Photo by Flying Focus-Castricum, The Netherlands

W-O DEVOCEAN

CHEMICAL TANKER WITH DOUBLE HULL FOR WORLD WIDE SERVICES

Builders: Volharding Shipyards Newbuilding BV, Westerbroek, The Netherlands
Owners: W-O Shipmanagement GmbH & Co KG, Haren/Ems, Germany

Volharding Shipyards recently completed another high quality chemical IMO II tanker suitable for world wide services, the 'W-O Devocean'. The vessel, built for German based shipowner WO is suited for the carriage of both oil and chemical products. Originally named 'W-O Chia, due to bareboat charter, the ship was renamed to 'W-O Devocean'.

Volharding Shipyards

Founded in 1919, the shipyard has built up a solid reputation. Since the mid nineties, the organization has developed from a one-location shipyard to a powerful and expanding shipbuilding group with locations in the northern Netherlands and strong ties with Turkey and China. The expansion has been generated by means of a strong focus on efficiency. Volharding Shipyards is strongly focussed on competitiveness, quality and flexibility which they aim to achieve by:

- the combined possibilities of the different locations;
- their design, engineering, project management and production experience;
- the supporting industries in The Netherlands;
- and cost-effective steel building in Turkey and China.

Volharding Shipyards consists of shipbuilding facilities at Harlingen and Izmit Turkey. The yards employs some 150 people, 50 of whom work in design, engineering and project management. Between twelve and twenty vessels are delivered yearly with an average turnover of 200 million Euros. Strategic market segments of the Volharding Shipyards are:

- RoRo vessels;
- Tankers;
- General cargo and container vessels;
- Offshore;
- Special projects & One-offs.

Design Philosophy

The 'W-O Devocean' is a further development of the two 10,000 tons product tankers which were built in 2001 at Frisian Shipyard Welgelegen in Harlingen. These vessels, yard no. 519 and 520, were delivered to Pritchard Gordon Tankers as oil product tankers and named 'Lucy P.G.' and 'Asprella'. Late 2002, Volharding Shipyards received an order to

Eight cargo segregations have been provided with individual cross-overs

Gas freeing of the tanks is executed with a Smitgas Systems inert gas generator

built two identical vessels, but equipped as chemical tankers IMO 2, with a draught of 6.80 m, instead of the original 6.50 m. This upgrade to a chemical IMO II tanker resulted in some changes in equipment and materials, such as a foam and thermal oil system and some more stainless steel catwalk piping.

The double hull tankers have been designed and built to the Rules and Regulations of Bureau Veritas under yard no. 558 and 559 and carry the following notation: I, Hull, Mach, Oil/Chemical Tanker, ESP unrestricted navigation, AUT-UMS, Chemical Tanker IMO Type 2 with list of defined cargoes. Design and equipment of the tanker complies with all relevant international rules in accordance to IMO, SOLAS, MARPOL, OCIMF, USCG, ILO, AVM-APS, MON-SHAFT, IWS, IG, Panama Canal Authorities and Suez Canal Authorities.

Main Characteristics

The 'W-O Devocean' is a handy size chemical/product tanker with epoxy coated cargo tanks. The tanker features a double hull and double bottom and carries deepwell pumps in all tanks. Built under yard number 582, the 'W-O Devocean' features the following main characteristics.

Cargo is handled by Svanehøj deepwell pumps

Principal particulars

Length o.a.	140.95 m
Length b.p.	135.40 m
Breadth mld.	19.60 m
Depth to main deck	9.35 m
Draught	6.80 m
Deadweight	12,200 t

Tank capacities

Heavy fuel oil	425 cu.m
Gas oil	115 cu.m
Potable water	100 cu.m
Ballast water	5,297 cu.m
Cargo tanks	13,200 cu.m

Accommodation

The accommodation has been designed for a crew of fourteen. Officers and crew are accommodated in single-berth cabins. Each cabin is fitted with a private sanitary unit with shower, water closet and washing basin. The accommodation section includes an owners cabin, mess- and dayrooms, a cargo control room and ship's offices. The complete accommodation section is fully air conditioned by a York AC unit incorporating three 50 percent capacity compressors.

