



A turning point in the approach to **cruise ship design**

On the 19th of January, Yard number 488 was launched at the Lobith facilities of Shipyard De Hoop. This passenger vessel, named *Celebrity Flora*, is the first expedition ship specifically designed and built for extremely luxurious cruises in the Galapagos area and also the first seagoing cruise ship built in the Netherlands for many years. Celebrity Xpeditions, subsidiary of Royal Caribbean Cruise Lines, signed the contract for this vessel with Shipyard De Hoop on the first of August 2017 and the keel of the first section was laid on the 13th of December, that same year. The erection of this first 49.2-tons section on the longitudinal slipway marked the starting point of a building process lasting approximately one and a half years.

After the launch, the ship was towed to Wiltonhaven, in Schiedam, to be further outfitted and to perform the test runs, after which the name giving ceremony was performed. Sharing Celebrity's passion for environmental stewardship was the most important factor in choosing godmother Yolanda Kakabadse to lead the naming ceremony of one of the most eco-friendly ships of its size in the Galapagos Islands. Recognised as a prominent environmental leader and a global champion of sustainable development and biodiversity preservation, Kakabadse is a former Minister of Environment for the Republic of Ecuador and a former president of both the International Union for Conservation of Nature and World Wildlife Fund International.

Starting from Baltra (one of the smaller islands of the Galápagos), at the start of cruise season 2019, the expedition cruise ship will be making year-round cruises to the Galapagos Islands, alternated with various 11 and 12 day cruises. There will also be an option for a 17-day route to destinations in nearby regions of the

islands. The vessel can accommodate one hundred passengers in fifty suites, located on decks five and six, whilst the 80 crew members are accommodated in 52 cabins on the lower decks.

A prestigious contract

Despite dynamic international competition, Shipyard De Hoop secured the prestigious contract as a result of their accumulated experience of technically advanced features on high-end offshore vessels, combined with the knowledge of developing luxury cruise interiors (for

smaller inland cruise vessels). It took almost a year from the initial discussion with Celebrity Cruises before the first block sections were erected.

De Hoop's management are convinced that more than a decade of participating in smaller seagoing cruise vessel projects, with the associated design development and investment in knowledge, has now paid off. De Hoop's CEO, Patrick Janssens, states that this was the ideal basis for entering the growing market of expedition cruise vessels - their designers were fully prepared when the Celebrity Cruises challenge arose. Furthermore, with many Dutch suppliers and subcontractors on the client-approved 'makerslist', this project presented a great opportunity for the Dutch shipbuilding industry as a whole.

A VIP cruise concept

Celebrity Flora marks a turning point in the approach to ship design. The project, developed in close collaboration with the client and a number of co-makers/sub-contractors, is a new approach to marine exploration of the Galapagos

IMPLEMENTING IMPOSSIBLE RULES & REGULATIONS

Islands: it aims to create the feeling of being immersed in the environment, rather than just visiting it. The exterior deck areas are optimised for the best outdoor experience, offering a wide range of designated features, including a special railing design, protective sun awnings and pleasant hammocks for enjoying the scenery in full comfort. To make the guests' stay even more pleasant, the ship's superstructure shape has been submitted to wind tunnel tests, to ensure passengers on deck will not be subjected to exhaust gasses. Although a number of expedition cruise vessels were ordered in recent years, none were optimised for the open water experience in warmer climates, or in an environment where nature is so diverse and unique.

Designed and Lloyd's classed for worldwide service, *Celebrity Flora* will be the first vessel to be built according to the latest probabilistic damage stability regulations and therefore already complies

