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# **BABICZ DICTIONARY OF MARINE TECHNOLOGY**

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**Foreword to the First Edition**

There are a lot of new rules and regulations issued by IMO and Authorities to ensure safer shipping. However, safety at sea depends on many factors. The last but not least is the good knowledge of professional maritime English. This knowledge is significant at all the stages: during the ship design, construction and operation.

Poor English will always cause problems; a badly written Contract or Specification can be the reason for costly misunderstanding and troublesome delays. How can we expect a proper operation of complicated systems and devices if their technical manuals are difficult to understand?

We believe the improvement of professional marine English in design offices, shipyards and onboard ships is a very important factor of maintaining safety at sea, and this dictionary was intended as our modest contribution in this huge task.

The terms in the dictionary have been carefully selected and checked. However, nothing is perfect and we would be grateful for any corrections or suggestions on how to make it better.

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**CONTENTS**

<b>1. About the book .....</b>	<b>3</b>
<b>2. Dictionary .....</b>	<b>5</b>
<b>3. List of Acronyms and Abbreviations .....</b>	<b>244</b>
<b>4. Types of Civil Ship .....</b>	<b>249</b>
<b>5. Picture Dictionary .....</b>	<b>251</b>

bulk cargoes are: petroleum and its derivatives, coal, coke, grain, fertilizers, minerals, ores, bauxite and cement. Dry bulk cargoes are carried by specialised ships, some of which take name after the materials they transport. These include ore carriers, coal carriers and grain carriers.

**Solid bulk cargo** – Any material, other than liquid or gas, consisting of a combination of particles, granules or any larger pieces of material, generally uniform in composition, and loaded directly into the cargo spaces without any intermediate form of containment.

**Bulk carrier, bulker** – A vessel designed to carry dry cargo, loaded into the vessel with no containment other than that of the ship's boundaries, as distinguished from the liquid bulk carrier or tanker. Conventional bulk carrier is constructed with a single deck, single skin, double bottom, hopper side tanks and topside tanks in cargo spaces.

**Handysize bulk carriers** – Bulklers in the 10,000 – 34,999 dwt capacity range capable of carrying either dry bulk cargoes or industrial consignments packed in units (e.g. bags of sugar or flour, metallurgical products, timber).

**Handymax bulk carriers** – Bulklers in the 35,000-49,999 dwt capacity range.

**Panamax bulk carriers** – 50,000 – 79,999 dwt bulklers, which can pass through the Panama Canal.

**Capesize bulk carriers** – 80,000 – 199,000 dwt bulklers, the size of which obliges them to go round the Capes of Good Hope and Horn.

**Dunkirk-Max** – A new “max” design was presented in “Significant Ships of 2001”, named Dunkirk-Max by the builder CSBC; it was marketed as the largest ship, in terms of deadweight and cubic capacity, to meet the specific limitations of the

de Gaulle Lock in the port of Dunkirk, France.

**Bulk container** – A container designed for carrying free-flowing dry cargoes loaded through hatchways in the roof of the container and discharged through hatchways at one end of the container.

**Bulkhead** /'bʌlkhed/ n. –

1. Any of various wall-like constructions inside a vessel, as for forming watertight compartments, subdividing space, or strengthening the structure.
2. A partition built in a subterranean passage to prevent the passage of air, water, or mud.
3. A retaining structure of timber, steel, or reinforced concrete, used for shore protection and in harbor works.

**Bulkhead corrugation** – A typical section of a bulkhead consisting of parallel sheets welded to each other at angles, in order to provide sufficient bending stiffness when subject to transverse loads.

**Bulkhead deck** – The uppermost deck up to which the transverse watertight bulkheads and shell are carried.

**Bulkhead doors** – Access doors or flood prevention doors. A wide variety of designs and configurations are available: side-hinged door, sliding door, upward rolling door, and top-hinged door. In any case a door can be of a single or multi-panel type. There are three basic ways of operating bulkhead doors; by swinging on hinges, by sliding on guiding wheels and frames or by rolling up into stowage position.

