadth, moulded.....10.84m
Depth, moulded.....4.4m
Gross tonnage.....277
Displacement.....464.3tonnes
Design, draught.....3.20m ABL
4.83m navigational (to bottom of skeg)
Design, deadweight.....43tonnes
Lightweight.....421tonnes
Max speed.....11.8knots
Bollard pull.....48tonnes

Propulsion
Main engine(s):
Number of engines.....1 main genset
Make.....Caterpillar
Model.....C32 IMO Tier III compliant
Output of each engine.....940kWe

Propeller(s):
Number of propellers.....2
Make.....Schottel
Model.....SRP340 LE L-Drives
Diameter.....2.1m
Material.....CuAl10Fe5Ni5-C-GS
Fixed/controllable pitch.....Fixed
Open/nozzled.....Nozzled

Deck machinery and bridge electronics
Crane(s):
Number of cranes.....1
Make.....Palfinger
Model.....PK 11001MC
Capacities/SWL.....0.5tonnes@10m

Winch(es):
Number of winches.....1
Make.....DMT
Model.....TW-E250kN
Capacities.....125tonnes (brake holding)
Line pull (1st layer): 25 tonnes@9m/min
8tonnes@25m/min
Towline: 2 x 110m@44mm diameter line
Other deck machinery/equipment:
- Data Hidrolik DTH 50-120 tow hook
- Data Hidrolik DTC 4000 EP-L rope reel

Bridge electronics:
Radar(s).....Furuno FAR-1518 BB
Autopilot.....Simrad AP 70 Mk2
GPS.....Furuno GP-170

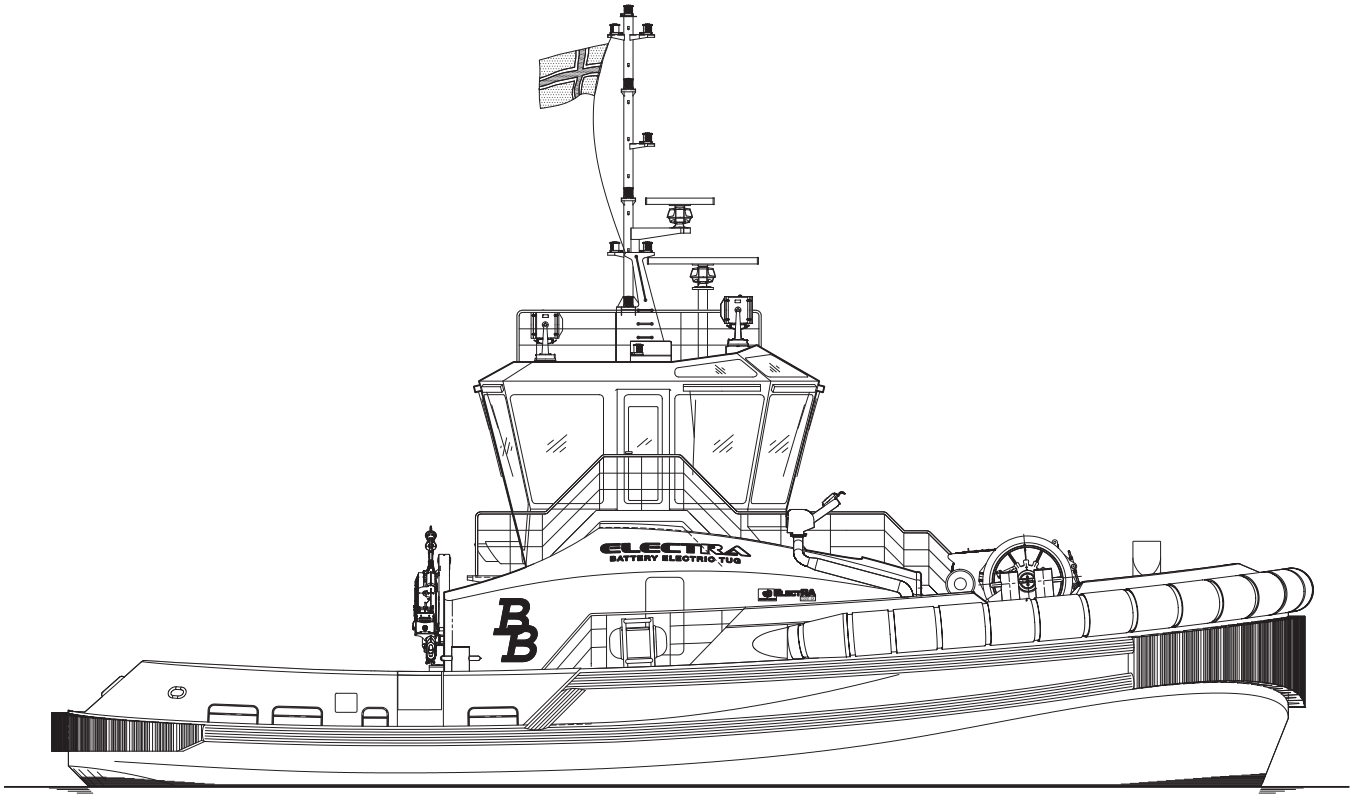
Onboard capacities:
Fuel oil.....19.1m^3
Fresh water.....7.7m^3
Sullage.....5.7m^3
Foam.....6.5m^3

Complement:
Number of crew.....>4
Number of passengers.....0
Number of cabins.....3

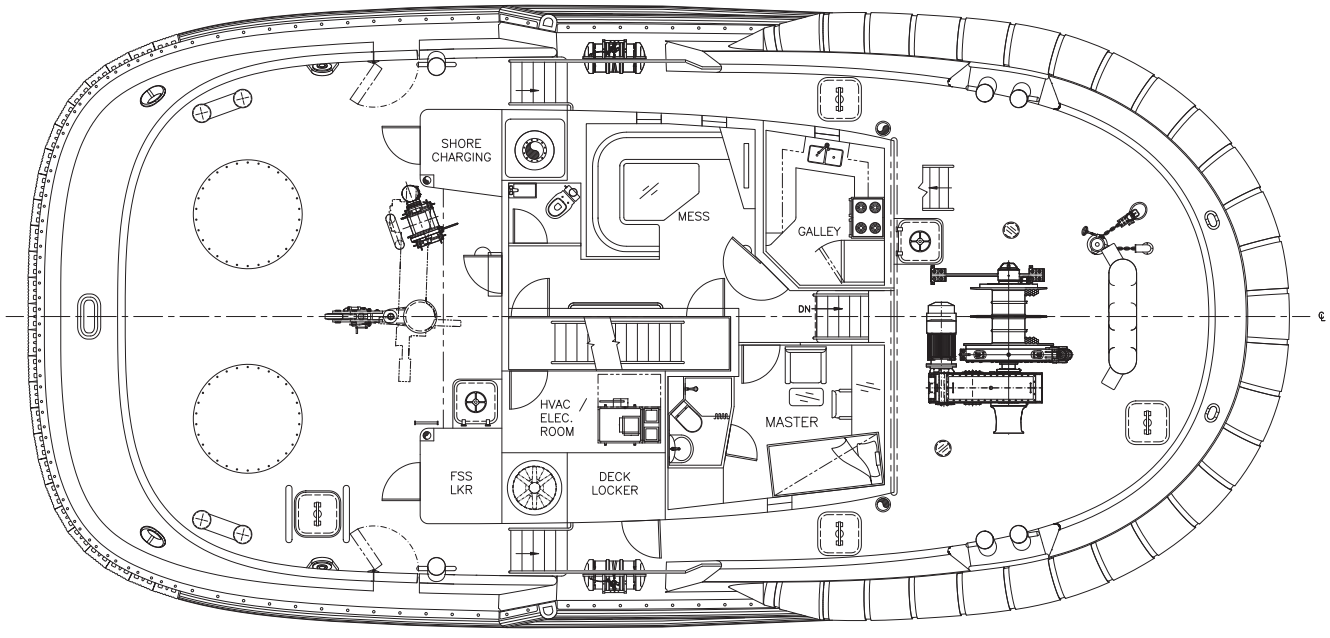
Other significant or special items of equipment:
- 2 x 600m^3/hr seawater (or 150m^3/hr foam) fire monitors
- Corvus Orca Energy NMC batteries, 1,718kWh

Classification:
Classification society.....ABS
Notations.....✠A1, Towing Vessel, ✠AMS, ✠ABCU, BP (48.15 MT), ESS-LiBattery, QR, UWILD

BB ELECTRA



OUTBOARD PROFILE



DECK PLAN

BÜRGERMEISTER BRAUER – Patrol and SAR boat developed for high performance

Shipbuilder:.....**Baltic Workboats**
Designer:.....**Baltic Workboats**
Vessel's name:.....***Bürgermeister Brauer***
Owner/Operator:.....**Flotte Hamburg**
Country:.....**Germany**
Flag:.....**Germany**
Total number of sister ships already completed:.....**1**
Total number of sister ships still on order:.....**1**
Contract date:.....**2022**
Delivery date:.....**December 2024**

Designed for high-speed patrol and search and rescue (SAR) missions, *Bürgermeister Brauer* is equipped with a next-generation hybrid propulsion system integrating two Volvo Penta D16 diesel engines directly connected to shaftlines via ZF 3311 gearboxes, each providing 625kW of power. These work in conjunction with two Volvo Penta D13 588kW diesel engines connected to Danfoss EM-PMI540 500kW generators, from which the power can be transferred to the shaftline via Danfoss EM-PMI540 500kW electric motors connected to both gearboxes' PTI/ PTO slots.

This set-up allows the vessel to operate in multiple power modes, maximising performance while minimising fuel consumption and emissions. Baltic Workboats comments: "The ability to operate in electric mode reduces fuel consumption and emissions, making it an ideal choice for operators whose operating speeds vary significantly depending on the mission. Additionally, the reduction in engine runtime extends maintenance intervals, lowering overall operational costs."

The hybrid propulsion system is managed through an advanced power management system that ensures seamless transitions between operational modes. It also optimises energy use in real time, automatically selecting the most efficient power source based on speed, mission profile and environmental considerations. The system monitoring and configuration is integrated into Baltic Workboats' Integrated Automation Monitoring and Control System (IAMCS) where all of the vessel's main and auxiliary systems can be controlled from a single touch screen.

TECHNICAL PARTICULARS

Length, oa.....29m
Breadth, moulded.....6.7m
Gross tonnage.....143
Displacement.....110tonnes
Design, draught.....2.2m
Service speed
(in full electric mode).....20knots (7knots)
Max speed
(in full electric mode).....25knots (10knots)

Propulsion
Main engine(s):
- 2 x Volvo Penta D16 MH + 2 x Volvo Penta D13 with Danfoss generators
- 2 x Danfoss electric motors at gearbox PTI

Make.....Volvo Penta/Danfoss
Model.....D 16 MH / D13 generators
Output of each engine.....625kW (D16 MH) 588kW (D13)

Generator(s)/ Electric motors:
Number of electric generators.....4 x PM motors
Make.....Danfoss Editron
Model.....EM-PMI540
Output of each motor.....500kW

Gearbox(es):
Number of gearboxes.....2
Make.....ZF
Model.....311 with PTI/ PTO function

Propeller(s):
Number of propellers.....2
Make.....CJR
Material.....Ni-Al-Bronze CU3
Number of blades.....5
Fixed/controllable pitch.....Fixed

Deck machinery
Crane(s):
Number of cranes.....1
Make.....Palfinger
Model.....PK11001M
Capacities/SWL.....1.4tonnes@5.9m

Other deck machinery/equipment:
- Viking Metis 700 daughter boat (launched from dedicated boat slip)
- EST-Floattech 440kWh battery ESS

Bridge electronics:
Radar(s).....JRC X-band and S-band
Autopilot.....Alphatron Alphapilot
GMDSS.....Sailor 7222
GPS.....JRC JLR-21
Chart plotter.....JRC JAN ECDIS, 3 x Hatteland 24" displays

Engine monitoring system.....Power Management System Danfoss Editron (integrated into Baltic Workboats Integrated Automation Control and Monitoring System for the entire vessel)

Fire detection system.....Deckma AFMS3000

Onboard capacities:
Fuel oil.....11,000litres
Fresh water.....1,900litres
Sullage.....2,300litres

Complement:
Number of crew.....3-5
Number of passengers.....12
Number of cabins.....3

Classification
Classification society.....Lloyd's Register
Notations.....✠100 A1 SSC Patrol, Mono, HSC, G3, MCH, Hybrid power, UMS.

ElectRA 2200

for Buksér og Berging

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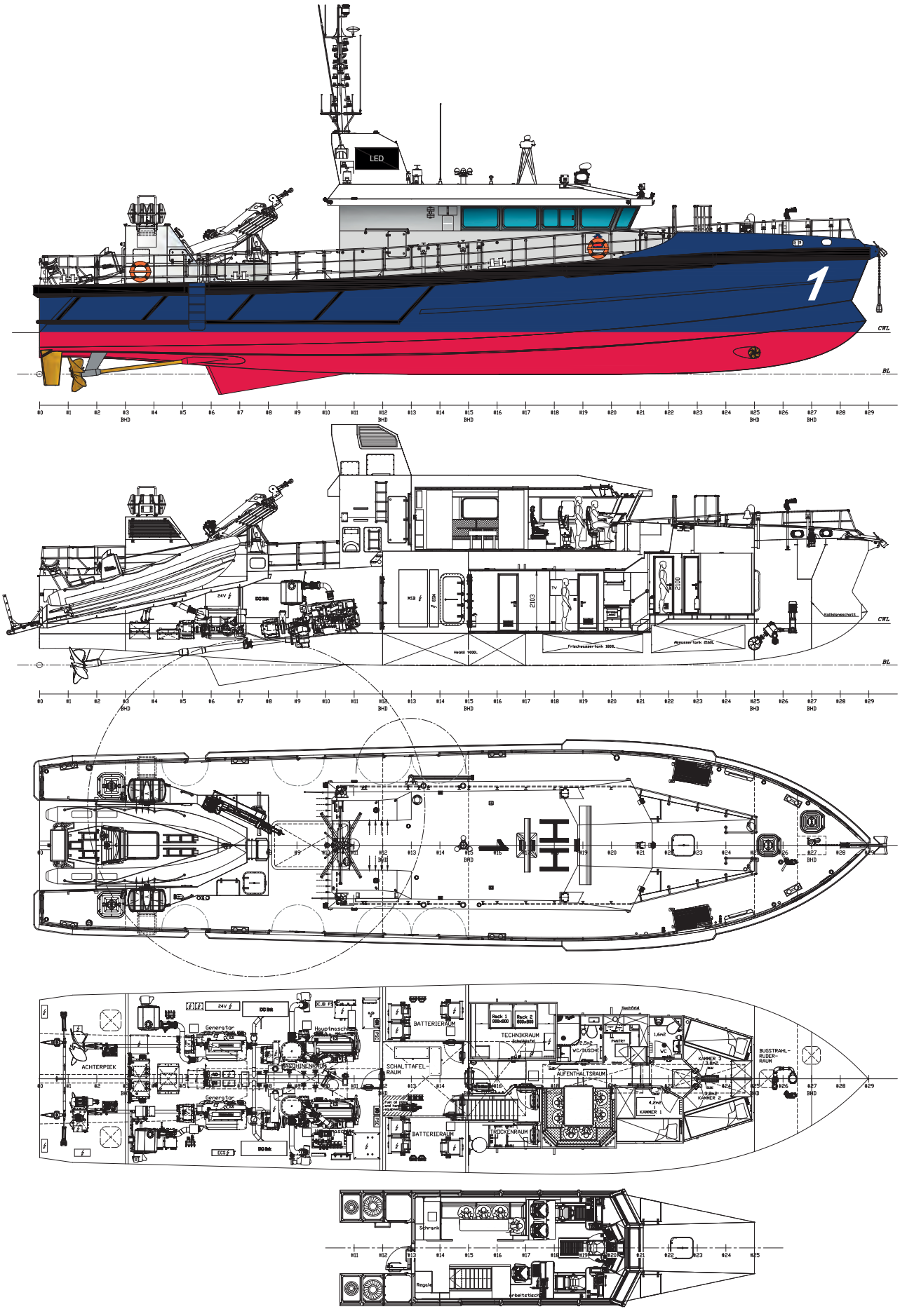

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AWARD WINNING NAVAL ARCHITECTS

CAMARC DESIGN

WORKBOAT DESIGN PROVEN WORLDWIDE

camarc.com

CA SHANGHAI – First of four container carriers for southeast Asia

Shipbuilder:	**CSSC Huangpu Wenchong Shipbuilding Company Limited**
Designer:	**SDARI**
Vessel's name:	***CA Shanghai***
Owner/Operator:	**Asean Seas Line Co**
Country:	**China**
Flag:	**Liberia**
Total number of sister ships already completed:	**4**
Total number of sister ships still on order:	**0**
Contract date:	**June 2022**
Delivery date:	**April 2024**

CA Shanghai is the latest-generation container vessel for Yangon Port Limited, developed by Shanghai Merchant Ship Design and Research Institute (SDARI). This vessel, the first in a series of four newbuilds, will be mainly used for the transportation of container cargoes in southeast Asia.

The ship was designed and built as an oceangoing, single-screw, two-stroke diesel engine-driven and fully cellular gear-less container carrier, with a fully continuous upper deck. It also features SDARI's trademark S-bow, a transom stern and a semi balance rudder with rudder bulb, and is suitable for carrying 20ft/40ft/45ft dry cargo containers and reefer containers, as well as dangerous and hazardous cargoes.