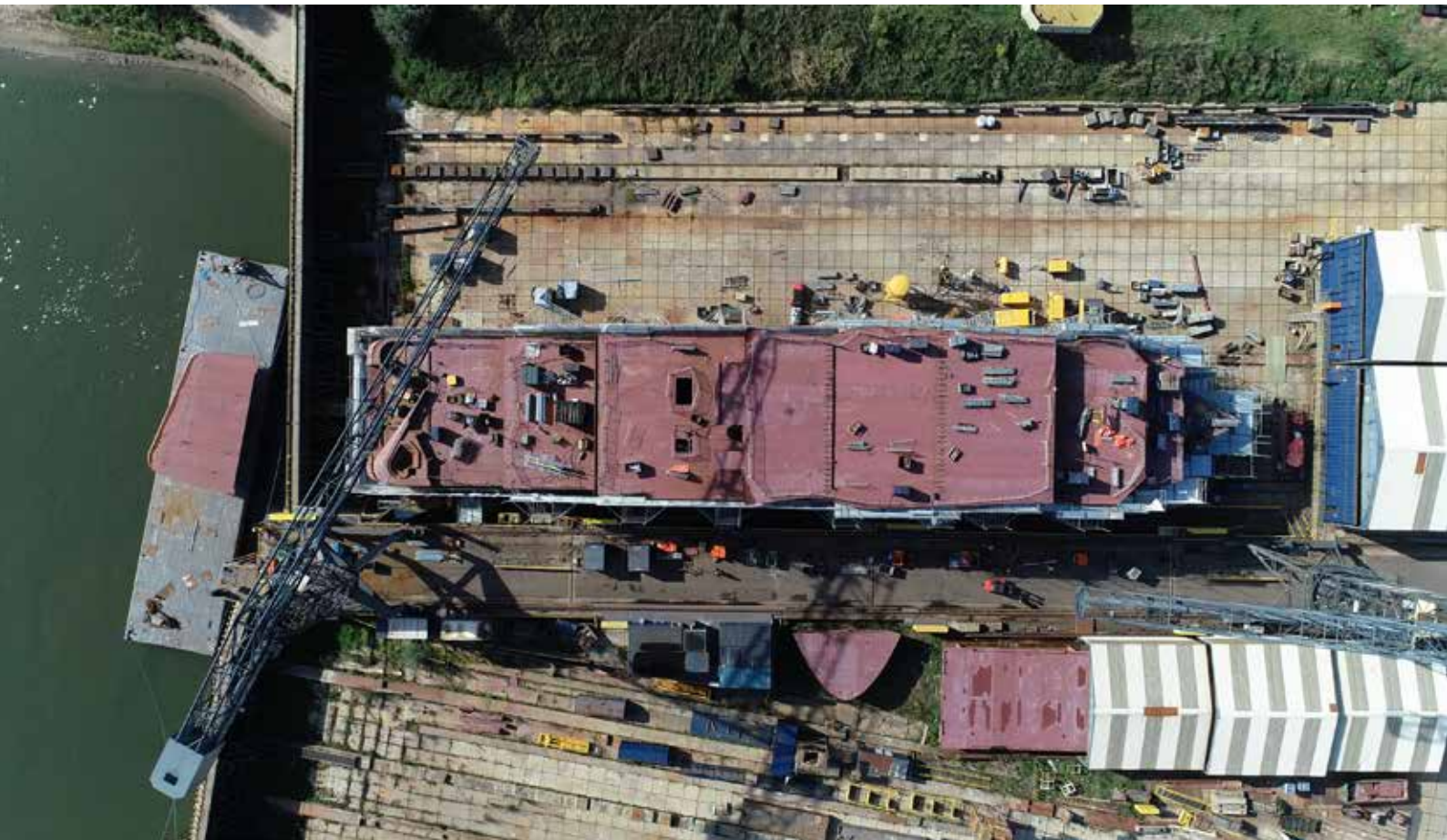
with the relevant Rules and Regulations for 2020; this is supplemented with the client's constraint to comply with a two-compartment damage stability regulation. The amendment, stipulating these regulations, was implemented by IMO in June 2017, under protest of many ship designers and builders, who considered these rules to be impossible. Moreover, along with compliance with future international rules and regulations, the vessel also commits to specific Galapagos National Park Directorate Regulations, whereby specific environmentally low-impact features were applied.

To further reduce the environmental footprint, the cruise ship accommodates an enhanced sewage plant to improve the quality and reduce the amount of wastewater; an improved HVAC system and improved thermal insulation, as a result of energy-efficient low-emissive glazing leads to 50 per cent less energy consumption. It almost speaks for itself

that the HVAC equipment is capable of handling the challenging environmental parameters, warmer seawater and higher outside air temperatures of the Galapagos.

Also, in the electric system, many measures have been taken to save energy - for example, the use of LED lighting and solar panels. Droste Elektro, a neighbour of the Dutch Lobith based shipyard, are system integrators that are responsible for the complete electrical installation, including the design installation of all switchboards, drives, converters, power management system and alarm/detection systems.

