

SIGNIFICANT SMALL SHIPS of 2023

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CONTENTS

SIGNIFICANT SMALL SHIPS OF 2023

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APETAHI EXPRESS	4
AQS TRYM	6
ARCTIC FJORD	10
ASIS 12M FIREFIGHTING RIB	12
CAMARC FB25	14
CAP DE BARBARIA	16
CUTTER PATRIOTA	18
EN AVANT 25	20
H.T.M.S. TA CHAI	22
HAISEA WAMIS	26
HST SWANSEA	28
IWS SKYWALKER	30
LABOE	32
LNG SENTINEL I	34
PASTEL	38
PENGUIN REFRESH	40
SAAM VOLTA & CHIEF DAN GEORGE	42
SALICORNIA	44
SIGNET SIRIUS & SIGNET CAPELLA	46
SOL	48
SVITZER MARLIN	50
WINDEA ONE	52
XIN MING ZHU VIII	56

APETAHI EXPRESS – Reduced weight for spacious ferry for French Polynesia



Builder: Austal Ships
 Designer: Austal Ships Pty Ltd
 Vessel's name: **Apetahi Express**
 Owner/operator: Aremiti
 Country: Tahiti
 Flag: France
 Total number of sister ships
 already completed: 0
 Total number of sister ships still on order: 0
 Contract date: July 2021
 Delivery date: June 2023

The 66m high-speed catamaran ferry *Apetahi Express* (Austal Hull 425) was delivered to The Degage Group, based in French Polynesia, on 2 June 2023. It is the third vessel to have been constructed by Austal's Vietnam shipyard in Vung Tau since that facility commenced operations in 2018, and the sixth vessel Austal has constructed for The Degage Group.

An original design, *Apetahi Express* was developed by Austal's Australian and Vietnamese design and engineering teams to meet the exacting demands of inter-island transport in its operational zone. For example, the ferry has integral passenger ramps, due to the minimal wharf facilities at the smaller islands on the vessel's route, which enable quicker passenger flow and minimise berthing time at each port. The cargo cranes enable rapid loading and unloading of the custom-designed baggage trolleys.

The ferry features multiple indoor and outdoor decks for passengers and a large cargo space, accommodating up to 16 tonnes of cargo. The Austal Passenger Express 66-class catamaran design features two spacious passenger decks, and can accommodate 574 passengers, with additional seats available on an external sun deck.

During the design process, The Degage Group placed an emphasis on reducing CO₂ emissions and improving fuel efficiency. By optimising the aluminium hull design (through extensive

hydrodynamic and aerodynamic CFD simulations) and reducing vessel weight, Austal reports that it achieved a significant reduction in resistance that has not only lowered fuel consumption but also improved seakeeping, delivering a more comfortable ride for passengers.

Austal explains: "Weight was reduced through several initiatives, including the use of a buffed finish on the topsides and superstructure, which not only gave the vessel a sleek modern appearance, but also resulted in a significant weight saving by avoiding the use of marine-grade paint." "As a side eco-friendly bonus, LED lighting has been utilised throughout the vessel to reduce onboard energy consumption."

Fitted with four fuel-efficient MAN 16V175D MM diesel engines and four Hamilton Jet HT900 waterjets, as well as Austal's Motion Control System (including active interceptors and T-foils) and the latest MARINELINK-Essentials programme (with an enhanced, intuitive user interface), the new ferry achieved a speed of 38 knots during sea trials. *Apetahi Express* has a contracted top speed of 35.8 knots. Since arrival in French Polynesia in July 2023, the new ferry has been operating successfully between Pape'ete (Tahiti) and Vaitape (Bora Bora).

TECHNICAL PARTICULARS

Length, oa.....66.85m
 Length, bp.....64m
 Breadth, moulded.....15.2m
 Depth, moulded.....5.55m
 Design, draught.....1.94m
 Design, deadweight.....100 tonnes
 Deck space (total).....27m²
 Deck capacity.....2 tonnes/m²
 Service speed.....35.8 knots (90% MCR)
 Range.....360nm

Propulsion:

Main engine(s):
 Number of engines.....4
 Make.....MAN
 Model.....16V175D MM

Output of each engine.....2,720kW@
 1,800rpm (IMO Tier II)

Gearbox(es):

Number of gearboxes.....4
 Make.....Reintjes
 Model.....VLJ1930

Waterjet(s):

Number of waterjets.....4
 Make.....Hamilton Jet
 Model.....HT900

Generators:

Make.....Volvo D5A TA
 Power.....approx. 93kW (sized
 according to load analysis)
 Voltage.....380V, three phase AC
 4-wire earthed neutral system
 220V, Single phase AC, 24V DC
 Frequency.....60Hz

Onboard capacities:

Fuel oil.....2 x 14,000litres (main storage),
 2 x 1,000litres (day tank),
 2 x 25,000litres (long-range)
 Fresh water.....5,000litres
 Sullage.....2,000litres (black/
 grey water)
 Sludge.....900litres
 Lube oil.....2 x 250litres
 Bilge holding.....1,200litres
 Hydraulic oil.....2 x 200litres

Complement:

Number of crew.....16 (subject to
 flag approval)
 Number of passengers.....574 (+80
 non-revenue)
 Number of crew cabins.....7 x double
 2 x single

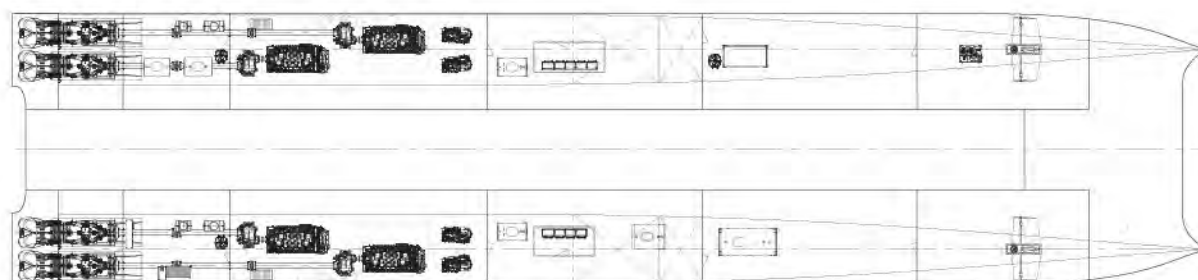
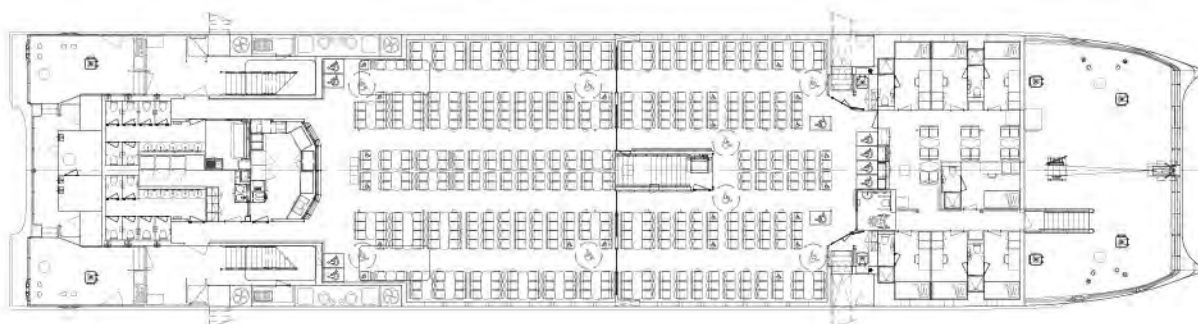
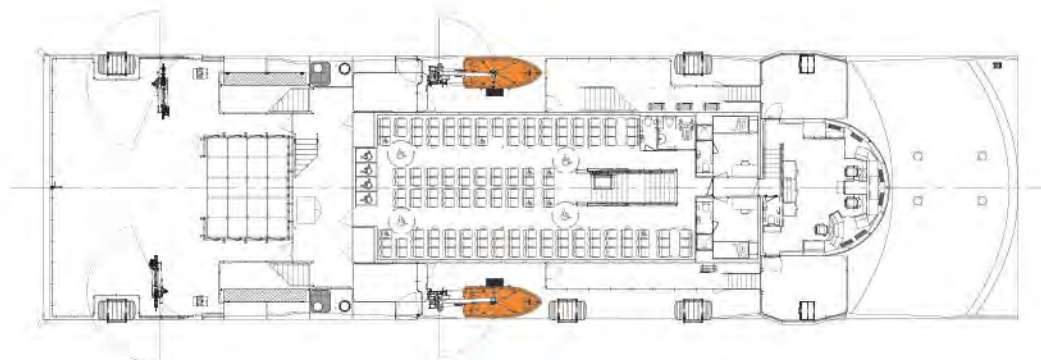
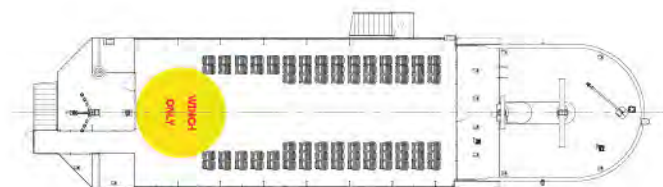
Classification:

Classification society.....DNV
 Notations.....✱1A HSLC, R2,
 Passenger craft, EO

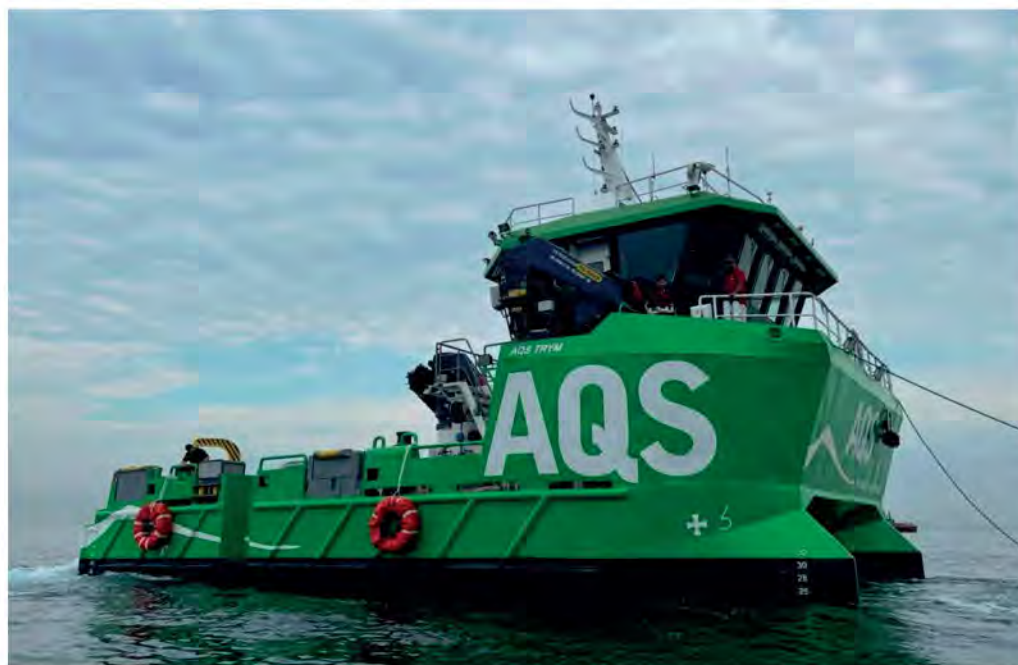
Other important international regulations
 complied with:.....HSC Category B



APETAHI EXPRESS



AQS TRYM – Aquaculture support catamaran utilising hybrid propulsion



Builder: Skagen Ship Consulting /
TRX Marine
Designer: Macduff Ship Design Ltd
Vessel's name: AQS Trym
Owner/operator: AQS
Country: Norway
Flag: Norway
Total number of sister ships
already completed: 0
Total number of sister ships still on order: 0
Contract date: Q2 2022
Delivery date: September 2023

The delivery of the 18.5m aquaculture catamaran AQS Trym to owner AQS marked the first collaboration between Macduff Ship Design, Turkish yard TRX Marine and Norway's Skagen Ship Consulting. The vessel was designed as an evolution of Macduff's established aquaculture support cat design, combining a high-spec hydraulic deck machinery package with the latest generation of battery hybrid propulsion and high standards of crew comfort and safety.

AQS Trym will operate at fish farms in northern Norway. The vessel has been built with a steel hull and aluminium wheelhouse, and is equipped with a battery hybrid propulsion system. The main generators comprise twin IMO Tier III-compliant Scania DI16 units, each producing 450kW. These generators charge a compact and high-capacity battery of 1,156kWh, made by Lithium Systems. The propulsive arrangement is completed with two 374kW Lönne electric motors attached to Nogva Heimdal gearboxes, driving 2,220mm-diameter controllable-pitch propellers in nozzles. This combined setup provides 21tonnes of bollard pull, while vessel manoeuvrability is enhanced by tunnel thrusters in all four corners.

Despite its relatively compact size, AQS Trym boasts an impressive carrying capacity. The deck is rated 1.5tonnes/m² over an area of 55m², and the maximum deadweight is over 110tonnes. The hydraulic deck machinery package was supplied by SHM and comprises a main winch, a vertical tugger winch, a shark jaw, a stern roller and towing pins. Macduff says: "For aquaculture-specific operations, the deck machinery package also includes rope- and mooring-handling equipment."

The deck machinery is completed by four capstans and a pair of Palfinger PK 150002M folding knuckle boom cranes, each featuring a maximum lift of 30tonnes. AQS Trym has also been equipped with a garage and associated facilities for the launch and recovery of ROVs.

Macduff adds: "Crew comfort and safety was a priority of the design from the beginning, with four large cabins above deck for the four crew members, well separated and insulated from machinery spaces to reduce noise and vibration." Waterline access is possible via a protected ship-side stair, and the wheelhouse and mess have been equipped for crew comfort and rest while off-duty.

TECHNICAL PARTICULARS

Length, oa 18.5m
Length, bp 12.25m
Breadth, moulded 12m
Depth, moulded 4.8m
Gross tonnage 231tonnes
Displacement 425tonnes
Design, deadweight 115tonnes
Deck cargo area 55m²
Deck capacity 1.5tonnes/m²
Service speed 9knots
Bollard pull 21tonnes

Propulsion:

Motors:

Number of motors 2
Make Lönne
Output of each motor 374kW

Gearbox(es):

Number of gearboxes 2
Make Nogva Heimdal
Model HG3SF

Propeller(s):

Number of propellers 2
Make Nogva Heimdal
Diameter 2,220mm
Number of blades 4
Fixed/controllable pitch Controllable
Open/nozzled Nozzled

Energy storage system:

Number 1
Make Lithium Systems
Output 1,156kW

Generators:

Number of generators 2
Make Nogva Scania
Model DI16
Output of each 450kW

Deck machinery:

Cranes:

Number of cranes 2
Make Palfinger
Model PK 150002M
Capacities/SWL 1,035kNm/30tonnes

Winch(es):

Number of winches 1
Make SHM
Capacities 1,650m rope,
40tonnes pull, 135tonnes brake

Roller(s):

Number of rollers 1
Make SHM
Capacities/SWL 40tonnes

Other deck machinery/equipment:

- 4 x Hydema capstans (SWL 3tonnes, 3tonnes, 5tonnes, 8tonnes)
- 1 x SHM vertical tugger winch (SWL 10tonnes)
- 1 x SHM stern T-Lock (SWL 20tonnes)
- 1 x SHM corner plate lock (SWL 25tonnes)
- 1 x SHM RILRT hydraulic bollard (SWL 15tonnes)
- 1 x SHM IRLT hydraulic bollard (SWL 20tonnes)
- 1 x SHM DM7 CL50t shark jaw (SWL 50tonnes)
- 1 x SHM towing pin (SWL 45tonnes)

Onboard capacities:

Fuel oil 25,000litres
Fresh water 7,500litres
Ballast water 20,000litres

Complement:

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

Other significant or special items of equipment:

- 4 x Veth VT90 tunnel thrusters

Classification:

Classification society Norwegian
Maritime Authority
Notations Small Coasting



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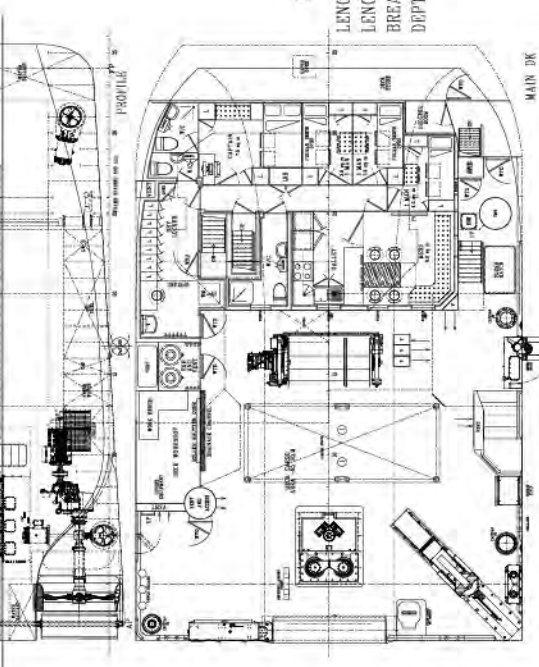
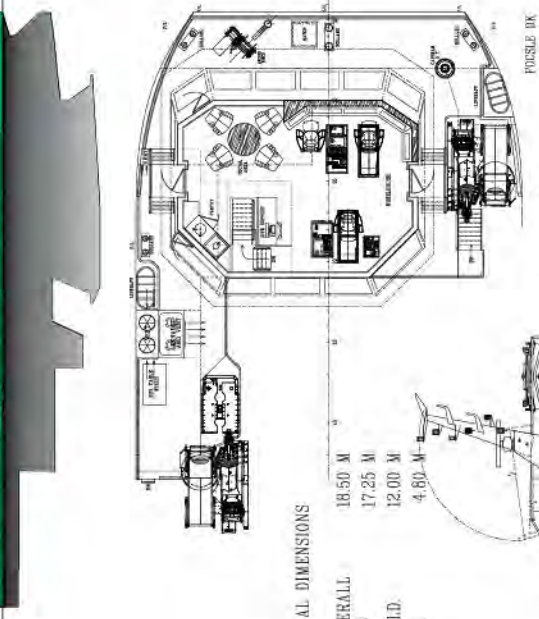
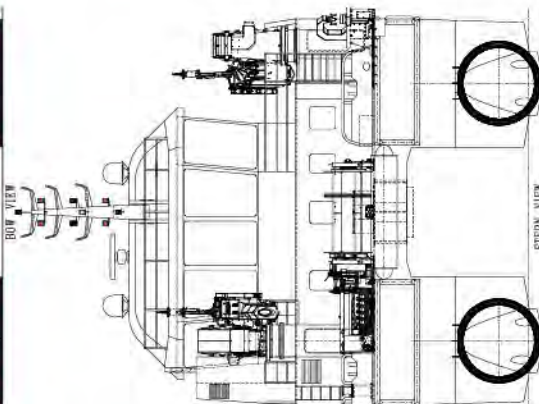
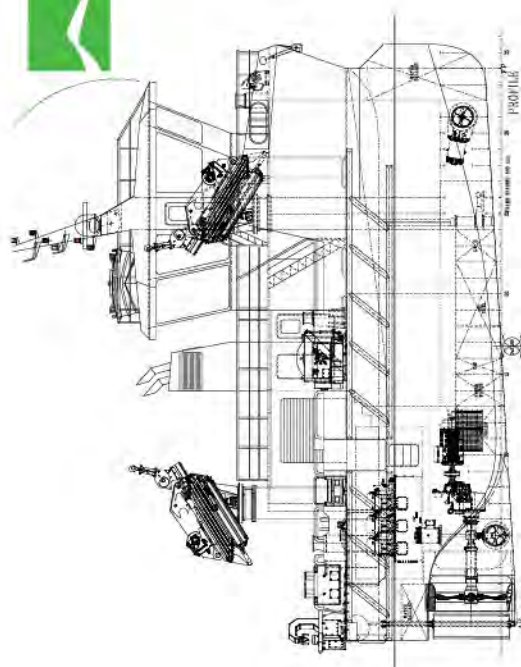
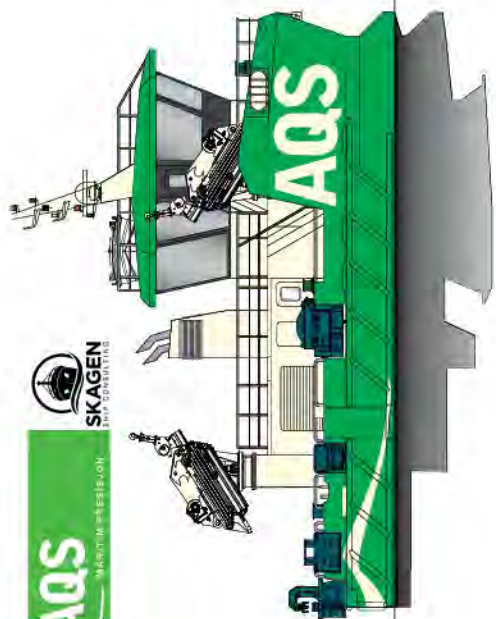
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MACDUFF SHIP DESIGN
SKAGEN SHIP CONSULTING AS
18.5 m CATAMARAN WORKBOAT

PRINCIPAL DIMENSIONS

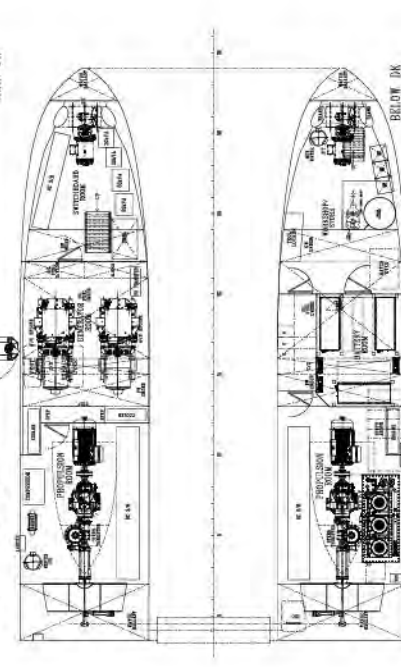
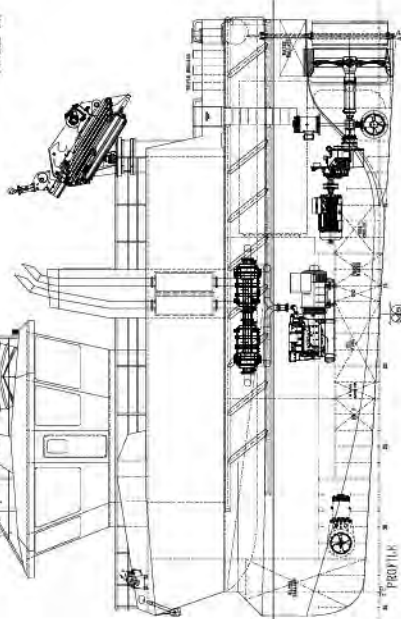
LENGTH OVERALL 18.50 M
LENGTH B.P. 17.25 M
BREADTH MLD. 12.00 M
DEPTH MLD. 4.80 M

POUSLE DK

MAIN DK

PROFILE

BELOW DK





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28m Catamaran Passenger Ferry



Windea One
32m Catamaran CTV



Xin Ming Zhu VIII
45m Catamaran Passenger Ferry

ARCTIC FJORD – First US-built addition to the wild Alaska pollock fleet in decades



Builder:Thoma-Sea
 Designer:Kongsberg Maritime
 Vessel's name:Arctic Fjord
 Owner/operator:Arctic Storm Management Group
 Country:US
 Flag:US
 Total number of sister ships already completed:0
 Total number of sister ships still on order: 0
 Contract date:2018
 Delivery date:December 2023

2023 saw Seattle-based fishery Arctic Storm Management replace its 1974-built trawler *Arctic Fjord* with a larger newbuild of the same name – and one specifically designed to handle operations in the Bering Sea, where 45knot gusts of wind and 4m wave heights are not unknown. The 99m newcomer was constructed domestically, in line with the Jones Act, by Louisiana-based boatyard Thoma-Sea, and to the specs of the NVC 336 WP trawler design, supplied by Norway's Kongsberg Maritime. In fact, this order ranks as Kongsberg's first ever contract for a US-built vessel.