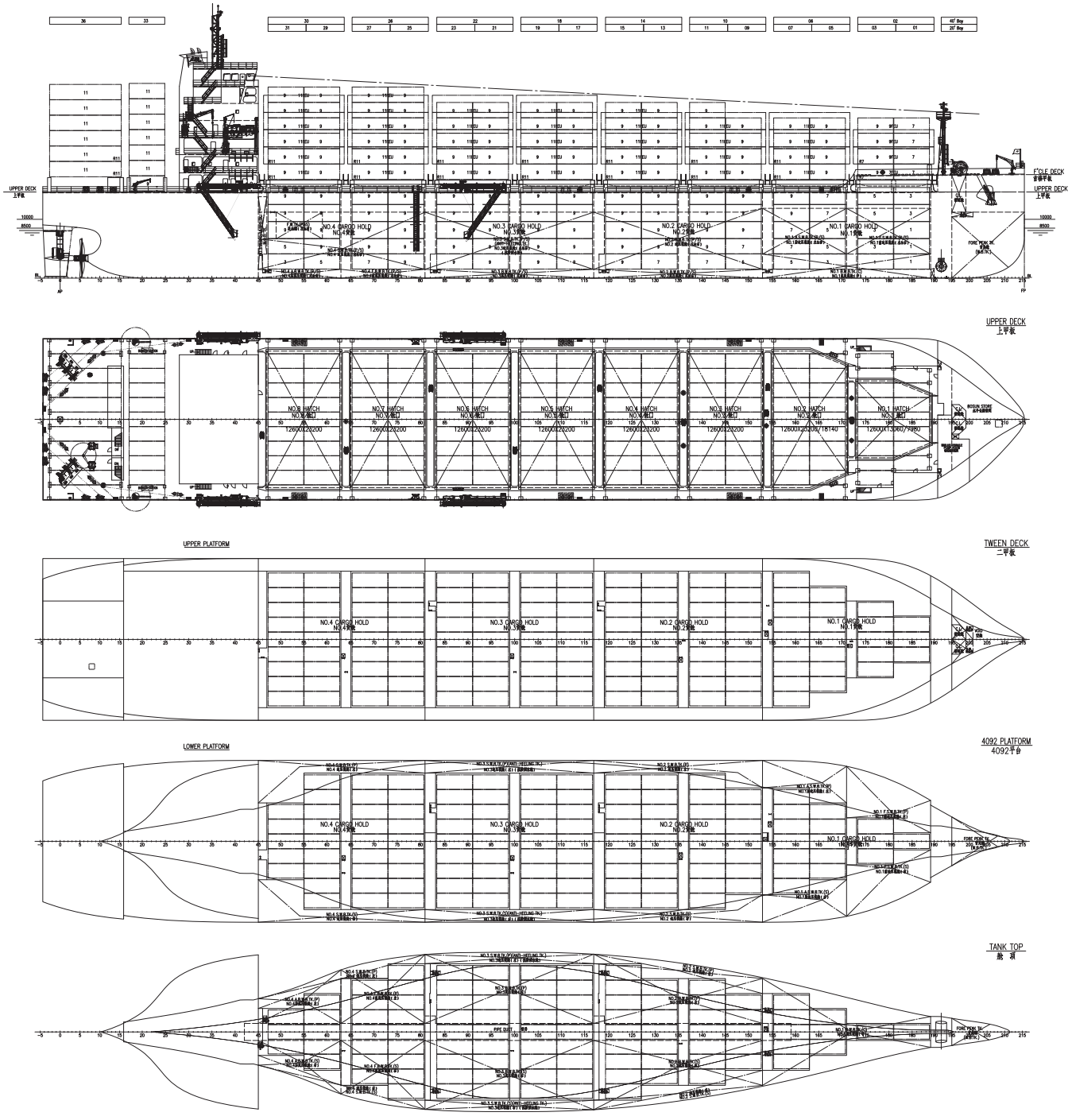
SDARI says: "The size of the vessel can exactly fit Yangon Port, with a length less than 167m. Compared to a BKK 1,900teu container vessel, its length is 5m shorter; the lightweight is about 10% less; and its main engine is also smaller. Also, the maximum speed is lower, but the service speed can fulfil the requirement of the route in southeast Asia. Due to its shorter length, the vessel can access more ports."

CA Shanghai has four double-hull cargo holds, "used for side and bottom segregated ballast tanks, one pair of which [serves] as anti-heeling tanks", says SDARI, adding: "The hull lines and forecastles were optimised to promote stability performance." The company says that, through a combination of large deadweight, low fuel consumption and the use of very low and ultra-low sulphur fuel oil, the vessel is compliant with EEDI phase 3 requirements.

TECHNICAL PARTICULARS

Length,oa	166.95m
Length, bp	164m
Breadth, moulded	27.5m
Depth, moulded	14.5m
Draught, design	8.5m
Service speed	17knots
Main engine(s)	
Number of engines	1
Make	MAN
Model	6S50ME-C9.7
Output of engine	7,580kW
Propeller(s)	
Number of propellers	1
Make	Shanghai Marine Propeller Design Co., Ltd
Diameter	6.7m
Material	Ni-Al-Bronze Cu3
Speed	82.1rpm
Fixed/Controllable pitch	Fixed
Diesel-driven alternators	
Number	3
Engine make/type	Yanmar 6EY22ALW
Type of fuel	HFO & MDO
Alternator make/type	Taiyo Electric
Output/speed of each set	980kW
Boilers	
Number	1
Type	Composite boiler
Make	CSSC Jiujuang Boiler Co
Output, each boiler	Oil-fired side, 1,300kg/h Exhaust gas side, 1,000kg/h
Bow thruster(s)	
Make	Wuhan Kawasaki Marine Machinery Co
Number	1
Output (each)	1,000kW
Deck machinery	
Cranes	
Number	2
Make	Taizhou Jinchuan
Performance	4tonnes/4.7m
Onboard capacities	
Heavy oil	1,000m^3
Water ballast	9,400m^3
Containers	
Lengths	20'/40'/45'
Heights	8'6" / 9'6"
Total TEU capacity	1,673
On deck	1,069
In holds	604
Bridge equipment	
Radars	2 x Furuno FAR-2328/ FAR-2338S-NXT
Fire detection system	Consilium
Other systems	Kongsberg AC600 bridge control system
Complement	
Number of crew	8 officers + 12 crew + 6 Suez/repair crew
Number of passengers	0
Number of cabins	20
Classification society	DNV
Notations	✠1A, Container ship, DG(P), COAT-PSPC(B), CMON, BIS, Recyclable, TMON(oil lubricated), SAFELASH, E0, BWM(T), LCS

CA SHANGHAI


UPPER DECK
上甲板
NO.4 CARGO HOLD
NO.4货舱
NO.3 CARGO HOLD
NO.3货舱
NO.2 CARGO HOLD
NO.2货舱
NO.1 CARGO HOLD
NO.1货舱
F'CLE DECK
首楼甲板
UPPER DECK
上甲板
NO.5 HATCH
NO.5舱口
NO.4 HATCH
NO.4舱口
NO.3 HATCH
NO.3舱口
NO.2 HATCH
NO.2舱口
NO.1 HATCH
NO.1舱口
UPPER PLATFORM
TWEEN DECK
二甲板
LOWER PLATFORM
4092 PLATFORM
4092平台
TANK TOP
舱 顶

DHB DILIGENT – UK pilot boat with a mid-wheelhouse design

Shipbuilder: **Holyhead Marine**
Designer: **Camarc Design**
Vessel's name: ***DHB Diligent***
Owner/Operator: **Port of Dover**
Country: **UK**
Flag: **UK**
Total number of sister ships already completed: **0**
Total number of sister ships still on order: **0**
Contract date: **Unspecified**
Delivery date: **August 2024**

The first-in-class 15m multi-role pilot boat *DHB Diligent*, built by Holyhead Marine Services, North Wales, for the Port of Dover, was hailed, at the time of its delivery in August 2024, as the first new pilot boat to enter service at the port in nearly 20 years.

Designed by Camarc, the multi-role vessel has bypassed the usual aft-wheelhouse pilot boat configuration in favour of a mid-wheelhouse layout, creating a large aft working deck space to support the Port of Dover's full range of round-the-clock roles.

Camarc says: "As well as pilotage there are harbour patrols, towing, pushing, debris collection, personnel transfers and rescue operations." The enclosed aft working deck space facilitates these alternative roles, and the installation of a robust Camarc Popsure fender system and an integrated bow pusher pad further supports these duties. The boat's aft MOB rescue cradle can be used for rescue operations but can also aid debris collection.

For pilotage runs outside of the harbour, a top speed of 25knots is achievable thanks to the boat's twin-diesel installation and fixed-pitch propellers. A resilient wheelhouse was installed to reduce noise and improve comfort. Camarc's refined hull design has also been adopted on this new multi-role model to improve comfort and improve fuel efficiency. The reduction in fuel emissions from the hull has been further enhanced with an IMO Tier III SCR exhaust emissions system.

The FRP-hulled *DHB Diligent* also features an onboard monitoring system, supplied by AST Reygar, which provides real-time monitoring related to fuel consumption, emissions and component health, to ensure the crew are forewarned well in advance of a potential system failure. In terms of green propulsion, the boat has also been prepared to run on hydrotreated vegetable oil (HVO): this alt-fuel's popularity increased somewhat over the course of 2024, predominantly within the small-to-medium-sized boat segment. The boat's HVO would be supplied by a 1,600litre-capacity tank.

TECHNICAL PARTICULARS

Length, oa 15.3m
Length, bp 14.2m
Breadth, moulded 4.4m
Displacement 21tonnes
Design, draught 1.4m
Design, deadweight 2.5tonnes
Lightweight 18.5tonnes
Service speed 20knots
Max speed 25knots
Range ..... 250nm@20knots

Propulsion
Main engine(s):
Number of engines 2
Make ..... Scania
Model DI13
Output of each engine 368kW

Gearbox(es):
Number of gearboxes 2
Make ..... ZF
Model ..... 510 V

Propeller(s):
Number of propellers 2
Make ..... CJR
Material ..... Ni-Al-Bronze
Fixed/controllable pitch ..... Fixed

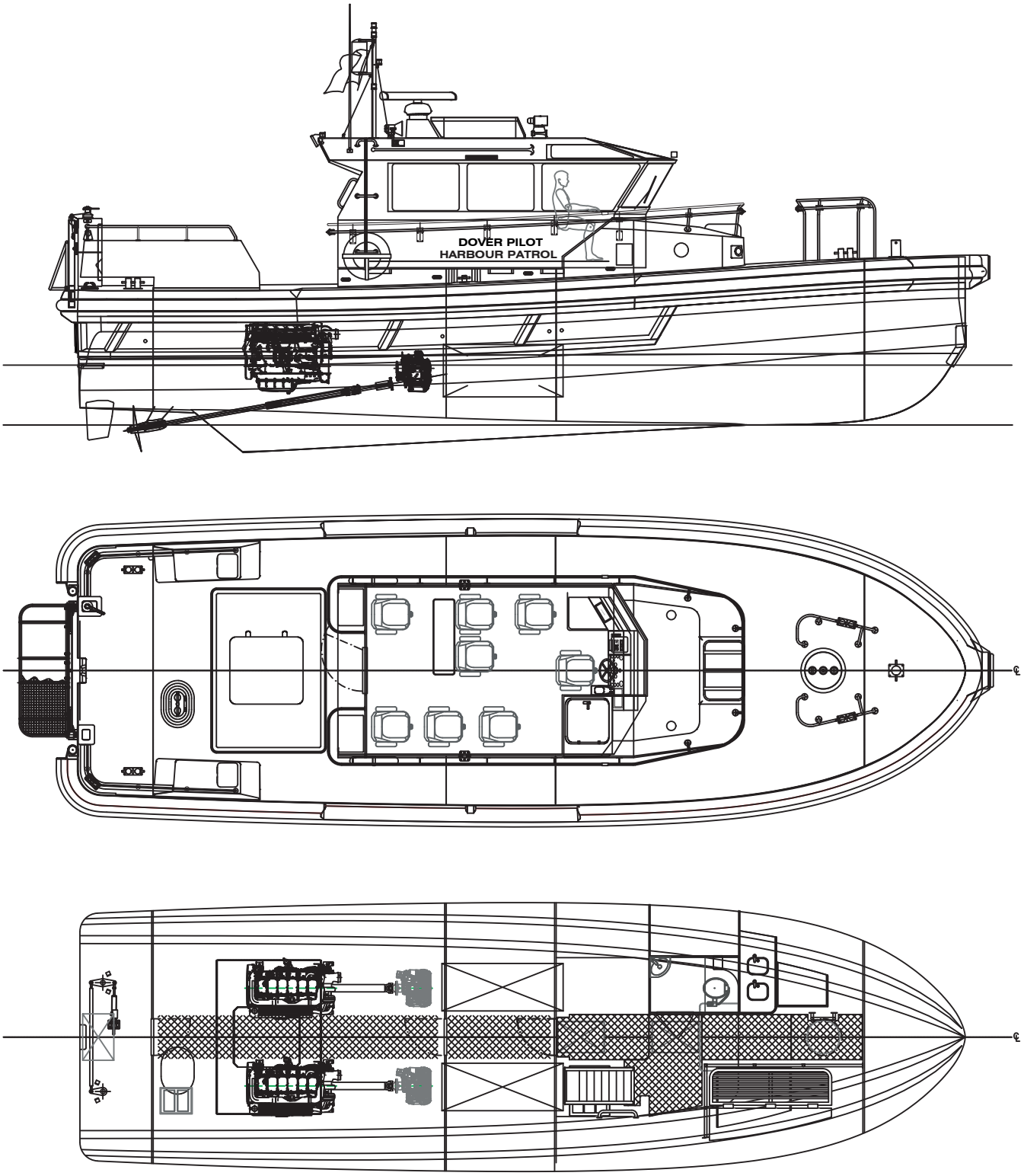
Onboard capacities:
Fuel oil 1,700litres
Fresh water 100litres
Sullage 100litres

Complement:
Number of crew 2
Number of passengers 6
Number of cabins 0

Other significant or special items of equipment:
- Camarc Refined Hull
- IMO Tier III SCR emissions system
- Camarc Popsure fender and bow pusher
- Aft rescue cradle

Classification
Classification society ..... N/A
Notations ..... UK MCA Workboat Code

DHB DILIGENT



FCV PILOT-01 – India's first indigenous hydrogen fuel cell-powered ferry

Shipbuilder:	**Cochin Shipyard Ltd**
Designer:	**Cochin Shipyard Ltd**
Vessel's name:	***FCV PILOT- 01***
Owner/Operator:	**Cochin Shipyard Ltd**
Country:	**India**
Flag:	**N/A**
Total number of sister ships already completed:	**0**
Total number of sister ships still on order:	**Unspecified**
Contract date:	**March 2022**
Delivery date:	**February 2024**

Hydrogen fuel cell systems are increasingly being adopted in marine applications as a clean and efficient alternative to traditional fossil fuels, bringing the benefits of reduced greenhouse gas emissions, quieter operation and the potential for extended range without the need to refuel. Their modular design allows for flexibility in installation, making them suitable for various types of vessels, from small boats to large ships. As the maritime industry seeks to reduce its carbon footprint, hydrogen fuel cells are emerging as a key technology for sustainable marine transportation.

In turn, Cochin Shipyard Limited (CSL) has designed, developed and constructed India's first fully indigenous hydrogen fuel cell-powered, battery-operated ferry, running on Low Temperature Proton Exchange Membrane Technology (LT-PEM). "By implementing this technology, the only by-products of the reaction will be water and heat," the shipyard explains.

The ferry seats 50 passengers and operates at 6.5knots. The fuel cell engine is supported by lithium iron phosphate (LFP) batteries. The electrical power produced by the fuel cell engine is used for propulsion load and hotel load requirements, and any excess power produced is used to charge the LFP batteries. CSL adds: "The operation is silent and, since there are no moving parts, the maintenance is also low as compared to using a typical combustion engine." The ferry is also equipped with CCS2 DC charging and AC shore charging equipment, to charge the batteries at harbour.

The vessel has five onboard hydrogen cylinders, which can carry 40kg of hydrogen, supporting eight hours of operation. Each cylinder is rated for 350-bar pressure. The ferry is also fitted with a solar panel, rated 3kW, and an associated system to feed its auxiliary power supply.

"By successfully implementing hydrogen fuel cell technology, CSL has set a new benchmark in India's maritime industry," the shipbuilder states. "This project aligns with the Government of India's vision for a sustainable and carbon-neutral future, supporting global efforts to reduce dependency on fossil fuels in marine transportation."