To fulfil Celebrity's vision of complimenting the ship's design with local 'Galapagos' elements, they partnered with Adriana Hoyos, a world-renowned designer living in Ecuador and South Florida. The iconic furniture and sculpture selection to be found onboard *Celebrity Flora* are wholly inspired by the region's different elements and textures.



The keel of the first section was laid on the 13th of December 2017



A building process of one and a half years on De Hoop's longitudinal slipway

Passengers' comfort

Shipyard De Hoop has put a lot of effort into decreasing noise and vibrations, the result of which can be seen in floating floors, flexibly mounted equipment and anti-vibration panels in walls and ceilings. The practical implementation of this was supported by theoretical frequency analysis of the ship and its interior construction: De Hoop's engineers have subjected the ship to a design spiral with four stages, to achieve the optimum in

terms of vibrations and sound levels. With the highest possible Comfort Class notation achieved (Comfort Class 1), quiet and comfortable passenger areas are assured.

The raw materials for the carpentry, upholstery, finishing and decorations of all eight accommodation decks, consist of sustainable, natural, regionally inspired materials. To safeguard the passenger experience and ensure correct use of

materials, a dedicated team of designers and ergonomists were involved during the final fine-tuning of the interior layout.

The Marina, the embarkation area located aft on deck three, is the primary point of access to the ship and the guests will be brought on board over water, in one of the three available Ridged Inflatable Boats (RIBs). *Celebrity Flora's* transom features integrated aft stairs, combined with a foldout stern platform with special boarding facilities, to allow safe and easy boarding for the passengers. The non-standard layout of *Celebrity Flora* is immediately expressed when boarding, as the only passenger entrance to the vessel is via the stern. Once inside, the route leading the passengers to their accommodation is focussed on passenger experience.

This latest custom built addition to the fleet of Royal Caribbean Cruise Lines, features 50 staterooms divided over decks five and six, with a capacity to host a total of 100 passengers. *Celebrity Flora* transports its guests in spacious all-suite cabins, featuring generous bathrooms, connected to the outside world through



The Alpatron JRC MFD bridge contains all Navigation equipment, including the DP and thruster control systems

outward-facing layouts and integrated balconies. Compared to other designs, the range of cabin types demonstrates an interesting variety: *Celebrity Flora's* two Penthouse Suites, the largest in the Galapagos, with separate indoor and outdoor living areas, plus customisable lighting and shades, include a telescope for stargazing or spotting wildlife. When booking, guests have a further choice of a variety of excessively luxurious cabins - two Royal Suites, one Ultimate Sky Suite, seven Premium Sky Suites, 16 Sky Suites and 22 Sky Suites with veranda. All Passenger cabins feature full room automation that allows you control everything with just the touch of a button.

A further characteristic of this vessel is the large variety of public areas - to be found on decks three, four, seven and eight - including a choice of seven different seating locations. Guests can unwind in the floor to ceiling glass-wrapped observatory or the open-air hideaway in *The Vista* - on the forward respectively aft part of deck seven - with 360-degree views, cocoon style loungers and private cabanas. They can watch the sun go into the ocean in the Sunset Lounge or enjoy naturalist presentations and excursion information sessions in the Discovery Lounge, both to the stern of deck four. On deck three, Darwin's Cove and the Naturalist Centre, are home to the tourist offices - providing information about destination, wildlife and environmental efforts. On top of all that, guests can also participate in a guided astronomy tour or enjoy starlit skies on their own, from the Stargazing Platform on deck eight.