**Bulkhead stool** – The lower or upper base of a corrugated bulkhead.

**Bulkhead structure** – Bulkhead plating with stiffeners and girders.

**Bulkheads** – Vertical partition walls which subdivide the ship interior into watertight compartments. Bulkheads reduce the extent of seawater flooding in case of damage and provide additional stiffness to the hull girder. They can be flat or corrugated.

nected to a flange by a key and taper. After the failure the drive side of the keyway was found to have had a number of small cracks occurring at the larger end. An identical piece of equipment showed identical signs of cracking which would have to fail in due course.

**Froude number** ( $F_n$ ) – A non-dimensional number indicating the relation between a vessel's length and its speed, expressed as  $F_n = V/\sqrt{gL}$  where  $V$  = speed (knots),  $g$  = acceleration due to gravity,  $L$  = length of the vessel.

**Fuel cell** – A source of electrical power in which the chemical energy of fuel is converted directly into electrical energy by electrochemical oxidation (also known as "cold combustion"). Fuel cells convert energy stored in fuel directly into electricity through an electromechanical process, not by burning the fuel.

**Fuel Conditioning Module** (FCM) – A new automated two-stage fuel oil supply module developed by Alfa Laval.

**Fuel oil stability** – Fuel oils are produced from various crude oils and refinery processes. Due to incompatibility, such fuels can occasionally tend to be unstable when mixed. This is why the mixing on board should be avoided to the widest possible extent.

**Fuel oil system** – Various piping systems, provided for bunkering, storage, transfer, offloading and treatment of fuel oils. The following systems are provided for diesel engines that operate on heavy fuel oils: Fuel oil transfer system, Fuel oil treatment system and Fuel oil supply system.

**Fuel oil transfer system** – This system receives and stores fuel and delivers it to settling tanks. Fuel oils are loaded through deck fill connections that have

sample connections provided to permit the fuel to be sampled as it is taken aboard. HFO is loaded in storage tanks fitted with heating coils. In preparation for use, HFO is transferred to the fuel oil settling tanks via FO transfer pumps which are equipped with a suction strainer. Piping is so arranged that the pumps can transfer fuel between storage tanks and then to the deck connections for offloading. Settling tanks are used to permit gross water and solids to settle on the bottom.

**Fuel oil treatment system** – From the settling tanks fuel oil is transferred to the service tanks via FO treatment system. For cleaning of heavy fuel oils (HFO) the two stage process is commonly used. The fuel is heated in a settling tank to about 50-60°C and then is drawn out by the purifier inlet pump. The inlet pump delivers the fuel to a thermostatically-controlled heater which raises the fuel temperature to about 80°C, and thence to the centrifugal purifier. The dry purified fuel is then transferred to a centrifugal clarifier by the purifier discharge pump. After clarification the clarifier discharge pump delivers the fuel to the service tank for the engine use.

**Fuel oil supply system** – This system supplies the fuel from the service tank to the diesel engine. The system consists of: a supply flow meter, supply pumps, circulating pumps, preheaters, the final filter, a viscosity controller, a FO venting box.

The pressurised system is preferable while operating the diesel engine on high viscosity fuels. It can be delivered as a modular unit (fuel oil supply unit), tested and ready for service supply connections.

**Fuel oil treatment** – Fuels supplied to a ship must be treated on board before use in order to remove solid as well as

- Undersea pipeline systems and risers
- Offshore facilities (machinery, electrical and piping systems, production equipment).

**Offshore loading systems** – Offloading systems for floating production units (FPU), floating production/storage vessels (FPSOs) and shuttle tankers.

**Offshore patrol vessel (OPV)** – A ship used for customs patrol, SAR and off-board fire-fighting operations.

**Offshore structure** – The structure supporting an offshore installation, either floating or resting on the seabed.

**Fixed structures:**

- structures permanently fixed by piling (piling foundation),
- structures resting on the sea bed by action of gravity (gravity foundation, self-elevating platforms),
- structures with excess of buoyancy, connected to the base by tensioned anchoring elements (“Tension Leg Platforms”).

**Floating structures:**

- connected to the sea bed by anchoring (mooring),
- kept in position by active positioning/propelling system.

**Offshore support vessels (OSV)** – A range of vessel types developed to carry out different support operations necessary for floating drilling rigs, as well as moored or fixed production platforms. In order to encompass a more varied and multifunctional role, the facilities installed on board offshore support vessels have been revolutionized, so that the OSV are now amongst the most technically sophisticated vessels afloat.