TECHNICAL PARTICULARS

Length, oa	24.8m
Length, bp	24.1m
Breadth, moulded	6.4m
Depth, moulded	1.7m
Gross tonnage	70tonnes
Displacement	43tonnes
Design, draught	0.9m at full load
Design, deadweight	4.1tonnes (approx.)
Lightweight	39.12tonnes
Deck space (total)	145m^2
Service speed	6.5knots
Max speed	6.5knots
Range	52nm

Propulsion
Main engine(s):

Number of engines	2
Make	KPIT Marine Motors
Model	KMM01230002(P), KMM01230003(S)
Output of each engine	20kW
Batteries	LFP, 2 x 102.4kW

Propeller(s):

Number of propellers	2
Make	Madras Marine Propulsion System
Diameter	0.6m
Material	Ni-Al-Bronze
Number of blades	3
Speed	600rpm
Fixed/controllable pitch	Fixed
Open/nozzled	Open

Deck machinery/equipment:
- Anchor
- Anchor cables and chains
- Bilge pump

Bridge electronics:

Radar(s)	Raymarine
GPS	Raymarine
Chart plotter	Raymarine
Fire detection system	Ampac

Other communication systems:
- DTEx handheld radio transceiver
- VHF radio
- Electronic compass
- Echo Sounder
- Electric horn

Onboard capacities:

Hydrogen	40kg@350bar

Complement:

Number of crew	4
Number of passengers	50
Number of cabins	0

Classification

Classification society	Indian Register of Shipping
Notations	IRS: 卐 IWL, ZONE2, FERRY 卐 IY, BATTERY PROP, FC (main)-Hydrogen

When performance is on the line

If the waves and wind are against you, it's good to have Hägglunds with you. Winches excel with our hydraulic direct drives, providing high reliability and matchless tension control. You get sustainable torque and built-in shock load protection, packed into a design that saves space on deck. So put your trust in our marine experience – and a team that's always on your side. **We drive what drives you.**

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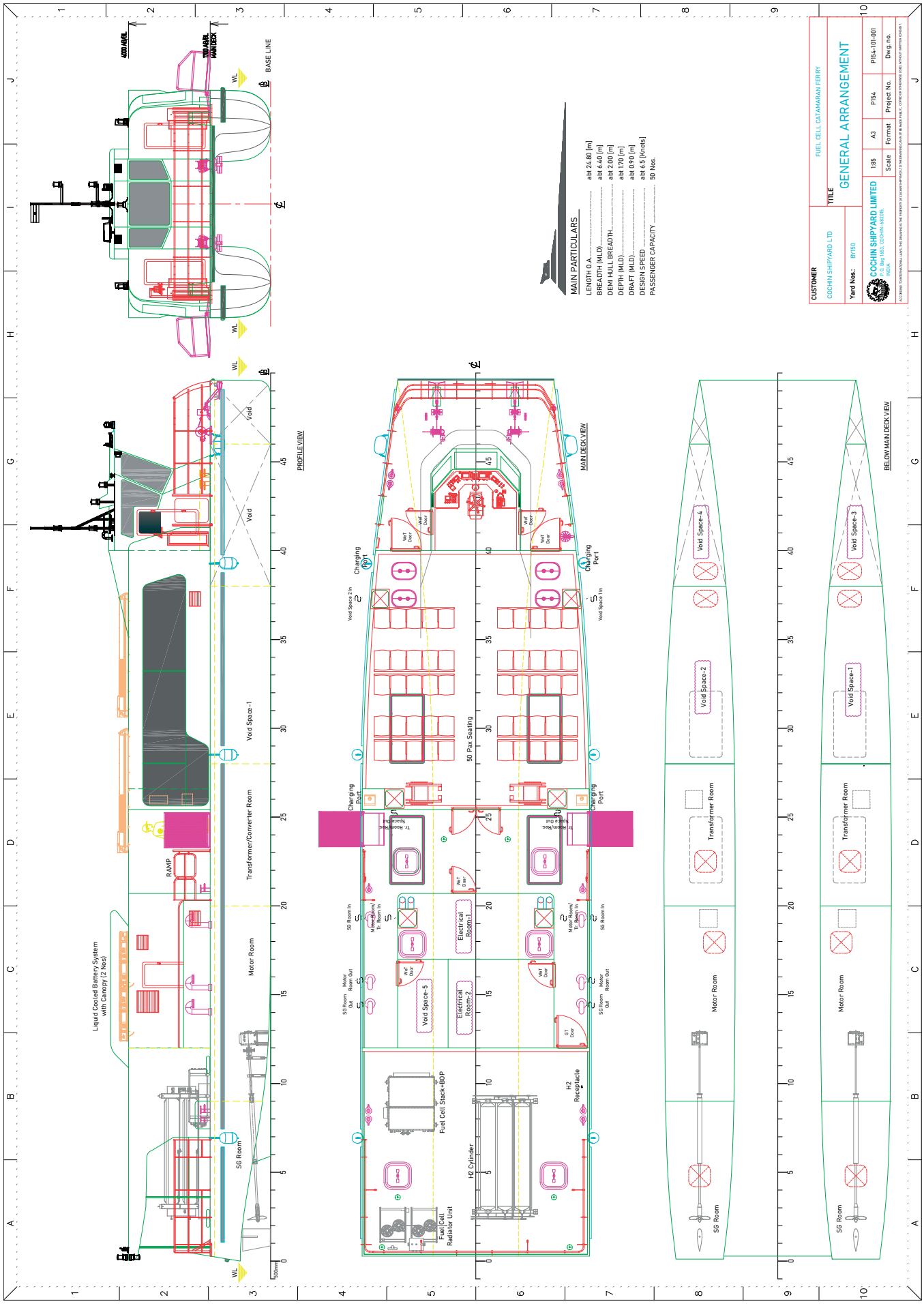
HÄGGLUNDS

FCV PILOT-01


MAIN PARTICULARS
LENGTH O.A. abt 24.80 [m]
BREADTH (MLD) abt 6.40 [m]
DEMI HULL BREADTH abt 2.00 [m]
DEPTH (MLD) abt 170 [m]
DRAFT (MLD) abt 0.90 [m]
DESIGN SPEED abt 6.5 [Knots]
PASSENGER CAPACITY 50 Nos
CUSTOMER
COCHIN SHIPYARD LTD
Yard Nos: BY150
FUEL CELL CATAMARAN FERRY
TITLE
GENERAL ARRANGEMENT
COCHIN SHIPYARD LIMITED
Scale 1:85
Format A3
Project No. P154
Dwg. no. P154-101-001
PROFILE VIEW
MAIN DECK VIEW
BELOW MAIN DECK VIEW
Liquid Cooled Battery System with Canopy (2 Nos)
RAMP
Transformer/Converter Room
Motor Room
SG Room
Void Space-1
Void Space-2
Void Space-3
Void Space-4
Void Space-5
50 Pax Seating
Electrical Room-1
Electrical Room-2
Charging Port
Fuel Cell Stack+BOP
H2 Cylinder
H2 Receptacle
Fuel Cell Radiator Unit

Navigating to zero

Keep your options open.

A tug launched today will be required to lower emissions year-on-year until it achieves carbon neutrality. In many cases, the technology for zero emissions operations has not yet reached maturity. Even if it had, how to pay today for a solution that will return on investment tomorrow? What fuels will be available? Affordable?

You're looking at the solution. The Damen ASD Tug 2713 Fuel Flexible (FF) is prepared for whatever the future demands. The vessel operates on a variety of dual-fuel arrangements now, and stands ready for rapid, cost-effective conversion once the picture becomes clear.

Pictured here:
ASD Tug 2713 FF

Find out more on **Damen.com**

DAMEN
OCEANS OF POSSIBILITIES

GUARDIAN – Agile unmanned recovery vessel

Shipbuilder:..... **Coastal Workboats**
Designer:..... **Chartwell Marine**
Vessel's name:..... ***Guardian***
Owner/Operator: ..... **Zelim Ltd**
Country:..... **United Kingdom**
Flag:..... **MECAL Approved, Workboat Code 3**
Total number of sister ships already completed (excluding ship presented):..... **0**
Total number of sister ships still on order:... **0**
Contract date:..... **Unspecified**
Delivery date: ..... **December 2024**

Guardian is a groundbreaking unmanned recovery vessel (URV) designed to enhance maritime safety through cutting-edge technology and innovative design. Developed by Zelim, the vessel represents a paradigm shift in rescue operations by prioritising efficiency, reliability and reduced risk to human operators.

At 8.4m in overall length and 2.5m in overall beam, *Guardian* is compact yet powerful. Its displacement of 3.8tonnes (departure condition) ensures stability and agility in challenging environments, while its aluminium construction adheres to ISO 12215 Category D standards for strength and durability. This marine-grade aluminium hull is paired with a sleek, hydrodynamic design, enabling the vessel to reach speeds of over 30knots, powered by a 400hp (298kW) Bukh VGT SOLAS diesel engine and an Alamarin AJ285 waterjet.

Guardian's standout feature is its unmanned operation capability, which leverages cutting-edge autonomous and remote-controlled technologies. The integration of the Sea Machines SM300 system allows the vessel to be operated remotely, ensuring operator safety by removing personnel from hazardous environments. Additionally, the vessel is equipped with Zelim's patented SWIFT recovery conveyor, a system designed for rapid and secure recovery of casualties from the water. The conveyor ensures that *Guardian* can efficiently retrieve and stabilise individuals while maintaining stability in adverse conditions.

Safety is paramount in *Guardian*'s design. A self-righting bag system is incorporated to enhance survivability in extreme conditions, ensuring the vessel can right itself in the event of capsize. Non-slip surfaces across the deck, along with strategically placed reflective patches on the sponsons, provide operational safety and visibility during day or night operations. The robust hull features reinforced towing and mooring points, including an aft towing bollard and strategically placed cleats, allowing for versatility in operations.

The vessel's advanced bridge electronics, including the ZOE Intelligent Detection system and integrated radar, enhance situational awareness for remote operators. Dual GNSS sensors, proximity ultrasound sensors, and an automatic radar plotting aid (ARPA) ensure precise navigation and obstacle avoidance in complex environments. *Guardian* is also equipped with a painter release and a Henriksen HHSR12 lifting hook, enabling seamless launch and recovery operations.

The design is compatible with existing fast rescue craft (FRC) cradles and features an inflatable collar that provides buoyancy and protection during rescue operations. The vessel's innovative paint scheme, featuring luminous yellow and anthracite grey colours, ensures visibility while reinforcing its robust and modern aesthetic.

TECHNICAL PARTICULARS

Length, oa 8.33m
Breadth, moulded 2.55m
Depth, moulded 1.885m

Gross tonnage 3.5
Displacement 3.5tonnes
Lightweight 3tonnes
Deck space (total) 8m²

Max speed..... 30knots+ (dependent on sea state)
Range 200nm

Propulsion
Main engine(s):
Number of engines 1
Make ..... Bukh
Model ..... VGT SOLAS
Output of each engine 298kW
Waterjet(s):
Number of waterjets 1
Make ..... Alamarin
Model AJ285

Other deck machinery/equipment:
- SWIFT recovery conveyor for rapid unmanned personnel and equipment recovery
- Henriksen HHSR12 hook

Bridge electronics:
Radar(s) ..... Furuno
Autopilot ..... Sea Machines
GMDSS ..... Raymarine
GPS ..... Furuno
Gyro ..... Furuno
Chart plotter ..... Furuno
Engine monitoring system ..... Furuno

Other communication systems ..... ZOE Intelligent Detection system for situational awareness

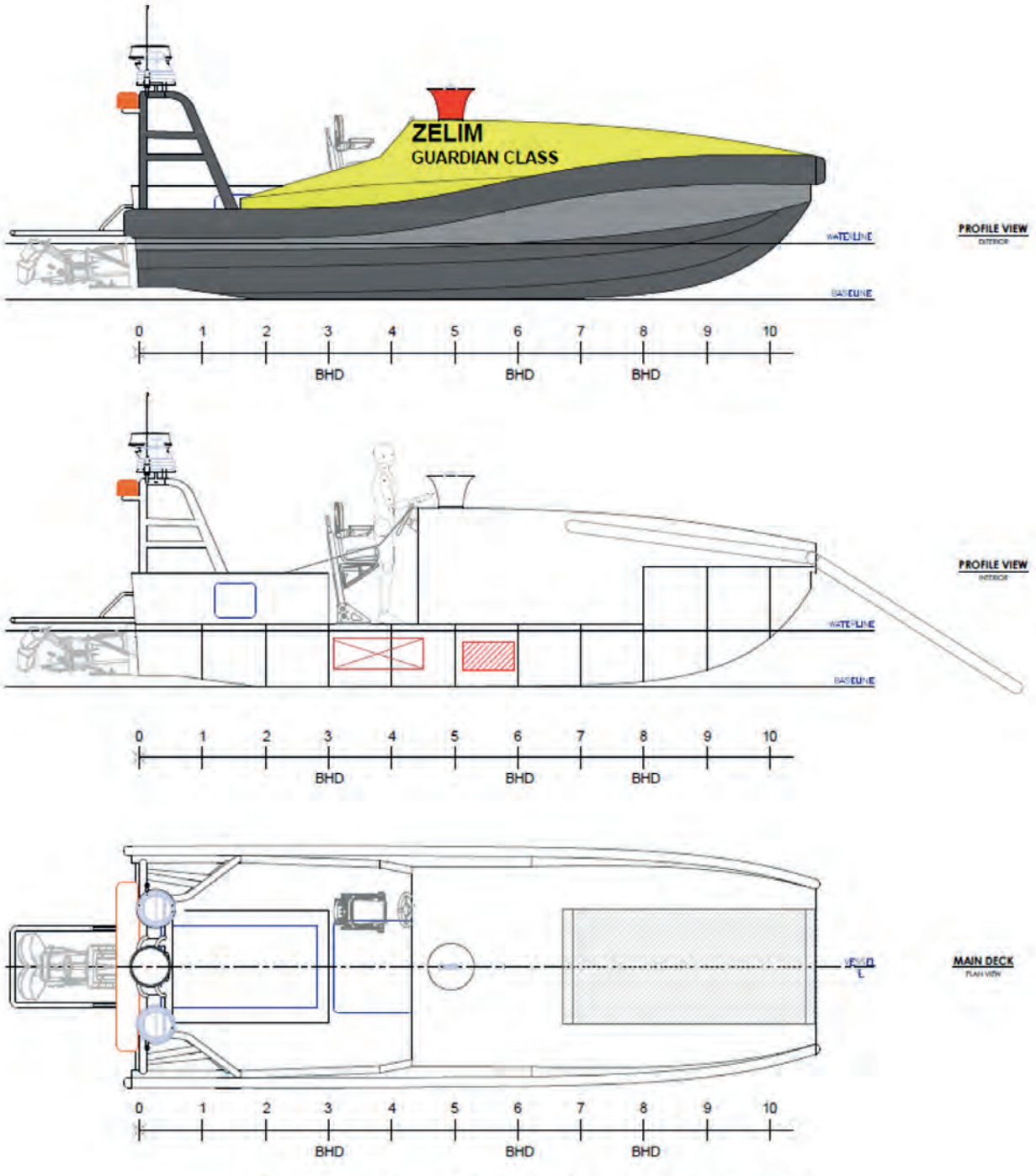
Onboard capacities:
Fuel oil 170litres

Complement:
Number of crew ..... 3 or unmanned
Number of passengers 3
Number of cabins 0

Other significant or special items of equipment:
- Self-righting bags for vessel stability in case of capsizing
- Mooring cleats (port and starboard)

Classification
Classification society ..... MECAL-approved
Notations ..... MCA Workboat Code Class 3

GUARDIAN


ZELIM
GUARDIAN CLASS
PROFILE VIEW
WATERLINE
BASELINE
0 1 2 3 4 5 6 7 8 9 10
BHD BHD BHD
PROFILE VIEW
WATERLINE
BASELINE
0 1 2 3 4 5 6 7 8 9 10
BHD BHD BHD
MAIN DECK
0 1 2 3 4 5 6 7 8 9 10
BHD BHD BHD

HUANG HE KOU – LNG dual-fuel pure car truck carrier

Shipbuilder: **Guangzhou Shipyard International Company Limited (GSI)**
Designer: **Shanghai Merchant Ship Design and Research Institute (SDARI)**
Vessel's name: ***Huang He Kou***
Owner/Operator: **SPDBFL/ COSCO**
Country: **China**

Flag: **Liberia**
Total number of sister ships already completed: **2**
Total number of sister ships still on order: **1**
Contract date: **September 2022**
Delivery date: **September 2024**

Huang He Kou is a pure car truck carrier (PCTC) built by Guangzhou Shipyard International Company Limited (GSI), a subsidiary of China State Shipbuilding Corporation (CSSC).

The vessel was delivered to SPDB Financial Leasing (SPDBFL)/COSCO, to ship cars made in China, in September 2024, alongside a second vessel, *Gan Jiang Kou*. The vessel's car-carrying trade has already seen it embark on a route from Shanghai to Chile, Guatemala and Peru, among other countries.

Slightly under 200m in length, the vessel is equipped with an LNG dual-fuel engine, which effectively reduces pollutant emissions. This installation has helped the ship to achieve a significant reduction of more than 30% in CO_2 emissions, an 80-90% decrease in NOx emissions and virtual elimination of SOx emissions, thus meeting IMO's stringent Tier III standards.

This onboard propulsive set-up aligns with GSI's focus on building alternatively fuelled ships, including LNG, methanol and other eco-friendly propulsion systems. For example, GSI previously built the 49,990dwt methanol dual-fuel medium-range (MR) tankers *Stena Pro Patria*, *Stena Pro Marine* and *Stena Prosperous* for Proman Stena Bulk, a joint venture between Stena Bulk AB and Proman.

Huang He Kou features 12 vehicle decks, including eight fixed decks and four liftable decks, allowing flexible space adjustment, with a car capacity of 7,000 units. The ship's automated deck adjustment system optimises utilisation of space and enhances loading/unloading efficiency.

The 11th and 12th decks of the ship are specially designed for hydrogen-fuelled vehicles, making it a new generation of energy-saving, environmentally friendly and highly efficient large car carriers.