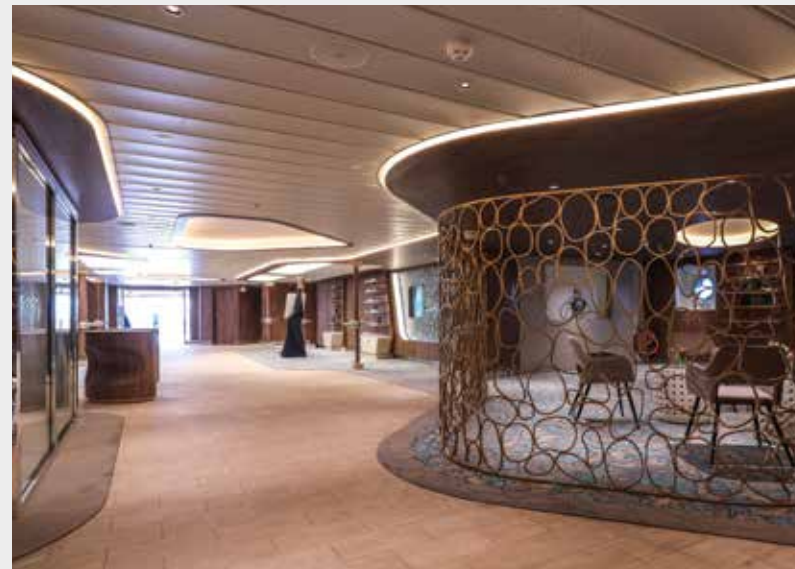
Breakfast, lunch and dinner are served in the Seaside Restaurant on deck four, while the Ocean Grill on deck seven offers a more casual dining space, panoramic views and dinner under the stars. According to *Celebrity Cruises*, eating and drinking on board *Celebrity Flora* is an important part of the total cruise experience. In addition to the special philosophy of the various restaurants and bars on board, much attention has been paid to the 'logistics of food'. The layout of the dry/cold/freezer stores, galleys, pantries and eateries up to and including the scullery and the



Cocoon style loungers on the the open-air hideaway in *The Vista*



The Ocean Grill on deck seven offers a casual dining space under the stars



On deck three, Darwin's Cove and the Naturalist Centre, are home to the tourist offices



Enjoying naturalist presentations and excursion information sessions in the Discovery Lounge



Breakfast, lunch and dinner are served in the Seaside Restaurant



Celebrity Flora transports its guests in spacious all-suite cabins

waste/sewage management, can be called unique.

The number of persons on board is completed with 80 crewmembers, including personal suite attendants to cater to guests' every need, divided over 52 cabins. The sophisticated layout of the cruise vessel allows for a separate routing for crew 'behind the scenes', to keep disruption to a minimum and not to inconvenience the passengers.

On lower deck (deck 3), a RIB garage with hydraulic hull doors, hatches and dedicated cranes is provided for storage of the tenders. To allow for swift and unseen provisioning logistics by the crew, to starboard side - near the dry, cool and freeze stores in the fore ship - a loading bay is provided. This unique RIB handling, in combination with the dedicated stern boarding facilities for passengers, is the money-maker of this design.

The custom-built Novurania RIB tenders feature stairs with a metal railing that fits flush against the open aft of *Celebrity Flora*, creating a seamless ship to shore transportation system that makes it easier to go exploring the islands. Each tender also features a hydraulic ramp that makes wet landings in the islands more convenient. This ramp can also be used as a platform that makes getting on and off for snorkelling much easier.

HVAC SYSTEM
CONSUMING
50%
LESS ENERGY



Photo by Flying Focus

Propulsive performance

As this vessel is expected to be stationary, in a bay or near one of the islands, for 66 per cent of the operational time, considerable thought went into the design and selection of engine room equipment, allowing the ship to perform efficiently under DP (Dynamic Positioning). Combined with a zero-speed stabiliser system, the DP1 system will choose a heading to minimise the roll and heave motions on the vessel, significantly improving passenger comfort. To achieve a high level of redundancy and to meet the Class

requirements (PSMR* and DP1 / DP-AM notation), the power and propulsion plant of *Celebrity Flora* is duplicated and housed in two separate engine rooms.

The power supply for two rudder propellers, two bow thrusters and other consumers, is supplied by four caterpillar C32 diesel generator sets. The diesel engines are equipped with an SCR (Selective Catalytic Reduction) installation, whereby the emission of nitrogen oxide (NOx) is greatly reduced. The rudder propellers, type 20 CRP of 1450kW each,

were supplied by Steerprop from Finland, while the 400kW bow thrusters are provided by Veth from the Netherlands. With this configuration a 12-knot cruising speed can be achieved and a high-maneuvrability is guaranteed.

One glance at the ship's profile reveals the sophisticated bow shape - featuring a straight, wave-piercing stem, with an integrated bulb. This characteristic bow both reduces resistance in waves when in transit and saves energy when staying in position, similarly due to the higher efficiency of the bow thruster.