Hull

The hull has been constructed out of regular shipbuilding steel and where necessary constructed of high tensile steel. All cargo tanks form part of the construction on the outside of the tanks except for the main deck and are separated from each other by vertically positioned corrugated bulkheads. Eight cargo segregations have been provided, each with individual cross-over at the cargo manifold.

The forecastle carries two SEC windlasses with cable lifter, two mooring drums and warping head. The aft deck carries a single winch with two mooring drums and warping head and one winch with a steel wire drum for a stern anchor, mooring drum and warping head.

Cargo Tank Section

The total cargo tank capacity is 13,200 cu.m, excluding the slop tank, for the total of thirteen tanks. Constructed out of mild steel, the cargo tanks have been epoxy coated and are suitable for a specific gravity of 1.025 t/cu.m. All tanks are provided with tank washing, heating, ventilation and closed loading devices. Cargo is handled by electric driven three-stage Svanehøj deepwell pumps, type DW 150/150-3-K. The speed of these cargo pumps is frequency controlled and they feature a pump capacity of 250 cu.m/h. In the slop tank a deepwell pump has been fitted of the DW 100/100-4-K DOL type with a capacity of 80 cu.m/h. Electric motors are all explosion proof. All cargo piping and valves are of stainless steel 316L. Each tank is connected with ND 150 pipeline, while common lines and cross-overs are made of ND 200. Each tank is provided with two pressure/vacuum type relief valves with high velocity vent head and one gas freeing vent outlet with flame screen. A central vapour return line leads to

The Azcue general service pump

the crossover. Two centrally placed electric driven fans of approximately 10,000 cu. m. have been provided to serve all tanks for drying through the cargo lines. Each tank is also provided with two fixed Scanjet tank washing machines. Two portable washing machines and two portable fans are also available for cargo tank washing purposes. Tank washing water is heated by a heat exchanger placed in the engine room. The heat exchanger is of sufficient capacity for washing two tanks simultaneously.

All tanks are provided with radar type installation to measure the ullage, MMC secondary gauging, high and high-high level alarms, temperature measurement, pressure indications, local start/stop of cargo pumps and manual control of cargo valves. The cargo control room features mimic panels and VDUs with remote controls and indicators of tank parameters, pumps and valves. An independent loading instrument has also been placed in the cargo control room. An Acta cargo hose crane serving the cargo manifold has been fitted near the manifold which a safe working load of 3 tons at 15 m reach.

Inert Gas Generator

Gas freeing of the tanks is executed, in compliance with SOLAS requirements, with a combustion type oil-fired Smitgas Systems inert gas generator with a capacity of 1,875 cu.m/h. Inert gas is produced by the combustion of fuel oil with air into a water-cooled combustion chamber in which controlled complete combustion takes place. The chamber is indirectly cooled by seawater, where after cooling, sulphur oxide washing takes place in a second stage, in a specially designed spray and cooling system.

The clean combustion product, inert gas with a typical oxygen content of 2%, leaves the generator at a temperature of a few degrees Celsius above that of the seawater.

The basis of the inert gas system is the low-oxygen oil burner, which was patented under the name of Ultramizing® burner. In this system the oil is atomized in an ultra-fine dispersion pattern, using the combustion air for atomization. This features a highly efficient, two stage oil/air mixing technique, which results in an oxygen content of less than 0.1% volume and without any soot formation.

Thermal Fluid Installation

For heating of the cargo tanks, tank washing water, HFO systems and the accommodation section a Aalborg Industries thermal fluid installation has been installed, incorporating two 1,500 kW oil-fired boilers and a 600 kW exhaust gas boiler. Each boiler features a modulating heavy oil burner and a non-fixed control panel fitted with control and safety equipment. Cargo tanks and slop tank are provided with double loop 316L heating coils, suited for a maximum cargo temperature of 65 degrees Celsius. The system is divided into a primary system for engine room systems and bunker tanks and a secondary system, which is used for heating of the cargo tanks. Both systems are coupled through a heat exchanger in the ballast pump room.

Engine Room

The prime mover of the 'W-O Devocean' consists of a medium-speed four-stroke MaK type 8M32C marine diesel engine. The 8-cylinder in-line main engine develops 3,840 kW at 600 rpm and runs on HFO 380 cSt/50C.