TECHNICAL PARTICULARS

Length, oa 199.9m
Length, bp 195.6m
Breadth, moulded 38m
Depth, moulded 14.8m
Gross tonnage 68,252
Design, draught 8.6m
Design, deadweight 11,579dwt
Service speed 19knots

Main engine(s):
Number of engines 1
Make ..... MAN
Model ..... MAN B&W 6S60ME-C10.5-GI-EcoEGR, Tier II/III
Output of each engine ..... 14,940kW@105rpm (MCR)

Propeller(s):
Number of propellers 1
Material ..... Ni-Al-Bronze
Number of blades 4
Fixed/controllable pitch ..... Fixed

Deck machinery
Crane(s):
Number of cranes 4
Capacities/SWL ..... 1 x main crane – 5tonnes SWL
2 x overhead cranes – 2tonnes SWL
1 x provision crane – 5tonnes SWL

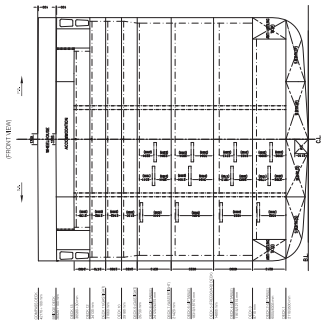
Onboard capacities:
Fuel oil ..... 1,100m^3 (VLSFO)
500m^3 (MGO)
LNG ..... 3,350m^3
Ballast water ..... 7,000m^3

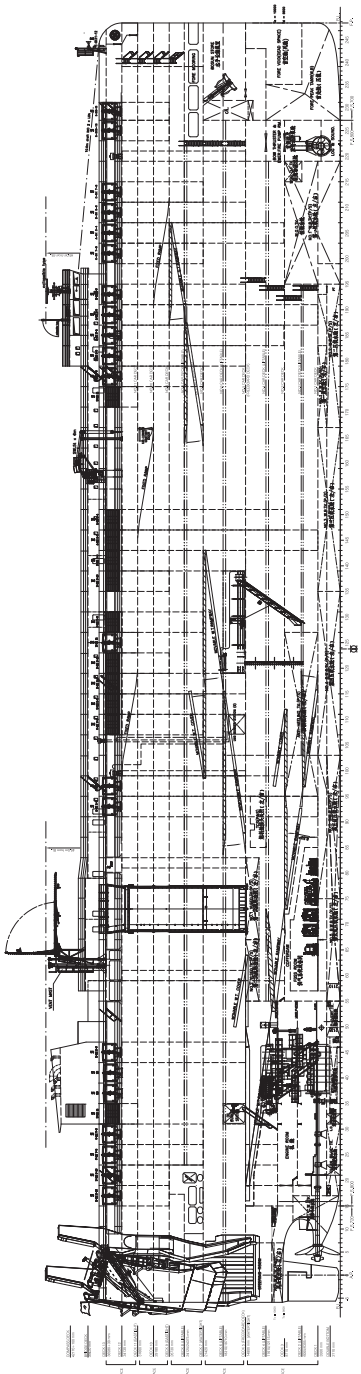
Complement:
Number of crew 26
Number of passengers 0

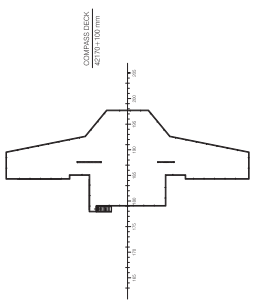
Vehicles:
Number of vehicle decks 12
Number of cars 7,000

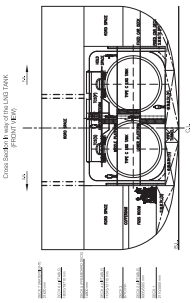
Classification
Classification society ..... China Classification Society
Notations ..... ★CSA Car Carrier; PSPC(B); In-Water Survey; Loading Computer(S,I,D); ★CSM AUT-0; Natural Gas Fuel; OMBO; G-ECO (BWM(T)); G-EP(GPR(EU)); SCM; ERS*

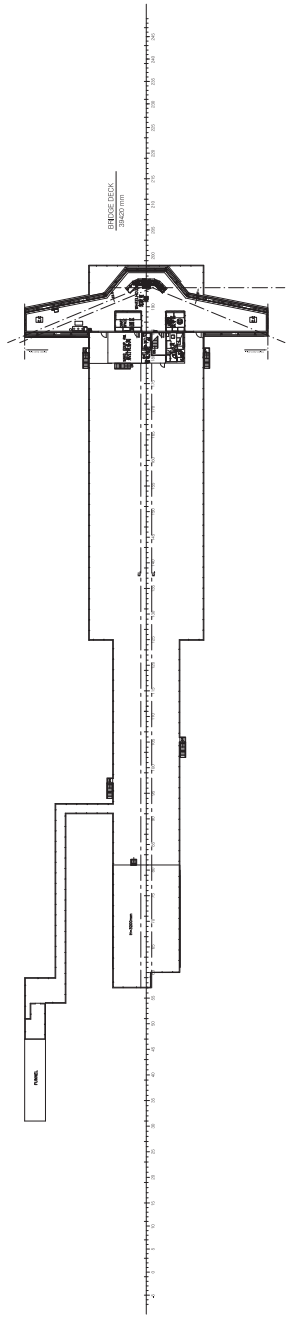
HUANG HE KOU











IRON DOVE – Compact, HVO-fuelled tug with muscle

Shipbuilder:.....**Med Marine Eregli Shipyard**
Designer:.....**Robert Allan Ltd**
Vessel's name:.....***Iron Dove***
Owner/Operator:.....**Svitzer**
Country:.....**Australia**
Flag:.....**Australia**
Total number of sister ships already completed:.....**4**
Total number of sister ships still on order:.....**0**
Contract date:.....**Unspecified**
Delivery date:.....**February 2025**

Delivered shortly after the new year, tugboat *Iron Dove* was specifically designed with the capacity to handle exceptionally challenging operations. This innovative vessel stands out not only for its operational capabilities and power but also for its propulsion technology.

At the heart of the powertrain are high-speed 3516E 2,350kW 6-Turbo main engines, manufactured by CAT, which operate using hydrotreated vegetable oil (HVO) as fuel – a sustainable choice, requested by the customer, Svitzer. The operator has already made the switch to HVO for its fleet of tugs operating in and around London, UK.

As Turkish boatbuilder Med Marine notes: "The use of HVO fuel enables operators to achieve greater environmental sustainability by reducing overall fuel consumption. In addition to using this fuel, thanks to the SY-Drive thruster units developed by Schottel and the Caterpillar 6-Turno 3516E main engines with huge torque values, two propellers can be operated with a single engine."

The powertrain is strong enough to permit a bollard pull of 80tonnes, despite a relatively compact length of just 28m. Med Marine adds that *Iron Dove* is the first tugboat produced in the Europe, Middle East and Africa (EMEA) region to feature Caterpillar's 6-Turbo 3516E main engines paired with SY-M propulsion, "setting a new benchmark in tugboat innovation".

The tug has also been developed to relay data-driven services, such as operation observation, performance assessments and onboard high-speed data processing, to the operator for real-time condition analysis. "Local data recording in a ring buffer ensures that no critical information is lost, even during internet disruptions," says Med Marine.

TECHNICAL PARTICULARS

Length, oa.....28.4m
Length, bp.....25.65m
Breadth, moulded.....13m
Depth, moulded.....5.4m
Gross tonnage.....<500
Displacement.....785tonnes
Design, draught.....4.175m
Design, deadweight.....220tonnes
Lightweight.....564tonnes

Deck space (total).....60m^2
Deck capacity.....4tonnes/m^2
Bollard pull.....80tonnes (minimum)

Propulsion
Main engine(s):
Number of engines.....2
Make.....Caterpillar
Model.....3516E
Output of each engine.....2,350kW

Gearbox(es):
Number of gearboxes.....2
Make.....Schottel
Model.....SRP 490 SY-Drive

Propeller(s):
Number of propellers.....2
Make.....Schottel
Model.....SRP 490 SY-Drive
Number of blades.....4
Speed.....1,800rpm
Fixed/controllable pitch.....Fixed
Open/nozzled.....Nozzled

Winch(es):
Number of winches.....1
Make.....Ibercisa
Capacities.....250tonnes brake holding force

Other deck machinery/equipment.....Towing hook

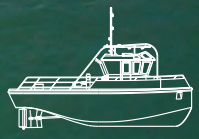
Bridge electronics:
Radar(s).....Furuno X-Band Radar
Autopilot.....Simrad AP70 Mk2
GMDSS.....A3
GPS.....Furuno GP-170
Chart plotter.....Maxsea Time Zero
Engine monitoring system.....Caterpillar

Onboard capacities:
Fuel oil.....155m^3
Fresh water.....20m^3
Sullage.....6m^3
Ballast water.....33m^3

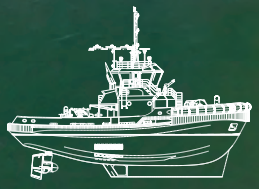
Complement:
Number of crew.....8
Number of passengers.....0
Number of cabins.....5

Classification
Classification society.....Bureau Veritas
Notations.....I ✠Hull •MACH ✠AUT-UMS, Escort Tug, Firefighting Ship 1 With Waterspraying, Unrestricted Service, IWS

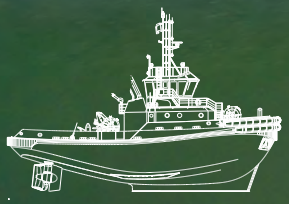
Z-Tech Series



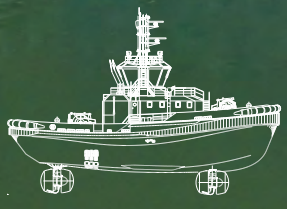
Mooring Launch Series



RAstar Series



RAmparts Series



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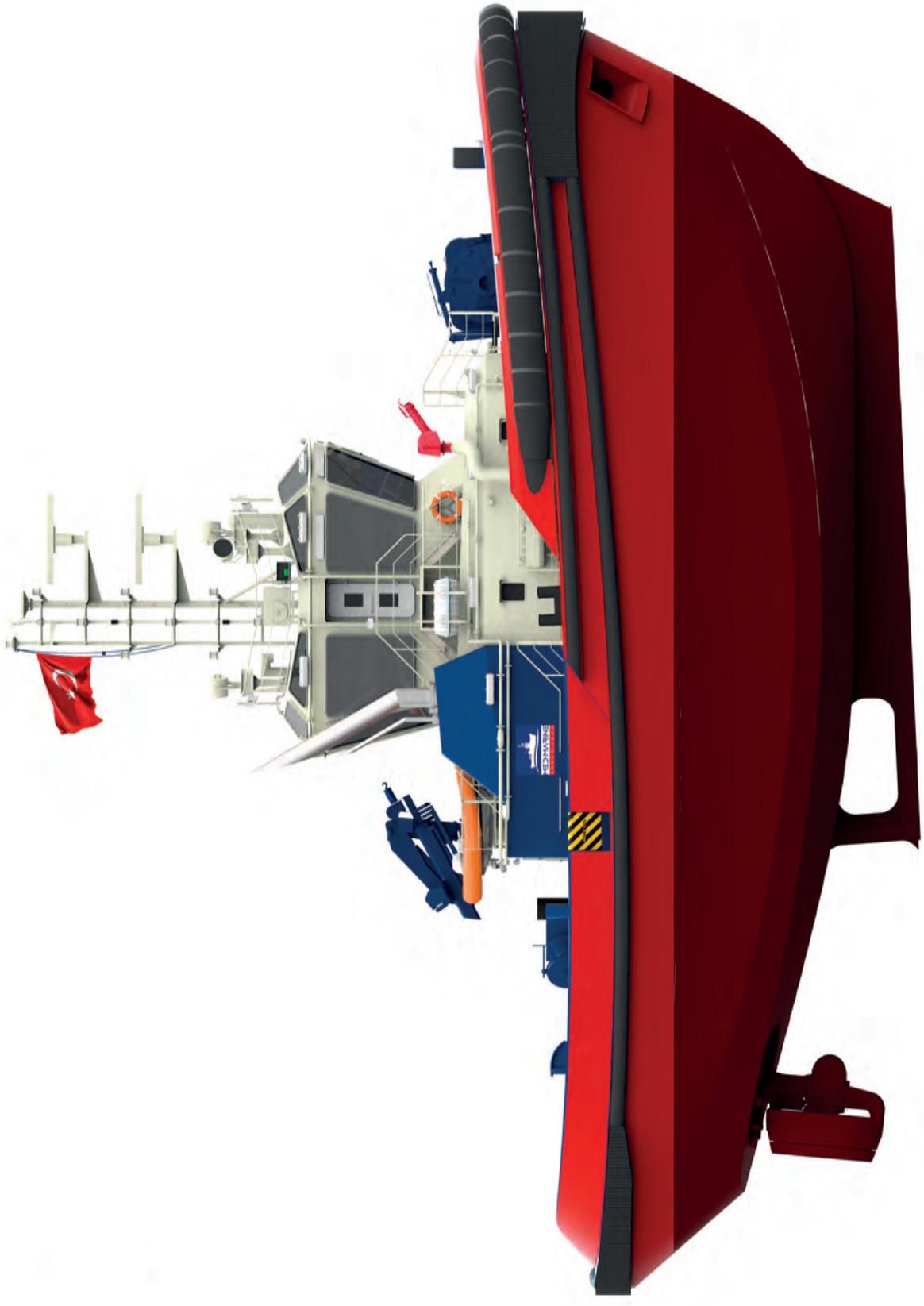


KÄTHE WESSELS – Low-draught, high-bollard pull ASD tug

Shipbuilder: **Damen Shipyards Group**
Designer: **Damen Shipyards Group**
Vessel's name: ***Käthe Wessels***
Owner/Operator: **Neue Schleppdampfschiffsreederei Louis Meyer GmbH & Co. KG**
Country: **Germany**
Flag: **Germany**
Total number of sister ships already completed: **0**
Total number of sister ships still on order: **0**
Contract date: **September 2023**
Delivery date: **February 2024**

In February 2024, Hamburg-based Neue Schleppdampfschiffsreederei Louis Meyer GmbH & Co. KG welcomed an ASD Tug 2111, one of the first in its class. This vessel, now operating under a long-term charter with Emder Schlepp-Betrieb GmbH (ESB), is stationed in Emden, a top-tier port renowned for car shipping. The tug's compact design, shallow draught and bollard pull exceeding 50tonnes make it suited for navigating large vessels through the port's diverse areas.

This marks the third Damen-built vessel for Louis Meyer and the second for ESB. The ASD Tug 2111 stands out for its advanced engineering and eco-friendly features. It complies with IMO Tier III emissions standards, ensuring reduced environmental impact – a critical factor in modern maritime operations. The tug is equipped with a 2.4m-diameter propeller, which delivers enhanced thrust for superior towing and manoeuvring capabilities. Additionally, the patented Damen Twin Fin system ensures exceptional course stability and predictable handling, whether during free sailing or bow-to-bow operations.

The ASD Tug 2111's design prioritises both performance and versatility, enabling it to handle the demanding conditions of Emden's busy port. Its compact size does not compromise power, making it an ideal choice for tight spaces and shallow waters. For ESB, this tug enhances operational reliability, supporting Emden's role as a key hub for automotive logistics. For Louis Meyer, the vessel represents a step forward in modernising its fleet with sustainable, high-performance assets.

TECHNICAL PARTICULARS

Length, oa 21.01m
Breadth, oa 10.81m
Depth at sides 4.05m
Gross tonnage 199
Displacement 403tonnes
Draught aft 5m
Deck space ..... 45m^2
Deadweight 40tonnes
Max speed 12.2knots
Bollard pull ..... 50.8 tonnes (ahead) / 47.8tonnes (astern)

Propulsion
Main engine(s):
- Number of engines 2
- Make ..... Caterpillar
- Model ..... 3512C HD TA/C
- Output total power ..... 2,760kW@1,600rpm

Propeller(s):
- Number of propellers 2
- Make ..... Kongsberg Maritime
- Model ..... US165S P17 FP
- Diameter 2,400mm
- Material ..... Ni-Al-Bronze
- Number of blades 3
- Fixed/controllable pitch ..... Fixed
- Open/nozzled ..... Nozzled

Towing winch:
- Number of winches 1
- Make ..... Damen Marine Components
- Capacities ..... Hydraulically driven two-speed double drum, pull 35tonnes, up to 10m/min on second layer, max speed 40m/min, brake holding force 150tonne on second layer

Bridge electronics:
- Radar ..... Furuno FAR 1518-BB
- Autopilot ..... Simrad AP-70
- GMDSS A1
- Satellite compass/GPS ..... Simrad GN70/HS80A
- Electronic Chart System ..... MaxSea TZ Professional
- Engine monitoring system ..... Praxis Automation

Other communication systems:
- Echosounder FE-800
- VHF ..... Cobham Sailor 7222
- AIS ..... Furuno FA-170
- Remote monitoring ..... Damen Triton

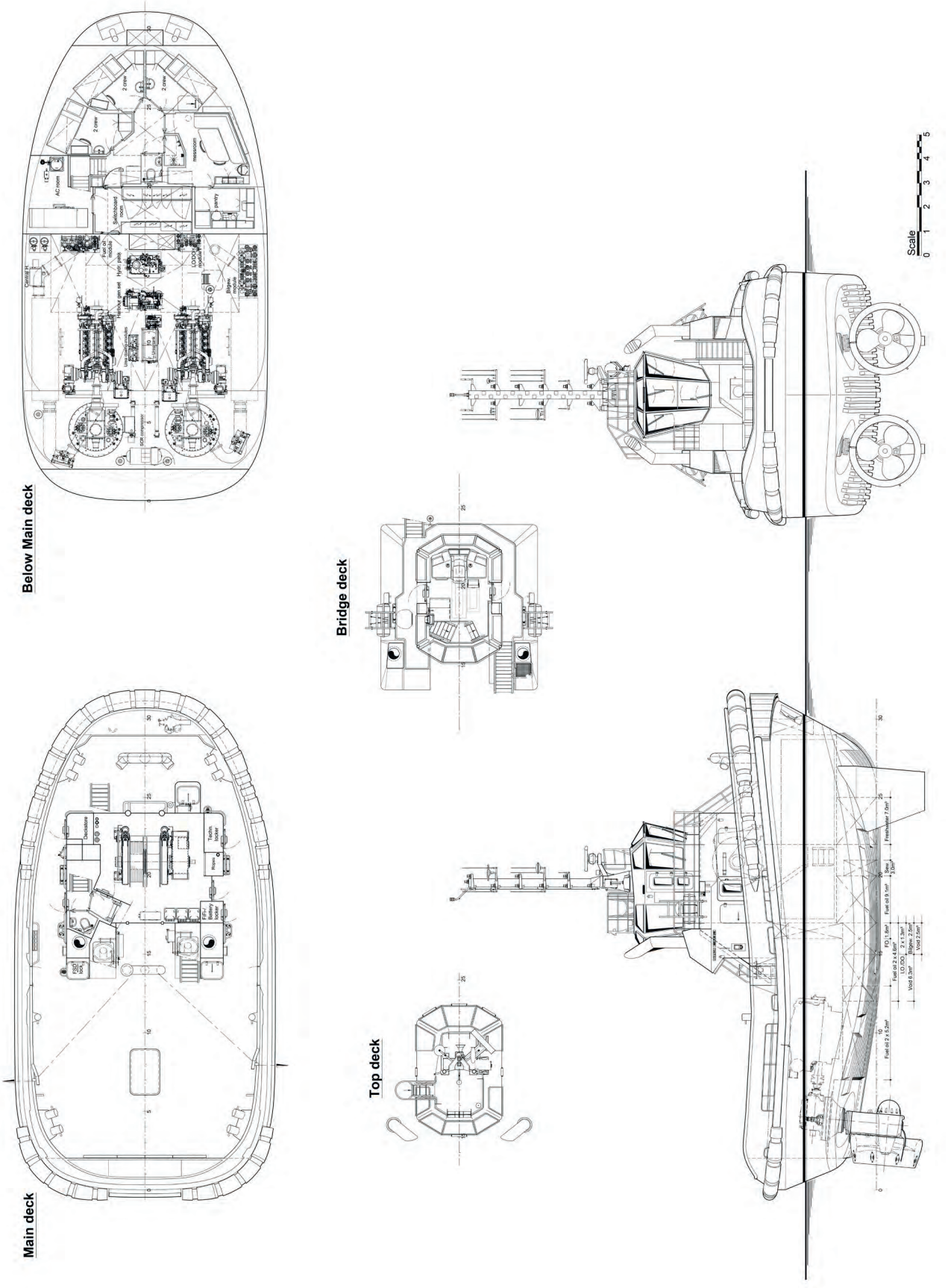
Onboard capacities:
- Fuel oil ..... 30.5m^3
- Fresh water ..... 7m^3
- Sewage ..... 3m^3
- Dirty lubrication oil ..... 1.32m^3
- Clean lubrication oil ..... 1.32m^3
- Bilge water ..... 2.54m^3
- Urea ..... 1.46m^3

Complement:
- Number of crew 6
- Number of passengers 0
- Number of cabins ..... 3 (doubles)

Other significant or special items of equipment:
- Exhaust gas aftertreatment system for IMO Tier III compliance

Classification
- Classification society ..... Bureau Veritas
- Notations ..... I ✠ HULL ● MACH Tug (Bollard pull = 50tonnes) (maximum steering force = 40tonnes, maximum braking force = 52tonnes, maximum escort speed = 10knots) Unrestricted Navigation AUT UMS Inwater Survey

KÄTHE WESSELS



PURUS TIGERS 1839 – Hybrid CTV for offshore wind transits

Shipbuilder:	**Damen Shipyards Group**
Designer:	**Damen Shipyards Group**
Vessel's name:	***Purus Tigers 1839***
Owner/Operator:	**Purus Wind**
Country:	**UK**
Flag:	**UK**
Total number of sister ships already completed:	**4**
Total number of sister ships still on order:	**3**
Contract date:	**March 2023**
Delivery date:	**January 2025**

Purus Tigers 1839 is the fourth FCS 2710 Hybrid design delivered by Damen Shipyards to Purus. The 26.8m loa vessel has been designed to provide low-emission crew transfer services to the offshore wind sector. Purus has stated its intention to operate an environmentally conscious fleet, which includes its series of crew transfer vessels (CTVs).