The introduction of this advanced propulsion system, the hull configuration (improved with CFD calculations) and the specially developed diesel engine arrangement, guarantee an average 25 per cent reduction in hull resistance, 15 per cent reduction of fuel consumption and equivalently fewer exhaust emissions. These characteristics make this cruise ship one of the most energy-efficient ships in its class, in addition to being IMO Tier III compliant.

The ship is effectively protected against fires by a Technoship Ultra-Fog system. Their high-pressure water mist system



The RIB tenders against the open aft create a seamless ship to shore transportation system



The tourist offices provide information about destination, wildlife and environmental efforts

(100-120 bar) is designed to kill fire by suppressing two of the three vital variables required for fire: heat (by cooling with a cloud of tiny droplets) and oxygen (tiny droplets block access to O2). Fire Detection system is provided by Consilium BV via system integrator Droste.

Modern luxury

Celebrity Cruises/Xpeditions' iconic "X" is the mark of modern luxury, with its cool, contemporary design and warm spaces, where the 'cuisine' and dining experiences are as important as the design of the venues. Celebrity Cruises' twelve ships offer modern luxury vacations, visiting all seven continents.

Being one of the five cruise brands operated by global cruise vacation company Royal Caribbean Cruise Lines, Celebrity also presents cruise tour experiences in Alaska and Canada.

The Greece-based Chandris Group originally founded celebrity Cruises in 1988. In 1997, Celebrity Cruises Ltd merged with Royal Caribbean Cruise Line, to form Royal Caribbean Cruises Ltd and has been a wholly owned subsidiary of the latter since then. The company has its headquarters in Miami, Florida. Celebrity's signature logo is an 'X' displayed on the funnel of Celebrity ships, which is the Greek letter chi for 'Chandris'.

Like many other Dutch shipyards, De Hoop is renowned for flexibility, knowledge and skills, particularly in specialist vessels and niche markets. These characteristics were again confirmed with this order from the Celebrity Xpeditions. After the recession, the shipyard has had successful reprise up to now and a substantially filled order book to look forward to for the years to come. Following the completion of *Celebrity Flora*, the next vessel in line will be yard number 491, a 45-metre event vessel for Spido, a leading Dutch maritime entrepreneur in the Rotterdam harbour area. This 45 meter Cor D. Rover / De Hoop yacht-style design will be suitable for harbour cruises as well as parties and events.

Moreover, De Hoop has started to build an expedition cruise vessel for SilverSea, following last year's acquisition by Royal Caribbean Cruise Lines, who now have a majority stake in the SilverSea company.

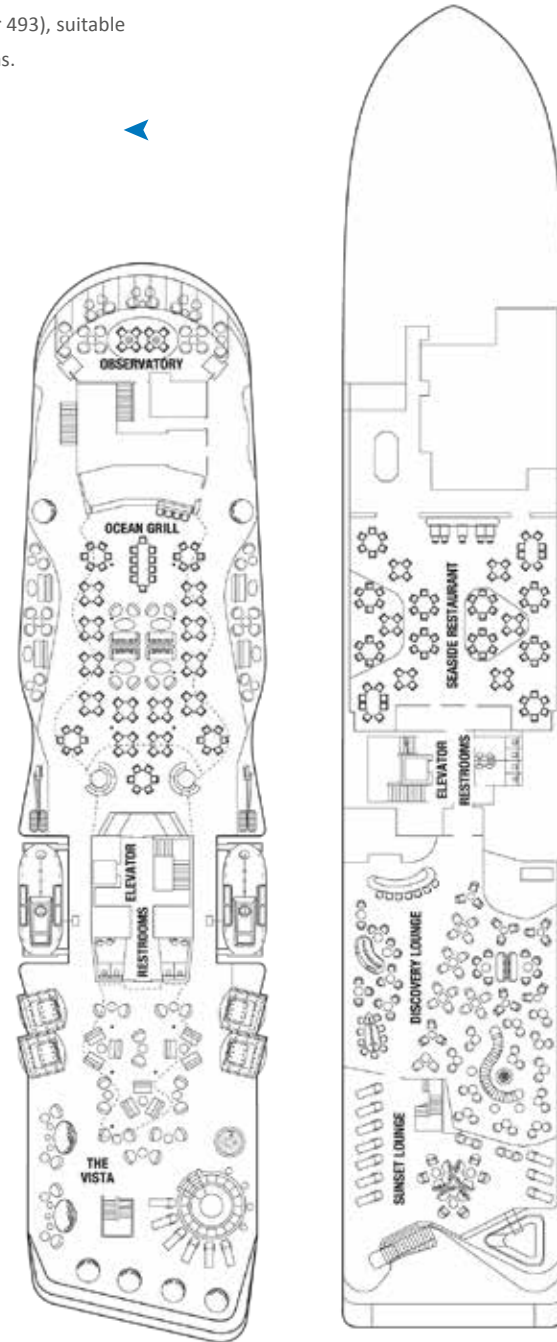
**25% LESS FUEL &
15% LESS FUEL CONSUMPTION**