Einar Vegsund, director of Kongsberg's Ship Design Solutions division, recalls: "*Arctic Fjord* is designed for a 152-man crew, which meant installing 48 cabins – whereas 25-28 cabins is more typical for Norwegian fillet trawlers." The vessel is now stationed in Seattle, and will process surimi, fish meal and valuable fish oil for a global market, with all phases of the process being handled on board.

Arctic Fjord features a wave-piercing bow, to reduce fuel consumption and slamming in rough waters. The ship's high-pull requirement is enabled by a single 7,200kW Bergen main engine, powerful enough to grant the vessel a bollard pull of 110tonnes. When the newbuild made its way from the Gulf of Mexico to Seattle for handover, it did so at an average speed of 16.4knots, though subsequent sea trials off the US

West Coast have seen the vessel exceed 19knots – notably fast for its size.

Overall, *Arctic Fjord* has a freezing capacity of 250tonnes per day – roughly twice the volume handled by its previous namesake. The onboard fish-processing factory was supplied by Danish company Carsoe, while Swan Net USA provided the boat's trawl gear.

Other installations include a Bergen auxiliary engine (rated 3,600kW) and a 1,050kW Kongsberg TT 1850 tunnel thruster for enhanced manoeuvrability. Kongsberg oversaw the supply of the vessel's main electrics and propulsive set-up, including the gearbox and propeller, plus a sonar-enabled fish-finding system and pump/valve/tank controls – and will provide ongoing system support to the owner. The vessel also incorporates Kongsberg's 'Take Me Home' system, which can reroute power from the auxiliary engine to the propeller should the main engine run into difficulties.

Arctic Fjord benefits from an extensive array of deck machinery, including: four cranes; a pair of 73tonne trawl winches; four 45tonne net drums; two 26tonne windlass/mooring winches; two 50tonne Gilson winches; an 18tonne outhaul winch; and an 8tonne capstan. The vessel also carries a small rescue boat, sized approximately 6.5m, to recover any man overboard (MOB) casualties. The vessel also hosts a pair of 650kW refrigerated sea water (RSW) units.

For the crew's comfort, all 48 cabins come with WC/shower facilities, and WiFi and Internet Protocol Television (IPTV) are provided throughout. The trawler also offers a hospital section, a galley and lounge areas. On deck, the vessel's covered, sloped bow is intended to protect crew from bad weather.

TECHNICAL PARTICULARS

Length, oa.....99.3m
 Length, bp.....93m

Breadth, moulded.....21m
 Depth, moulded.....13.8m (to deck no.4)
 10m (to deck no.3)
 Scantling draught.....8.5m (approx.)
 Max speed.....19.6knots
 Bollard pull.....110tonnes

Main engine(s)
 Number of engines.....1
 Make.....Bergen
 Model.....B33-45V12P
 Output of engine.....7,200kW

Gearbox(es)
 Number of gearboxes.....1
 Make/model.....Kongsberg GFC 1180
 with PTO/PTI

Propeller(s)
 Number of propellers.....1
 Make.....Kongsberg Promas/Innoduct
 Diameter.....4,200mm

Deck machinery
 Trawl winches.....2 x 73tonnes
 Net drums.....4 x 45tonnes
 Cod end winch.....2 x 50tonnes
 Lazy line winch.....1 x 71tonnes
 Gilson winches.....2 x 50tonnes
 Outhaul winch.....1 x 18tnnes
 Net sounding cable winches.....2 x 3.8tonnes
 Windlass and mooring winches.....2 x 26tonnes
 Mooring winch.....1 x 10tonnes
 Capstan.....1 x 8tonnes

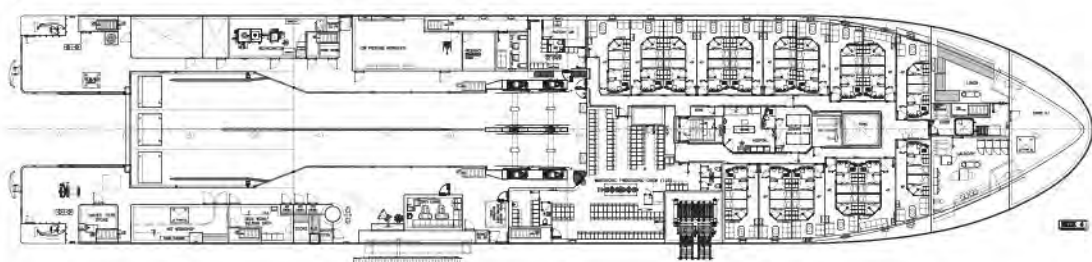
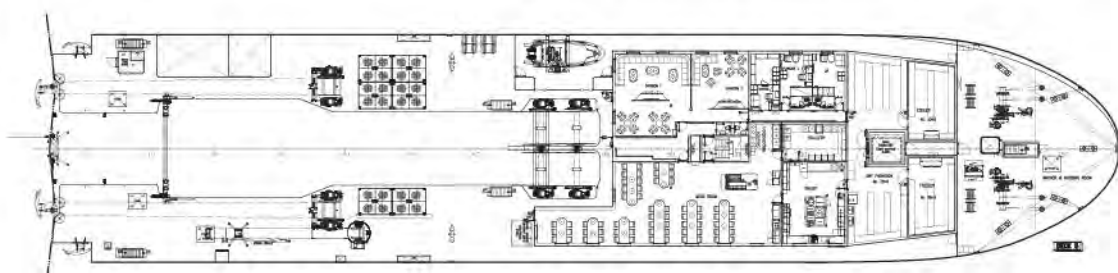
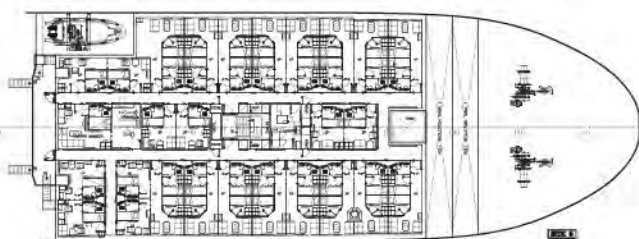
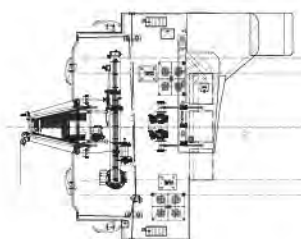
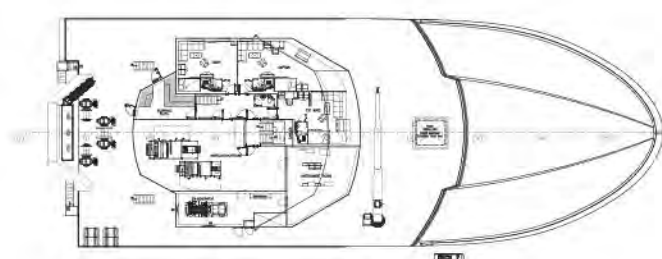
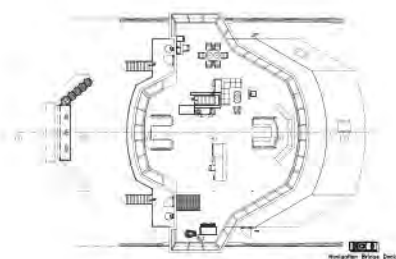
Onboard capacities
 Frozen fish.....4,000m³
 Fish meal.....1,260m³
 Fish oil.....490m³
 Fuel oil.....1,050m³
 Potable water.....180m³

Classification
 Classification society.....DNV
 Notations.....DNV + 1A, E0,
 Stern Trawler, Ice 1B, TMON
 (Hull structure, propeller nozzle and rudder – Ice 1A)





ARCTIC FJORD



ASIS 12M FIREFIGHTING RIB – High-speed support for Saudi Arabia's NEOM project



Builder:	ASIS Boats
Designer:	ASIS Boats
Vessel's name:	ASIS 12m Firefighting RIB
Owner/operator:	NEOM
Country:	Saudi Arabia
Total number of sister ships already completed:	0
Total number of sister ships still on order:	0
Contract date:	September 2023
Delivery date:	January 2024

This 12m GRP rigid inflatable boat (RIB), scheduled for handover in January 2024, was designed and built by ASIS Boats for Saudi Arabia's NEOM project: a US\$500 initiative to establish a sustainable tourism hub within the kingdom.

This new ASIS RIB was devised to support the NEOM public safety department – “whether responding to emergencies, ensuring the safety of personnel or patrolling the waters around NEOM”, ASIS Boats tells *Significant Small Ships*. Given that the NEOM area comprises 10 regions, covering approximately 26,418km², the boat will certainly have its work cut out.

The ASIS 12m Firefighting RIB features the builder's proprietary Air Hull, formed by a unique ‘reverse U chine’ hull design, to improve the stability of the vessel and maintain balance at the boat's keel. “This gives the boat precise turning capabilities, inherent lift and the ability to navigate in more extreme sea conditions all while

keeping the occupants dry by deflecting the water away,” ASIS Boats explains. Combined with twin Mercury outboard engines, this makes for smoother, more stable and drier rides. Additionally, the Air Hull's streamlined reverse chines can significantly reduce drag, leading to increased speed and improved fuel efficiency.

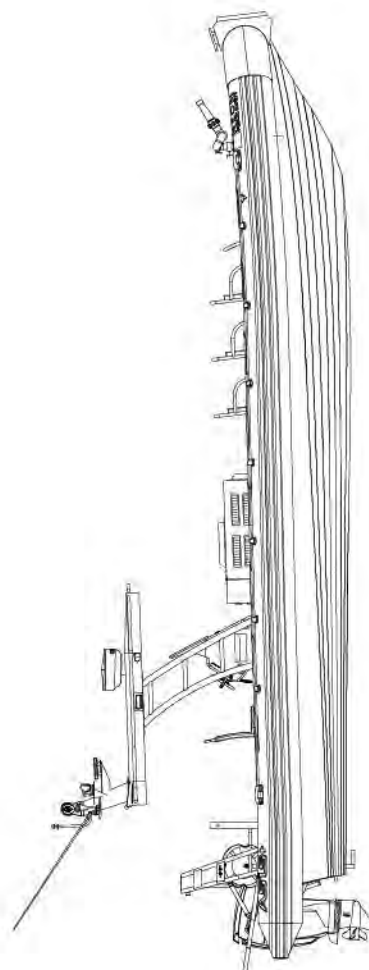
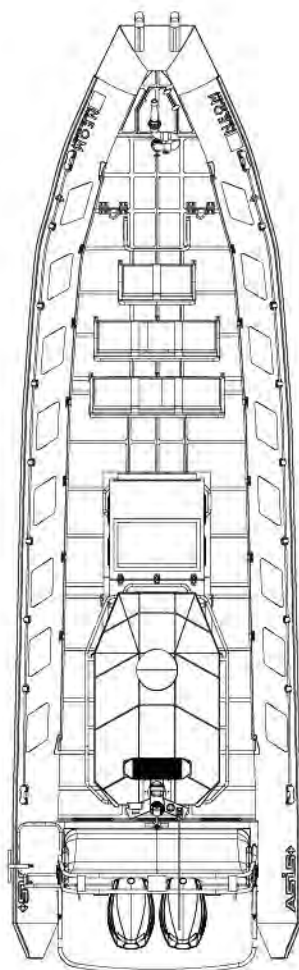
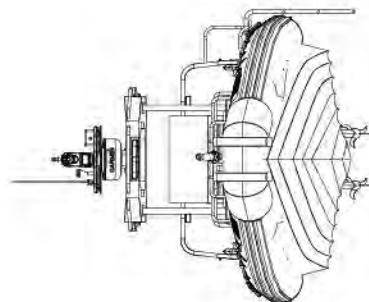
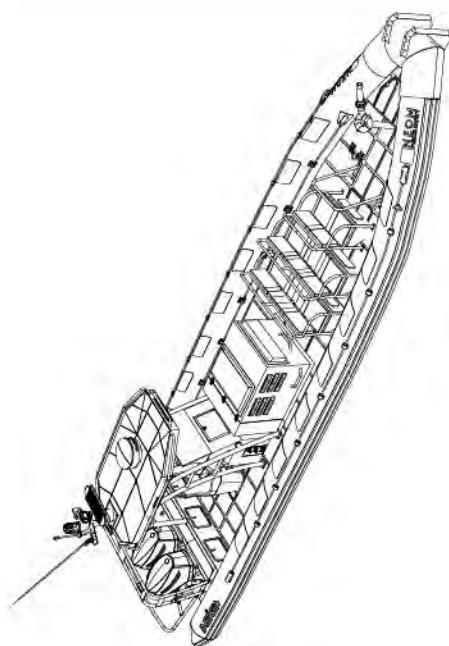
Another notable feature of the RIB is its Darley LSDE 500-1000 firefighting pump, which is capable of pumping 1,500gallons (approximately 5,678litres) of water per minute. This is augmented by a brass Sidewinder monitor, rated 750gpm at 1,000psi, with a foam proportioning system. The pump will enable the RIB to respond promptly to both fires on shore or maritime incidents. The “heart of the RIB”, as ASIS Boats calls it, comprises PE closed cell foam-filled tubes for optimal buoyancy and stability.

The boat has been fitted with shock-/vibration-absorbing suspension seats, supplied by Sweden's Ullman Dynamics, for the comfort and safety of the crew during high-speed emergency or response transits – even in the thick of turbulent waters, where excessive slamming becomes a serious risk. The RIB also features a marine-grade aluminum ASIS console and heavy-duty T-top, both incorporating components that have been designed to withstand the harshest of maritime conditions – thereby ensuring that the boat can perform its duties effectively over the long term, and navigate through various waters with ease, ensuring swift response times.

TECHNICAL PARTICULARS	
Length, oa.....	12.2m
Length, bp.....	9.1m
Breadth, moulded.....	3.75m
Depth, moulded.....	1.58m
Design, draught.....	0.8m (incl. engine)
Design, deadweight.....	4.55tonnes
Lightweight.....	4.7tonnes
Deck space (total).....	20.2m ²
Max speed.....	40knots
Bollard pull.....	5tonnes
Range.....	161nm
Propulsion:	
Main engine(s):	
Number of engines.....	2
Make.....	Mercury
Model.....	350 Verado Outboard
Output of each engine.....	294kW
Bridge electronics:	
Radar(s).....	Garmin GMR Fantom 18x Dome Radar Marine Radar Scanner
GPS.....	Garmin GPSMAP 8610xsv w/sonar (10" multifunction display)
Chart plotter.....	w/WiFi connectivity
Complement:	
Number of crew.....	2
Number of passengers.....	15 (offshore)
Number of cabins.....	0
Other significant or special items of equipment:	
- Darley firefighting pump	
Classification:	
Notation.....	CE (B)



ASIS 12M FIREFIGHTING RIB



CAMARC FB25 (BOATS 18 & 19) – Firefighting duo for the Hellenic Fire Service



Builder: **Tehnomont Shipyard**
 Designer: **Camarc Design**
 Vessel's name: **Boats 18 & 19**
 Owner/operator: **Hellenic Fire Service**
 Country: **Greece**
 Flag: **Greece**
 Total number of sister ships
 already completed: **2**
 Total number of sister ships still on order: **0**
 Contract date: **Unspecified**
 Delivery date: **November 2023**

Late 2023 saw the delivery of two Camarc-designed, 25m fireboats to Greece's Hellenic Fire Service fleet, which plans to use both vessels to enhance its operational capabilities. Constructed by Croatia-based boatbuilder Tehnomont Shipyard, these all-aluminium, Bureau Veritas-classed vessels are each powered by a triple-engine/-waterjet installation. This propulsive arrangement, alongside Camarc's latest refined hullform, is credited with enabling the boats to achieve speeds of 30knots.

A specific feature of these vessels is in the utilisation of the three main engines for both propulsion and firefighting operations, without the need to install and maintain additional engines specifically for the firefighting systems. Camarc explains: "All three main engines are used to achieve maximum response speeds, while, in FiFi mode, the centre engine is used to power the FiFi pumps/monitors, with the wing engines being used for manoeuvring."

In addition to the manoeuvrability provided by the vessels' waterjets, control systems and bow thrusters have been fitted to further enhance the boats' station-keeping capability throughout

firefighting missions. Two fire pumps feed three deck fire monitors and on-deck hydrant connections as well as an onboard vessel drench system. The vessel also hosts two FiFi foam tanks which can be used with the onboard fire monitors.

Both boats also have the capabilities to conduct rescue operations, and are fitted with side and aft man overboard (MOB) recovery stations, rescue davits and a survivor room. A rescue boat and launching crane have also been factored into the design, to facilitate rescues in shallow waters.

The vessels are fully equipped for longer-duration missions at sea while keeping the crew comfortable, with the lower accommodation area fitted with berths for all crew, WC and showers, and a mess area.

TECHNICAL PARTICULARS

Length, oa.....25.5m
 Length, bp.....22.9m
 Breadth, moulded.....7m
 Depth, moulded.....3m
 Gross tonnage.....113tonnes
 Displacement.....82tonnes
 Design, draught.....1.5m
 Design, deadweight.....12tonnes
 Lightweight.....70tonnes
 Deck space (total).....40m²
 Service speed.....20knots
 Max speed.....30knots
 Range.....250nm@20knots

Propulsion:
 Main engine(s):
 Number of engines.....3
 Make.....MAN
 Model.....D2862 LE435

Output of each engine882kW

Gearbox(es):
 Number of gearboxes.....3
 Make.....ZF
 Model.....3050

Waterjet(s):
 Number of waterjets.....3
 Make.....Hamilton
 Model.....HM521

Deck machinery:
 Crane(s):
 Number of cranes.....1
 Make.....Palfinger
 Model.....PC2700 M
 Capacities/SWL.....1,745kg@5m reach

Onboard capacities:
 Fuel oil.....6,000litres
 Fresh water.....1,000litres
 Sullage.....500litres

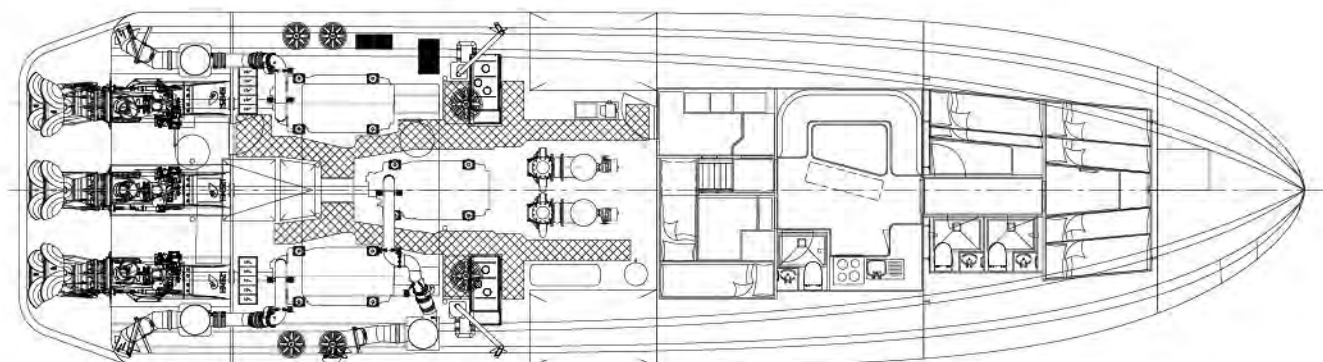
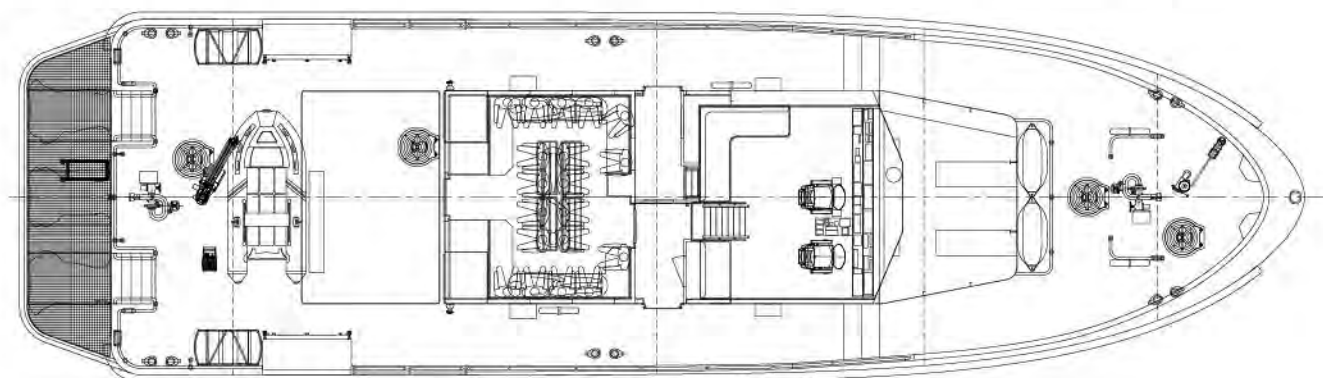
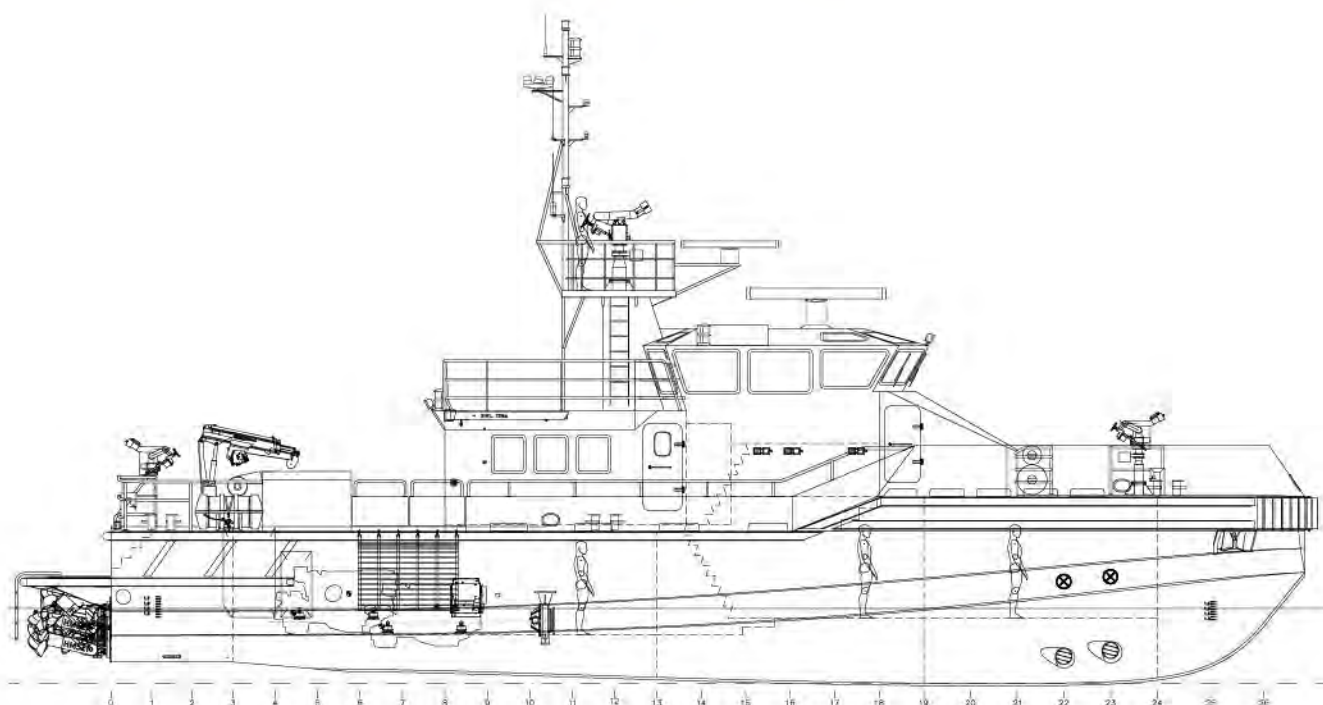
Other capacities:
 Firefighting foam.....2,000litres

Complement:
 Number of crew.....10
 Number of passengers.....20
 Number of cabins.....3
 Other significant or special items of equipment:
 - Twin bow thrusters
 - Jason fire monitors and pumps
 - (2x 780m³/h fire pumps /
 - 2x 300m³/h water/foam fire monitor /
 - 1x 900m³/h water/foam fire monitor)

Classification:
 Classification society.....Bureau Veritas
 Notations.....Fire Fighting, Lightship,
 E, Water Spraying, Rescue



CAMARC FB25 (BOATS 18 & 19)



CAP DE BARBARIA – Double-ended ro-pax ferry with hybrid power set-up



Builder: **Astilleros Armon Vigo**
 Designer: **Cotenaval**
 Vessel's name: **Cap De Barbaria**
 Owner/operator: **Balearia**
 Country: **Spain**
 Flag: **Spain**
 Total number of sister ships
 already completed: **0**
 Total number of sister ships still on order: **0**
 Contract date: **August 2021**
 Delivery date: **May 2023**

Cap De Barbaria is a double-ended ferry tasked with operating between Ibiza and Formentera in Spain eight times a day, carrying up to 389 passengers, 76 cars and 14 trucks, with a cruise speed of 14knots.