**Platform supply vessels (PSV)** – form the largest group of offshore support vessels. The PSV vessel is designed for supplying rigs and platforms with necessary equipment, stores and drilling consumables. These are typically cement, baryte and bentonite transported as

dry powders; drill water; of oil or water-based liquid mud, methanol and chemicals for specialized operations. The PSV loads at a shore base. Liquid cargo is carried in double bottom tanks, dry bulk cargoes in special pneumatic pressure tanks, equipment and drill pipes on the aft open deck. At the rig or platform, the liquid and powder cargoes are pumped up or transferred pneumatically while deck cargo is handled by the rig crane.

A typical PSV operating profile shows the vessel spending about 25% of the time in harbour loading and unloading, 40% sailing at a service in the 14-16 knot range and 35% loading or discharging at sea, often in strong winds, high seas and strong currents.

**Anchor handling tug supply vessel (AHTS)** – A special ship designed to serve the offshore industry. The AHTS can carry out as towing, handling rig’s anchors, deepwater mooring, platform supply, handling submersible robot ROV, rescue, firefighting and oil recovery operations. The required bollard pull has a powerful influence on the design, since this defines the power need, the propeller size, hull shape and depth aft to give the necessary propeller immersion. Hull beam and shape shall give good stability, particularly when heavy moorings and anchors are suspended from the stern. Anchor handling requires high power, winch capacity, deck space aft, storage bins for rig chains and auxiliary handling equipment.

Anchor handling requires high power, winch capacity, deck space aft, storage bins for rig chains and auxiliary handling equipment.

**Offshore unit** – Any floating offshore structure (including vessels and barges), designed for operating afloat or supported by seabed.

**Oil** /'ɔɪl/ n. – Petroleum in any form including crude oil, sludge, oil refuse and refined products.

**Oil clearance**, oil recovery – An operation of removing oil from the water surface.

sition of any associated condition of class.

**Proof** /<sup>1</sup>*pru:f*/ n. – Evidence, information etc. that shows definitely that something is true.

**PROPAC** – An integrated mechanical propulsion system developed by Wärtsilä Corporation as a single supplier with commitment to lifetime support. The main component of the system is a Wärtsilä L20 engine driving through reduction gear Lips CP propeller or Lips compact thruster.

Propac CP = Wärtsilä L20 engine and reduction gear, Lips CP propeller and Lipstronic controls.

Propac ST = Wärtsilä L20 engine and reduction gear, Lips compact thruster and Lipstronic controls.

**Propel** /*prə'pel*/ v. – To drive forward, especially mechanically: The ship is propelled by a diesel engine.

**Propeller** /*prə'pelə(r)*/ n., screw propeller – A revolving screw-like device that drives the ship.

A screw propeller may be generally classified as either fixed pitch or controllable pitch. The pitch of a fixed-pitch propeller cannot be altered during the operation. The pitch of a controllable-pitch propeller can be changed at any time, subject to bridge or engine-room control.

**Adjustable bolted propeller** (ABP) – Similar in concept to a standard controllable pitch propeller, the ABP is based on a hollow hub with blades bolted to it from the inside. In service, the slotted holes on the hub allow the blade pitch angle to be adjusted to compensate for long-term variations in hull resistance. If the propeller is damaged, individual blades can be replaced without drydocking, and only spare blades have to be stocked rather than a bulky monobloc propeller.

**Assembled propeller**, built-up propeller

– A propeller cast in more than one piece. In general, built-up propellers have the blades cast separately and fixed to the hub by a system of bolts and studs.

**CLT propeller** – The contracted and loaded tip propellers, developed by Spanish company Sistemar in the late 1980s: screw propellers with important load at the blade tips thanks to the fitting of end plates at the blade tips. As well as a higher efficiency, CLT propeller also offers lower noise and vibration, lower fuel consumption and better manoeuvrability.

**Contra-rotating propellers** (CRP) – Two propellers positioned in tandem on coaxial shafts that rotate in opposite directions. The after propeller of the pair is of smaller diameter to suit the contracting race column of the forward one. Higher efficiencies can be achieved with this propeller arrangement because no rotational energy needs to be left in the propeller wake.