Yard number 489, to be named *Silver Origin*, is based on the engineering principles of *Celebrity Flora*, whilst the design-architects will give it the dedicated SilverSea 'look and feel'.

Queen series, while the KD project will be an 85-metre inland day-passenger / event vessel (yard number 493), suitable for maximum 1000 persons.

Tom Oomkes

Furthermore, De Hoop proudly announces four more new orders: two 55-metre offshore patrol vessels with a hybrid propulsion system, for HLS International for deployment in West Africa, and long-term customers Lueftner Cruises and Koln Dusseldorfer (KD) have both ordered a cruise vessel. The Lueftner project will be a 135-metre river cruise vessel (yard number 492), following the successes of the *Amadeus Silver* and



Principal particulars

Builder	Shipyards De Hoop, Lobith, The Netherlands
Owner	Celebrity Cruises/Xpeditions, Royal Caribbean Cruise Lines, Miami - Florida, United States
Length oa	101.50 m
Length bpp	97.43 m
Beam mld	17.00 m
Depth mld	6.50 m
Draught mld	4.50 m
Speed max	14.5 kts
Gross Tonnage	5,922 GT
Deadweight	1,200 dwt
Tank capacities	
Fuel oil	255 cu.m
Fresh water	175 cu.m
Sewage grey	150 cu.m
Sewage black	45 cu.m
Treated water holding	140 cu.m
Urea	16 cu.m
Water ballast	530 cu.m
Classification	
Lloyd Register of Shipping	
✠ 100A1, Passenger Ship, *IWS, ECO (BWT, IHM, OW, P, SEEMP),	
✠ LMC, PSMR*	
UMS, DP(AM), NAV1, PCAC 1, 3	