Operator Balearia is aiming to set a global benchmark in sustainability via its commitment to eco-efficient mobility driven by cleaner and more eco-friendly energy sources, such as full electric propulsion. This newbuild will allow passengers to travel with zero noise and emissions impact, while enjoying a design that prioritises outdoor accommodation, with terraces at different levels offering chill-out areas, a large bar (with space for DJs) and a shower area to cool off.

For this project, Armon Shipyard worked alongside Spanish companies Cotenaval (in charge of the design), Ingeteam (which managed the diesel-electric hybrid propulsion) and Oliver Design (in charge of the accommodation sections). Propulsion-wise, Cap de Barbaria is equipped with three Caterpillar C32 engines (of 940kWe each) and two main Marelli electric propulsion motors (of 1,150kWe each), coupled to two Schottel Azimut

EcoPropellers, one at each end. Armon says "The hydrodynamically optimised design allows the EcoPeller to produce maximum steering forces...[and] reduces fuel consumption, ensuring lower operating costs and emissions."

The vessel's hybrid system can ensure the following four operational modes: sailing mode, when the power management system is set in PTI mode and the ship is driven by the three main engines; zero-emissions mode, when the electrical plant is powered by the batteries – typically when approaching port, or undertaking manoeuvring; harbour mode, activated to charge batteries in case of a low state of charge at harbour; and shore mode, where the vessel's electric requirements (as well as charging of the batteries) are fulfilled via a shore-based connection.

TECHNICAL PARTICULARS

Length, oa.....82m
 Length, bp.....76.58m
 Breadth, moulded.....15.5m
 Depth, moulded.....5.8m
 Gross tonnage.....3,401tonnes
 Design, draught.....3.8m
 Design, deadweight.....570.1tonnes (max)
 Lightweight.....1,467.7tonnes
 Service speed.....14knots (90% MCR
 bow + 40% stern)
 Max speed.....15knots
 Range.....1,000nm

Propulsion:

Main engine(s):
 Number of engines.....3
 Make.....Caterpillar
 Model.....C32
 Output of each engine.....940kW

Propeller(s):

Number of propellers.....2
 Make.....Schottel
 Model.....SRE EcoPeller
 Diameter.....3,100mm
 Material.....Cast iron
 Number of blades.....4
 Speed.....1,800rpm
 Fixed/controllable pitch.....Fixed
 Open/nozzled.....Open
 Special adaptations.....Azimuth

Bridge electronics:

Radar(s).....2 x Furuno FAR-2218
 Autopilot.....2 x Simrad AP70MKII
 GMDSS.....Furuno FM-8900S
 GPS.....Furuno GP-170
 Gyro.....1 x Simrad GC-80MK2 compact
 Engine monitoring system.....Sedni
 Fire detection system.....Marinelec
 Other communication systems.....Gicom

Onboard capacities:

Fuel oil.....68m³
 Fresh water.....31m³
 Ballast water.....106m³

Complement:

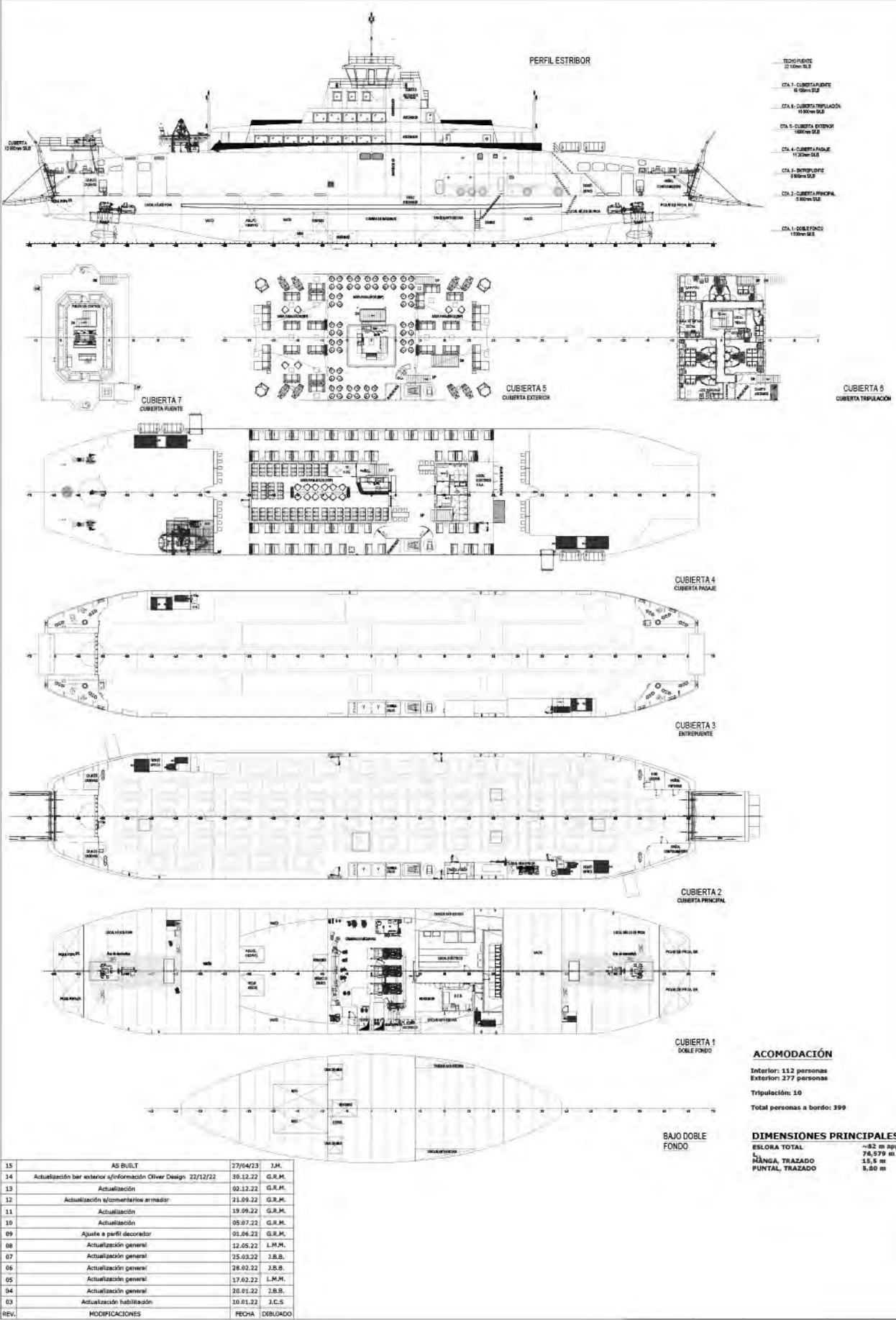
Number of crew.....10
 Number of passengers.....389
 Number of cabins.....8

Vehicles:

Number of vehicle decks.....1
 Total lane length.....240 lane metres
 Number of cars.....76
 Number of trucks/trailers.....15

Classification:

Classification society.....Bureau Veritas
 Notations.....+Hull +Mach, I Ro-Ro
 passenger ship, Coastal
 Area, AUT-UMS, + Electric Hybrid (Z E)



CUTTER PATRIOTA – Pilot boat perfected for Atlantic Ocean operations



Builder:Nitromar
 Designer:Danilo López – Santiago García
 Vessel's name:Cutter Patriota
 Owner/operator:Genaman
 Country:Uruguay
 Flag:Uruguay
 Total number of sister ships already completed:0
 Total number of sister ships still on order:1
 Contract date:January 2022
 Delivery date:November 2023

The pilot boat *Cutter Patriota* was designed as the development of a previous pilot boat named *Capitan Jon*, which has been operating since 2018. This newbuild is bigger than its predecessor, measuring 17m instead of 15m in overall length, reflecting its remit for operations in the Atlantic Ocean, compared to *Capitan Jon*'s typical operations on River Plate.

The challenge was to achieve the same or better performance, using the same propulsion plant (2 x 460hp engines at 2,400rpm), albeit with bigger displacement and the ability to operate in significant wave heights above 1.5m. *Cutter Patriota*'s original lines plan was modified after a model was tested at the Faculty of Engineering Ship Model Basin (in Montevideo, Uruguay). The main differences between the newcomer and its predecessor include a more vertical bow line with reduced attack angle, as well as a planing surface curved down from the stern to about 8% of the length on the waterline.

"The good results obtained after testing at the model basin were corroborated during sea trials," explains designer Danilo López. "The speed was improved, from 22knots to 24knots, and the exhaust gas temperature, the impact bow pressure and pitching were reduced significantly." As a result, *Cutter Patriota* is claimed to be more efficient and comfortable for both crew members and pilot passengers.

This newbuild also represents the third unit to be built in aluminium by shipyard Nitromar, which has more typically built steel vessels including trawlers, barges, a tugboat and a multipurpose propelled pontoon. It is hoped that this new production line will prove a good starting point for a wider revitalisation of the local naval industry, to bulwark it against economic uncertainties, the yard says. Three new aluminium boats are now under construction at Nitromar, featuring sizes of 12m, 17m and 25m loa, showing a growing confidence in the aluminium technique and know-how achieved by the shipyard.

TECHNICAL PARTICULARS

Length, oa.....17m
 Length, bp.....16.12m
 Breadth, moulded.....4.65m
 Depth, moulded.....2.52m
 Gross tonnage.....38tonnes
 Displacement.....24tonnes
 Design, draught.....1.15m
 Design, deadweight.....5tonnes
 Lightweight.....19tonnes
 Deck space (total).....30m²
 Service speed.....18knots
 Max speed.....24knots
 Range.....800nm

Propulsion:

Main engine(s):
 Number of engines.....2
 Make.....Yanmar
 Model.....6CXBM-GT
 Output of each engine.....338kW

Gearbox(es):

Number of gearboxes.....2
 Make.....ZF
 Model.....286V
 Output speed.....1,200 rpm

Propeller(s):

Number of propellers.....2
 Make.....Michigan
 Model.....Hy Torq MY-T4

Diameter.....686mm
 Material.....CuNiBrAl
 Number of blades.....4
 Speed.....1,200 rpm
 Fixed/controllable pitch.....Fixed
 Open/nozzled.....Open

Deck machinery:

- Anchor capstan, 24VDC Maxwell VW2500

Bridge electronics (make/model):

Radar(s).....Samyung SMR-3700
 GMDSS.....MMSI 770576521 - Call signal CXCP - AIS Samyung SI - 70A
 GPS.....Koden KGP-913 MKII
 Chart plotter.....Samyung NAVIS-5100 plotter/GPS/echosounder
 Engine monitoring system.....Yanmar - ZF Microcommander
 Fire detection system.....Tecnimar

Other communication systems:

- VHF ICOM IC-M 330 (2)
 - BLU Samyung SRG-3150

Onboard capacities:

Fuel oil.....5.2m³
 Fresh water.....0.35m³
 Sullage.....0.35m³
 Ballast water.....1.8m³
 Other capacities.....Oily water tank, 0.35m³

Complement:

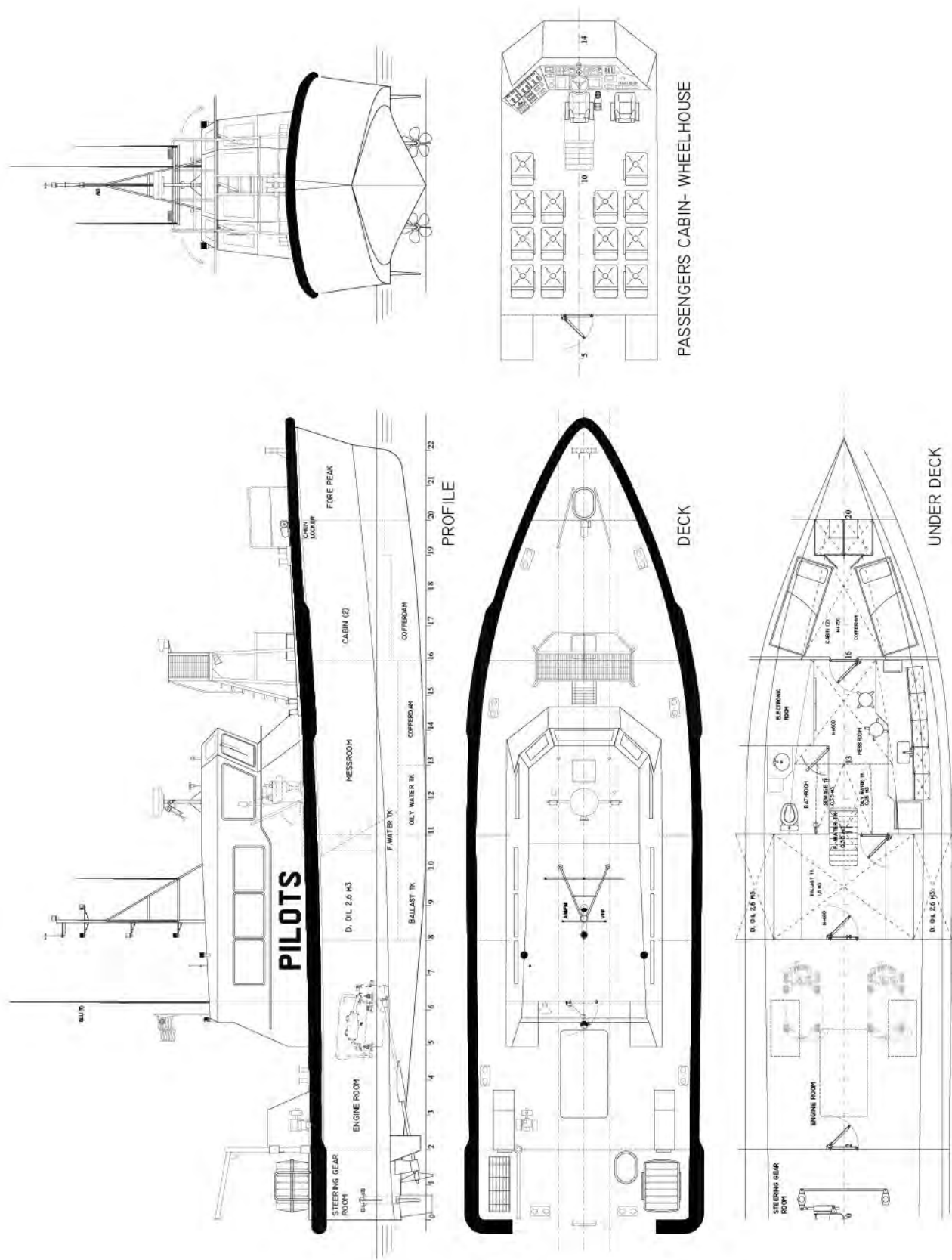
Number of crew.....2
 Number of passengers.....14
 Number of cabins.....1

Classification:

Classification society.....N/A
 Notations.....N/A

Other important international regulations complied with:

- Lloyd's Rules & Regulations for Special Service Craft
 - IMO Stability Code
 - COLREG



EN AVANT 25 – Tugboat optimised for ops in high latitudes



Builder:	Damen Shipyards Group
Designer:	Damen Shipyards Group
Vessel's name:	<i>En Avant 25</i>
Owner/operator:	Muller Groep B.V.
Country:	The Netherlands
Flag:	The Netherlands
Total number of sister ships already completed:	0
Total number of sister ships still on order:	0
Contract date:	August 2022
Delivery date:	August 2023

August saw Dutch marine services group Muller Dordrecht take delivery of the 32m Damen ASD Tug 3212 type *En Avant* 25, constructed at the Damen Song Cam Shipyard in Vietnam. The vessel was designed specifically for towing in harbour and offshore (including towage of large structures), as well as for escort work and firefighting duties.

This Damen tug class was also developed to be highly manoeuvrable, with optimal seakeeping characteristics. It also comes with multiple options to equip the tug for specific roles. Damen notes: "Muller Dordrecht has opted for almost all of them, including: the IMO Tier III aftertreatment system for low NOx emissions; a large aft deck winch, together with an open stern; hydraulic towline guide pins; a deck crane; and a support boat." The client also specified a 'winterisation package' for operations in high latitudes, and, as such, *En Avant* 25 features additional insulation and heated windows.

"Despite the requirement to install all these additional features, Damen was able to deliver the tug in just nine months," the builder states. "This was achievable due to Damen's long-established policy of building certain vessel types in anticipation of future sales."

En Avant 25 has 65m² of deck space at its disposal, providing ample material storage space. The tug's firefighting system comprises two main engine-driven pumps and two remotely operated foam/water monitors, located forward of the wheelhouse, and these boast a combined discharge rate of 2,400m³ per hour.

The crew accommodation comprises a pair of single cabins for the captain and the chief engineer, plus four doubles for other personnel. The tug is also fitted with a

reverse osmosis watermaker with the capacity to produce 4m³ of fresh water each day

TECHNICAL PARTICULARS

Length, oa.....	32.7m
Breadth, oa.....	12.82m
Depth at sides.....	5.35m
Gross tonnage.....	450tonnes
Displacement.....	800tonnes
Draught, aft.....	6.2m
Max speed.....	14knots
Bollard pull (tonnes).....	83.5tonnes (ahead) 78.1tonnes (astern)

Propulsion:

Main engine(s):
Number of engines 2
Make Caterpillar
Model 3516C TA HD/D
Output of each engine 5,050bkw
(6.772bhp) @1800rpm

Propeller(s):

Number of propellers	2
Make	Kongsberg Maritime
Model	US 255 P30/P35 FP
Diameter	3,000mm
Material	NiAlBr
Number of blades	4
Fixed/controllable pitch	Fixed
Open/nozzled	Nozzled

Deck machinery:

Crane(s):
 Number of cranes 1
 Make Heila
 Model HLM 20-35-D
 Capacities/SWL 1.7tonnes@10.58m

Towing winch fore:

Number of winches.....1 x hydraulically
driven two-speed
double drum)

MakeDamen Marine Components
Capacities:
- Pull 30tonnes up to 27m/min
- Maximum speed 44m/min
- Brake holding force 200tonnes

1 x towing winch (single-drum two-speed winch with spooling device and warning head)

- High pull/low speed 30tonnes up to 11.4m/min
- Slack rope speed 8tonnes up to

- Brake holding force 190tonnes

1 x DMT tugger winch
Capacities

- Pull 10tonnes at 0-15m/min
- Holding force 20tonnes

Bridge electronics:

Radars 2x Furuno FAR 1518-BB
Autopilot Simrad AP-70
GMDSS A3
Satellite compass/GPS Simrad
GN70/HS80A

Engine monitoring systemPraxis
Automation

Other communication systems:

- Echosounder Furuno FE-800
- Speed log Furuno DS-80
- VHF Cobham Sailor 6210
- VHF Sailor SP3540
- AIS Furuno FA-170
- EPIRB Jotron Tron-60S
- SART Jotron Tronsart 20
- Remote monitoring Ready for Damen Triton

Onboard capacities:

Fuel oil	168.9m ³
Fuel water	15.4m ³
Sewage	5.1m ³
Bilge water	6.5m ³

Other capacities:

Dirty lubrication oil.....	7.8m ³
Clean lubrication oil.....	6.5m ³
Foam	12.3m ³
Urea	3m ³

Complement:

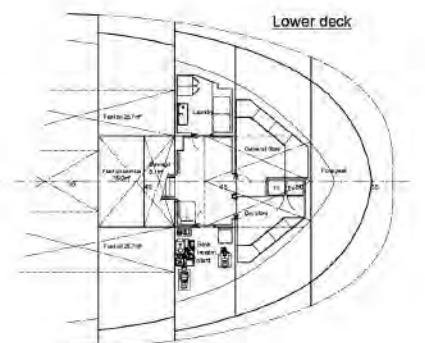
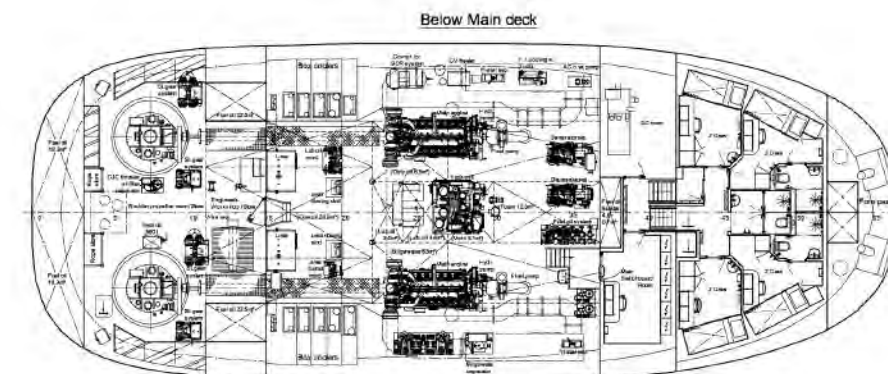
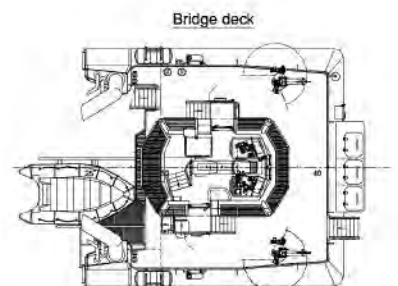
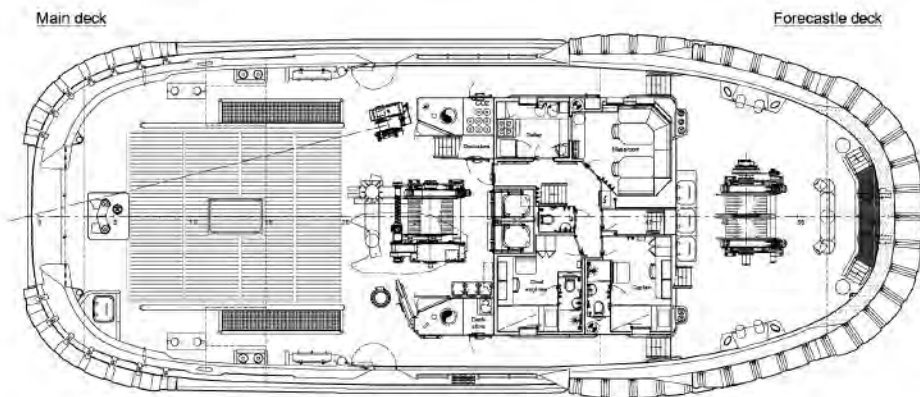
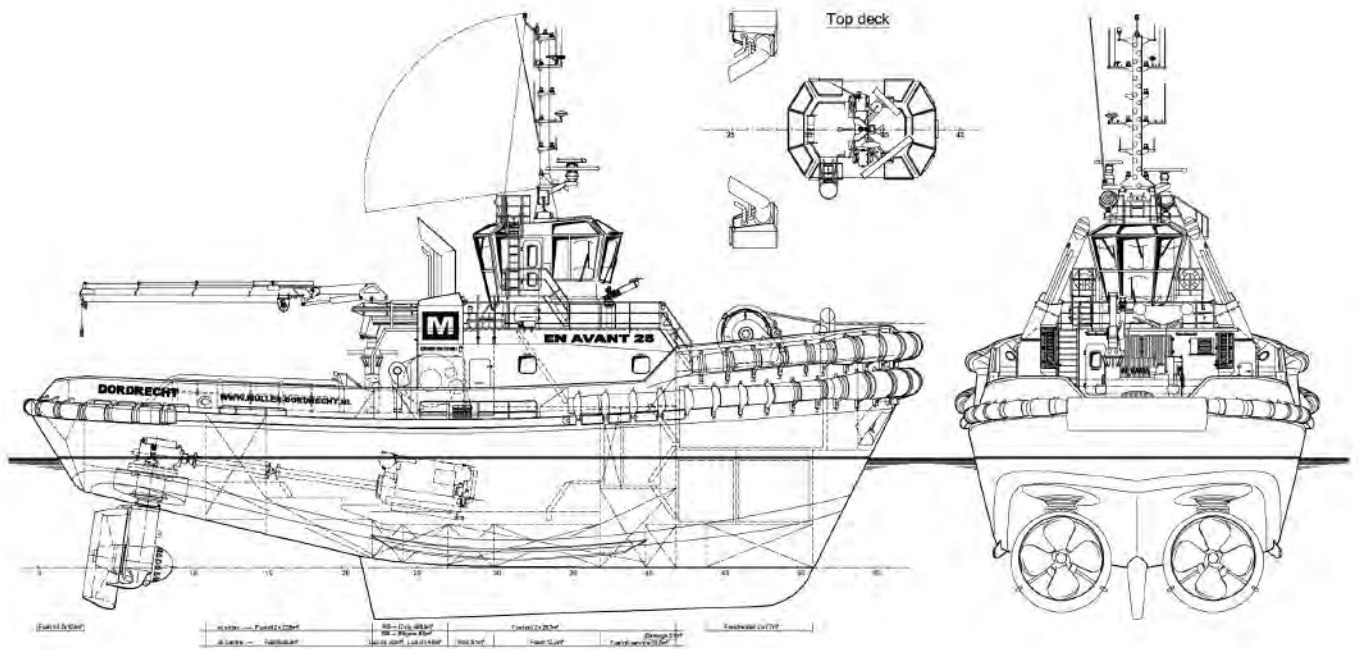
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Number of crew.....>10
Number of passengers.....0
Number of cabins.....6
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Classification:

Classification society Bureau Veritas
Notations I * HULL • MACH Escort
Tug, Unrestricted Navigation,
AUT, UMS, Inwater Surey,
COMF-NOISE 3, COMF-VIB 3,
Fire Fighting Ship 1,
Green Passport EU, Clean ship

Other important international regulations complied with:

- IMO Tier III compliant



H.T.M.S. TA CHAI – Support tug for surface ships and submarines



Builder:Asian Marine Service PCL
 Designer:Robert Allan Ltd.
 Vessel's name:H.T.M.S. Ta Chai
 Owner/operator:Royal Thai Navy
 Country:Thailand
 Flag:Thailand
 Total number of sister ships already completed:1
 Total number of sister ships still on order:1
 Contract date:May 2021
 Delivery date:August 2023

This RAmports 3200-SD tug type was built by Asian Marine Services PCL (ASIMAR) in Thailand, and designed by Robert Allan Ltd (RAL) to serve the Royal Thai Navy's fleet of surface ships and submarines. The Royal Thai Navy had previously taken delivery of two RAL-designed RAmports 3200 tugs, in 2017 and 2019 respectively, but this time opted for a tug with a slightly wider hullform.

The accommodation has been outfitted for a crew of 20, including two cabins with living room for the master and chief engineer, a mess and a galley arranged in the deckhouse, and other crew cabins located on the lower accommodation deck. RAL says: "The wheelhouse is designed with a split type control station, which provides maximum all-round visibility with exceptional visibility to the bow and side fendering, as well as operation on the aft deck."

H.T.M.S. Ta Chai is equipped with deck machinery including a hawser winch at the bow and a towing hook on the aft deck. The major deck machinery equipment was provided by Fluidmecnica of Spain. The propulsive arrangement consists of two MTU 16V4000 M54 main engines, rated 1,685kW at 1,800rpm, which drive a pair of Schottel SRP 400FP Z-drives. The

firefighting pump is driven by an MTU 12V4000 M53R dedicated diesel engine, rated 1,140kW at 1,600 rpm. Electrical power generation is provided by a pair of MAN D2376 LE322 generators rated 200kWe at 50 Hz, which are able to operate in parallel as required.

In addition to its regular fendering, H.T.M.S. Ta Chai also features "a few fenders underwater along the hull side and in way of Z-drives to provide protection working with submarines", RAL says.

TECHNICAL PARTICULARS

Length, oa.....31.5m
 Length, bp.....29.83 m
 Breadth, moulded.....12.6m
 Depth, moulded.....5.49m
 Gross tonnage.....497tonnes
 Displacement.....842.71tonnes
 Design, draught.....4m
 Design, deadweight.....250tonnes
 Lightweight.....590tonnes
 Deck space (total).....49m²
 Deck capacity.....3tonnes/m²
 Max speed.....13knots
 Bollard pull.....55tonnes
 Range.....6,444nm@8knots

Propulsion:
 Main engine(s):
 Number of engines.....2
 Make.....MTU
 Model.....16V4000 M54
 Output of each engine.....1,685kW

Propeller(s):
 Number of propellers.....2
 Make.....Schottel
 Model.....SRP 400FP Z-drive
 Diameter.....2,300mm
 Material.....CuAl10Fe5Ni5-C-GS
 Number of blades.....4
 Speed.....272rpm

Fixed/controllable pitch.....Fixed
 Open/nozzled.....Nozzled

Deck machinery:

Crane(s):
 Number of cranes.....1
 Make.....Palfinger
 Model.....PK 15500M
 Capacities/SWL.....0.6tonnes@14m

Winch(es):

Number of winches.....1
 Make.....Fluidmecnica
 Model.....M-2800-140-2B-2C-1T-RED-H-24
 Capacities.....130tonnes brake pull

Roller(s):

Number of rollers.....2

Bridge electronics:

Radar(s).....Raytheon Anschütz GmbH
 Autopilot.....Raytheon Anschütz GmbH
 GMDSS.....Cobham SATCOM
 GPS.....Simrad Yachting
 Gyro.....Raytheon Anschütz
 Chart plotter.....Simrad Yachting
 Fire detection system.....Kidde

Onboard capacities:

Fuel oil.....170m³
 Fresh water.....30m³
 Sullage.....20m³
 Ballast water.....30m³
 Firefighting foam.....7m³

Complement:

Number of crew.....20
 Number of passengers.....0
 Number of cabins.....5

Classification:

Classification society.....Lloyd's Register
 Notations.....* 100A1, TUG,
 FIRE FIGHTING SHIP 1, * LMC



When performance is on the line

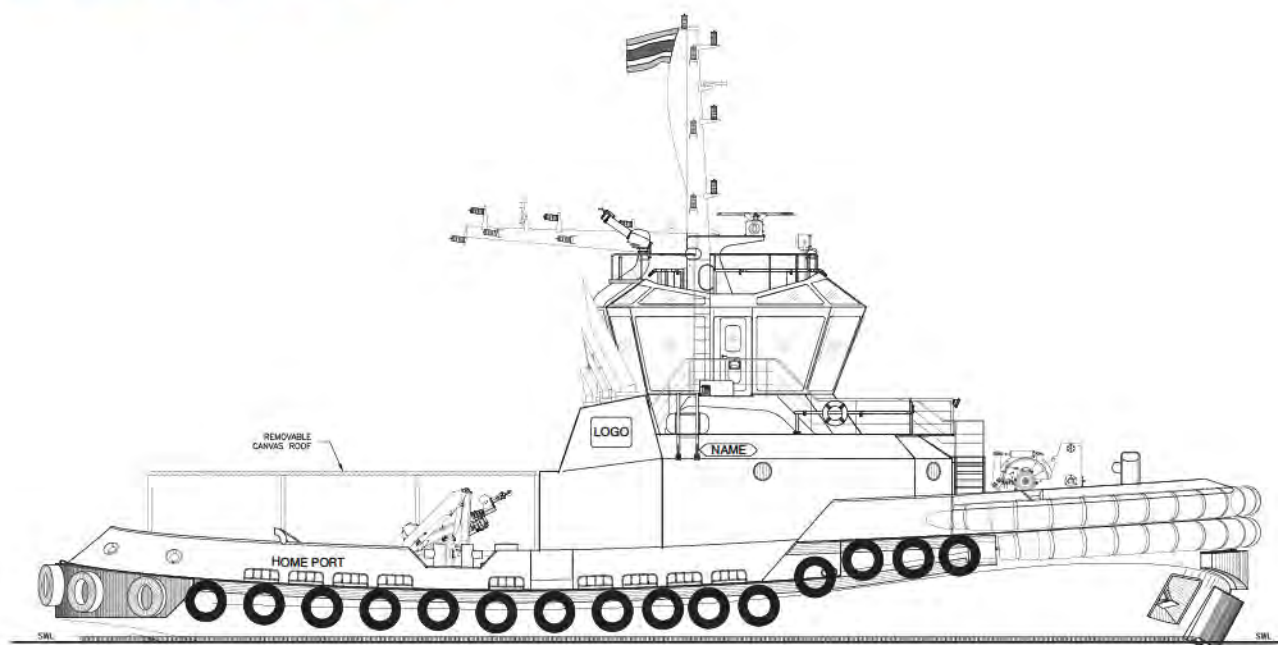
If the waves and wind are against you, it's good to have Hägglunds with you. Winches excel with our hydraulic direct drives, providing high reliability and matchless tension control. You get sustainable torque and built-in shock load protection, packed into a design that saves space on deck. So put your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

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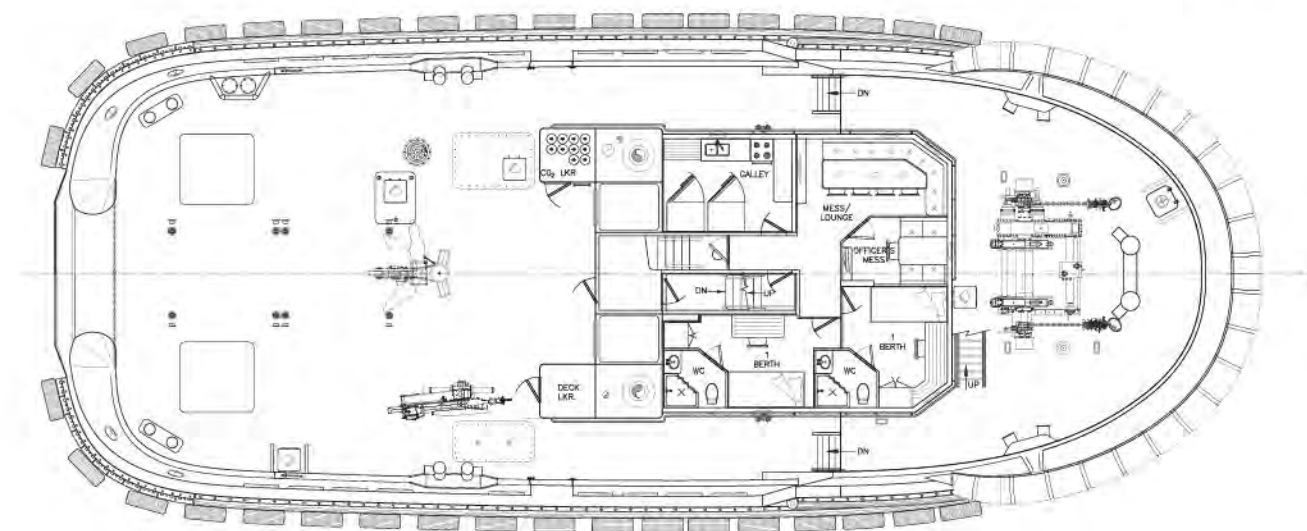
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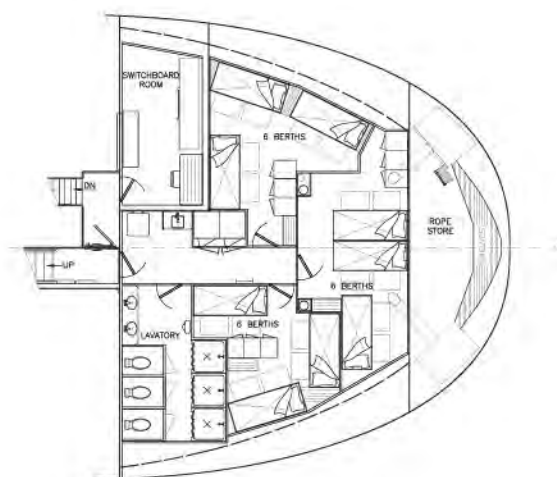
H.T.M.S. TA CHAI



PROFILE



MAIN DECK



LOWER ACCOMMODATION DECK



ROBERT ALLAN

Naval Architects & Marine Engineers
www.ral.ca

RStar 4000-DF | HaiSea Kermode

HAISEA WAMIS – Electric tug makes its debut in Turkey



Builder: **Sanmar Shipyards**
 Designer: **Robert Allan Ltd**
 Vessel's name: **HaiSea Wamis**
 Owner/operator: **Haisea Marine**
 Country: **Canada**
 Flag: **Vancouver, BC**
 Total number of sister ships
 already completed: **2**
 Total number of sister ships still on order: **1**
 Contract date: **December 2021**
 Delivery date: **May 2023**

HaiSea Wamis is the debutante in the Robert Allan Ltd (RAL)-designed ElectRA 2800SX electric tugboat series – a battery-powered workhorse that, in builder Sanmar Shipyards' words, "is proof that zero-emission propulsion is no longer a future aspiration, but a fully viable solution that can be achieved with no loss of power or performance".

The ElectRA 2800SX design was developed exclusively for Sanmar, and has been hailed as the first electric tug to be exported from Turkey. Delivered in May, HaiSea Wamis was the first of three sister tugs (including HaiSea Wee'Git and HaiSea Brave) delivered to Haisea Marine, a joint venture operator formed by Canadian shipping company Seaspan and the Haisla Nation of British Columbia (BC). The trio will fulfil harbour tug duties at LNG Canada's new export facility in Kitimat, BC.

The vessel has 6,000kWh of battery capacity and can achieve a bollard pull of 70tonnes, performing all ship berthing and unberthing manoeuvres on battery power alone. Between jobs, all three tugs will top up their batteries from dedicated shore charging facilities at their berths in Kitimat, thereby resulting in their achieving zero-emissions operations in all-electric mode. According to reports, charging each tug's

battery set-up to full capacity can be achieved within four hours, granting the vessels a wider operational window throughout the day.

Intended for extended operations, each tug has been designed and built with four crew cabins. Another obvious advantage of incorporating pure electric power is the reduction in noise – a benefit for both the onboard occupants and the surrounding marine environment.

The wheelhouse has been arranged to grant the crew 360° visibility – a necessity when operating outside the LNG Canada facility, providing an uninterrupted view of other boats (such as supply vessels). Two firefighting monitors are positioned just outside the wheelhouse, and a Palfinger 18500MC knuckle boom crane has been installed on HaiSea Wamis' aft deck.

Speaking after the vessel's delivery, Ali Gurun, chairman of Sanmar Shipyards, described HaiSea Wamis as "a major stride forward along the road to a sustainable, environmentally friendly tug and towing industry", adding: "The significance of this project is huge, not just for us, but also for the industry as a whole."

TECHNICAL PARTICULARS

Length, oa 28.4m
 Breadth, moulded 13m
 Depth, moulded 5.9m
 Gross tonnage 485tonnes
 Design, draught 5.9m
 Service speed 12knots
 Max speed 13knots
 Bollard pull 68tonnes

Propulsion:
 Battery pack
 Make Corvus Energy
 Output of battery pack 5,288kWh

Generator(s):
 Number of generators 2

Make CAT
 Model C32

Propeller(s):
 Number of propellers 2
 Make Schottel
 Model SCD 460
 Diameter 2,600mm
 Number of blades 4
 Speed 33m/s
 Fixed/controllable pitch Fixed
 Open/nozzled Nozzled

Deck machinery:
 Crane(s):
 Number of cranes 1
 Make Palfinger
 Model 18500MC
 Capacities/SWL 180kNm (18.3mt)

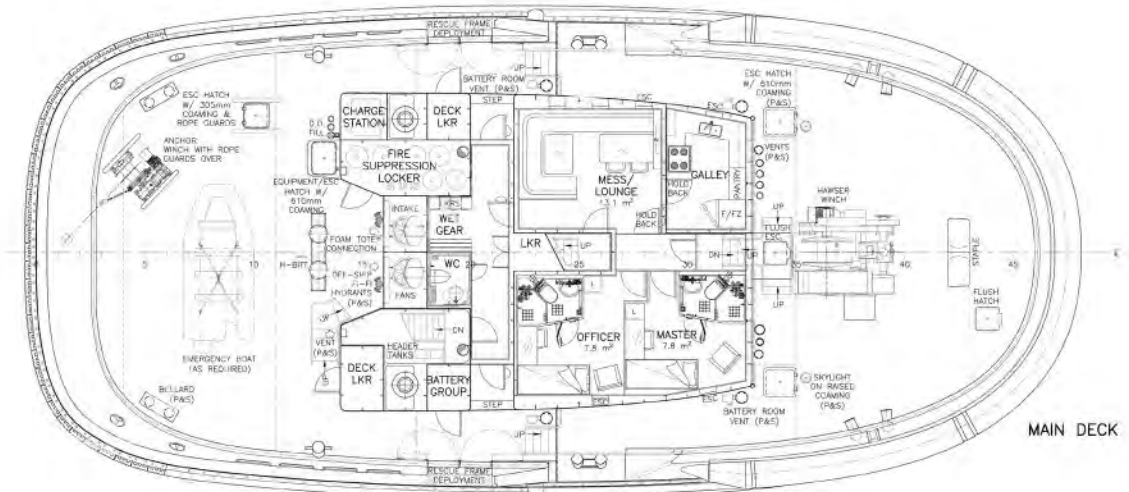
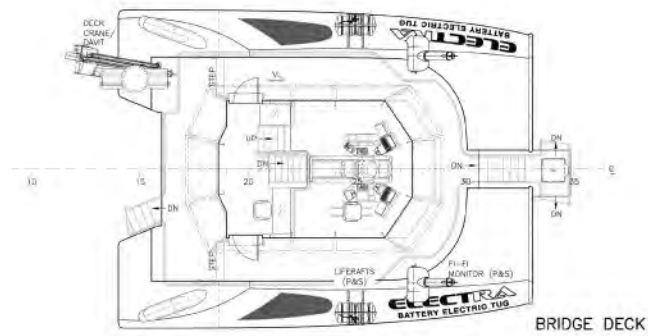
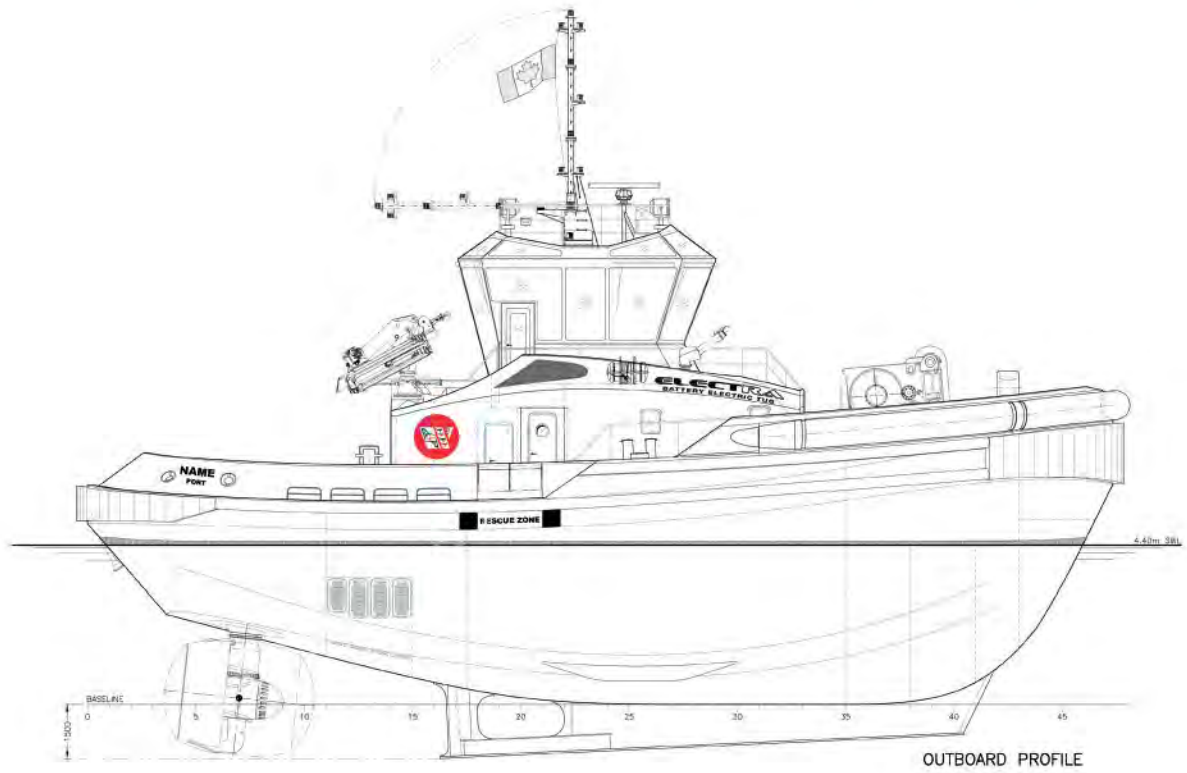
Winch(es):
 Number of winches 1
 Make DMT
 Model HW-010-E70kN

Anchor winch:
 Number of winches 1
 Make DMT
 Model AW-100-E19C
 Capacities 118kN

Onboard capacities:
 Fuel oil 102,300litres
 Fresh water 18,100litres
 Sludge 4,500litres
 Other capacities 68.8m³ (void tanks)

Complement:
 Number of crew 4-6
 Number of passengers 0
 Number of cabins 4

Classification:
 Classification society ABS
 Notations +A1, Towing Vessel,
 FFV 1, +AMS, + ABCU, BP,
 ESS-LIBATERY, NBLES, UWILD



HST SWANSEA – Hybrid CTV designed for zero-emissions loitering



Builder: **Strategic Marine**
 Designer: **BMT**
 Vessel's name: **HST Swansea**
 Owner/operator: **HST**
 Country: **UK**
 Flag: **UK**
 Total number of sister ships
 already completed: **8**
 Total number of sister ships still on order: **10**
 Contract date: **Unspecified**
 Delivery date: **April 2023**

Demand for crew transfer vessels (CTVs) has soared in the offshore wind farm sector in recent years, but with this demand comes a call for greater comfort and safety for the crews tasked with navigating these vessels to turbine sites located further offshore. BMT's response was to design and develop the StratCat 27 (SC27) hybrid CTV in collaboration with its Singapore-based shipbuilding partner Strategic Marine, having described this design as "a statement of environmental responsibility and a commitment to crew well-being". The debut in this new class was delivered in April 2023, and attracted a number of visitors on the jetty at last year's Seawork exhibition, hosted in Southampton, the UK in June 2023.