**Controllable-pitch** (CP) **propeller** – A propeller with a mechanism in the propeller hub that can be operated remotely to change the propeller pitch setting from a maximum design ahead pitch to a maximum design astern pitch. The pitch can be changed while the propeller rotates and develops thrust within these limits, or the pitch can be maintained at any intermediate setting for continuous operation.

**Ducted propeller**, shrouded propeller – The propeller placed in a duct, i.e. a ring with a cross section that has a wing-like profile. The duct offers protection to the propeller blades and contributes to the thrust generated by the propeller. The same amount of thrust can be generated from a propeller of smaller diameter, making it a suitable solution for small-draught vessels.

See also **propeller nozzle**.

## **ACRONYMS and ABBREVIATIONS**

<b>AB</b>	able seaman
<b>ABS</b>	American Bureau of Shipping
<b>AC</b>	alternating current
<b>ACV</b>	air cushion vehicle
<b>AGV</b>	Automatically Guided Vehicles
<b>AHT</b>	anchor-handlig tug
<b>AHTS</b>	anchor-handling tug supply vessel
<b>AIMS</b>	American Institute of Merchant Shipping
<b>AIMU</b>	American Institute of Marine Underwrites
<b>AIS</b>	Automatic Identification System
<b>A/Res</b>	Assembly Resolution
<b>ARPA</b>	automatic radar plotting aid
<b>ATA</b>	automatic tracking aid
<b>BC Code</b>	Code of Safe Practice for Solid Bulk Cargoes
<b>BCH Code</b>	Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk
<b>BHP</b>	brake horse power
<b>BIMCO</b>	Baltic and International Maritime Council
<b>BMT</b>	British Marine Technology
<b>BOD</b>	biochemical oxygen demand
<b>BOG</b>	boil-off gas
<b>BOR</b>	boil-off rate
<b>BRT</b>	brutto register tonnage
<b>CAD/CAM/CIM</b>	computer aided design/computer aided manufacture/computer integrated manufacture
<b>CAH/TS</b>	construction, anchor handling/tug supply vessel
<b>CAS</b>	condition assessment scheme
<b>CASS</b>	combustion air saturation system
<b>CBT</b>	clean ballast tank
<b>CC</b>	crude carrier
<b>CCI</b>	International Radio Consultative Committee
<b>CFC</b>	chlorofluorocarbons, or refrigerants in general
<b>CFD</b>	computational fluid dynamics
<b>CIM</b>	computer integrated manufacturing
<b>CNG</b>	Compressed Natural Gas
<b>COB</b>	container-oil-bulk ship
<b>CODAD</b>	Combined Diesel and Diesel
<b>CODOD</b>	Combined Diesel or Diesel
<b>CODAG</b>	Combined Diesel and Gasturbine
<b>CODOG</b>	Combined Diesel or Gasturbine
<b>COG</b>	course over ground
<b>COGAS</b>	Combined Gasturbine and Steamturbine

<b>VLCC</b>	very large crude carrier
<b>VNSI</b>	Netherlands Shipbuilding Industry Association
<b>VOC</b>	volatile organic compounds
<b>VTS</b>	vessel traffic services
<b>WIG</b>	wing-in-ground-effect craft

## TYPES OF CIVIL SHIPS

### DRY CARGO VESSELS

**Bulk carriers** - belt-type self-discharging bulk carrier, cement carrier, coal carrier, open hatch bulk carrier, ore carrier, sugar carrier, self-unloading coal carrier, self-unloading wood chip carrier

Cassette carrier

Coaster, low-air-draught coaster

Con-ro vessel

**Containerships** - container carrier, feeder, Panamax container vessel, post-Panamax container ship, refrigerated container ship, hatchcoverless container ship, ultra-large container ship