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Subcontractors and suppliers of equipment fitted on board the *Celebrity Flora*, YN 488
Alfa Laval Benelux, Breda: fuel oil separator; booster module; plate heat exchangers; **Alphatron Marine**, Rotterdam: *Alphatron* JRC MFD bridge; Nav/Naut equipment; dynamic positioning system; thruster control system; **Aluland**, Gravendeel: steel plates; **Amero Compressoren**, Badhoevedorp: starting air compressors; working air vessels and filters; **Anko Tool Co Inc**, United States: fresh cooling water and grey water spools; **Axces**, Tholen: silencer harbor generator set; **Beutech**, Steenwijk: grey water tanks; **Bolidt**, Hendrik-Ido-Ambacht: *Bolidtdeck* future teak floors; **Builtink Technology**, Duiven: stretch ceilings; **Büter Hebeteknik GmbH**, Waalre: hydraulic telescopic crane; **Class ARS**, Dubai-VAE: international tonnage certificate; **Consilium**, Gouda: fire detection system; **Corrosion**, Moerkapelle: anti-fouling; cathodic protection (iccp); anodes; **Damen Marine Components**, Hardinxveld-Giessendam: bottomwells; **Datema Nautical Safety**, Delfzijl: life saving and fire fighting equipment; nautical inventory; **DCC**, Ridderkerk: paint (consultant); **De Smidse**, Arnhem: aluminum panels; **Delade**, Doetinchem: curtains; furniture; **Distrimex Pomen & Sevice**, Doetinchem: pumps; **Droste Elektro**, Tolkamer: arrangement and cable diagrams, connection diagrams and documentation/ reports; battery charger/convertor; rittal racks; **Drumarkon**, Schelluinen: ceilings; **Eriks**, Capelle aan den IJssel: handwheels, appendages; **Famos**, Poland: walls and doors; ceilings; **Framo**, Norway: anti heeling pump; **Friesland Staal**, Drachten: steel; **Georg Fischer**, Epe: valves; **GSB**, Ochten: paint; **Hatenboer**, Schiedam: fresh water maker, treatment and distribution systems; hydrophore units; water mist system; hot water systems; AC condensation water treatment system; **Heinen & Hopman**, Bunschoten: air-conditioning systems; heating and ventilation; waste heat recovery systems; **Helder & May**, Rotterdam: rubber-mortar floors; floating A-60 floors; Visco-elastic sound-proofing floors; tile floor; rubber-mortar floors with PU finishing layer; **Herzbach**, Germany: sanitary items; **Holland Air Pumps**, Oirschot: clean-bilge water pumps; pump; treated water pump; **Hyet Solar**, Arnhem: flexible solar panels; **Innclose**, Varsseveld: cold stores; freeze stores; garbage room; thaw room; **Intersona**, Epe: noise and vibrations analysis; **Kone Elevators**, Finland: passenger elevator; service elevator; **Kraaijeveld**, Slidrecht: anchor and mooring winches; capstans; **Landuwasco**, Vlaardingen: dryers; ironing systems; washing machines; **Lemtech**, Didam: pipelining; valves; **Lloyds Register Nederland**, Rotterdam: classification; **Marinfloc**, Sweden: bilge discharge monitor; oily bilge water separator; **Martin Systems**, Germany: sludge, grey water and waste water systems; **Modular Arts**, Seattle: wall panels; Momec AB, Sweden: interior doors; Multimetaal, Den Helder: aluminium profiles and plates; **Napa**, Finland: napa loading and stability computer; **Nicoverken**, Schiedam: appendages; pipeline materials; pipes; Fuchs gantry crane zodiac; **Nidec**, Slidrecht: *Leroy Somer* alternators; **Nit**, Finland: interior staircase; **North Sea Handling**, Norway: *Zodiac* hoisting equipment; **Nouwen Scheepsbetimmeringen**, Rhenoy: ceiling installation; **NRF Thermal Engineering**, Mill: boxcooler; **Oxin**, Italy: galley equipment; **Paattimaakarit**, Finland: doors crew interior; **Palfinger**, Barneveld: life boats and rescue boats; **Parosha International**, Annaparochie: roller shutter doors; **Pon Power**, Papendrecht: *Caterpillar* main generator set; **Reikon**, Spijkenisse: *Azcue* pumps; **Remat**, Breda: drive systems main propulsion and AC motors; **Roelofs**, Nijverdal: railings; **Sandfirden Technics**, Den Oever: *OceanLine* emergency diesel generator set, consisting of a Scania diesel engine and a Leroy Somer alternator; **Schoenrock**, Germany: remote controlled watertight doors; **Somtec**, Italy: windows; **Steepprop**, Finland: propeller; **Strongflow oy**, Finland: swimmingpool equipment; **Supernova Luxury Interiors**, Franeker: luxury interiors; **Synkronex**, Finland: tween decks for pool equipment and storage; **Technisch Bureau Uittenboggaart**, Ridderkerk: *SKF Marine* retractable zero-speed fin stabilizer; **Steinbach ingenieurtechnik**, Germany: ballast watertreatment plant; **Technoship**, Apeldoorn: ultra fog watermist system; **Theunissen Technical Trading**, Malden: *Pesch/Seematz Xenon* searchlights; **Toss**, Rotterdam: compass calibration; **Trinox**, Hardinxveld-Giessendam: pilot chair, weather tight doors, hatches; **VDI**, Ridderkerk: insulation; **Veth Propulsion**, Papendrecht: *Veth* tunnel thruster, type VT-550; **Visser Glas Projecten**, Duiven: special glass doors; **Wave International Limited**, U.K.: b.b. separator; **Wetcab**, Poland: sanitary units; **Winel**, Assen: pilot, luggage, bunker and tender doors; **Wolfard & Wessel Werktuigbouw**, Hoogezand: engineering and production of piping systems; **Wortelboer**, Rotterdam: anchors and chains.