The vessel features a battery capacity of 190kWh, enabling it to operate with zero emissions while in harbour and when loitering at offshore wind farms. In addition to its hybrid capabilities, the FCS 2710 Hybrid is IMO Tier III-compliant, in recognition of its significantly reduced NOx and SOx emissions. "With these performance standards, Purus aims to directly provide its clients with the benefits of reduced emissions and fuel consumption," Damen Shipyards states.

The new Hybrid FCS 2710 has now joined the three other models in this series that Purus Wind's High-Speed Transfers department ordered from Damen in the second half of 2022. Damen says that *Purus Tigers 1839* "is updated with the latest design adjustments such as an improved wheelhouse window arrangement and bridge console lay-out". The company adds: "The twin axe hullform ensures excellent stability and fuel economy as well as providing extensive deck space and accommodation."

Damen is supporting the FCS 2710 Hybrid via its UK service hub, situated in Southampton. "Purus will have access to local support, both scheduled and unscheduled, as well as to spare parts and components to help them ensure maximal uptime," Damen says.

TECHNICAL PARTICULARS

Length, oa	26.8m
Length, moulded	26m
Breadth, moulded	10.3m
Depth at sides	4.3m
Gross tonnage	235
Draught max	2.3m
Design, deadweight	15tonnes
Deck space (total)	90m^2
Max speed	>25knots
Range	700nm@25knots

Propulsion
Main engine(s):

Number of engines	2
Make	Caterpillar
Model	C32 TTA
Output total power	2,162bkW@ 2,000-2,300rpm

Gearbox(es):

Number of gearboxes	2
Make	Reintjes
Model	ZWVSA 440

Propeller(s):

Number of propellers	2
Material	Ni-Al-Bronze
Fixed/controllable pitch	Fixed
Open/nozzled	Open

Deck machinery
Crane(s):

Number of cranes	1
Capacities/SWL	1,700kg@10.56m

Anchor winch(es):

Number of winches	1 x electric anchor winch
Anchor weight	150kg

Other deck machinery/equipment:
- Heavy-duty bow fender
- Hoisting winch

Bridge electronics:

Radars	2 x 19" radar scanner 4ft, X-band, range up to 96nm
GMDSS	A2
GPS	5.7" LCD, 24 V

Other communication systems:

Remote monitoring	Damen Triton
Digital echo sounder	Display 6.5" TFT LCD, frequency 200kHz, Voltage 230V

Onboard capacities:

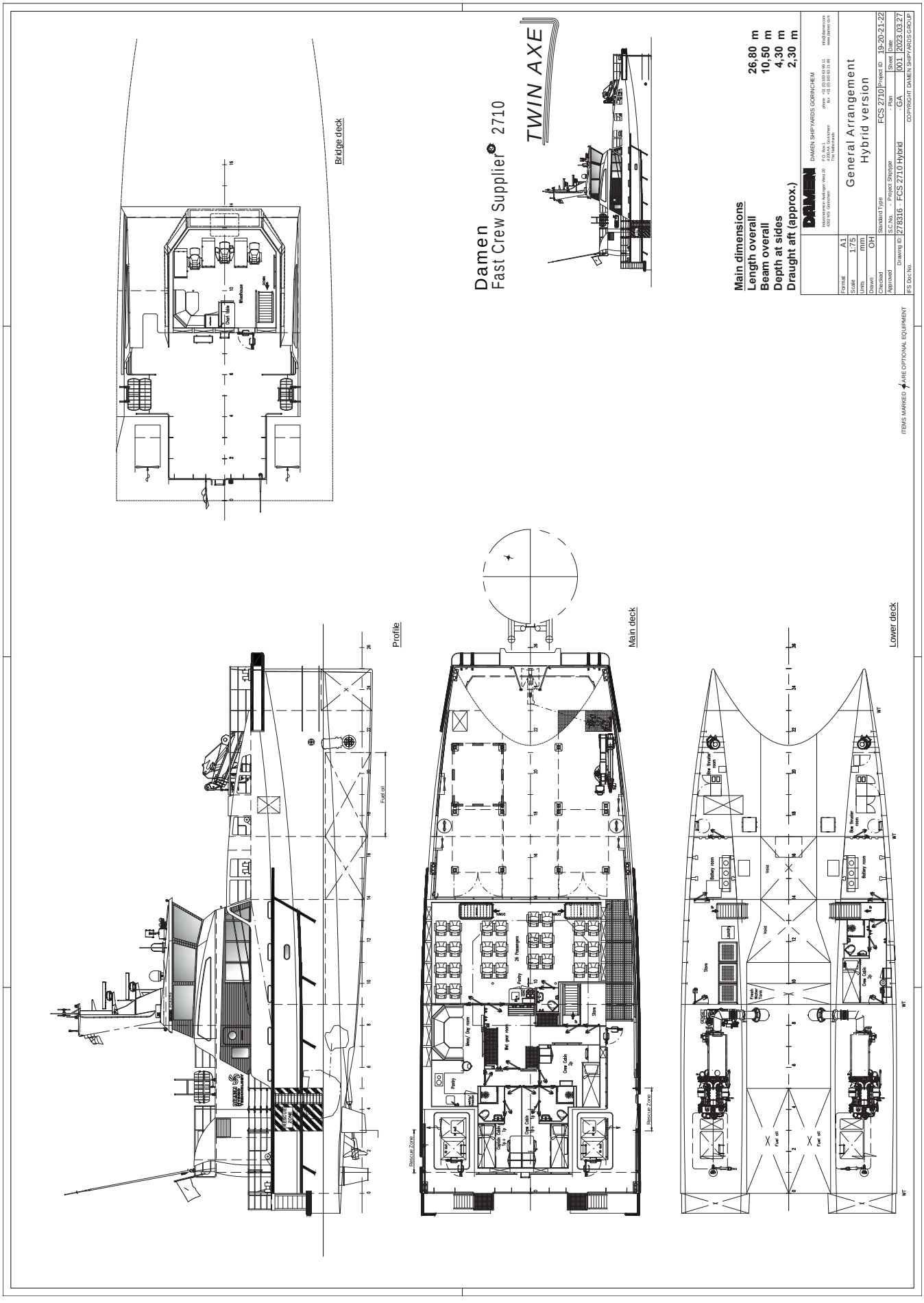
Fuel oil	30.5m^3
Fresh water	3.5m^3
Sewage	0.55m^3
Ballast water/dirty oil	0.42m^3
Urea	1.5m^3

Complement:

Number of crew	3
Number of (industrial) personnel	26
Number of cabins	1 x captain's cabin 1 x single crew cabin 2 x double crew cabin

Classification

Classification society	Bureau Veritas
Notations	I ✠ HULL ● MACH, Light ship / Fast Utility Vessel, Electric Hybrid (ZE), Sea area 3


Damen
Fast Crew Supplier 2710
TWIN AXE
Main dimensions
Length overall 26,80 m
Beam overall 10,50 m
Depth at sides 4,30 m
Draught aft (approx.) 2,30 m
DAMEN SHIPYARDS GORINCHEM
General Arrangement
Hybrid version
Format A1
Scale 1:75
Units mm
Dawn OH
Checked
Aproved
Standard Type
S.C.No. - - Project Shipype
FCS 2710
Project ID 19-20-21-22
- Plan
Sheet 001
Date 2023.03.27
Drawing ID 278316 - FCS 2710 Hybrid - GA
IFS Doc No.
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Bridge deck
Profile
Main deck
Lower deck
Rescue Zone
Fuel oil
WT

REACH REMOTE 1 – Crew-free research craft and ROV deployer

Shipbuilder:	**Trosvik Maritime**
Designer:	**Kongsberg Maritime**
Vessel's name:	***REACH REMOTE 1***
Owner/Operator:	**Reach Subsea**
Country:	**Norway**
Flag:	**Norwegian**
Total number of sister ships already completed:	**2**
Total number of sister ships still on order:	**0**
Contract date:	**Unspecified**
Delivery date:	**January 2025**

Formed in 2008, Norwegian operator Reach Subsea specialises in deploying work-class ROVs to gather ocean data for clients. "We were looking for something that could make us a bit more competitive in this market," explains Bjørg Mathisen Døving, VP for the REACH REMOTE fleet at Reach Subsea, "and we also wondered why we were utilising a big vessel for what were quite easy ROV deployment tasks." An encounter with Kongsberg Maritime in 2015 led Research Subsea to consider the use of a remote-controlled USV.

This uncrewed craft would not only taxi a work-class ROV from site to site, but act as an 'energy carrier', providing the power required by the ROV for its offshore tasks. The USV and ROV would be operated from remote operations centres (ROCs), on land or on another ship. This concept would evolve into Reach Subsea's *REACH REMOTE 1* USV.

For Døving, the vessel offers numerous benefits compared to traditional crewed vessels. For instance, the smaller overall vessel size (think no need for heads, crew berths, fresh-water tanks or a galley), combined with the use of hybrid electric propulsion, spells lower rates of fuel consumption per operation, minimising the boat's environmental impact. Reach Subsea and Kongsberg restricted the USV's length to just under 24m, to meet the UK Maritime & Coastguard Agency's (MCA's) Workboat Code 3 requirements.

From a safety perspective, moving operations to onshore ROCs also removes the dangers faced by human crews in rough offshore environments. Additionally, as smaller, quieter vessels, USVs significantly reduce underwater noise, minimising disturbance to sea life.

There is also the benefit of reducing unplanned downtime by using shipboard predictive maintenance technologies to keep tabs on the performance of vital equipment and systems. Moreover, remote-controlled operations open up new job opportunities for a more diverse workforce, including people who may be restricted from travelling offshore, due to disabilities or family commitments, for example.

REACH REMOTE 1 isn't just dependent on its ROV for underwater tasks; the USV can also perform its own surveys, using two Kongsberg EM2040 multibeam echosounders and a Topas PS120 sub-bottom profiler, which can gather data up to 500m-deep. The ROV is an electric work-class ZEEROV model, produced by Kystdesign. Rated 112kW, the vehicle measures 2.75m x 1.7m x 1.69m, weighs 3,800kg and can carry up to 600kg of sensors and scientific equipment. The ZEEROV can descend to depths of 2,000m, and has been specially developed for 30 days' worth of prolonged immersion, matching the USV's range.

Described "the heart of the vessel", the ROV LARS is customised for crew-free operations, deploying the ROV beneath the surface through a 5m x 3m moonpool. Døving adds: "The umbilical that runs with the ROV is also a lifting umbilical with a SWL of 8.6tonnes. So, in principle, it acts like a winch. We could use the LARS with any drone or underwater vehicle that fits."

The engine room houses two Volvo Penta diesel engines with permanent magnet motors, which provide power for both the vessel and the ROV. Kongsberg supplied the USV's two lithium-ion battery banks, which can be used for peak shaving and added redundancy in the event of engine failure, or to power the vessel in pure-electric mode. The USV uses two ZF azimuthing thrusters, one fore and one aft, to maintain its DP2 dynamic positioning capability.

TECHNICAL PARTICULARS

Length, oa	23.9m
Breadth, moulded	8m
Endurance	30 days
Main engine(s):	
Number of engines	2
Make	Volvo Penta
Model	D13 MH
Output of each engine	441kW@1,900rpm (variable speed)
Propeller(s):	
Number of propellers	2
Make	ZF
Model	ATL WM-FP L-drive azimuth thrusters
Fixed/controllable pitch	Fixed
Open/nozzled	Nozzled
Deck machinery/equipment:	
- ROV launch and recovery system (LARS): ROV launched from moon pool	
Other significant or special items of equipment:	
- Power electric system (switchboards, drives, etc.)	
- Batteries	
- Automation systems including Kongsberg K-Chief, K-Safe, K-Thrust	
- HiPAP hydro-acoustic positioning system	
- Multibeam echosounder and sub-bottom profiler	
Classification	
Classification society	DNV

(NB – a general arrangement for this vessel is currently unavailable)

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RV DJILDJIT KAARTADJINY – Custom-designed research vessel for West Australian waters

Shipbuilder:.....**Dongara Marine**
Designer:.....**Southerly Designs**
Vessel's name:.....**RV *Djildjit Kaartadjiny***
Owner/Operator:.....**Department of Primary Industries and Regional Development (Western Australia)**
Country:.....**Australia**
Flag:.....**Australia**
Total number of sister ships already completed:.....**0**
Total number of sister ships still on order:...**0**
Contract date:.....**February 2022**
Delivery date:.....**January 2024**

RV *Djildjit Kaartadjiny* is a joint production from Southerly Designs and shipbuilder Dongara Marine, the duo behind the fishing vessel *Raging Bull* (see *Significant Small Ships of 2021*). This new aluminium monohull will help the Australian government's Department of Primary Industries and Regional Development (DPIRD) to survey and monitor the health of the region's valuable fisheries, including rock lobsters, crabs and demersal fish.

The vessel's main helm is situated in the port-aft quarter of the wheelhouse, so that the skipper is close to the work deck and can see what is happening. A window in the aft bulkhead opens upwards and outwards to help the skipper to see and communicate with the deckhand. RV *Djildjit* also features an external control station and a Vision Pro CCTV system for visual monitoring around the vessel, while an IP68-rated Vision Precision camera permits crew to monitor anchor recovery.

The aft deck features an A-frame, a deck crane, a pot winch and a pot tipper. A removable folding stern launch and recovery ramp enables the crew to deploy and retrieve auxiliary vessels up to 6m in length. RV *Djildjit* can stay out at sea for up to 15 days at a time. A pair of 680litre-capacity tanks are located aft, one on each side: these can store containerised fuel for the auxiliary vessel's outboards, but they are also plumbed for use as live rock lobster tanks.

The vessel is powered by a MAN engine, driving a five-bladed Veem propeller. Sea trials saw a loaded RV *Djildjit* achieve a cruise speed of 18.5knots, increasing to 24.5knots max. A Mase Mariner 3000 genset is also fitted on board, and the vessel can utilise two 1kW/24V solar panel arrays on the wheelhouse roof – each array comprising five panels – for its hotel loads.

RV *Djildjit* is fitted with a large rudder and two Sleipner side thrusters, including an SH320 unit forward and an SH240 aft, to bolster manoeuvrability and work with the vessel's DP system to maintain position for extended periods. The vessel is also fitted with a full Humphree active ride control system, and Dongara Marine has provided the option for a gyrostabiliser. The boat's underwater tools include a Furuno BBDS1 bottom discrimination sounder (which uses bouncing soundwaves to identify seabed materials) and a Furuno DFF-3D multibeam sonar. Furuno also supplied the vessel's TZT3 internal fish finder and DRS4D-NXT solid state doppler ultra-HD radar, which provides coverage out to 48nm.