Forest products carrier

General cargo ship

**Heavy lift vessels** – dock ship, open deck cargo ship, project cargo ship, semi-submersible heavy lift ship

Multi-purpose cargo ship

Newsprint carrier

Paper carrier

Reefer vessel

River/sea dry cargo vessel

**Ro-ro vessels** - car carrier, multi-purpose ro-ro carrier, ro-ro freight ferry, sto-ro paper carrier

### LIQUID CARGO SHIPS (tankers)

Asphalt – bitumen tanker

Chemical tanker, stainless steel chemical parcel tanker

**Crude oil tankers:** Aframax tanker, arctic tanker, coastal tanker, Suezmax tanker, shuttle tanker, very large crude carrier (VLCC), ultra large crude carrier (ULCC)

Ethylene tanker

Fruit juice tanker

**Gas carriers:** LNG tanker (methane tanker), LPG tanker, liquefied CO<sub>2</sub> carrier

Molten sulphur tanker

Oil tanker

Orange-juice carrier

Product tanker

Shuttle tanker

Tanker for palm oil

### COMBINATION CARRIERS

Ore/Oil carrier,

Ore/Bulk/Oil carrier (OBO)

## PICTURE DICTIONARY

1. DRY CARGO VESSELS .....	253
2. CONTAINER VESSELS .....	254
3. TANKERS .....	255
4. FERRIES .....	256
5. INDUSTRIAL VESSELS .....	257
6. SERVICE VESSELS .....	258
7. HULL STRUCTURE OF MULTI-PURPOSE DRY CARGO VESSEL .....	259
8. HULL STRUCTURE OF SINGLE HULL TANKER.....	260
9. HULL STRUCTURE OF DOUBLE HULL TANKER .....	261
10. BULK CARRIER CARGO HOLD .....	262
11. RUDDERS .....	263
12. SEMI-SPADE RUDDER .....	264
13. RUDDER BLADE UNDER CONSTRUCTION.....	265
14. ANCHORING EQUIPMENT .....	266
15. MOORING WINCHES .....	268
16. MOORING AND TOWING FITTINGS .....	269
17. HATCH COVERS.....	270
18. LIFT- AWAY HATCH COVERS .....	272
19. MULTI-FOLDING HATCH COVERS.....	274
20. HATCH COVERS - FITTINGS.....	275
21. LIFTING APPLIANCES.....	276
22. DERRICK BOOM.....	279
23. CARGO CRANES .....	280
24. MONORAIL CRANE.....	282
25. RO-RO ACCESS EQUIPMENT .....	283
26. ROLL TRAILERS .....	285
27. LIFEBOATS .....	286
28. RESCUE BOATS.....	288
29. INFLATABLE LIFERAFTS.....	289
30. RESCUE BOAT/LIFERAFT DAVIT.....	290
31. SHIP COMPARTMENTS .....	291
32. PROPULSORS .....	293
33. SCREW PROPELLERS.....	294
34. MERMAID PODDED PROPULSOR.....	296
35. AZIMUTHING THRUSTERS.....	297
36. AZIPULL – PULLING RUDDERPROPELLER .....	298
37. SCHOTTEL AZIMUTHING THRUSTER.....	299
38. TUNNEL THRUSTERS.....	300
39. BALLAST WATER SYSTEM .....	301
40. BILGE SYSTEM .....	303
41. OILY WATER SEPARATOR.....	305
42. PROPULSION SYSTEMS.....	306
43. LOW SPEED DIESEL ENGINE.....	308
44. MARINE GENERATING SETS.....	310
45. SEAWATER COOLING SYSTEM .....	312
46. PLATE HEAT EXCHANGER.....	313
47. PLATE-TYPE FRESHWATER GENERATOR.....	314
48. FO BUNKERING, TRANSFER AND STORAGE SYSTEM.....	315
49. FO TREATMENT SYSTEM.....	316
50. FO SUPPLY SYSTEM.....	319