HST Swansea was delivered to HST Marine, a UK offshoot of Purus Marine Group. One of its most notable features is its parallel hybrid system, which enables pure-battery, zero-emissions operations when loitering at wind farms and within port. The CTV is also equipped with Caterpillar C32 propulsion. BMT explains: "The SC27 is IMO Tier III-ready, with a selective catalytic reduction [SCR] and diesel exhaust fluid [DEF] system, ensuring compliance with emission standards." The twin C32 engines provide 1,081kW of power apiece, propelling the SC27 to a speed of 27knots.

The vessel's innovative hybrid system is supported by a 120kWh battery system, with specific provision in the design for a low-impact expansion in future.

HST Swansea also features BMT's patented Active Fender System (AFS),

which boasts an impressive 1.75m transfer capability. This, the designer says, "ensures safety with a smooth transfer process while minimising potential impacts on turbines during landings" – an important consideration when it comes to personnel safety and vessel integrity.

The SC27 can comfortably accommodate 24 technicians in business-class-style seats with reclining options, USB ports and onboard entertainment. Five high-spec cabins, including a master's cabin and four double cabins, provide crew privacy and relaxation.

BMT adds that the SC27 is perfectly suited for technician transfers, turbine refuelling and cargo transfers. "With wind farms on the rise, Europe has been a rich market for CTV designs, but now globally and more specifically in the UK, France, the Netherlands and Taiwan, these CTV-operating countries are taking offshore wind energy seriously," the designer states. "BMT is poised to meet this growing demand and continue to prioritise crew comfort, knowing it enhances crew performance and well-being during offshore operations."

TECHNICAL PARTICULARS

Length, oa: 27.4m
 Length, bp: 23.99m
 Breadth, moulded 8.9m
 Depth, moulded 3.85m
 Gross tonnage 214.7tonnes
 Displacement 135tonnes
 Design, draught 1.6m
 Design, deadweight 39.1tonnes
 Lightweight 95.9tonnes
 Deck space (total) 93.3m²
 Deck capacity 2tonnes/m²
 Service speed 25knots@85% MCR
 Max speed 27knots
 Bollard pull 15tonnes
 Range 1,400nm

Propulsion:

Main engine(s):
 Number of engines 2
 Make Caterpillar
 Model C32 ACERT
 Output of each engine 1,081kW

Gearbox(es):

Number of gearboxes 2
 Make ZF
 Model ZF 3050 V
 Output speed 766rpm

Propeller(s):

Number of propellers 2
 Make Mencast
 Material NiAlBr
 Number of blades 5
 Fixed/controllable Fixed
 Open/nozzled Open

Deck machinery:

Crane(s):
 Number of cranes 1
 Make Palfinger
 Model PK 23500M
 Capacities/SWL 2.45tonnes@8m

Winches:

Number of winches 1
 Make Hercules
 Model 150

Bridge electronics:

Radar(s) Simrad R5024 12U/6X X-Band
 Autopilot AP70 MK2
 AutoPilot IMO Pack Analog
 GPS Simrad P3007 IMO

Onboard capacities:

Fuel oil 35,000litres
 Fresh water 3,500litres
 Sullage 2,500litres
 Urea 1,000litres

Complement:

Number of crew 3
 Number of passengers 2
 Number of cabins 5

Other significant or special items of equipment:

- 2 x BMT's Active Fender System (AFS)
 - 2 x 110kW Motors
 - 1 x 120kWh battery pack

Classification:

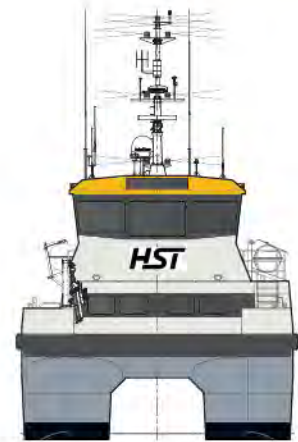
Classification society Bureau Veritas
 Notations * Hull Mach Wind
 Farms Service Ship-SO-Sea Area 3



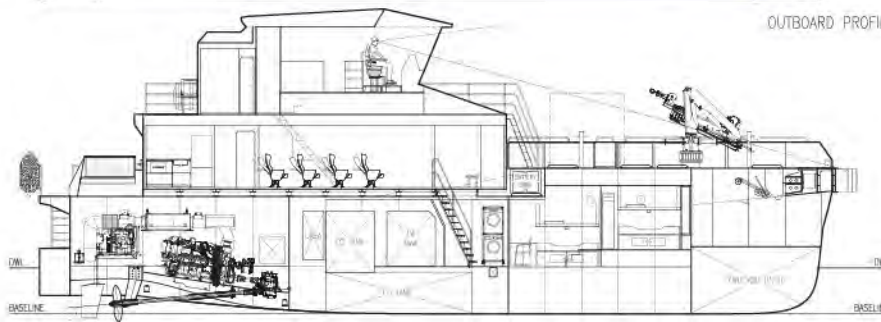
HST SWANSEA



OUTBOARD PROFILE

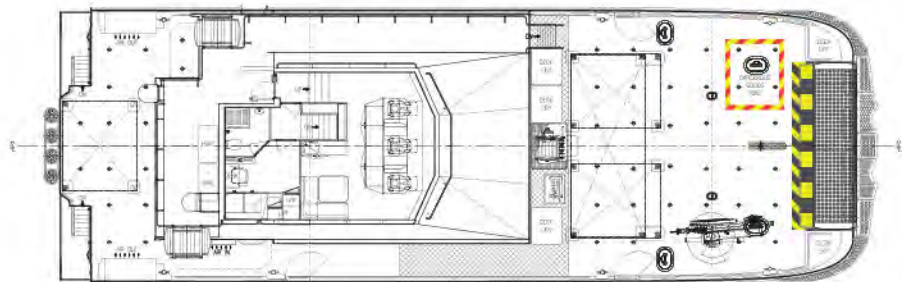


VIEW ON BOW



INBOARD PROFILE

FR.0	FR.1	FR.2	FR.3	FR.4	FR.5	FR.6	FR.7	FR.8	FR.9	FR.10	FR.11	FR.12	FR.13	FR.14	FR.15	FR.16	FR.17	FR.18	FR.19	FR.20	FR.21
TRANSOM	1200	2400	3000	4800	6000	7200	8400	9600	10800	12000	13200	14400	15600	16800	18000	19200	20400	21100	22300	23500	24700



PLAN VIEW BRIDGE

FR.0	FR.1	FR.2	FR.3	FR.4	FR.5	FR.6	FR.7	FR.8	FR.9	FR.10	FR.11	FR.12	FR.13	FR.14	FR.15	FR.16	FR.17	FR.18	FR.19	FR.20	FR.21
TRANSOM	1200	2400	3000	4800	6000	7200	8400	9600	10800	12000	13200	14400	15600	16800	18000	19200	20400	21100	22300	23500	24700



PLAN VIEW ON MAIN DECK

FR.0	FR.1	FR.2	FR.3	FR.4	FR.5	FR.6	FR.7	FR.8	FR.9	FR.10	FR.11	FR.12	FR.13	FR.14	FR.15	FR.16	FR.17	FR.18	FR.19	FR.20	FR.21
TRANSOM	1200	2400	3000	4800	6000	7200	8400	9600	10800	12000	13200	14400	15600	16800	18000	19200	20400	21100	22300	23500	24700



PLAN VIEW ON HULL

BMW ACTIVE FENDER SYSTEM
PROTECTED BY PATENT NO.628200252



IWS SKYWALKER – Double-ended wind farm commissioning and service vessel



Builder: **CMHI (Jiangsu)**
 Designer: **Kongsberg Maritime**
 Vessel's name: **IWS Skywalker**
 Owner/operator: **IWS**
 Country: **Norway**
 Flag: **Norway**
 Total number of sister ships
 already completed: **0**
 Total number of sister ships still on order: **5**
 Contract date: **2021**
 Delivery date: **December 2023**

In December 2023, Kongsberg Maritime celebrated the delivery of one of its most innovative ship designs to date. With 50 years of ship design experience, this delivery, the UT 5519 DE Wind Farm Commissioning and Service Vessel (CSOV) *IWS Skywalker*, "encompasses the same pioneering spirit as the company's first UT Design PSV and AHTS designs of the early 1970s", the group comments.

IWS Skywalker marks the first in a series of six UT 5519 DE CSOVs for Norway-based Integrated Wind Solutions (IWS), all built by CMHI's yard in Jiangsu, China. The UT 5519 DE design features an innovative double-ended hull form and propulsion set-up, and also features a fully integrated 'walk to work' system, providing safe and efficient transfer of personnel and equipment between the vessel and offshore turbines.

The UT 5519 DE's development was based on research, as well as operational experience from Kongsberg Maritime's first SOV designs (a pair of UT540 WP SOVs delivered to Edda Wind). Data and feedback from those first two ships, collected as part of the EU-funded Nexus research project, resulted in this new range. Kongsberg says: "Time was spent visualising operations, power consumption and other operational parameters, with a view to more efficient operations with the new design." The Nexus programme also

provided alternative fuel solutions and concepts for fully electric operation, leading to the resulting fully double-ended design with a hybrid power system.

The vessel's battery hybrid power plant has been optimised for operations, and the vessel has secured DNV's Silent (E) class notation, setting limits for underwater noise generated by the vessel, to minimise disturbance to marine life. "Sea trials showed the noise transmission to be well below the class notation limits," says Kongsberg. All six vessels are built around a comprehensive integrated technology package provided by Kongsberg Maritime, which includes: permanent magnet (PM) azimuth thrusters; generators and electrical systems; a fully integrated bridge with navigation, dynamic positioning (DP) and automation systems; and deck machinery equipment and control systems. The vessel also features a helideck and carries a daughter craft.

The CSOV's main propulsion is provided by four US 255 L PM azimuth thrusters, with PM motors mounted on top of the thrusters. "This offers a fully symmetrical propulsion and manoeuvring system, matching the symmetrical hull design, fore and aft," Kongsberg comments.

At the time of writing, *IWS Skywalker* has now commenced work at the Dogger Bank Wind Farm, operating between 130-200km from the east coast of Yorkshire, UK. Speaking in December 2023, Einar Vegsund, director of the Ship Design Solutions department at Kongsberg Maritime, said: "As we reach our 50th year of designing ships across all segments, we're delighted to be delivering one of our most advanced designs to date. In the same way as the first UT 704 platform supply vessel ventured out into the North Sea back in 1974 as a pioneer of its time, our latest state-of-the-art windfarm service operation vessel, *IWS Skywalker*, and its sister ships, will again be pioneering operations in the energy markets offshore."

TECHNICAL PARTICULARS

Length, oa 90m (excl. boat landing)
 Length, bp 78.8m
 Breadth, moulded 19.6m
 Depth, moulded 7.5m
 Design draught 6.3m
 Deck space (total) 530m²
 (+ 420m² warehouse)
 Deck capacity 5tonnes/m²
 Max speed 13knots

Propulsion:

Main engine(s):
 Number of engines 3
 Make Caterpillar
 Model 3512E
 Output of each engine 1,700kW

Propeller(s):

Number of propellers 4
 Make Kongsberg Maritime
 Model US 205 LPM
 Number of blades 4
 Fixed/controllable pitch Controllable
 Open/nozzled Nozzled

Deck machinery:

Crane(s):
 Number of cranes 1 x 3D-compensated crane
 1 x deck crane
 Make MacGregor
 Capacities/SWL 3D-compensated crane: 5tonnes@33.5m

Other deck machinery/equipment:

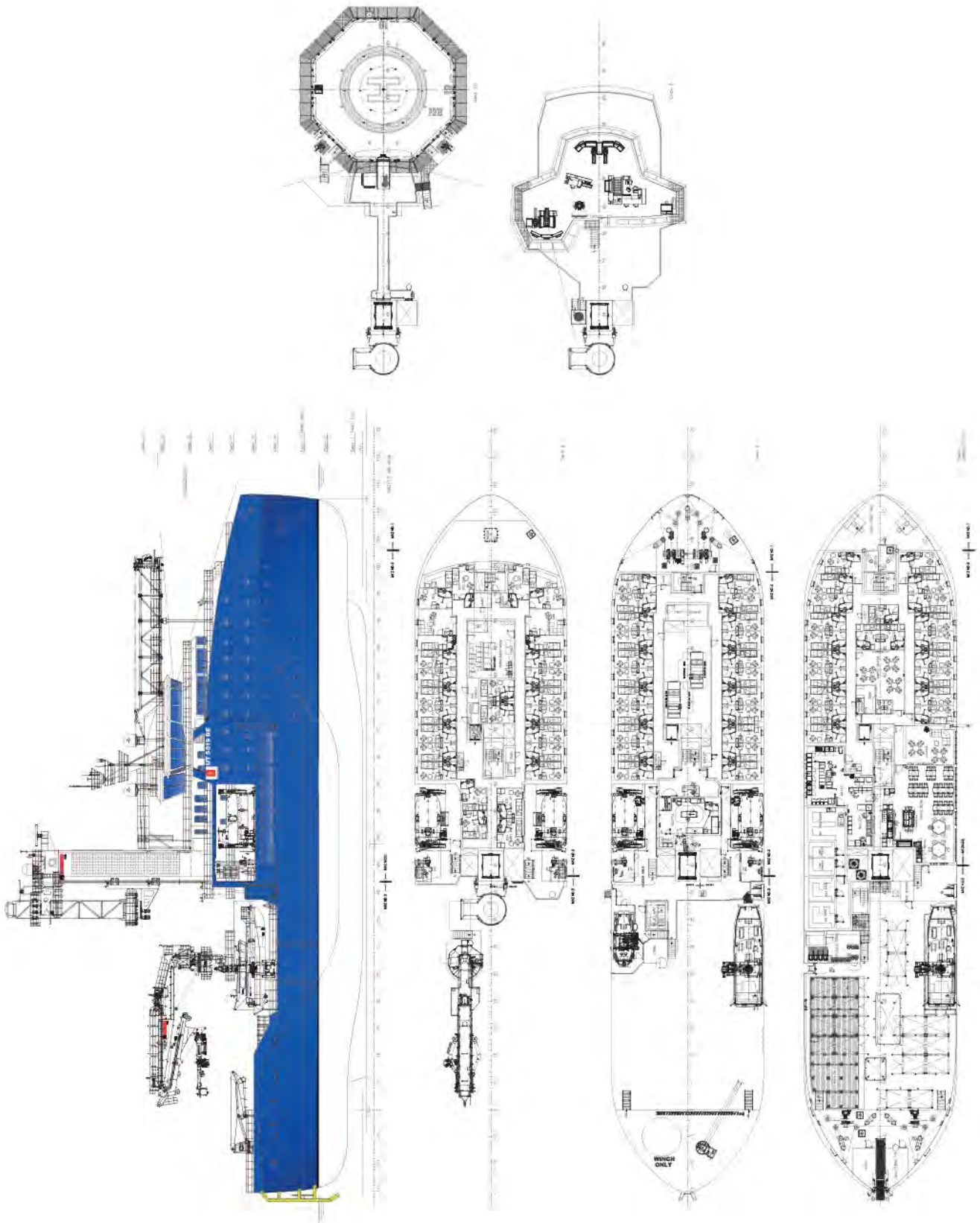
- MacGregor 3D-compensated height adjustable gangway system

Complement:

Number of crew >120
 Number of passengers 0
 Number of cabins 92

Classification:

Classification society DNV



LABOE – Hybrid-electric commuter ferry for the city of Kiel



Builder: **Holland Shipyards Group**
 Designer: **Holland Shipyards Group**
 Vessel's name: **Laboe**
 Owner/operator: **Schlepp-und Fährgesellschaft Kiel (SFK)**
 Country: **Germany**
 Flag: **Germany**
 Total number of sister ships already completed: **3**
 Total number of sister ships still on order: **1**
 Contract date: **October 2022**
 Delivery date: **November 2023**

Laboe is a pioneering hybrid ferry, designed and constructed for Schlepp-und Fährgesellschaft Kiel (SFK) in Germany, and hailed as a significant stride towards the goal of advancing zero-emission public transport, particularly within the scenic Kieler Fjord. The vessel also represents the fourth hybrid ferry and the seventh vessel delivered to SFK by Holland Shipyards Group since 2020.

The ferry's dual-power system is capable of running on both generators and a state-of-the-art battery bank. In fact, Laboe's battery power capacity – comprising a 546kWh Octopus High Energy pack, supplied by EST-Floattech – is reported to be much higher than those aboard SFK's other hybrid-power ferries. This will enable the boat to sail for longer when running in full-electric mode.

EST-Floattech comments: "This battery system ensures the energy consumption remains low during the sailing, as the vessel can easily switch between generators and the battery system. The vessel can even sail fully emission-free around the city of Kiel, where it transports commuting pedestrians and cyclists from A to B." The supply

package comes with state-of-the-art battery racks and covers.

The newbuild has been outfitted to serve not only as a commuter ferry but also as a vessel for tourist day trips around the Kieler Fjord. Laboe's hull has been engineered to enable the vessel to navigate at speeds of up to 11knots with minimal water resistance, optimising both performance and energy consumption, and offering passengers a relatively smooth ride.

The upper deck features a open-air seating area, situated forward, with protection against the sun when necessary. The permanent magnet (PM) motors were supplied by Hybrid Ship Propulsion, while Scania provided a DC13 auxiliary engine and Sandfirden Technics supplied the EU Stage V-compliant generators. Meanwhile, Windex Engineering provided the vessel's HVAC system.

Holland Shipyards Group adds that, thanks to the ergonomic design of the helm station, navigation can be managed by just one crew member, which should also increase operational efficiency.

TECHNICAL PARTICULARS

Length, oa.....33.54m
 Length, bp.....33.48m
 Breadth, moulded.....8.8m
 Depth, moulded.....3.7m
 Displacement.....319m³ (max)
 Design, draught.....2.4m
 Design, deadweight.....64tonnes
 Lightweight.....255tonnes
 Max speed.....11knots

Propulsion:
 Main engine(s):
 Number of engines 2

MakeBaumüller
 ModelDST2-315
 Output of each engine385kW

Propeller(s):
 Number of propellers..... 2
 MakeViscus DT
 Diameter1,200mm
 MaterialCu3
 Number of blades..... 4
 Fixed/controllable pitch.....Fixed
 Open/nozzled.....Open

Bridge electronics:
 Radar(s)RHRS-2024
 AutopilotArgonav Radarpilot 720
 GPSFuruno SC-70
 GyroRZ S-300
 Engine monitoring system.....HSE
 Fire detection system.....Syncro View Marine DS69

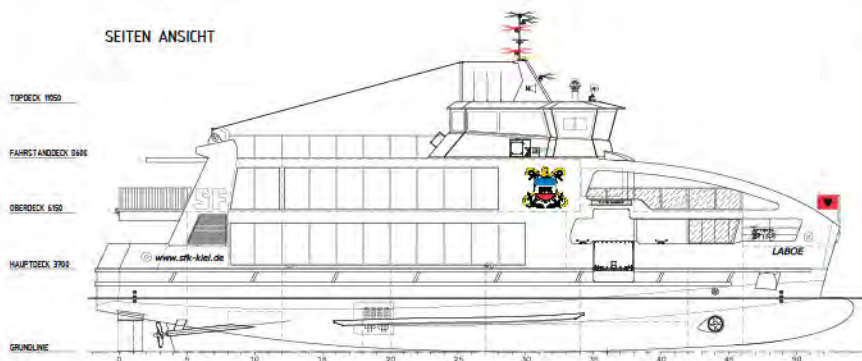
Onboard capacities:
 Fuel oil15.32m³
 Fresh water16.31m³
 Sullage9.75m³
 Urea1.02m³

Complement:
 Number of crew..... 5
 Number of passengers..... 300
 Number of cabins 0

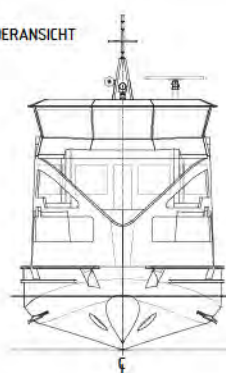
Other significant or special items of equipment:
 - 546kWh battery pack for hybrid propulsion

Classification:
 Classification societyNBKB (Dutch Inland Waterways)
 Notations.....Zone 2,3,4 Netherlands, Zone 2 Germany (Binschuo), R (Rhine) up to Basel

SEITEN ANSICHT

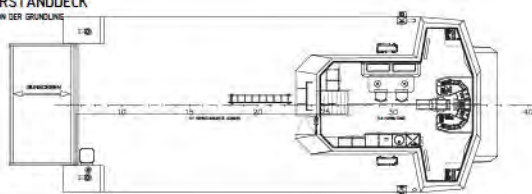


VORDERANSICHT

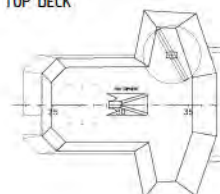


FAHRSTANDECK

840 VON DER GRUNDLINE

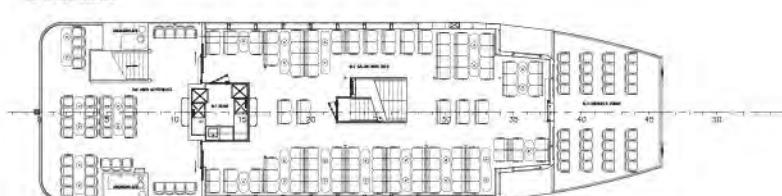


TOP DECK



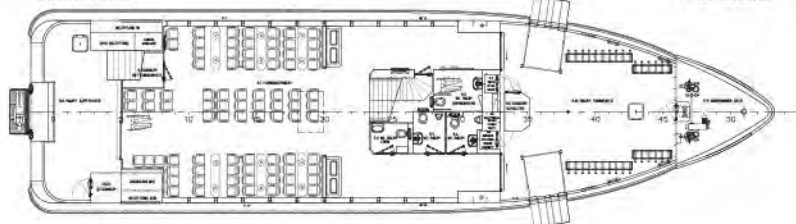
OBERDECK

650 VON DER GRUNDLINE



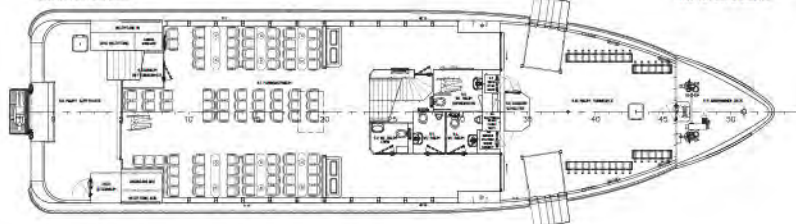
HAUPTDECK

370 VON DER GRUNDLINE



ANKERWINDE DECK

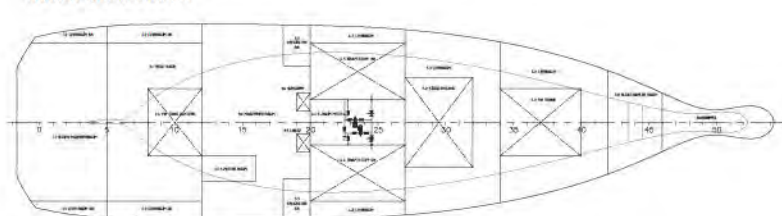
470 VON DER GRUNDLINE



UNTER RAUM



TANKEN UND LEERRAUM



LNG SENTINEL I – Dual-fuel tug servicing Hong Kong's green energy infrastructure



Builder: **Cheoy Lee Shipyards/
Hin Lee (Zhuhai) Shipyard Co.**
Designer: **Robert Allan Ltd**
Vessel's name: **LNG Sentinel I**
Owner/operator: **Hongkong Salvage &
Towage Services**
Country: **Hong Kong**
Flag: **Hong Kong**
Total number of sister ships
already completed: **0**
Total number of sister ships still on order: **1**
Contract date: **July 2021**
Delivery date: **November 2023**

LNG Sentinel I is a dual-fuel variant of LRAL's Rastar 4200 tug series, customised to meet the requirements identified by Hongkong Salvage & Towage Services Ltd (HKSTS). As the exclusive service provider and operator of the two dual-fuel standby vessels for Hong Kong LNG Terminal Limited, HKSTS sought a vessel that would redefine the boundaries of efficiency and versatility.