The main engine is fitted with a Scana Volda

The Scana Volda reduction gearbox featuring pto/pti

Auxiliary power is derived from three MAN diesel-driven alternators

The Hamworthy KSE sewage treatment plant

The Aalborg Industries thermal fluid heating units

The cargo control room features remote controls and indicators

Radio Holland supplied and installed the navigational aids and communications systems

reduction gearbox featuring pto/pti and an output speed of 176 rpm. This propulsion plant drives a 3,600 mm diameter high-skew four-blade Scana Volda propeller, providing the tanker a fully loaded speed of about 13 knots at 90 percent mcr and a 200 kW shaft alternator load at a draught of 6.80 m.

Directional control is handeld by a Benes Hoogezand flap type rudder, controlled by a Tenfjord Rolls Royce hydraulically powered steering gear. Manoeuvring capacity at slow speeds is enhanced by a 400 kW Wartsila bowthruster unit featuring a controllable pitch propeller.

Auxiliary power is derived from three MAN diesel-driven alternators of approximately 460 kVA at 1,500 rpm. Emergency power is generated by an emergency diesel-driven alternator of 130 kVA running at 1,500 rpm. At sea power is derived from a single 940 kVA shaft generator. This shaft generator can also be utilized as an emergency propulsion unit of 750 kW. Shipboard power mains consist of 3 x 415 V/50 Hz, according to class requirements. All alternators are made by Bakker Sliedrecht and the electrical systems have been installed by Eekels Elektrotechniek. Main and auxiliary engines are provided with independent box coolers for closed circulation fresh water cooling. No seawater cooling systems are provided except for the AC cooling. Fuel and lubrication oil treatment is handled by Westfalia separators of which the lubrication oil separation of the main engine is handled by a continuously operating separator.

The bilge/ballast system consists of a remote controlled ballast system situated in the cargo tank section featuring two ballast pumps, GRP piping and hydraulically operated valves. Engine room auxiliary systems further include a Hamworthy sewage treatment plant and a fresh water maker.

Navcom Package

Radio Holland Netherlands supplied and installed the navigational aids and communications systems on board the 'W-O Devotion'. The scope of delivery includes the following main components:

- one Furuno FAR-2117 radar system;
- one Furuno FAR-2137S radar system;
- one S.P. HT-4500 Radio radiotelephony installation;
- two Furuno Felcom-15 Inmarsat-C installations;
- one Nera type F-77 Inmarsat-F installation;
- one Oki facsimile;
- two GMDSS VHF RT-4822 radios;
- one VHF RT-2048 radio;
- one ICS NAV-5 plus Navtex;
- one Furuno FE-700 echosounder;
- one Furuno digital depth display;
- one Furuno DS-80 dppler speed log,;
- one Jotron Tron-40S Epirb;
- two Jotron Tronsart radar transponders;
- three Jotron TR-20 portable VHF sets;
- four Entel intrinsically safe portable radios;
- two Furuno GP-90 GPS navigators;
- one Anschütz Standard-22 gyro compass;
- one Anschütz Pilotstar-D autopilot;
- one Anschütz recording system;
- one Anschütz rate of turn indicator;
- one Cassens & Plath magnetic compass;
- one I.T. Holland repeater compass;
- one Furuno weather fax;
- one Furuno automatic indentification system;
- one Rutter voyage data recorder.

Life-saving Appliances

All fire-fighting systems and life-saving appliances fitted on board are in compliance with SOLAS requirements. Life-saving appliances fitted on deck include a Hatecke free-fall lifeboat and a man-over-board boat with davit.

Subcontractors and suppliers of equipment fitted on board the 'W-O Devocean'

(partial list)

Aalborg Industries NL, Spijkenisse: *Wiesloch* thermal fluid heating units; economiser

Aalborg Inert Gas Systems, Nijmegen: inert gas generator

ABS Steigerbouw, Leeuwarden: scaffolding cargotanks

Ariston, Denmark: cargo monitoring system

Atlas Copco Ketting Marine Center, IJmuiden: *Atlas Copco* starting air compressors

Bakker Sliedrecht Electro Industrie, Sliedrecht: *A. van Kaick* generators; *EMOD* bowthruster motor

Belkoned Marine Service, Best: speed and manouvring trail measurements

Benes, Hoogezand: rudder installation

Bureau Veritas, Rotterdam: classification

Castrol Marine, Rotterdam: lube oils

Datema, Delfzijl: nautical inventory & safety equipment; portable gas detection equipment