## 14. ANCHORING EQUIPMENT

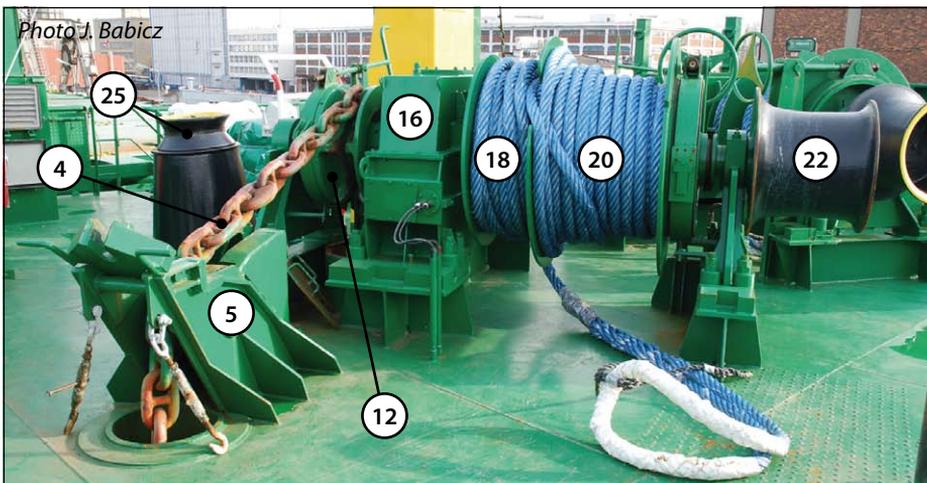
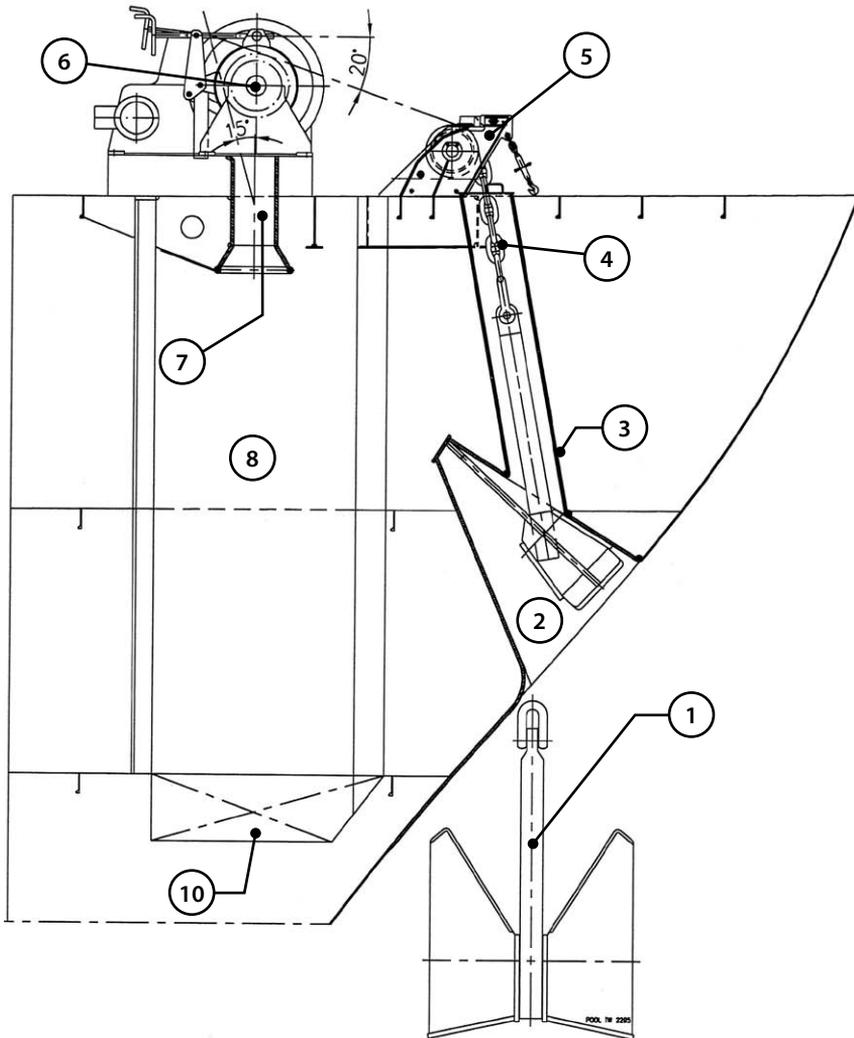
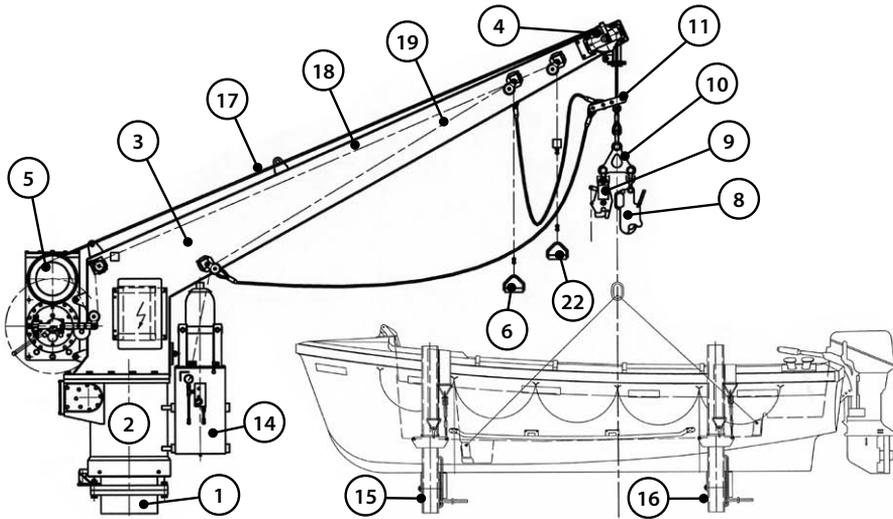