TECHNICAL PARTICULARS

Length, oa 18.6m
Length, bp 15.8m
Breadth, moulded 5.4m
Depth, moulded 2.4m
Displacement 42tonnes
Design, draught 1.8m
Design, deadweight 15tonnes
Lightweight 27tonnes
Deck space (total) ..... 30m^2
Service speed ..... 18.5knots (85% MCR)
Max speed 24.5knots
Range ..... 800+nm
Propulsion
Main engine(s):
Number of engines 1
Make ..... MAN
Model D2862 LE426
Output of each engine 1,140kW
Gearbox(es):
Number of gearboxes 1
Make ..... ZF
Model 3000A
Output speed ..... 2.5:1 reduction
Propeller(s):
Number of propellers 1
Make ..... Veem
Model ..... Veemstar LC Interceptor
Diameter 1m
Material ..... Ni-Al-Bronze
Number of blades 5
Speed 456rpm
Fixed/controllable pitch ..... Fixed
Open/nozzled ..... Open

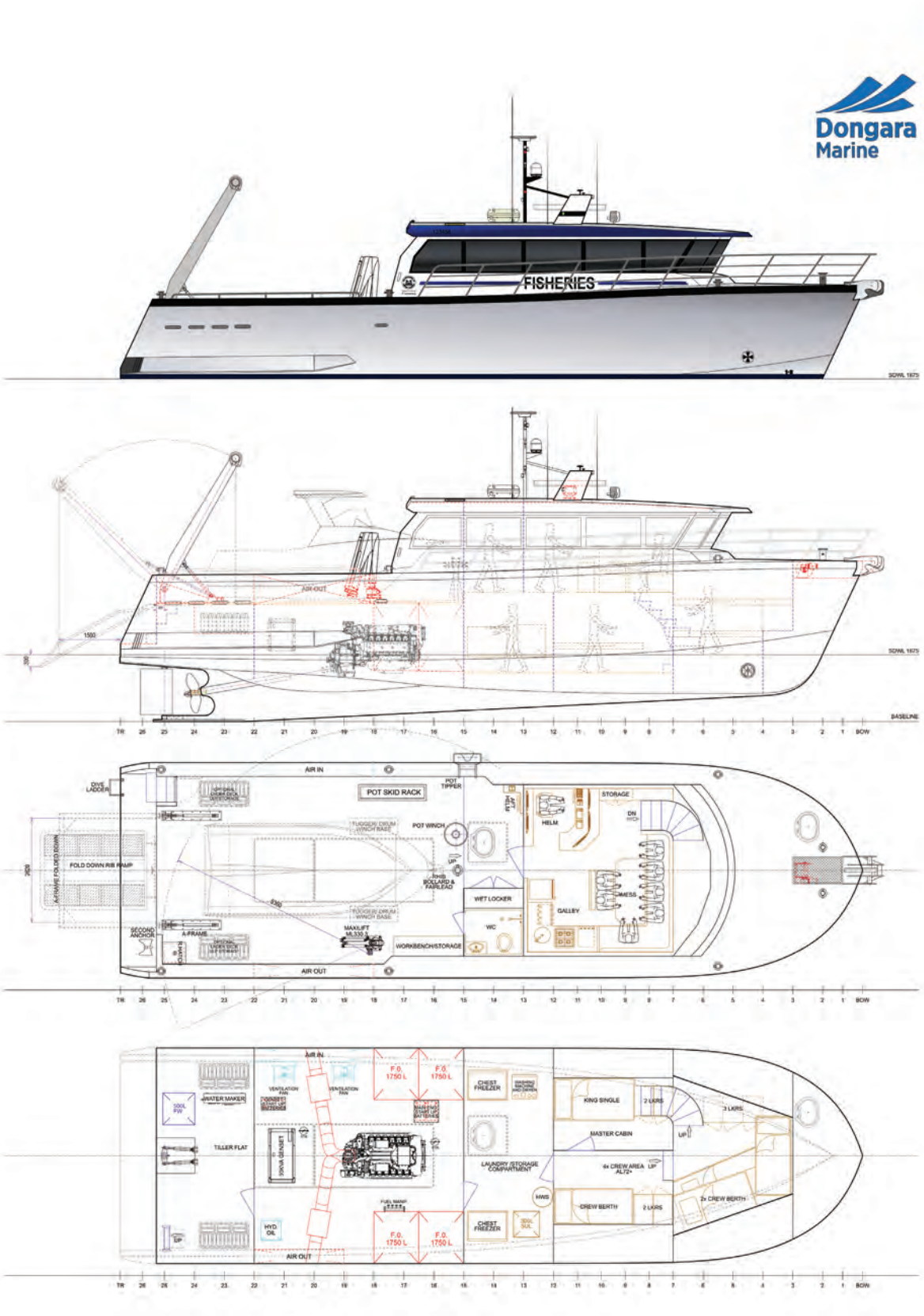
Deck machinery and bridge electronics
Crane(s):
Number of cranes 1
Make ..... Maxilift
Model ..... ML 330.3
Capacities/SWL 32kNm
2,350kg@1.36m
420kg@4.36m max reach
Winch(es):
Number of winches 1
Make ..... Dongara Marine
Model ..... Custom pot winch
Other deck machinery/equipment:
- A-frame, 3tonnes SWL (Dongara Marine custom)
- Equipped for (but not with) trawl/wire drum winch or longline reel (owner supply)
- Folding stern ramp for auxiliary vessel launch and recovery (Dongara Marine custom)

Bridge electronics:
Radar(s) ..... Furuno DRS4D-NXT
Autopilot ..... Simrad A2004
GPS ..... Furuno GP-39 GPS
Gyro ..... Furuno SCX-20 satellite compass
Chart plotter ..... TimeZero Professional system with MaxSea charts
3 x Simrad 19" / 1 x Furuno TZT3 16" screens
Engine monitoring system ..... Maretron
Fire detection system ..... Stat-X
Other communication systems
- Icom VHF
- Iridium satellite phone
- Cel-Fi go mobile/cell phone booster
- Starlink satellite internet

Onboard capacities:
Fuel oil 7,600litres
Fresh water 645litres
Sullage 300litres
Other capacities:
>5.5tonnes deck cargo
>6m/2.5tonne auxiliary vessel
2 x 680litre live fish tanks
Complement:
Number of crew 2
Number of passengers ..... 12 for <12 hours
6 for 12-24 hours
2 for unlimited hours
Number of cabins 3
Other significant or special items of equipment:
- Furuno BBDS1 sounder
- Furuno DFF-3D sonar
- Airmar 120WX WeatherStation
- Vision Pro CCTV and Precision Vision anchor monitoring camera
- Sleipner SH320 bow thruster
- Sleipner SH240 stern thruster

Classification:
Classification society ..... Australian Maritime Safety Authority (AMSA)
Notations ..... National Standard for Commercial Vessels (NSCV) 2B

RV DJILDJIT KAARTADJINY



RV RESILIENCE – Electric-hybrid research vessel for US operations

Shipbuilder:.....**Snow and Company, Inc**
Designer:.....**Incat Crowther USA**
Vessel's name:.....**RV *Resilience***
Owner/Operator:.....**US Department of Energy, Pacfic Northwest National Laboratory (PNNL)**
Country:.....**US**
Flag:.....**US**
Total number of sister ships already completed:.....**1**
Total number of sister ships still on order:.....**0**
Contract date:.....**February 2022**
Delivery date:.....**July 2024**

RV *Resilience* is a hybrid research vessel designed by global digital shipbuilder Incat Crowther and built by Snow & Company, which was delivered to the US Department of Energy's Pacific Northwest National Laboratory (PNNL) in July 2024.

Something of a milestone vessel, it is also the Department of Energy's first hybrid electric-diesel research vessel. Ushering in a new era for research for the Department of Energy, the 15m hybrid catamaran research vessel will help PNNL sustainably expand its research activities in the Sequim Bay region of Washington state.

RV *Resilience*'s 28m^2 main deck is equipped with an A-Frame, boom crane and moveable davit in addition to a foldable swim platform. Designed to support the work of six scientists, RV *Resilience* also features multiple research workstations, a dry laboratory, observation stations on the flybridge and convertible sleeping arrangements for multiday assignments.

Sustainability and operational flexibility are enhanced via the vessel's advanced parallel hybrid-electric propulsion system, which comprises two standard diesels, capable of producing 374kW each, and two electric motor-generators. While RV *Resilience* can travel at speeds of up to 23knots on its two main diesel engines, it can quickly transition to a silent, all-electric mode capable of speeds of up to 7knots.

This silent, all-electric mode will allow the PNNL researchers to conduct their activities with minimal noise pollution, allowing for enhanced research capabilities when taking sensitive acoustic measurements. Christian Meinig, division director for PNNL's Coastal Sciences division, comments: "This first-in-class electric-hybrid vessel will greatly expand our R&D and testing capabilities and help us build new partnerships. The large working deck and heavy-lift capability will allow us to deploy and recover larger instruments and uncrewed vehicles to rapidly develop technology and deliver impact to our sponsors."

TECHNICAL PARTICULARS

Length, oa.....15.24m
Length, bp.....15.15m
Breadth, moulded.....4.86m
Depth, moulded.....2.3m
Gross tonnage.....38
Displacement.....35tonnes
Design, draught.....1.316m
Design, deadweight.....8.526tonnes
Lightweight.....26.474tonnes
Deck space (total).....28.3m^2
Deck capacity.....1tonne/m^2
Service speed.....20knots@90% MCR
Max speed.....24knots@100% MCR
Range.....350nm

Propulsion
Main engine(s):
Number of engines.....2 x diesel
2 x electric
Make.....Volvo (diesel)
Danfoss (electric)
Model.....D8-510 (Volvo)
EM-PMI375-T200 (Danfoss)
Output of each engine.....374kW (diesel)
55kW (electric)
Gearbox(es):
Number of gearboxes.....2
Make.....Twin Disc
Model.....MGX-5075SC
Output speed.....1,126.5rpm

Propeller(s):
Number of propellers.....2
Make.....Michigan Wheel
Model.....M500
Diameter.....711.2mm
Material.....Bronze
Number of blades.....5
Fixed/controllable pitch.....Fixed
Open/nozzled.....Open

Deck machinery and bridge electronics
Crane(s):
Number of cranes.....1
Make.....Morgan Marine
Model.....150.2
Capacities/SWL.....1.3tonnes
Other deck machinery/equipment:.....5tonne SWL aft deck A-frame

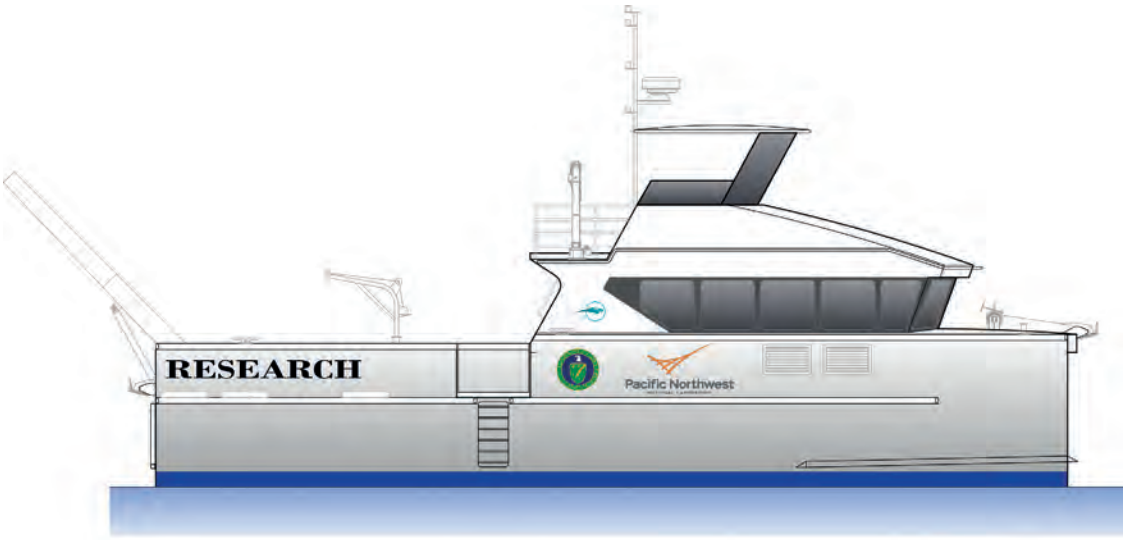
Onboard capacities:
Fuel oil.....2,300litres
Fresh water.....300litres
Sullage.....300litres

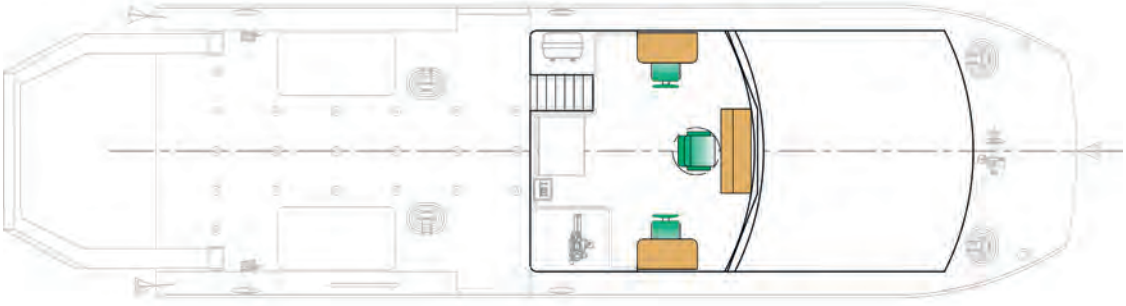
Complement:
Number of crew.....2
Number of passengers.....6
Number of cabins.....0

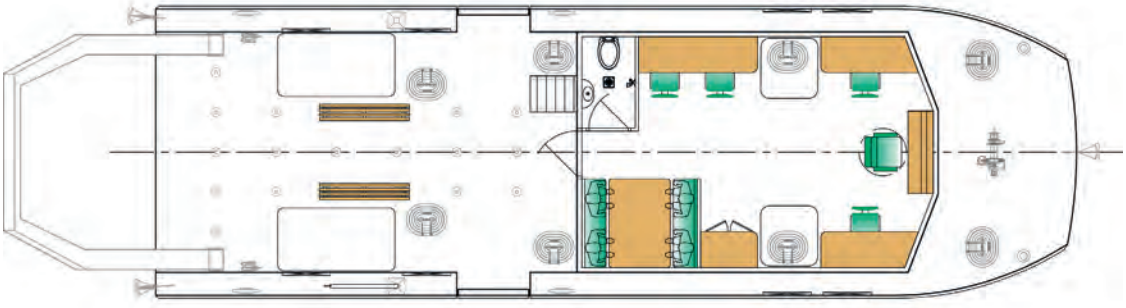
Classification society.....Designed to DNV-GL HSLC notations

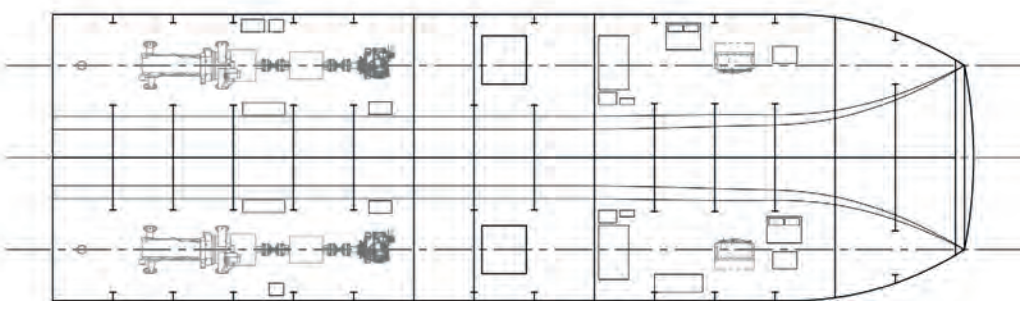
Other important international regulations complied with.....Compliant with ASTM F3353-19 – Standard Guide for Shipboard Use of Lithium-Ion (Li-ion) Batteries

RV RESILIENCE









SEA HAWK – Patrol boat designed to replicate bigger ship performance

Shipbuilder:..... **Norman R. Wright & Sons**
Designer:..... **Norman R. Wright & Sons**
Vessel's name:..... ***Sea Hawk***
Owner/Operator: ..... **NSW Police Force**
Country:..... **Australia**
Flag:..... **Australia**
Total number of sister ships already completed..... **4**
Total number of sister ships still on order:..... **2**
Contract date..... **July 2023**
Delivery date ..... **February 2024**

Norman R. Wright & Sons was asked by multiple agencies to develop a 12m patrol vessel with big boat features. The end result is the in-house developed 12m XLW (eXtra Long Waterline) patrol boat hullform. The hull was developed with the use of extensive CFD to ensure the ultimate in seakeeping and efficiency was met. End users of these smaller patrol vessels want to be able to go out in all sea conditions and match the performance of their much larger fleet, which results in less crew and fuel being required to perform the same duties.

The rugged vessel is built to a 5g bottom loading in advanced composites using E-glass/carbon, epoxy and foam cores, with structure approved to DNV Patrol S classification. The remainder of the vessel complies with AMSA NSCV Class 2C survey requirements, permitting use up to 30nm offshore while carrying two crew plus 10 special personnel.

This is the third variation on this hullform, with the earlier versions being petrol outboard-powered. This version is powered by Volvo D6 IPS-500 units, producing 380hp each. The Volvo IPS is coupled with the DP and hold features, allowing the small crew to push a button in order to maintain the vessel's position and orientation while performing their duties. The builder/designer says: "While all propulsion variants have their place, the diesel inboard IPS version uses around half the fuel of the outboard powered versions at 20knots, with 90hp less and considerably greater displacement."

Crew comfort was a priority and was achieved with a soft riding hull, forward-facing windscreen and UES mechanical suspension seats for all. The interior accommodation is fully air-conditioned. A small galley can be found in the wheelhouse along with a PC workstation. The forward accommodation features a full stand-up enclosed head with toilet, shower and basin, V-berth and large storage compartments.

The cockpit is on a single level with a 2tonne tow post and rope reel forward. A forward hatch leads to the genset void housing the Kohler 9kVA generator and fuel system, and space for a gyrostabiliser if required. The engines are accessed through the single large electric opening hatch, with another smaller one over the IPS units. The transom is fitted with a Stella Marine hydraulic lowering platform to assist with retrieving items from the water and diving.