The Rastar 4200-DF is a diesel-electric tug with a bollard pull of 100tonnes. The vessel is purpose-built for multiple tasks, such as berthing and unberthing the floating storage regasification unit (FSRU), loitering, patrolling and providing assistance in emergency evacuation scenarios, thus providing invaluable support for this critical energy infrastructure.

The tug's hybrid system enables it to operate on either diesel fuel or liquefied natural gas (LNG). Cheoy Lee Shipyards says: "By utilising LNG, the vessel significantly reduces greenhouse gas emissions, adhering to the highest standards of environmental stewardship. This forward-thinking approach aligns perfectly with Hong Kong's commitment to sustainable development and underscores the Rastar 4200-DF's status as a true industry leader."

LNG Sentinel I's hullform has been optimised for superior seakeeping, maximum stability and manoeuvrability, even in the harshest offshore conditions. The advanced propulsion system, coupled with state-of-the-art thrusters, guarantees precise control and exceptional bollard pull, enabling the tug to effortlessly handle the demanding tasks required at the Hong Kong Offshore LNG terminal. The Rastar 4200-DF is also equipped with a

comprehensive suite of navigation and communication systems, guaranteeing seamless coordination with other vessels.

With safety in mind, the tug has integrated fire suppression systems, advanced alarm/monitoring systems and comprehensive safety equipment into its design. As well as hailing LNG Sentinel I as representing "a new era in offshore LNG terminal support", Cheoy Lee says that the Rastar 4200-DF sets "a shining example of ingenuity and innovation, propelling the city towards a greener and more prosperous future".

TECHNICAL PARTICULARS

Length, oa 42m
Length, bp 39.59m
Breadth, moulded 16m
Depth, moulded 6.6m
Gross tonnage 1,275tonnes
Displacement 2049.34tonnes
Design, draught 5m
Design, deadweight 614.6tonnes
Lightweight 1,434.7tonnes
Deck space 100m²
Deck capacity 5tonnes/m²
Service speed 12knots@85% MCR
Max speed 14knots (diesel)
11knots (LNG)
Bollard pull 108tonnes
Range 1,000nm

Propulsion:
Main engine(s):
Number of engines 2 (diesel) /
2 (dual-fuel, diesel/LNG)
Make Wärtsilä
Model 2 x Wärtsilä 9L20 – diesel /
2 x Wärtsilä 8L20DF – diesel/LNG
Output of each
engine 1,980 kW (diesel) /
1,560 kW (diesel & LNG)

Gearbox(es):
Number of gearboxes 2
Make Wärtsilä
Model 3,000kW 690V/
60HZ (propulsion
asynchronous squirrel cage
induction motors)
Output speed 1,200rpm

Propeller(s):
Number of propellers 2
Make Wärtsilä
Model WST-32-FP Azimuth

Diameter 3,300mm
Material NIAI Br
Number of blades 4
Speed 185rpm
Fixed/controllable pitch Fixed
Open/nozzled Nozzled

Deck machinery:

Crane(s):
Number of cranes 1
Make Palfinger
Model PK65002(M)E
Capacities/SWL 5tonnes@6m &
2.5tonnes@15m

Winch(es):

Number of winches 4
Make MacGregor
Model
- 1 x MG-HTWD-1522D03076-Ble fwd
hydraulic towing winch
- 1 x MG-HTW1-1522D10064-BL aft
hydraulic towing winch
- 2 x MG-HUW-1040UL/UR hydraulic tugger
winches

Capacities:

Fwd winch: 100/50tonnes@
0-5m/0-10m/min
Aft winch: 50/10tonnes@
0-10m/0-30m/min
Tugger winch: 10tonnes@0-15 m/min

Other deck machinery/ equipment:

- MacGregor MG-HAW/VG-30 hydraulic
anchor windlass
- Macgregor MG-TPA-110-S / MG-EPP/1x11
hydraulic angular towing pins

Bridge electronics:

Radar(s) Furuno Radar 1:
X-Band radar FAR2218BB/PM
Radar 2: S-Band radar FAR2238BB/PM
Radar 3: FOIL-200 oil spill radar
Autopilot Raytheon Anschütz
Pilot Star N
GMDSS Furuno FELCOM18/30m
GPS Furuno GP170/GPA0215/MIC
Gyro Raytheon Anschütz Std-22NX
Chart plotter Furuno FMD-3100 ECDIS
Engine monitoring system Wärtsilä
Fire detection system Tyco T1216-C

Other communication

systems 2 x Furuno FM8900S VHF
Furuno FS 1575 SSB

Onboard capacities:

Fuel oil 265m³
Fresh water 66m³
Sullage 4m³
Recovered oil / ballast water 46m³

Other capacities:

- LNG 100m³
- Used oil 4m³
- Grey water 6m³
- Black water 6m³
- Dispersant 11m³
- Fi-Fi foam 17m³
- Lube oil 6m³

Complement:

Number of crew 11 + 2
supernumeraries
Number of passengers 0
Number of cabins 12

Classification:

Classification society Bureau Veritas
Notations BV I • Hull • Mach,
Dual Fuel (LNG),
Tug – Design Bollard = 108 (ahead)
100 T (Astern), Fire-Fighting 1 –
Waterspraying, Oil Recovery Ship
Second-Line, Unrestricted Navigation,
• AUT-UMS, Inwatersurvey

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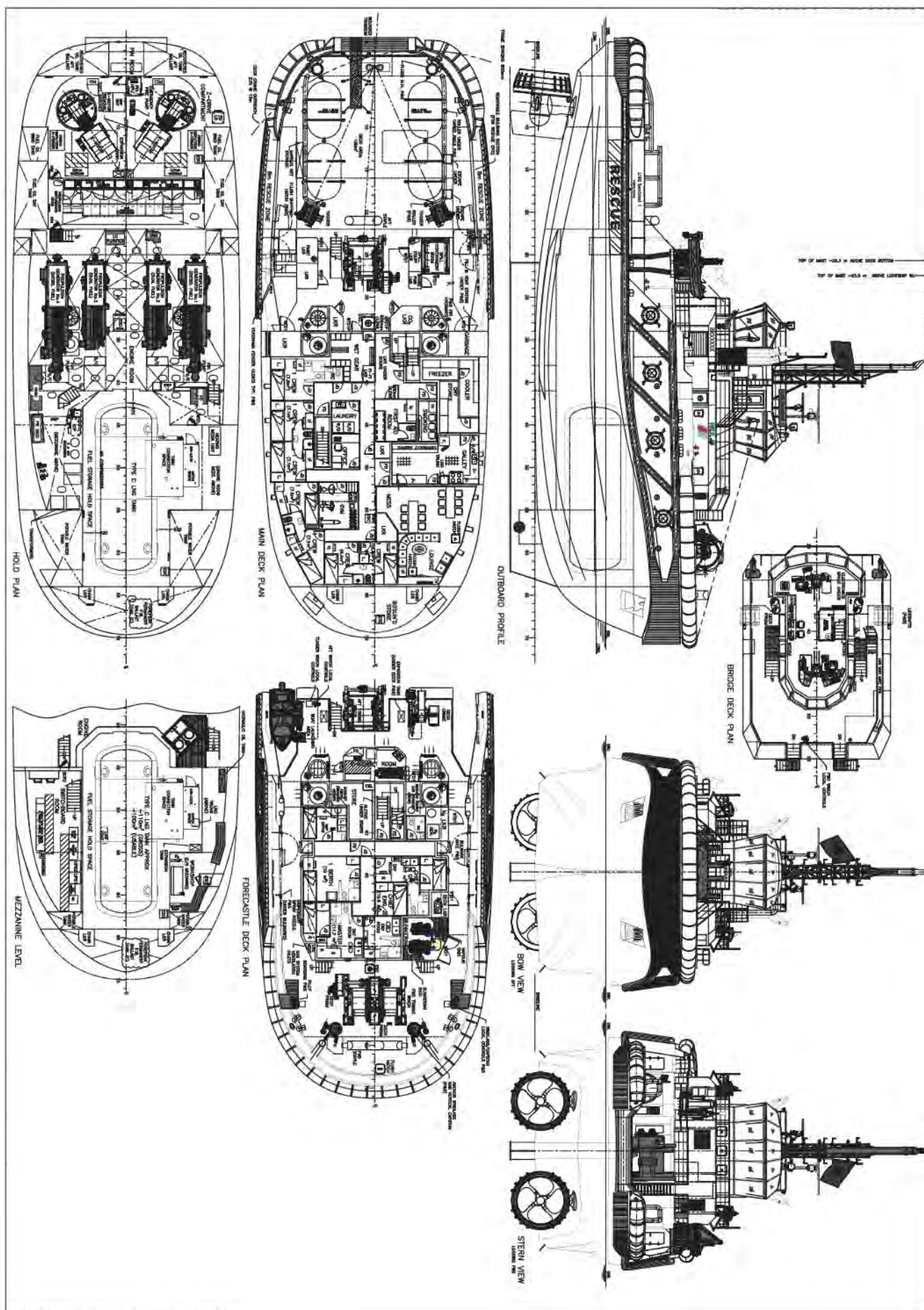
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LNG SENTINEL I





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SIGNIFICANT SMALL SHIPS of 2024

In early 2025, The Royal Institution of Naval Architects will publish the 25th edition of its annual journal *Significant Small Ships*, profiling first-in-class, innovative and/or unique vessels sized between 5-100m and delivered during 2024. We cover a wide range of international newbuilds, ranging from yachts and small recreational craft to fast ferries, patrol boats, workboats, CTVs, AUVs and tugs.

The Editor invites shipbuilders, designers and owners to submit details of vessels for possible inclusion in *Significant Small Ships of 2024*. Presentation will follow on the established two-page format, with a colour photograph, descriptive text and tabular details (including major equipment suppliers) on the first page, followed by a full-page general arrangement. Initial potential entries should comprise a short technical description (100 words) of the proposed vessel highlighting the special features and the delivery date.



All entries should be addressed to:

Editor, Significant Small Ships of 2024,
Email: sss@rina.org.uk

Tel: +44 (0) 20 7235 4622 Fax: +44 (0) 20 7245 6959



PASTEL – Electric long-range cruiser equipped with hull-lifting technology



Builder: **Pascal Technologies**
 Designer: **Pascal Technologies**
 Vessel's name: **PastEl**
 Owner/operator: **Pascal Technologies**
 Country: **Norway**
 Flag: **Norway**
 Total number of sister ships
 already completed: **0**
 Total number of sister ships still on order: **0**
 Contract date: **2022 (prototype)**
 Delivery date: **March 2023**

Included in this year's edition of *Significant Small Ships* as an innovative prototype, *PastEl* is a long-range electric day cruiser that has been designed for optimal energy efficiency, even at planing speeds. This efficiency is largely enabled by the incorporation of Pascal Technologies' AirHull technology into the design.

The AirHull technology provides an air cavity below the vessel, allowing overpressured air to be trapped beneath the hull. This arrangement effectively lifts *PastEl* out of the water, reducing resistance and wave generation by as much as up to 30% – and, consequently, reducing the amount of energy consumed, in a manner similar to that of a surface effect ship (SES).

However, Pascal Technologies claims that the vessel differs from a typical SES in its use of a special hull design – which is described by the group as combining the stability and deck space of a catamaran with the hull volume of a monohull – and a flexible flap system that keeps the air inside the cavity.

Additionally, use of a ride control system has helped the boat to achieve smooth and efficient sailings.

"The AirHull consists of the air system, driveline and batteries," Pascal Technologies

says. "All components are integrated and regulated by our ride control system."

"The platform architecture is robust and scalable for boats from 6m to 30m. It is optimised for electric boating, and the advanced ride control system ensures best-in-class energy efficiency."

PastEl also incorporates smart ship tech to inform its future evolution. For example, a number of sensors have been included on board, and these will collect operational data from the vessel. Pascal Technologies says: "We use machine learning to continuously improve control algorithms in the ride control system. Through over-the-air software upgrades, we can improve the vessel's performance over time."

"The onboard dashboard provides instant information about the vessel, and through the online dashboard you can access real time and historical data." While the current model utilises an Evoy Breeze motor, the design will be future-proofed for hydrogen-fuelled operations, Pascal Technologies says.

TECHNICAL PARTICULARS

Length, oa 8.56m
 Length, bp 7.57m
 Breadth, moulded 2.55m
 Depth, moulded 1.57m
 Displacement 2.8tonnes
 Design, draught 0.4m
 Design, deadweight 0.3tonnes
 Lightweight 2.5tonnes
 Service speed 24knots
 Max speed 36knots
 Range 45nm

Propulsion
 Main engine(s):
 Number of engines 1

Make Evoy (electric)
 Model Breeze (outboard)
 Output of each engine 90kW

Propeller(s):
 Number of propellers 1
 Material Stainless steel
 Number of blades 3
 Fixed/controllable pitch Fixed
 Open/nozzled Open

Deck machinery:
 - Pascal AirHull System

Bridge electronics:
 Autopilot Optional, Dometic
 GPS/GNSS VectorNav
 Gyro VectorNav VN 100
 Chart plotter Nextfour Q Experience
 Engine monitoring system Evoy

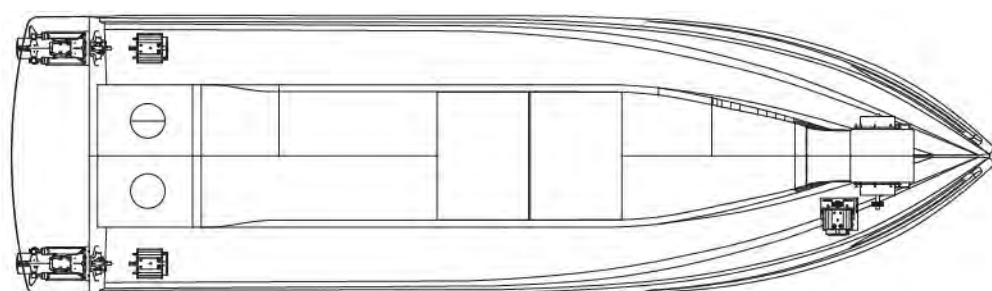
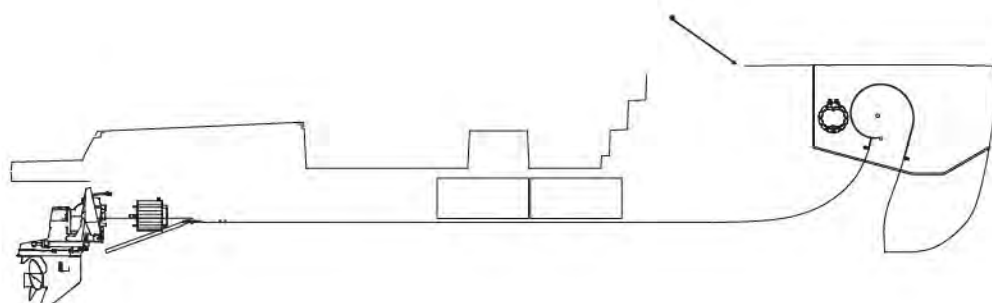
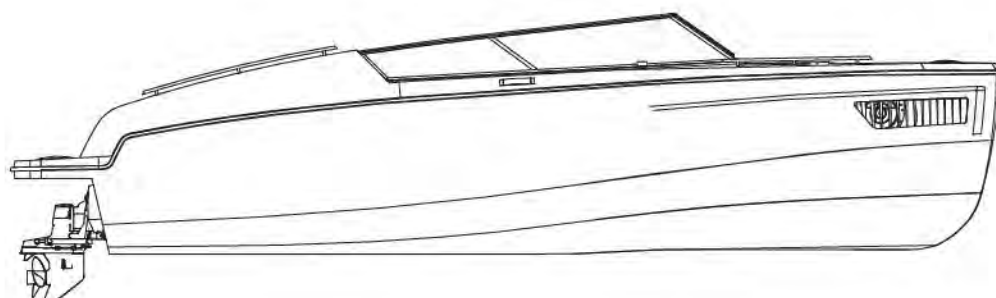
Other communication systems:
 - GNSS
 - accelerometer
 - gyro used in a Kalman filter to estimate 6DOF of the vessel

Other capacities:
 - Propulsion battery 126 kWh

Complement:
 Number of crew 1
 Number of passengers 7
 Number of cabins 1

Classification:
 Classification society N/A

Important international regulations
 complied with:
 - Harmonised ISO standards of the
 European Recreational Craft
 Directive



PENGUIN REFRESH – Electric ferry shaking up transits in Singaporean waters, cutting more than 6,000tonnes of CO₂ each year



Builder: **Penguin Shipyard**
 Designer: **Rolls-Royce Marine/Incat Crowther**
 Vessel's name: **Penguin Refresh**
 Owner/operator: **Penguin (operated on behalf of Shell Energy)**
 Country: **Singapore**
 Flag: **Singapore**
 Total number of sister ships already completed: **2**
 Total number of sister ships still on order: **1**
 Contract date: **Unspecified**
 Delivery date: **April 2023**

The e-ferry *Penguin Refresh* was developed in Singapore and Shell's petrochemicals facility on the island of Bukom, replacing the conventional diesel-powered ferries that have traditionally been used on this route.

This delivery ties in with Shell's changing philosophy with regards to sustainable operations. Nick Potter, general manager of Shell Shipping and Maritime, Asia Pacific & Middle East, has previously commented: "Shipping's future will involve different parts of the sector using different fuels, and electrification is a solution to decarbonise short voyages, including port operations. Switching to zero-emission, fully-electric ferries is part of Shell's ambition to help accelerate progress towards net-zero emissions in the shipping sector."

Penguin Refresh, along with her two sisters, is owned and operated by Singapore's publicly listed aluminium vessel builder-operator Penguin. The first of the trio is also reportedly the Shell Energy company's first all-electric vessel globally, and, according to James Tham,

Penguin managing director, "Singapore's first real-world commercial application of marine electrification".

The three ferries were developed under the 'Electric Dream' banner and, according to Tham, they will eliminate more than 6,000tonnes of CO₂ from the atmosphere in Singapore each year: equivalent to the annual emissions of three diesel-powered ferries.

Penguin Refresh is powered by a system of Trident lithium-ion batteries, supplied by Spear, which has a capacity of 1.24MWh. This permits the e-ferry to run at speeds of 20knots and over, with zero emissions and noise.

Incat Crowther says: "When berthed at Shell Bukom, the ferries will be charged via a combination of fast charging during peak hours, and slow charging during off-peak hours and overnight."

Penguin Shipyard selected Norway-based power solutions firm Zinus to deliver a fully autonomous charging system especially for *Penguin Refresh* and her sisters. The Zinus package includes three charging towers on land and a further six receiving units installed on board the three vessels.

According to reports, Zinus' system will enable the e-ferries to connect to a power supply in less than half a minute, for minimal disruption to schedules.

Penguin Refresh looks set to be the shape of things to come in Singapore: the country's Maritime & Port Authority (MPA) has announced that it will replace all of its 1,600 diesel-powered harbour craft with green-powered alternatives, whether these are running on batteries or alt-fuels, by the year 2030.

TECHNICAL PARTICULARS

Length, oa.....28.7m
 Length, bp.....28.4m

Breadth, moulded.....9m
 Depth, moulded.....2.2m
 Gross tonnage.....<300tonnes
 Design, draught.....1.1m
 Design, deadweight.....20tonnes
 Service speed.....20knots
 Max speed.....22knots

Propulsion:
 Main engine(s):
 Number of engines.....2
 Make.....Ramme
 Model.....HW500 M60 2250 B
 Output of each engine.....640kW

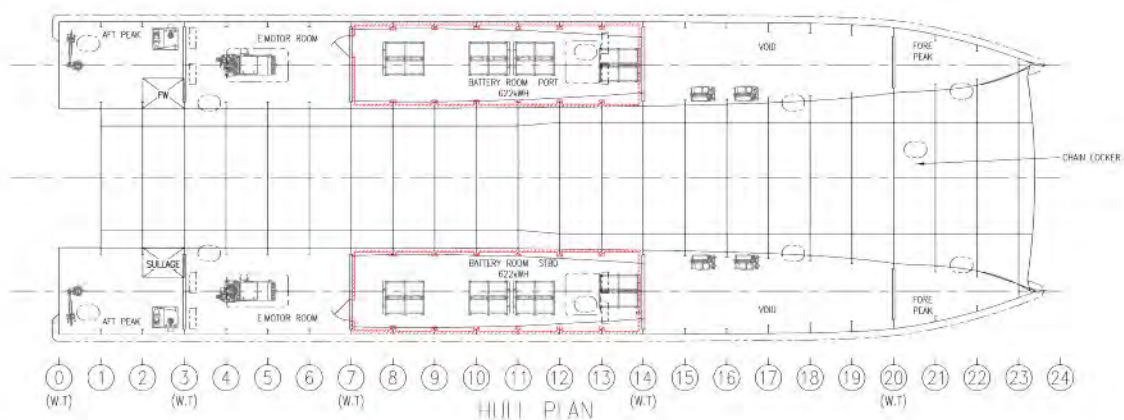
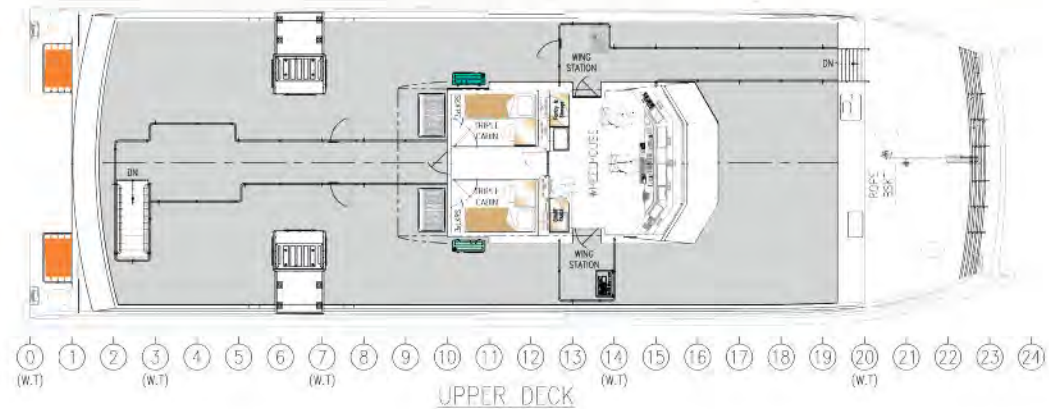
Gearbox(es):
 Number of gearboxes.....2
 Make.....Reintjes
 Model.....VS344-P
 Output speed.....2,250rpm

Propeller(s):
 Number of propellers.....2
 Diameter.....1,000mm
 Number of blades.....5
 Fixed/controllable pitch.....Fixed

Onboard capacities:
 Fuel oil.....N/A
 Fresh water.....1,000litres
 Sullage.....1,000litres

Complement:
 Number of crew.....6
 Number of passengers.....200
 Number of cabins.....2

Classification:
 Classification society.....Bureau Veritas
 Notations.....BV I +Hull, •Mach, Lightship – Fast Passenger Ferry, Sea Area 1, Battery System



SAAM VOLTA/CHIEF DAN GEORGE – Electric tug duo for the Port of Vancouver



Builder: **Sanmar**
 Designer: **Robert Allan Ltd**
 Vessel's name: .. **SAAM Volta and Chief Dan George**
 Owner/operator: **SAAM Towage Canada**
 Country: **Canada**
 Flag: **Canada**
 Total number of sister ships already completed: **2 (as of Dec '23)**
 Total number of sister ships still on order: **1 (for Sanmar fleet)**
 Contract date: **June 2021**
 Delivery date: **December 2023**

SAAM Volta and Chief Dan George are a pair of battery-electric harbour tugs, completed by Turkish boatbuilder Sanmar in December 2023 to the specs of Robert Allan Ltd's ElectRA 2300 class. Both tugs have been delivered to SAAM Canada and will operate in the Port of Vancouver, helping to achieve that facility's stated goal of becoming the world's most sustainable port.