Discom, Alblasserdam: silencers

Econosto, Rotterdam: valves,

Eefting Engineering, Kolham: hydraulic- and pneumatic piping installation; incinerator system

Eekels Elektrotechniek, Kolham: complete electrical installation; alarm & monitoring system; bridge desks, fire detection system; gen. alarm-, telegraph and brige watchkeeping system; cargo control desk; frequency controllers for cargo pumps; searchlights; window wipers; galley and laundry equipment

Elceestaal, Dordrecht: *Acta* hose handling crane

Friamco, Winsum: sanitairy installation

Hamworthy KSE, Rotterdam: *Hamworthy Svanehøj* deepwell cargo pumps; vacuum sewage treatment system

IHC Lagersmit, Kinderdijk: *Supreme* stern tube seals and bearings

Impas, Westerbroek: boostermodule, separatormodule, stainless steel cargo piping, engine room piping

Imtech Marine & Offshore, Rotterdam: *Aluminox* galley & laundry equipment; *Mitsubishi Electric* circuit-breakers

Ingersoll-Rand, Zoeterwoude: working air compressors

Intersona, Heerde: noise and vibration consultants and measurements

Hatecke, Drochtersen (G): free-fall lifeboat; MOB boat and davit

Hempel, Rotterdam: complete paint system

Kostabo, Harlingen: nautical inventory; safety-, fire fighting-, medical-, navigational equipment; liferafts; pyrotechnics

Kroon, Hoogezand: *TNF* accommodation system; *Alvedoor* fire doors; ship's hardware

Lankhorst Touwfabrieken, Dordrecht: mooring ropes

Lubrafil, Barendrecht: *Boll & Kirch* fuel and lube oil filters

Maas Marine, Alblasserdam: *Scanjet* tank cleaning machines

MaK (Nederland), Dordrecht: main engine

Marine Service Noord, Westerbroek: engine room installation;

cargo handling system; engineering; component delivery; outfitting and commissioning

Materiaal Metingen Europe,
Ridderkerk ..... : marine growth prevention system; *Harbinger®* aluminium lightweight gangway

Metalix, Kinderdijk ..... : steel building package superstructure and funnel

Mühlhan, Schiedam ..... : blasting & paint application cargo tanks

Mx Brandbeveiliging, Almere ..... : fixed CO_2 installation for engine room; fixed tankdeck foam system; fire protection system for deep fat fryer; watermist system in engine room; sprinkler system for paint store

Noordhof, Kropswolde ..... : painting (superstructure, engineroom)

Promac, Zaltbommel ..... : *Scana Volda* gearbox, propeller shaft and CP propeller

Radio Holland Marine, Delfzijl : navaids & communications systems

Reikon, Spijkenisse ..... : *Azcue* pumps

Rolls-Royce Marine Benelux,
Pernis RT ..... : *Tenfjord* steering gear

Ruyter Dieseltechniek, De,
Sliedrecht ..... : generator sets with *MAN* diesel engines

SARC, Bussum ..... : LOCOPIAS loading computer hard- and software, including sounding module for actual heel and trim.

Ship's Equipment Centre,
Groningen ..... : windlass; mooring winches
Theunissen, Malden ..... : *SeaTeleCom* communication equipment; *Pesch* Seematz searchlights & window wipers

Trinoxx, ardinxveld - Giessendam : doors and windows

Um Deniz Sanayi Turkey ..... : complete hull

VAF Instruments, Dordrecht .. : *ViscoSense®* viscosity control system; *ProFlow* fuel oil consumption flowmeter; *Oilcon® Mark 6* oil discharge monitor & control system

Vuyk Engineering Rotterdam,
Capelle a/d IJssel ..... : consultancy

Wärtsilä Propulsion Netherlands, Drunen ..... : bowthruster with CP-propeller

Wesemann Elektrotechniek,
Rotterdam ..... : controlling current transformers

Westfalia Separator,
Rotterdam ..... : purifiers (LO,GO, HFO)

Winel, Assen ..... : swing away cargo acces hatches

Winteb, Winschoten ..... : deairation caps ballasttanks

Wortelboer, Rotterdam ..... : anchors & anchor chains

YORK International, Dordrecht : HVAC system

General Arrangement