TECHNICAL PARTICULARS

Length, oa 13.71m
Length, bp 11.95m
Breadth, moulded 3.74m
Depth, moulded 2.25m

Displacement ..... 11.62tonnes (fully loaded)
Design, draught ..... 1m (max to underside of props)
Lightweight 10.05tonnes
Service speed ..... 24 knots@80% MCR
Max speed ..... 35.2knots (fully loaded)
Bollard pull 2tonnes
Range ..... 270nm@24knots

Propulsion
Main engine(s):
Number of engines 2
Make ..... Volvo
Model D6-IPS 500
Output of each engine ..... 280kW@3,500rpm

Bridge electronics:
Radar(s) ..... Furuno
Autopilot ..... Volvo
GPS ..... Furuno/Volvo
Chart plotter ..... Furuno
Engine monitoring system ..... Volvo
Other communication systems ..... Furuno
Multi-beam Sonar FLIR
M364 LR Long Range Thermal Camera

Onboard capacities:
Fuel oil 1,100litres
Fresh water 200litres
Sullage 120litres

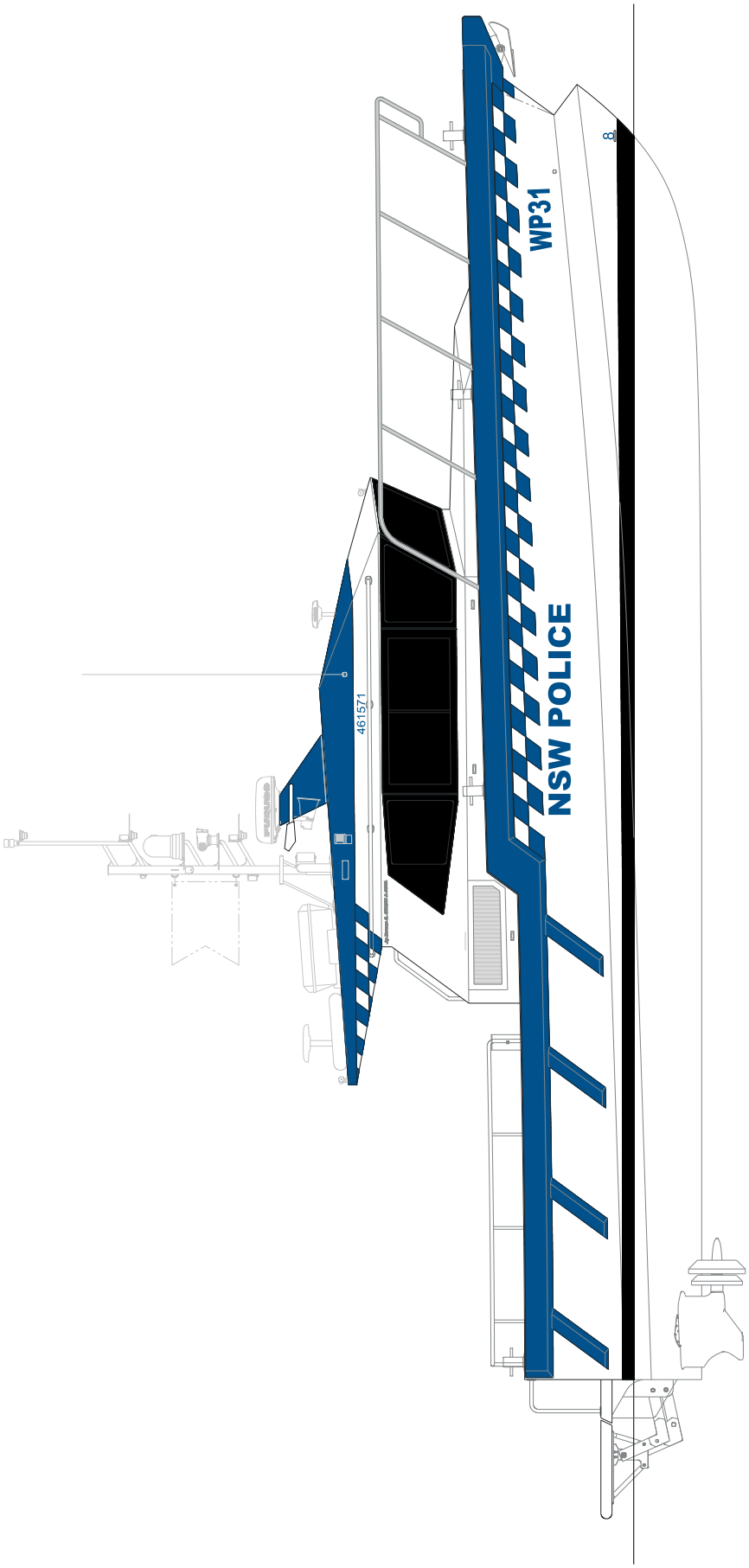
Complement:
Number of crew 2
Number of passengers 10
special personnel
Number of cabins 1

Other significant or special items of equipment:
- Kohler 9kVA generator

Classification
Classification society ..... N/A
Notations ..... AMSA NSCV Class 2C

Other important international regulations complied with:
- DNV 1A HSLC R2 Patrol S (Structure)

SEA HAWK



SUN PRINCESS – Largest cruise ship built in Italy

Shipbuilder:	**Fincantieri S.p.A – Monfalcone Shipyard**
Designer:	**Fincantieri S.p.A – Merchant Ship Business Unit**
Vessel's name:	***Sun Princess***
Owner/Operator:	**Princess Cruise Lines**
Country:	**US**
Flag:	**Bermuda**
Total number of sister ships already completed:	**0**
Total number of sister ships still on order:	**1 (to be delivered in September 2025)**
Contract date:	**March 2019**
Delivery date:	**February 2024**

Sun Princess is the largest cruise ship ever built in Italy, measuring 345m in length and with a gross tonnage of 177,882gt. It is the first cruise ship built by the Italian shipbuilder and the first commissioned by Princess Cruises to be powered not only by conventional marine gas oil (MGO) but also by liquefied natural gas (LNG).

As such, the design features several new systems compared to the previous vessels. These include: five Wärtsilä dual-fuel engines; two dual-fuel boilers; two cryogenic tanks, each containing 2,000m^3 of LNG; an LNG re-gasification and distribution system; and two boil-off gas compressors. The latter, specifically, are designed to recover the gas naturally generated within the LNG tanks and employ it in the dual-fuel boilers, minimising natural gas waste.

The vessel is also equipped with an air lubrication system, designed to create a curtain of bubbles below the hull and thus reduce the hull's hydrodynamic resistance, plus a cold-ironing system, to connect to shore power and avoid the use of its engines when quayside, for emission-free port visits.

Sun Princess is the first of the Sphere class, referring to the dominant presence of two large glass spheres on board. The first, placed around amidships and spanning eight decks in height – the first three of which encompass the entire main atrium, known as 'The Piazza' – allows vast amounts of natural light to enter this area. The second sphere, placed on deck 17 and developed over two decks in height, is known as 'The Dome' and can be viewed as a modern reinterpretation of the more traditional covered pool area.

TECHNICAL PARTICULARS

Length, oa	345.28m
Length, bp	316.11m
Breadth, moulded	42.47m
Depth, moulded	12.1m
Gross tonnage	177,882
Displacement	89,448.2tonnes (at design draught)
Design, draught	8.6m
Design, deadweight	12,200tonnes
Lightweight	74,415tonnes
Deck space (total)	approx. 47,000m^2 of public areas
Service speed	18.3knots@53% MCR
Max speed	22.6knots@100% MCR
Range	3,900nm with LNG

Propulsion

Main engine(s):

Number of engines	5 (2 x 14V, 2 x 12V, 1 x 8L)
Make	Wärtsilä
Model	46DF
Output of each engine	16,030kW (14V), 13,740kW (12V), 9,160kW (8L)

Propeller(s):

Number of propellers	2
Make	ABB
Diameter	6m
Material	Ni-Al-Bronze
Number of blades	6
Speed	133rpm (nominal); 150rpm (max)
Fixed/controllable pitch	Fixed
Open/nozzled	Open
Special adaptations	POD-mounted

Deck Machinery

Crane/Davit(s):

Number of cranes	18 stored power hinged davits (10 for lifeboats + 6 for tender/ lifeboats + 2 for fast rescue craft)
Make	Navalimpianti
Capacities/SWL	510kN (for lifeboats); 460kN (for tender/lifeboats); 25kN (for fast rescue craft)

Winch(es):

Number of winches	2 x combined anchor windlass/winches + 8 mooring winches (3 fwd + 5 aft)
Make	NOV-BLM
Capacities	430kN

Roller(s):

Number of rollers	53 (19 pedestal guide rollers + 26 Turner-type multi-roller fairleads + 8 external rollers)
Make	Techmarine
Capacities	1,930kN (SWL)

Bridge electronics:

Radar(s)	2 Wärtsilä 14ft S-band radars + 2 Wärtsilä 8ft X-band radars + 2 Wärtsilä 5ft X-band radars
Autopilot	Wärtsilä NACOS Multipilot
GMDSS	Sailor Inmarsat Mini-C
GPS	SAAB R5 Supreme
Gyro	Anschütz Standard 22NX System
Chart plotter	Wärtsilä ECDISPILOT Platinum
Engine monitoring system	Managed directly via the Wärtsilä Integrated Ship
Fire detection system	Martec Fire Detection System

Onboard capacities:

MGO	2,839.6m^3
Fresh water	4,222m^3
Sullage	4,407.4m^3
Ballast water	5,951.4m^3
LNG	4,004m^3

Complement:

Number of crew	1,549
Number of passengers	4,322 (lower berths) 5,451 (maximum based on LSA capacity and max. crew)
Number of cabins	3,003 (2,157 pax + 846 crew)

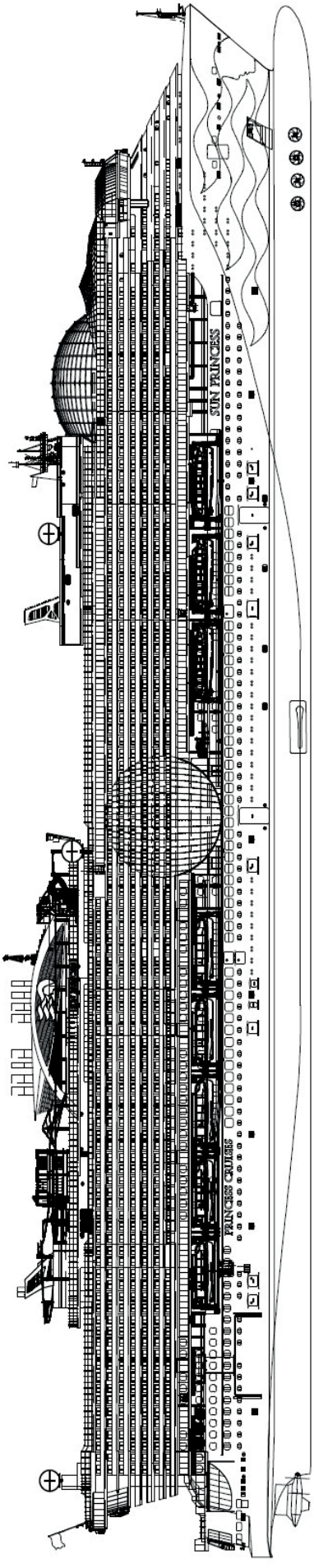
Other significant or special items of equipment:
- Silverstream air lubrication system

Classification

Classification society	Lloyd's Register

Other important international regulations complied with	ADA 2010

SUN PRINCESS



TOR BOREAS – Multi-role offshore wind farm support and survey craft

Shipbuilder: **Tor Marine**
Designer: **Macduff Ship Design**
Vessel's name: ***Tor Boreas***
Owner/operator: **Tor Boreas Limited**
Country: **UK**
Flag: **UK**
Total number of sister ships already completed: **0**
Total number of sister ships still on order: **0**
Contract date: **Q1 2022**
Delivery date: **Q4 2024**

Tor Boreas is a multi-role support vessel with a diesel-electric propulsion system. The vessel was designed with wind farm service, survey and support services in mind, and in particular to assist dive support services and to demonstrate lifting, utility, berthing and towing capabilities – all while maximising crew and passenger comfort.

Other vessel features include gyroscopic stabilisation, a dynamic positioning (DP) system and an extensive deck equipment package, all within a compact design of less than 24m registered length. This equipment includes a high-capacity 'A' frame, towing winch and crane, plus a four-point mooring system and a moon pool.

Substantial accommodation is provided for up to 18 personnel, with private bathroom facilities, along with ample provision for lounge and messing, enabling greater comfort to those aboard in harsh conditions. Additionally, *Tor Boreas* has been fitted with a Veem Marine gyrostabiliser, for enhanced stability, permitting a safer working platform for crew and enabling operation in a greater variety of sea and weather conditions, alongside the obvious advantage of improved crew comfort.

Propulsion is provided via a diesel-electric drivetrain with twin Schottel SRP 210 FP ASD units powered through an active front-end diesel electric system comprising three MAN D2676 340KWe generators and a Baudouin 4W105ES harbour generator set. This, combined with the presence of a Veth VT-90 bow thruster, provides high levels of manoeuvrability and allows the vessel to be fitted with a Kongsberg DP1 system.

TECHNICAL PARTICULARS

Length, oa 26.95m
Length, bp 23.95m
Breadth, moulded 11m
Depth, moulded 4.35m

Gross tonnage 399
Displacement 507tonnes
Draught, max 3.65m
Lightweight 445tonnes

Deck space (total) ..... 70m^2
Deck capacity ..... 5tonnes/m^2

Max speed 11knots

Propulsion
Number of motors 2
Make ..... Schottel - Vem
Output of each engine 450kW

Propeller(s):
Number of propellers ..... 2x ASD
Make ..... Schottel
Model ..... SRP 210 FP
Diameter 1,450mm
Number of blades 4
Fixed/controllable pitch ..... Fixed
Open/nozzled ..... Nozzled

Deck machinery and bridge electronics
Crane(s):
Number of cranes 1
Make ..... Melcal
Model KL120 T3
Capacities/SWL ..... 4.4tonnes@12.7m max

Winch(es):
Number of winches ..... 1 (towing)
Make ..... Data Hidrolik
Capacities ..... 100tonne brake, 25tonne@10m/min

Roller(s):
Number of rollers 1
Capacities ..... 30tonnes SWL

Other deck machinery/equipment:
- Kongsberg DP1 system
- Hydraulic 'A' frame, 1,000kg @4m (on board), 5,000kg @3m (outboard)
- 4-point electric mooring winches, 25tonnes holding, 4-8tonnes pull
- Aft roller
- Bow thruster
- Moon pool

Bridge electronics:
Radar(s) ..... X2 (X&S Band)

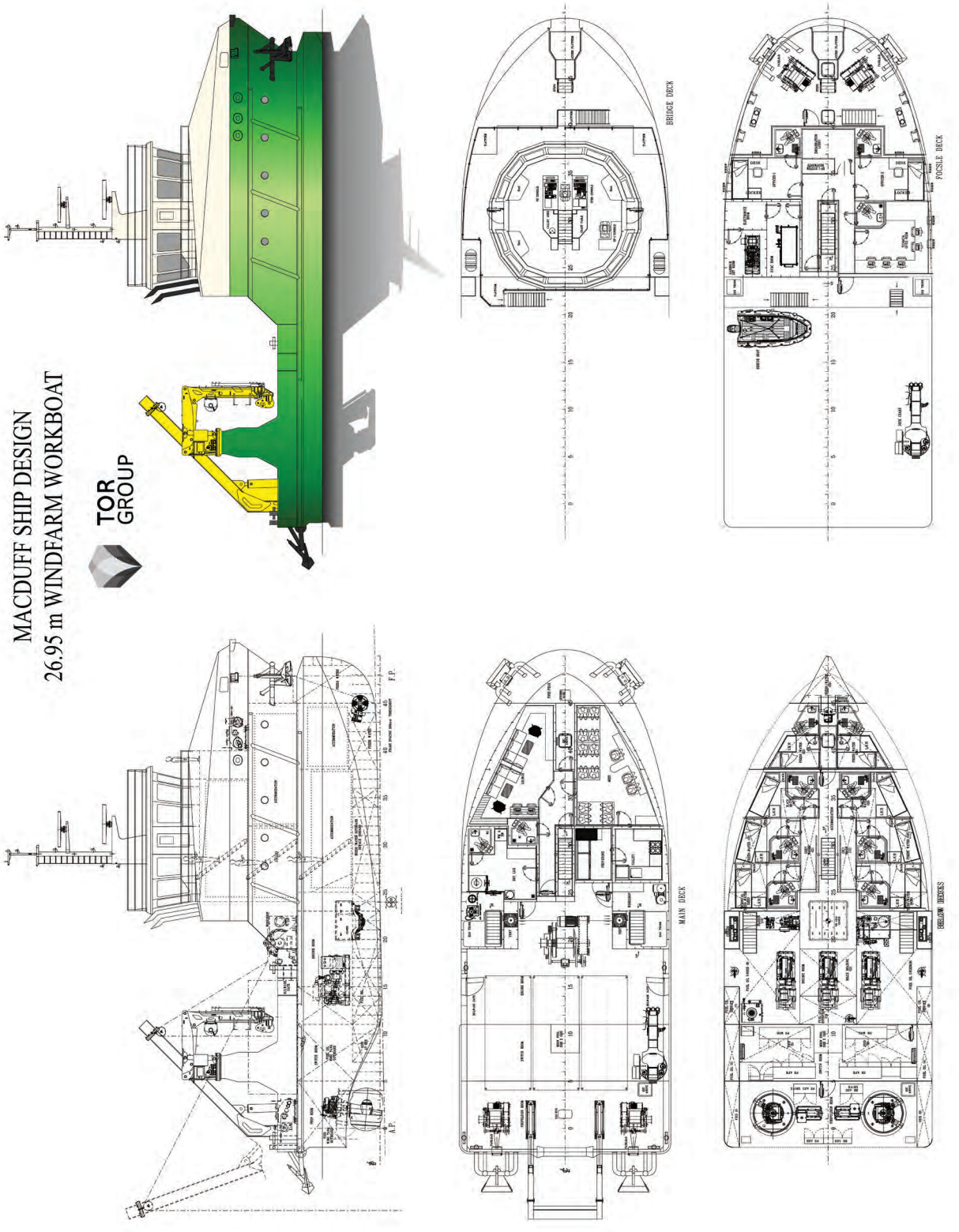
Onboard capacities:
Fuel oil 77,000litres
Fresh water 40,000litres
Black water 15,000litres
Grey water 11,000litres

Complement:
Number of crew 6
Number of passengers 12
Number of cabins 10

Other significant or special items of equipment:
- DP1 – Kongsberg
- Veem ZG140 SD gyroscopic stabiliser
- 1.45m x 1.45m moon pool
- Rescue boat

Classification
Classification society ..... Bureau Veritas
Notations ..... I ✠ HULL ● MACH, Wind Farm Service Ship – M2 Tug standardized bp 17 tonne unrestricted Navigation, ● AUT-UMS, ● DYNAPOS AM/AT

TOR BOREAS


MACDUFF SHIP DESIGN
26.95 m WINDFARM WORKBOAT
TOR GROUP
BRIDGE DECK
FOCSLE DECK
MAIN DECK
BELOW DECKS
F.P.
A.P.