SAAM Volta is the lead tug in SAAM's 'Dynamo' project, named in honour of the inventor of the first chemical battery, Italian physicist Alessandro Volta. Its twin tug, Chief Dan George, is named after a well-known late chief of the Tsleil-Waututh First Nation whose territory includes Burrard Inlet (Vancouver Harbour), where the tug will operate. A third tug in the series, DINAMO 2023, was also nearing completion at the time of writing, and will shortly thereafter join Sanmar's own operational fleet.

The ElectRA 2300-SX design has been optimised for emissions-free ship-docking operations. Utilising two Schottel SRP460 LE L-drives, it delivers 70tonnes bollard pull. The compact hullform and skeg (customised for high manoeuvrability and directional stability) make the vessel ideal for operations in Vancouver's tight 'finger piers'.

With 3,616kWh of Corvus Orca lithium-ion batteries installed in a pair of battery rooms port and starboard, each of the twin tugs

has sufficient energy to complete operations solely on batteries. Using their shore charging facilities, the vessels can generally recharge in one to two hours and get back out to the next job. However, they are also outfitted with two 940kWe IMO Tier III compliant Caterpillar C32 gensets, allowing them to conduct extended operations or repositioning voyages when required. Each tug is also equipped with an Elkon 1000V DC bus propulsion electrical distribution system.

Robert Allan Ltd (RAL) has calculated that, for each twin, reductions of CO₂ emissions alone compared to a conventional diesel tug are expected to exceed 1,000 tonnes per annum – which is roughly equivalent to the emissions of 400 to 500 cars for the pair. "The tugs' impact on the underwater environment will be as low as practicable," RAL states. As a member of both Green Marine and the Port of Vancouver's ECHO programme, SAAM Canada has dedicated itself to the reduction of underwater radiated noise (URN), so the operator has sought an underwater radiated noise notation (ABS UWN) for both vessels, to be assigned after sea trials in local waters. The tugs have also designed for zero discharges.

TECHNICAL PARTICULARS

Length, oa.....23.4m
 Breadth, moulded.....11.85m
 Depth, moulded.....4.94m
 Gross tonnage.....295tonnes
 Displacement.....534tonnes
 Design, draught.....5.55m
 Lightweight.....485tonnes
 Max speed.....13knots
 Bollard pull.....70.8tonnes
 Endurance.....>60 minutes at full bollard pull
 Several hours for typical operations

Propulsion:
 Main generator(s)
 Number of gensets.....2

MakeCaterpillar
 ModelC32 (IMO Tier III)
 Output of each engine940kWe

Propeller(s):
 Number of propellers.....2 (L-drives)
 MakeSchottel
 ModelSRP460 LE
 Diameter.....2.7m
 Number of blades.....4
 Speed655rpm input (and each rated for 2,100kW)
 Fixed/controllable pitch.....Fixed
 Open/nozzled.....Nozzled
 Special adaptations.....Compact L-drive with permanent magnet motor and high efficiency nozzle

Deck machinery:
 Winch(es):
 Number of winches.....1 (electric)
 MakeDMT
 ModelTW 021 E 250 kN
 Capacities.....25tonnes@0-9m/min
 8tonnes@0-28m/min
 190tonnes brake holding force

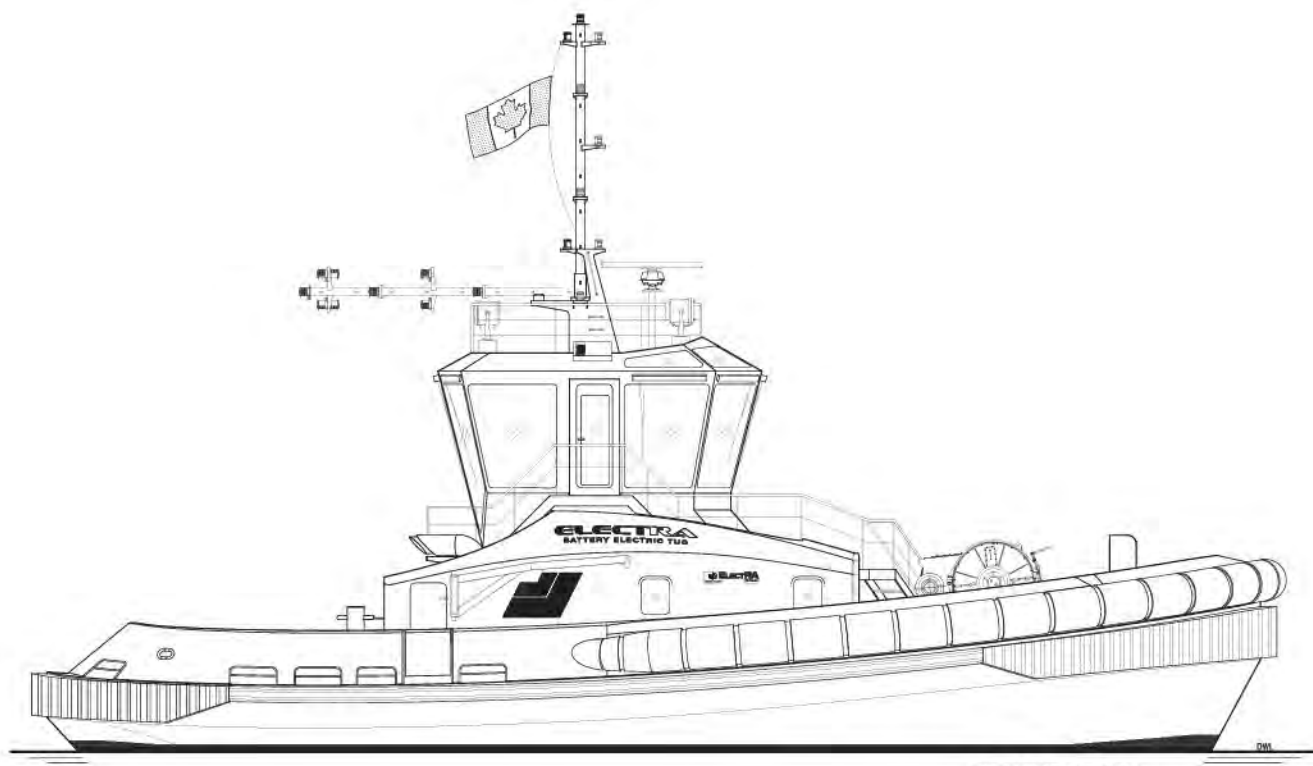
Onboard capacities:
 Fuel oil.....36m³
 Fresh water.....11m³

Complement:
 Number of crew.....2 (with options for up to 4)
 Number of passengers.....0
 Number of cabins.....1 (with option for 2nd)

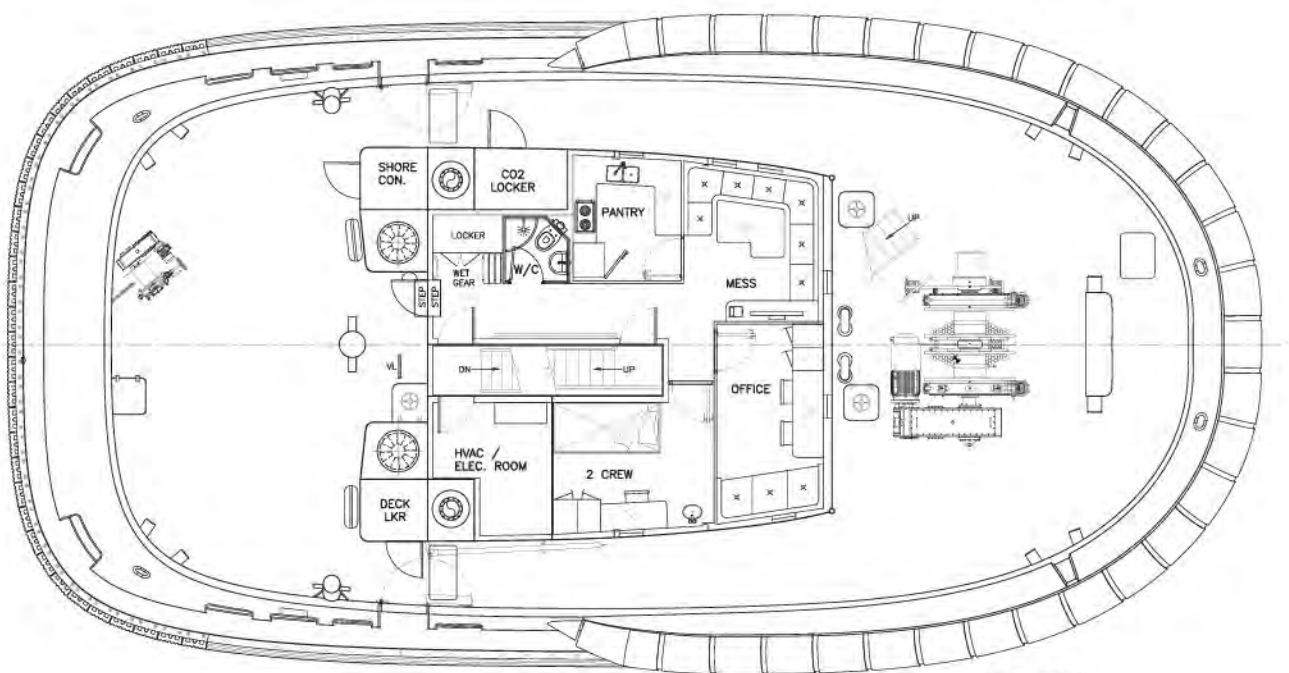
Classification:
 Classification society.....ABS
 Notations.....A1 Towing Vessel,
 AMS, ABCU, BP (71),
 QR, ESS-LiBattery, UWILD, IHM, UWN(x)

Other important international regulations complied with:
 - Optional off-ship firefighting/escort notations

SAAM VOLTA/CHIEF DAN GEORGE



OUTBOARD PROFILE



MAIN DECK



SALICÓRNIA – First all-electric ferry to be constructed for emissions-free operations on the Iberian Peninsula



Builder:Navaltagus-Reparação e Construção Naval
Main designer:Vera Navis Ship Design
Designer, interiors
/exteriors:Almadesign and Tomás Costa Lima
Vessel's name:Salicórnia
Owner/operator:Grupo ETE
Country:Portugal
Flag:Portugal
Contract date:2021
Delivery date:November 2023

November 2023 saw Portuguese boatbuilder Navaltagus Shipyard deliver what's reported to be the first all-electric ferry to operate on the Iberian Peninsula. The battery-powered *Salicórnia* was developed entirely by Portuguese companies, and has effectively replaced an older vessel on the São Jacinto-to-Ilhavo route. Navaltagus, which is managed by the vessel's operator Grupo ETE, predicts that the newcomer should reduce CO₂ emissions by approximately 300tonnes each year.

Salicórnia has the capacity for up to 252 passengers and 19 vehicles: increases of 30% and 90%, respectively, on the older vessel it has replaced, Navaltagus says. The vehicle deck has been designed to offer a clear height of 2.7m.

The e-ferry is powered by Shift batteries, which generate a combined output of 511kW, and are controlled by a Danfoss power management system. The batteries feed a pair of 200kW Veth VL-200si azimuth thrusters, helping the vessel to attain a service speed of 6knots and a top speed of 9knots. "Low noise levels and a

360° panoramic view on the top floor... further improve the passenger experience," the yard comments.

The e-ferry has an estimated value of €7.3 million, and the entire project amounted to around €9 million, including provision of the vessel's charging system. Some financing was provided by the Portugal 2020 partnership, established between Portugal and the EU. *Salicórnia* has been classed by DNV and will sail under the Portuguese flag. The hope now is that *Salicórnia* inspires further development of electric passenger vessels within this region, to provide zero-emission, noise-free rides accompanied by lower overall operating costs (not to mention, potential government incentives).

Speaking at the e-ferry's naming ceremony, José Ribau Esteves, mayor of Aveiro, hailed *Salicórnia* as "the result of our investment in the environment and people", adding: "We are applying our resources not only in the Ria de Aveiro, a place that needs our care, but also in the concrete lives of Aveirenses and in particular, in our town of São Jacinto, which needs this means of transport to go to work and to carry out their social, sporting and leisure activities."

TECHNICAL PARTICULARS

Length, oa.....36.96m
Breadth, moulded.....9.2m
Depth, moulded.....3m
Gross tonnage.....396tonnes
Design, draught.....1.7m
Service speed.....6knots
Max speed.....9knots
Range.....200 minutes
at service speed

Propulsion:
Main engine(s):
Number of engines.....2
Make.....Danfoss
Output of each engine.....200kW

Propeller(s):
Number of propellers.....2
Make.....Veth
Model.....VL-200si
(azimuth thrusters)
Number of blades.....5
Fixed/controllable pitch.....Fixed
Open/nozzled.....Nozzled

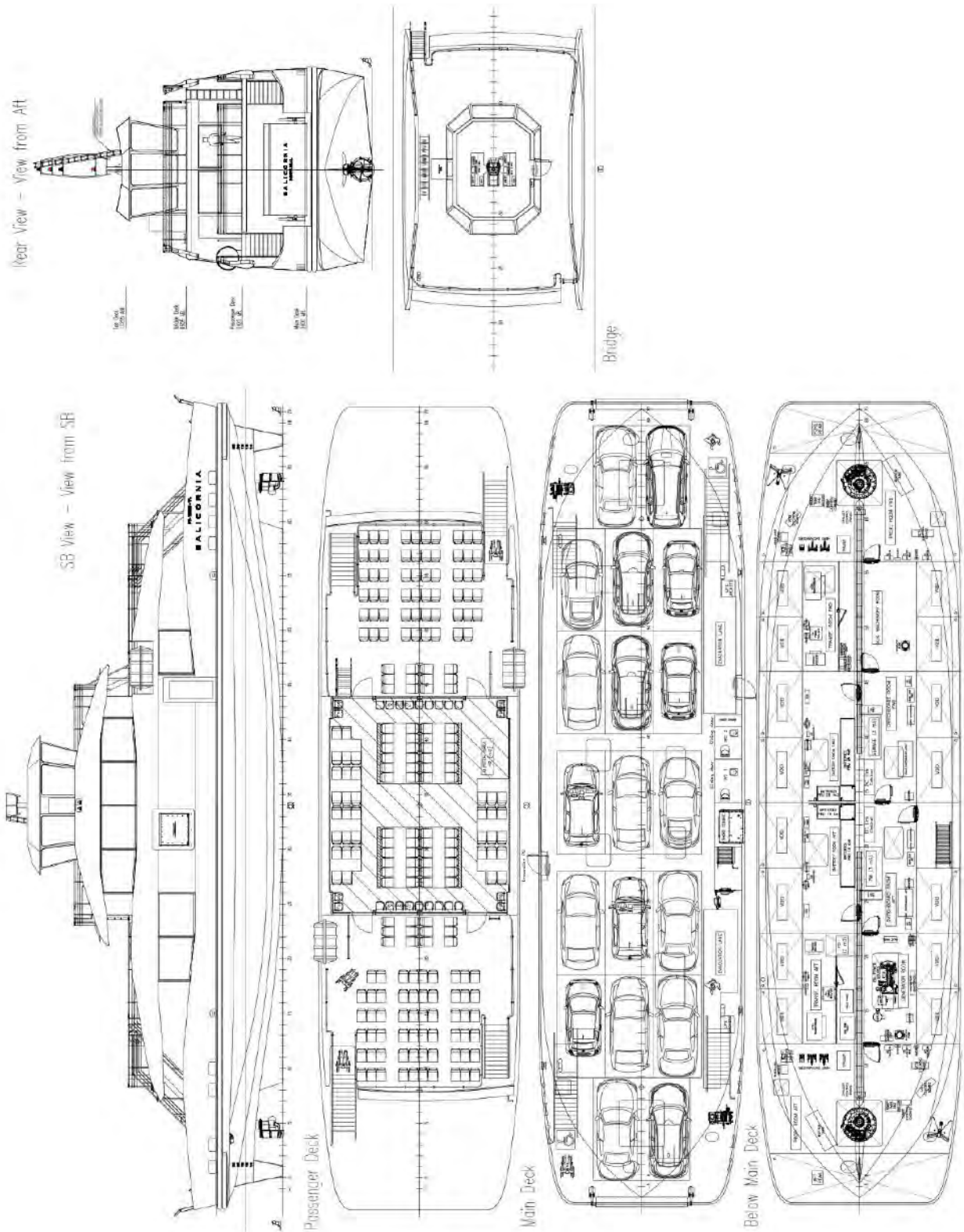
Deck machinery:
Winch(es):
Number of winches.....2
Make.....DMT
Model.....AW-100-E22c

Bridge electronics:
Radar(s).....Furuno Electric FAR-1513BB
Speed Log.....Furuno Electric DS-85
Echo Sounder.....Furuno Electric FE-800
GPS.....Furuno Electric RD-33
AIS.....Furuno Electric FA-170
VHF.....Furuno Electric FM-8900S

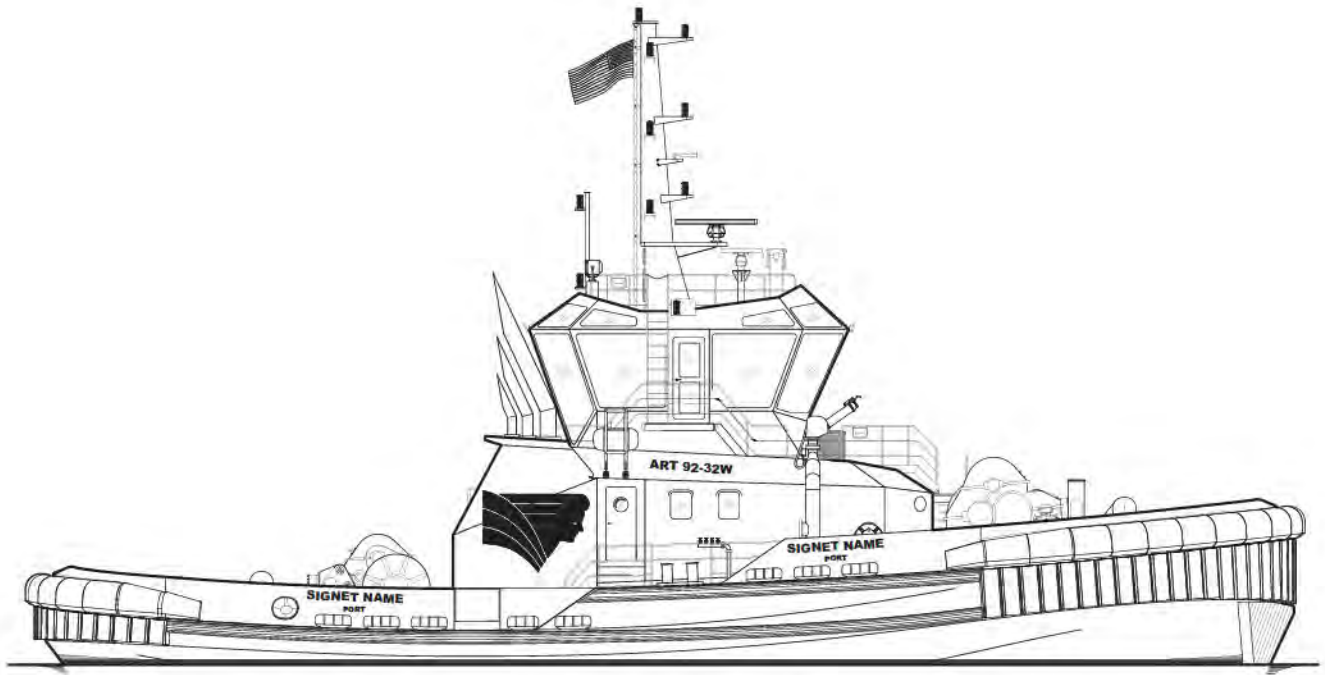
Onboard capacities:
Fresh water.....3.1m³
Sewage.....3.1m³

Complement:
Number of crew.....4
Number of passengers.....252
Number of vehicles.....19

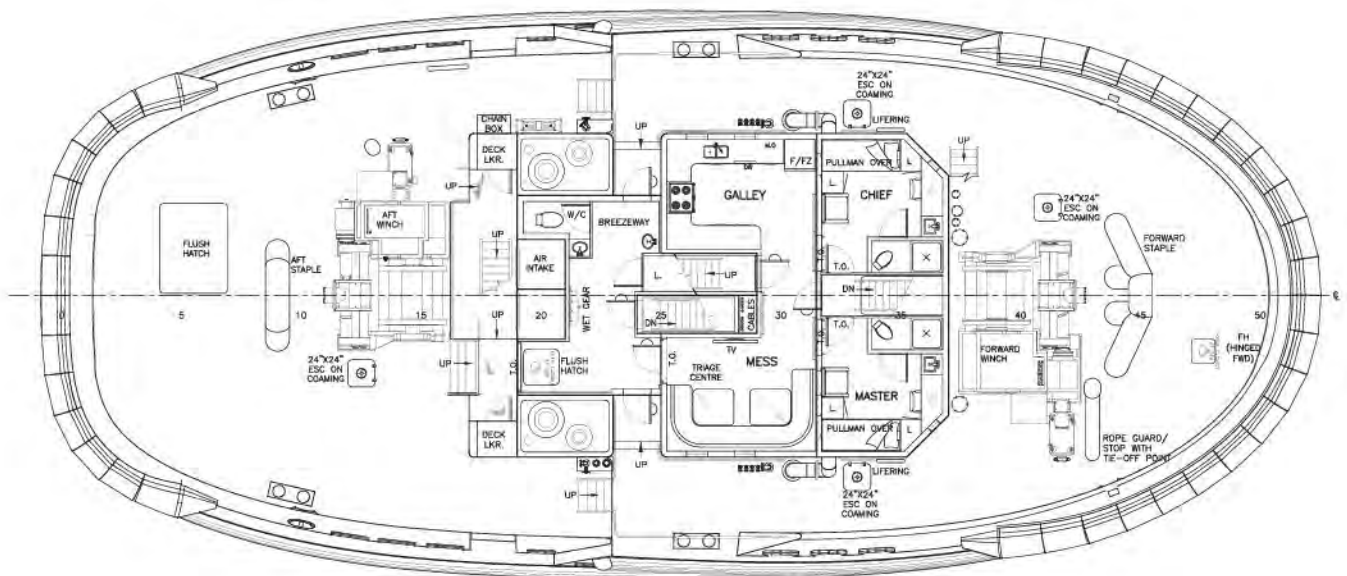
Classification:
Classification society.....Bureau Veritas
Notations.....I * HULL *
MC 5 IN (0.6) Z |
Battery System, Passenger Vessel Ferry



SIGNET SIRIUS/SIGNET CAPELLA



OUTBOARD PROFILE



MAIN DECK PLAN



SÓL – Customised electric cat for greener cruising



Builder:Sunreef Yachts
 Designer:Sunreef Yachts
 Vessel's name:Sól
 Owner/operator:Confidential
 Country:Unspecified
 Flag:Cayman Islands
 Total number of sister ships
 already completed:2
 Total number of sister ships still on order: 0
 Contract date:Unspecified
 Delivery date:June 2023

Launched in 2023 from Sunreef Yachts' facility in Gdansk, Poland, the debut 80 Sunreef Power Eco model, Sól, comprises an entirely customised motor yacht, drawing solely on electric power to achieve sustainable and energy-efficient cruising.

Sunreef elaborates: "The catamaran was commissioned by an experienced family of yacht owners, deeply engaged in sustainability and looking for the perfect eco-responsible motor yacht. The 80 Sunreef Power Eco boasts a custom-tailored layout and décor to accommodate eight guests in full luxury." The layout includes a four-cabin arrangement, as well as an energy-saving air conditioning system and smart energy management technology.

The catamaran is equipped with a pair of 360kW engines and a set of 990kWh batteries, operating in tandem with an onboard solar power system. This is enabled by an array of solar panels that have been fully integrated into Sól's body and composite mast: a feature that Sunreef has described as being akin to a 'solar skin'. As well as providing a clean cruising experience, making use of solar energy provides extended range for the vessel. The solar panels cover an area of approximately 200m².

Furthermore, the yacht has been fitted with a hydro propeller and wind turbines to

capture additional clean energy to top up its batteries, to keep the vessel running throughout a wide range of weather conditions. Sunreef has estimated that the vessel's batteries will enable electric cruises of up to 300nm in total silence.

The main saloon features tables and a wet bar area, as well as a fitted sofa and windows designed to maximise light intake. The saloon connects directly to the aft cockpit, which has been purposed as a sheltered al fresco dining area for guests.

TECHNICAL PARTICULARS

Length, oa.....23.96m
 Length, bp.....23.53m
 Breadth, moulded.....12.22m
 Depth, moulded.....4.2m
 Gross tonnage.....198tonnes
 Displacement.....114.15tonnes
 Design, draught.....2.4m
 Design, deadweight.....14.25tonnes
 Lightweight.....99.9tonnes
 Deck space (total).....366m²
 Service speed.....8knots
 Max speed.....13.5knots

Propulsion:

Main engine(s):
 Number of engines.....4
 Make.....Engiro
 Model.....29014 SDR
 Output of each engine.....180kW
 Solar panels.....36kWp
 Battery pack.....990kWh

Propeller(s):

Number of propellers.....2
 Make.....CJR Propulsion
 Model.....Custom-made
 Number of blades.....5
 Speed.....15.65knots, 1,000rpm@
 100% MCR
 Fixed/controllable pitch.....Fixed

Deck machinery:

Winch(es):
 Number of winches.....2
 Make.....Quick
 Model.....FSTB23240000A00
 - TB6 2300W DC 24V
 Capacities.....2,300W

Bridge electronics (make/model):

Radar(s).....Raymarine RD424HD
 24" (E92143)
 Autopilot.....Raymarine Autopilot
 set EV-300 Solenoid: EV-1,
 ACU-300 (T70160)
 GMDSS.....Furuno Inmarsat-C Felcom 18
 Furuno Navtex NX-700-B
 GPS.....Raymarine RS150
 GPS Receiver (E70310)
 Gyro.....Raymarine EV-1 sensor
 (in set with autopilot)
 Chart plotter.....Raymarine AXIOM XL 16"
 (E70399)
 Other communication
 systems.....Raymarine VHF Radio
 and AIS (T70424)

Onboard capacities:

Fuel oil.....8,000litres
 Fresh water.....2,300litres
 Black water.....1,000litres

Complement:

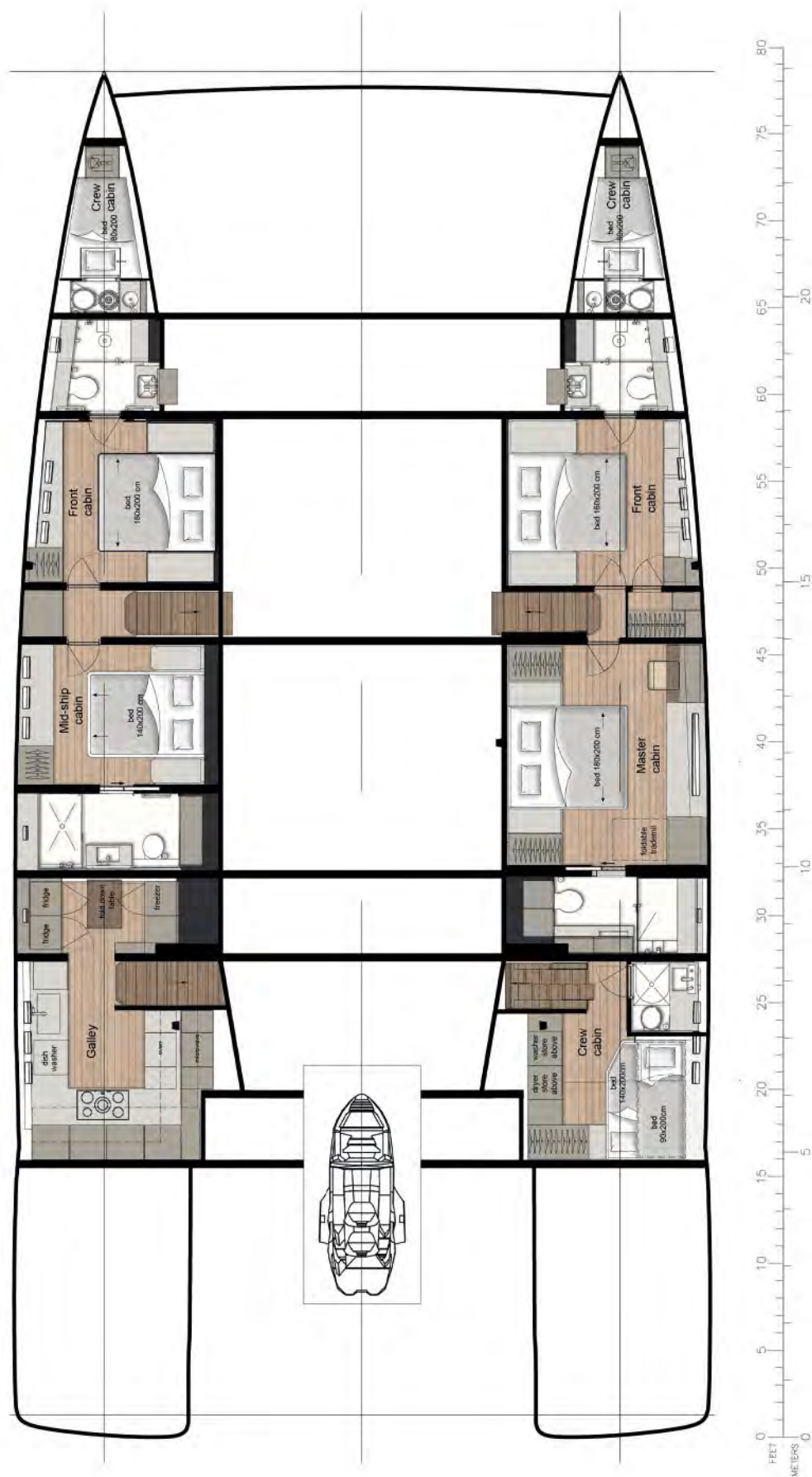
Number of crew.....4
 Number of passengers.....12
 Number of cabins.....4

Classification:

Classification society.....N/A
 Notations.....N/A

Other important international regulations complied with:

- Adaptation to commercial requirements
 MCA Small Craft Code (MGN 280 (M) Cat
 2)



SVITZER MARLIN – Smaller but spacious addition to the Berkeley class of pilot boats



Builder: **Dongara Marine**
 Designer: **Southerly Designs**
 Vessel's name: **Svitzer Marlin**
 Owner/operator: **Svitzer**
 Country: **Australia**
 Flag: **Australia**
 Total number of sister ships
 already completed: **0**
 Total number of sister ships still on order: **0**
 Contract date: **March 2022**
 Delivery date: **August 2023**

Handed over to global towage operator Svitzer in August 2023, *Svitzer Marlin* is the first example of Dongara Marine's 17.2m BerkeleyXVII design: a smaller variant of the 19.2m BerkeleyXIX class vessels. Svitzer acquired this newbuild to help fulfil a contract to provide terminal towage and pilot transfer services at Woodside Energy Limited (Woodside) LNG export terminals. The company has a 10-year contractual arrangement with Woodside for the provision of towage and pilot transfer services at Woodside's LNG export operations in the Australian Port of Dampier, commencing from late 2023.

Under the contract, Svitzer is supporting Woodside and its joint venture operations by providing *Svitzer Marlin* for pilot transfer services and five modern 80tonne bollard pull tugs to service the critical towage needs for the shipping of export LNG cargoes.

In addition to being the first BerkeleyXVII contracted, the all-aluminium vessel is differentiated by its use of the Volvo Penta Inboard Performance System (IPS). The models fitted to *Svitzer Marlin* comprise a six-cylinder D11 diesel, matched IPS20 steerable pod with twin counter-rotating propellers and Volvo Penta's electronic vessel control system.

With a total installed power of just over 900kW (1,200hp), the integrated package has pushed the *Svitzer* pilot boat to an average fully loaded maximum speed of just under 36knots, as demonstrated on sea trials. At 80% power, the vessel cruised at 28knots and used less than 6.5litres of fuel per nautical mile. Dongara Marine says: "Beyond the obvious cost savings, this excellent fuel economy also results in lower emissions."

Fitting *Svitzer Marlin* with steerable IPS drives has also resulted in great manoeuvring capability, including true sideways movement and the ability to essentially rotate within its own length. Acceleration performance was also demonstrated to be excellent on trials, with the boat going from idle to cruising speed in just 15 seconds.

Although smaller in dimensions than the previous Berkeley-class vessels (namely *Berkeley*, *AMG Winyama* and *Genesis*), *Svitzer Marlin* still has the capacity to carry six pilots, in addition to the launch master and deckhand. It also retains features such as the specially engineered polyethylene foam and HDPE tube fender system that provides increased deck space, and a Goodchild man overboard recovery system. The Southerly Designs hullform also preserves the Berkeley class's trademark fine forward sections and highly flared bow for superior seakeeping and reduced deck wetness, as well as a generous forward pilot embarkation / disembarkation area.

TECHNICAL PARTICULARS

Length, oa 17.2m
 Length, bp 15.4m
 Breadth, moulded 5.2m
 Depth, moulded 2.3m
 Displacement ~27tonnes
 Design, draught 1.1m (including appendages)
 Design, deadweight ~6tonnes (max)
 Lightweight ~21tonnes
 Service speed 28knots (80% MCR)
 Max speed 36knots
 Range ~500nm at service speed

Propulsion:
 Main engine(s):
 Number of engines 2
 Make Volvo Penta
 Model D11-IPS800
 Output of each engine 459kW

Gearbox(es):
 Number of gearboxes 2
 Make Volvo Penta
 Model Integral to IPS20 drives

Propeller(s):
 Number of propellers 4
 Make Volvo Penta

Model IPS20 P series
 Material NiBrAl
 Number of blades 2 x 3-blade /
 2 x 4-blade
 Fixed/controllable pitch Fixed
 Open/nozzled Open
 Special adaptations Two forward-facing
 propellers per driveline

Winch(es):
 Number of winches 1
 Make Lone Star Marine
 Model GX3
 Capacities 130m of 8mm rope +
 10m x 8mm chain or 95m x
 10mm rope + 10m x 8mm chain,
 3,500kg holding/1,500kg max pull

Other deck machinery/equipment:
 - Goodchild Marine man overboard (MOB)
 recovery platform
 - Pilot rails with Ronstan track system

Bridge electronics:
 Radar(s) Furuno DRS4D
 Autopilot Volvo Penta
 GMDSS for Sea Area 2
 VHF 2 x Icom M423G
 GPS Furuno GP-170 DGPS
 Chart plotter Time Zero system with
 3 x Simrad Mo-16T displays
 Engine monitoring system Volvo Penta
 Other communication systems Cel-fi
 mobile phone repeater

Onboard capacities:
 Fuel oil 3,270litres
 Fresh water 200litres
 Sullage 200litres

Complement:
 Number of crew 2
 Number of passengers 6
 (special personnel)
 Number of cabins 0

Other significant or special items of
 equipment:
 - 1 x Caterpillar C15 generator set
 - Stat-X engine room fixed firefighting
 system

Classification:
 Classification society Australian Maritime
 Safety Authority
 Notations NSCV 2C



WINDEA ONE – Crew transfer vessel using parallel hybrid propulsion



Builder:Penguin Shipyard
 Designer:Incat Crowther
 Vessel's name:WINDEA ONE
 Owner/operator:EMS Offshore
 Country:Germany
 Flag:German
 Total number of sister ships
 already completed:1
 Total number of sister ships still on order: 0
 Contract date:Unspecified
 Delivery date:June 2023

2023 saw a number of deliveries of new offshore crew transfer vessels (CTVs), including WINDEA ONE, hailed as the first 32m parallel hybrid CTV designed by Incat Crowther to utilise Volvo Penta's new parallel hybrid system together with IPS propulsion, enabling operations in all-electric mode for up to six hours.

The IMO Tier III-compliant CTV was built for Emden, Germany-based EMS Maritime Offshore (EMO) by Singapore's Penguin Shipyard International, under the designation WindFlex-32. The vessel has now been deployed by energy major Ørsted to service its wind farms in the North Sea.

Capable of speeds of up to 28knots, WINDEA ONE will be serviced by up to six crew and will transport up to 24 service personnel between the European mainland and the North Sea. The vessel's upper deck has two single office cabins, a bathroom, a crew mess and a galley, along with an office/meeting room. The main deck, meanwhile, features a client cabin and first aid room, along with two separate spacious accommodation areas for technicians, a technician change area and two bathrooms. The hull features four additional crew cabins.

WINDEA ONE has been fitted with a hydraulic knuckle-boom crane, capable of carrying loads of up to 50tonnes. The

vessel also incorporates Incat Crowther's patented Resilient Bow Technology, which was developed to minimise boat landing impact forces.

Speaking after the vessel's delivery, Ed Dudson, managing director of Incat Crowther Europe, commented: "The inclusion of Volvo's new parallel hybrid propulsion system in this vessel places EMO at the cutting edge of the industry. Not only can the vessel be operated in a fully electric mode, but there are also options to switch to biofuel, helping to further reduce emissions and the vessel's impact on the environment." And, this ability to harness green energy sources will naturally become an increasingly important consideration going forward. Dudson added: "With WINDEA ONE now in the water, we are confident it will be the first of many to incorporate hybrid propulsion systems as operators look to maximise efficiency and reduce emissions."

TECHNICAL PARTICULARS

Length, oa.....31.8m
 Length, bp.....29.7m
 Breadth, moulded.....10m
 Depth, moulded.....4.35m
 Gross tonnage.....336tonnes
 Design, draught.....1.5m
 Design, deadweight.....50tonnes
 Deck space (total).....120m²
 Deck capacity.....2 tonnes/m²
 Service speed.....26knots@85% MCR
 Max speed.....28knots
 Bollard pull.....16.4tonnes

Propulsion:

Main engine(s):
 Number of engines.....4
 Make.....Volvo Penta
 Model.....D13
 Output of each engine.....515kW

Propeller(s):

Number of propellers.....4 x IPS 30

Make.....Volvo Penta
 Model.....Q2
 Fixed/controllable pitch.....Fixed

Generator(s):

Make.....Kohler 44kW
 Number.....2

Deck machinery:

Crane(s):
 Number of cranes.....1
 Make.....Palfinger
 Model.....PK23500

Winch(es):

Number of winches.....1
 Make.....Hercules
 Model.....205

Other deck machinery/equipment:

- Incat Crowther Resilient Bow Technology (RBT)

Onboard capacities:

Fuel oil.....35,500litres
 Fresh water.....3,500litres
 Sullage.....2,500litres

Complement:

Number of crew.....6
 Number of passengers.....24

Other significant or special items of equipment:

- 2 x Volvo electric motors (2 x 180kW)
 parallel hybrid propulsion system
 - EST-Floattech Green Orca batteries (252kWh)

Classification:

Classification society.....Bureau Veritas
 Notations.....BV Hull •Mach Wind
 Farms Service Ship – M0,
 Sea Area 3

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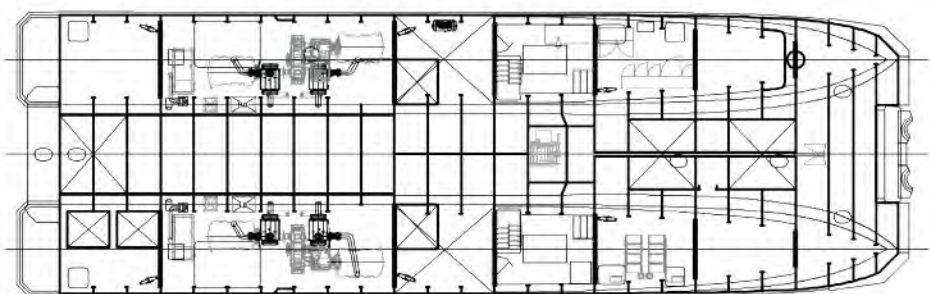
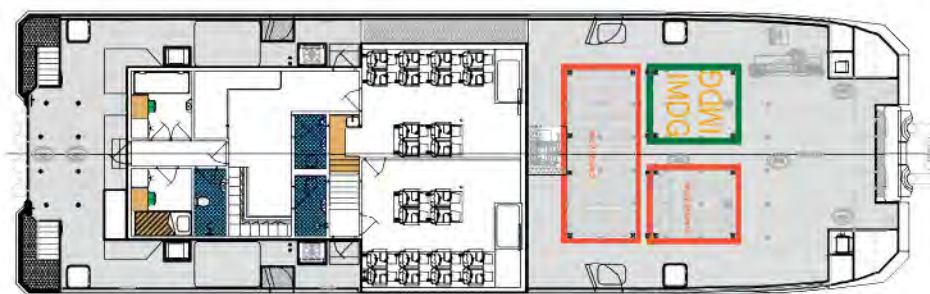
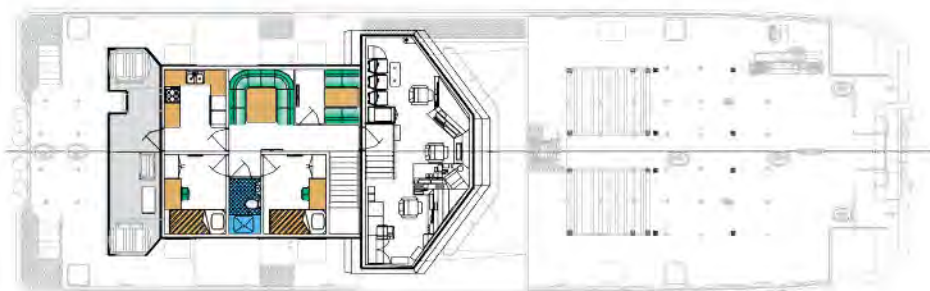
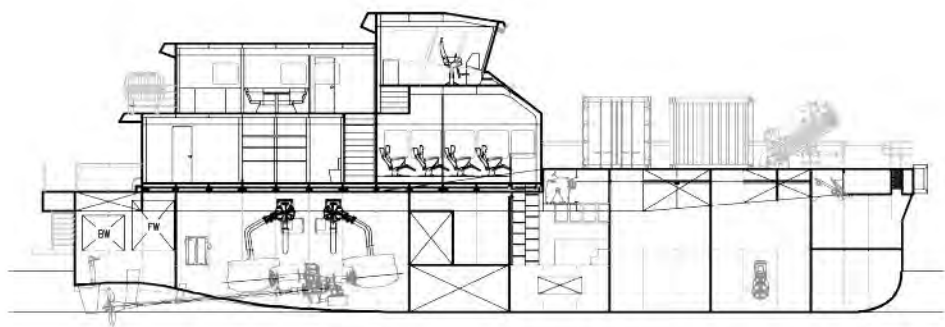
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XIN MING ZHU VIII – Fast ferry connecting Hong Kong



Builder: **Afai Southern Shipyard (Panyu Guangzhou) Ltd.**
 Designer: **Incat Crowther Pty Ltd.**
 Vessel's name: **Xin Ming Zhu VIII**
 Owner/operator: **Sun Ferry Services Company Ltd**
 Country: **China**
 Flag: **Hong Kong**
 Total number of sister ships already completed: **0**
 Total number of sister ships still on order: **5**
 Contract date: **July 2022**
 Delivery date: **December 2023**

Xin Ming Zhu VIII is one of six 500-pax aluminum fast ferries ordered as part of the Hong Kong Government's Vessel Subsidy Scheme (VSS), which was introduced to replace the territory's existing fleet of ferries, operated under franchise by Sun Ferry, while upgrading safety and environmental standards, including compliance with the High-Speed Craft Code.

When all deliveries have been completed, this batch of newbuilds will operate around the Hong Kong area, serving the routes between Central and Cheung Chau and connecting the mainland to the outlying islands. This move is expected to provide better public services and promote development of the Greater Bay Area.

The 44.1m x 11.1m ferry is powered by a pair of MTU diesel engines. Builder Afai Southern Shipyard says: "The designer, Incat Crowther, chose the Generation IV catamaran hull form for this fast ferry, which can reduce the overall resistance by 4% and increase the speed from 0.5-

0.75knots." Additionally, Afai Southern Shipyard has calculated that the hull design should help to improve overall seakeeping performance by 23%, effectively boosting passenger comfort at higher speeds (up to 27.5knots), including a reduced likelihood of seasickness.

Sea trials have also shown that *Xin Ming Zhu VIII* can achieve safe and reliable operations under bad weather, up to Grade 8 winds (between 39-46mph). Afai Southern Shipyard adds: "Lithium-ion batteries and solar panels are also applied on board for power during docking, which further reduces general consumption and makes her an environmentally friendly boat."

TECHNICAL PARTICULARS

Length, oa.....44.9m
 Length, bp.....43m
 Breadth, moulded.....11.1m
 Depth, moulded.....3.4m
 Gross tonnage.....599tonnes
 Design, draught.....1.5m
 Design, deadweight.....58.3tonnes
 Deck space (total).....107.35m²
 Deck capacity.....1.3tonnes/m²
 Max speed.....27.5knots
 Bollard pull.....60kN
 Range.....300nm

Propulsion:
 Main engine(s):
 Number of engines.....2
 Make.....MTU
 Model.....16V2000 M72
 Output of each engine.....1,440kW@2,250rpm

Gearbox(es):
 Number of gearboxes.....2

Make.....ZF
 Model.....ZF 5050

Waterjet(s):
 Number of waterjets.....2
 Make.....Kamewa
 Model.....Kamewa S71-4
 Output.....1,397kW@744rpm

Deck machinery:
 Winch(es):
 Number of winches.....1
 Make.....Hangzhou BoTu Marine Mechanical & Electrical Equipment Co.
 Capacities.....150m+12.5m AM2 chain

Roller(s):
 Number of rollers.....1
 Make.....Hangzhou BoTu Marine Mechanical & Electrical Equipment Co.

Bridge electronics:
 Radar(s).....Konden/MDC-7925P
 GMDSS.....Sailor 6103
 GPS.....Simrad MX521B+P3007
 Chart plotter.....Xinuo/hm-5817
 Engine monitoring system.....Rolls-Royce/MTUBV-NG
 Fire detection system.....Consilium Safety

Complement:
 Number of crew.....5
 Number of passengers.....500
 Number of cabins.....12

Classification:
 Classification society.....CCS
 Notations.....CCS *CSA Catamaran HSC, Passenger B, Coastal Service Restriction*CSM

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