WINDSERVE FRONTIER – Jones Act-compliant CTV for the US East Coast

Shipbuilder:	**Senesco Marine**
Designer:	**BMT**
Vessel's name:	***Windserve Frontier***
Owner/Operator:	**Windserve Marine**
Country:	**US**
Flag:	**USCG – Subchapter L**
Total number of sister ships already completed:	**2**
Total number of sister ships still on order:	**0**
Contract date	**2023**
Delivery date	**August 2024**

The 29m *WindServe Frontier* is a crew transfer vessel (CTV) set to play a crucial role in supporting the expanding offshore wind energy sector in the US. Built by Senesco Marine for WindServe Marine, this vessel is tailored for demanding operations along the US East Coast, where the offshore wind industry is experiencing rapid growth. Additionally, *WindServe Frontier* is fully Jones Act-compliant, meeting US federal maritime regulations by being built in the US, owned by US citizens, registered under the US flag and crewed primarily by US personnel.

The aluminium catamaran, classed by the American Bureau of Shipping (ABS), is a variant of BMT's proven 27m design, incorporating increased cargo capacity and additional machinery space to be 'hybrid-ready'. In other words, this approach ensures that the vessel can be retrofitted with batteries and electric motors, allowing for future adoption of hybrid propulsion technology.

WindServe Frontier is powered by Volvo Penta D13 main engines coupled with Volvo Penta IPS 900 propulsion, delivering a service speed of 24.5knots and a top speed of 27knots. The vessel accommodates six crew members and up to 24 wind turbine technician passengers, facilitating the safe, efficient transfer of personnel between shore, offshore wind turbines and service operation vessels (SOVs).

A standout feature of *WindServe Frontier* is BMT's patented Active Fender System (AFS), which enhances personnel safety by cushioning the impact between the vessel and turbine landing structures. "This technology ensures the vessel remains stable against turbines, reducing landing forces and enabling technician transfers in challenging sea conditions," BMT explains. Additionally, BMT's innovative Z-bow hull design optimises seakeeping performance and reduces resistance, to improve overall vessel efficiency.

The 252gt vessel is also equipped with the Reygar BAREFleet vessel monitoring system, which provides real-time performance data and operational insights. "This advanced technology supports predictive maintenance, reducing downtime and enhancing fleet efficiency," BMT adds.

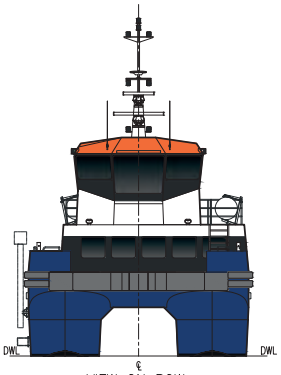
WindServe Frontier is part of a growing portfolio of BMT-designed CTVs constructed by Senesco Marine, including the 29m *WindServe Spartan*, the 20m *WindServe Odyssey* and the 27m *WindServe Genesis*, *WindServe Journey*, and *WindServe Explorer*.

TECHNICAL PARTICULARS

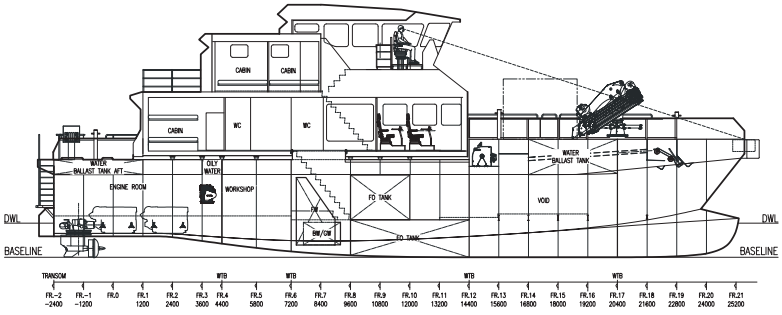
Length, oa	29m
Length, bp	21.8m
Breadth, moulded	9m
Depth, moulded	4.8m
Gross tonnage	252
Displacement	150tonnes
Design, draught	1.7m
Design, deadweight	50tonnes
Lightweight	100tonnes
Deck space (total)	65m^2
Deck capacity	2tonnes/m^2
Service speed	24.5knots@85% MCR
Max speed	27knots
Bollard pull	17tonnes
Range	3,000nm
Propulsion	
Main engine(s):	
Number of engines	4
Make	Volvo
Model	D13 700
Output of each engine	515kW
Gearbox(es):	
Number of gearboxes	4
Make	Volvo
Model	IPS 900
Propeller(s):	
Number of propellers	4
Make	Volvo
Model	SK008-4xID13-PS900-Q2
Diameter	760mm
Material	Ni-Al-Bronze
Number of blades	3-blade front propeller and 4-blade rear propeller
Speed	13.5m/s
Fixed/controllable pitch	Fixed
Open/nozzled	Open
Deck machinery and bridge electronics	
Crane(s):	
Number of cranes	1
Make	TOMIL
Model	T-12500M/2
Capacities/SWL	1,400kg
Winch(es):	
Number of winches	1
Make	Hercules
Model	AAW-150
Onboard capacities:	
Fuel oil	36,770litres
Fresh water	3,000litres
Sullage	2,154litres
Ballast water	13,260litres
Oily Water	900litres
Complement:	
Number of crew	6
Number of passengers	24
Number of cabins	2
Classification	
Classification society	ABS
Notations	A1✠ HSC Coastal Craft Ⓔ, •AMS OE, Wind-SC(A)

WINDSERVE FRONTIER

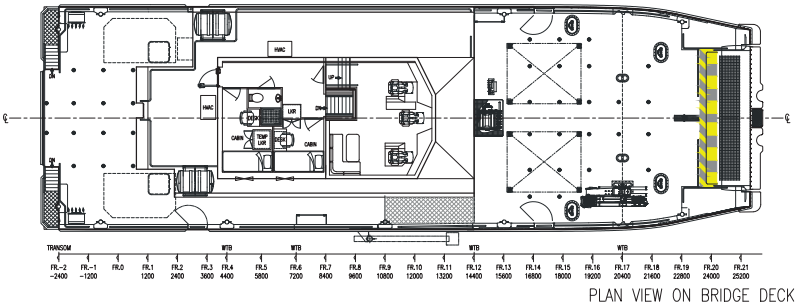
OUTBOARD PROFILE



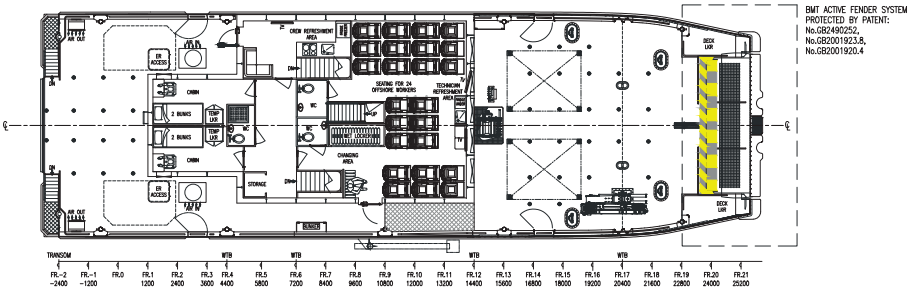
VIEW ON BOW



INBOARD PROFILE

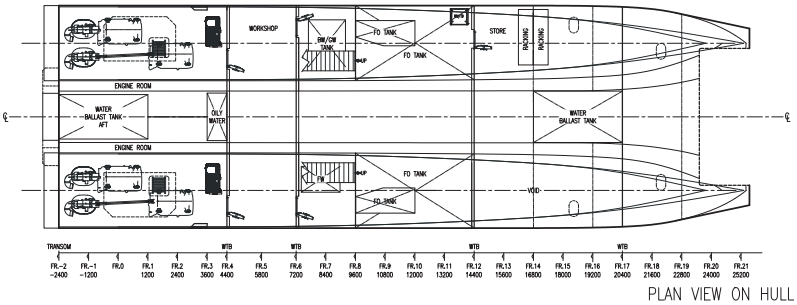


PLAN VIEW ON BRIDGE DECK



BMT ACTIVE FENDER SYSTEM PROTECTED BY PATENT: No.GB2490252, No.GB2001923.8, No.GB2001920.4

PLAN VIEW ON MAIN DECK



PLAN VIEW ON HULL

XIN MING ZHU XXX – Hybrid-powered passenger ferry for Hong Kong

Shipbuilder:	**Afai Southern Shipyard (Panyu Guangzhou)**
Designer:	**Incat Crowther**
Vessel's name:	***Xin Ming Zhu XXX***
Owner/Operator:	**Sun Ferry Services Company Limited**
Country:	**China**
Flag:	**China/Hong Kong**
Total number of sister ships already completed:	**0**
Total number of sister ships still on order:	**0**
Contract date:	**July 2022**
Delivery date:	**July 2024**

Xin Ming Zhu XXX is a 300-pax aluminium fast ferry, forming part of the Hong Kong Government's Vessel Subsidy Scheme (VSS), which was created with the aim of improving fleet quality and promoting environmental protection. After delivery, this batch of newbuilds will operate around the Hong Kong area, covering routes across the Central and Cheung Chau areas, and linking the outlying islands.

The ferry has been fitted with diesel-electric propulsion, and the designer, Incat Crowther, selected a catamaran hullform, which, AFAI Shipyard says, can reduce the overall resistance by 4%; increase the speed from 0.5-0.75knots; and improve seakeeping performance by 23%, effectively reducing seasickness and bring more comfort to the passengers. AFAI Shipyard says: "*Xin Ming Zhu XXX* can achieve a safe and reliable operation under bad weather during Grade 8 strong winds."

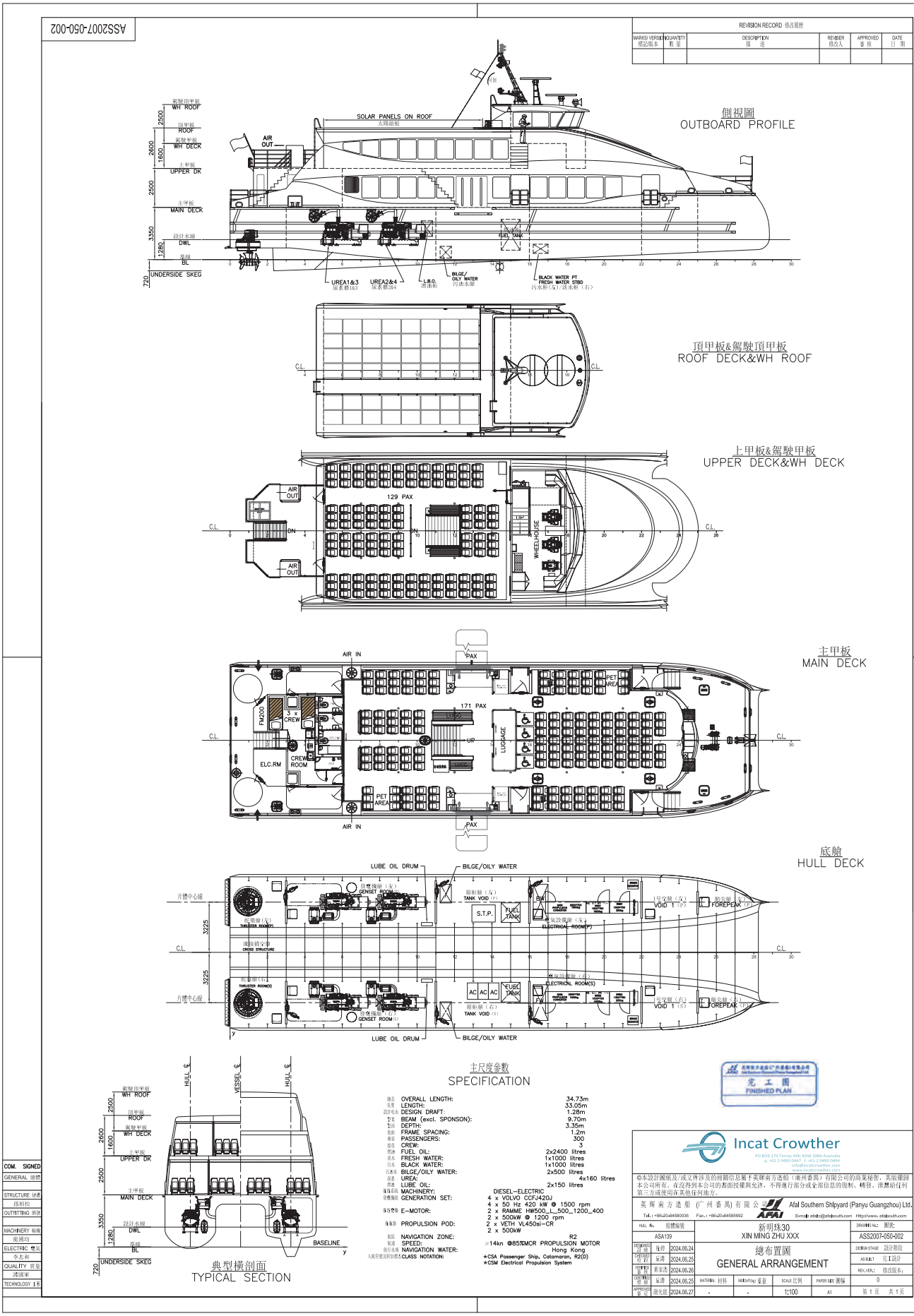
Xin Ming Zhu XXX is also equipped with a selective catalytic reduction (SCR) system for IMO Tier III emissions compliance. As another environmental bonus, the vessel incorporates 32kWh of battery power for electric operations when docked, to further reduce fuel consumption. Additionally, the vessel has been fitted with 72 solar panels, and these provide 7.5kW of onboard power.

The ferry's main deck includes seating for 171 passengers, dedicated areas for pets and designated wheelchair spaces. Incat Crowther says: "Large windows and ergonomic seating allow passengers to enjoy uninterrupted views of the islands. Ample luggage storage is integrated throughout, including a 6m² cargo area centrally positioned for convenience."

The delivery of *Xin Ming Zhu XXX* follows the delivery of two 45m-long, conventional diesel-powered vessels to Sun Ferry. The final three vessels, all 45m units, also designed by Incat Crowther and built by AFAI Shipyard, will be delivered by the end of 2025.

TECHNICAL PARTICULARS

Length, oa	34.73m
Length, bp	34.6m
Breadth, moulded	9.7m
Depth, moulded	3.35m
Gross tonnage	462
Displacement	171.9tonnes
Design, draught	1.28m
Design, deadweight	38.6tonnes
Lightweight	133.3tonnes
Service speed	14knots@85% MCR
Main engines:	
Number of engines	4
Make	Volvo
Model	CCFJ420J
Output of each engine	420kW@1,500rpm
Gearboxes	
Number of gearboxes	2
Make	Ramme
Model	HW500_L_500_1200_400
Output speed	500kW@1,200rpm
Waterjets	
Number	2
Make	Veth
Model	VL450si-CR
Output	500kW
Deck machinery	
Winch(es):	
Number of winches	1
Make	Hangzhou Botu Marine
Model	DB10-10
Capacities	140m anchor line 12.5m of 16mm anchor chain
Other deck machinery/equipment:	
- Capstan	
Bridge electronics:	
Radar(s)	Konden MDC-7925P
Autopilot	Samyung SI-70A
GMDSS	Sailor 6103
GPS	Simrad MX575D+P3007
Chart plotter	HM-5817
Engine monitoring system	Vingtor
Fire detection system	Consilium Safety
Onboard capacities:	
Fuel oil	2 x 2,400litres
Fresh water	1 x 1,000litres
Sullage	1 x 1,000litres
Ballast water	2 x 500litres
Complement:	
Number of crew	3
Number of passengers	300
Number of cabins	4
Classification	
Classification society	CCS
Notations	CSA Passenger Ship, Catamaran, R2(D), CSM Electrical Propulsion System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QUANTITY 數量
DESCRIPTION 描述
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APPROVED 審核
DATE 日期
側視圖
OUTBOARD PROFILE
SOLAR PANELS ON ROOF
太陽能板
AIR OUT
FUEL TANK
UREA1&3
UREA2&4
L.B.O.
BILGE/ OILY WATER
BLACK WATER PT
FRESH WATER STBD
UNDERSIDE SKEG
頂甲板&駕駛頂甲板
ROOF DECK&WH ROOF
上甲板&駕駛甲板
UPPER DECK&WH DECK
129 PAX
WHEELHOUSE
主甲板
MAIN DECK
AIR IN
171 PAX
PET AREA
LUGGAGE
ELC.RM
CREW ROOM
底艙
HULL DECK
LUBE OIL DRUM
BILGE/OILY WATER
S.T.P.
FUEL TANK
FOREPEAK
主尺度參數
SPECIFICATION
OVERALL LENGTH: 34.73m
LENGTH: 33.05m
DESIGN DRAFT: 1.28m
BEAM (excl. SPONSON): 9.70m
DEPTH: 3.35m
FRAME SPACING: 1.2m
PASSENGERS: 300
CREW: 3
FUEL OIL: 2x2400 litres
FRESH WATER: 1x1000 litres
BLACK WATER: 1x1000 litres
BILGE/OILY WATER: 2x500 litres
UREA: 4x160 litres
LUBE OIL: 2x150 litres
MACHINERY: DIESEL-ELECTRIC
GENERATION SET: 4 x VOLVO CCF/J420J 4 x 50 Hz 420 kW @ 1500 rpm
E-MOTOR: 2 x RAMME HW500_L_500_1200_400 2 x 500kW @ 1200 rpm
PROPULSION POD: 2 x VETH VL450si-CR 2 x 500kW
NAVIGATION ZONE: R2
SPEED: ≥14kn @85%MCR PROPULSION MOTOR
NAVIGATION WATER: Hong Kong
CLASS NOTATION: ★CSA Passenger Ship, Catamaran, R2(D) ★CSM Electrical Propulsion System
典型橫剖面
TYPICAL SECTION
HULL
VESSEL
BASELINE
完工圖
FINISHED PLAN
Incat Crowther
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HULL No. 船體編號 ASA139
新明珠30 XIN MING ZHU XXX
DRAWING No.: 圖號: ASS2007-050-002
DESIGN STAGE 設計階段
AS-BUILT 完工設計
REV./VER.: 修改版本: 0
總布置圖 GENERAL ARRANGEMENT
SCALE 比例 1:100
PAPER SIZE 圖幅 A1
第 1 頁 共 1 頁
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GENERAL 總體
STRUCTURE 結構
OUTFITTING 舾裝
MACHINERY 機械
ELECTRIC 電氣
QUALITY 質量
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