Fig.1 Anchor handling equipment on board the timber carrier BALTICA

### 30. RESCUE BOAT/LIFERAFT DAVIT



1. Pedestal
2. Davit column
3. Davit arm
4. Assembly components arm
5. Winch
6. Remote control for slewing
7. Slewing angle limiter
8. Rescue boat hook
9. Automatic release hook
10. Combined suspension
11. Jockey pulley
12. Instruction plate
13. Electric assembly
14. Hydraulic assembly
15. Fore boat chock
16. Aft boat chock
17. 18. 19. Wire
18. Handwheel for high-speed recovery of the boat
19. Hand crank for manual recovery
20. Remote control "Stop Go" for lowering

#### Life-saving related terms

Abandon ship drill, lifeboat drill

Boat cradle with lashing

Boat lashing

**Davit** - multi-pivot davit, roller track davit, semi gravity davit, stored power davit, telescope davit

**Distress flares** - multi-star flare, parachute flare, smoke flare

Embarkation station, Embarkation ladder

EPIRB

Hydraulic power pack

Jason's cradle

**Launching** - free-fall launching, launching by A-frame davit, simulated launching of free-fall lifeboat

**Lifeboat** - davit launched lifeboat, free-fall lifeboat, partially enclosed lifeboat, totally enclosed lifeboat

**Lifeboat inspection** - weekly inspection, annual thorough examination

**Lifejacket** - inflatable lifejacket, solid life-jacket

**Liferafts** - davit launched self-righting liferaft, davit launched standard liferaft, open reversible liferaft, throw-overboard self-righting liferaft, throw-overboard standard liferaft

Long link

On-load release gear

**Personal protective equipment** - immersion suit, inflatable lifejacket, manual lifejacket light, rigid lifejacket, water activated lifejacket light

Release system, emergency release system

Rescue net

SAR - search and rescue; SART; Snap hook

## 33. SCREW PROPELLERS



1. Adjustable bolted propeller



2. Blades



3. Propeller hub



4. Ducted propeller

### Standard nomenclature

Blade  
Blade outline, developed outline, projected outline,  
Blade bolt  
Blade foot  
Blade sealing rings  
Boss cap  
Cavitation  
Chord  
Coupling flange  
Erosion  
Fillet area, also blade root  
Hub, also boss  
Hub body  
Hub bolt  
Hub cover  
Hydraulic power unit  
Hydraulic servo motor for pitch setting  
**Oil distributor (OD) box** – gearbox integrated OD-box, gearbox mounted OD-box, shaft mounted OD-box

Pitch, nominal pitch  
Pitch distribution  
**Propeller** – adjustable bolted propeller, contracted and loaded tip propeller, controllable pitch propeller (CPP), ducted propeller, fixed pitch propeller (FPP), high skew propeller, KAPPEL propeller, keyless propeller, left-handed propeller, right-handed propeller, surface piercing propeller  
Propeller clearances – baseline clearance, tip clearance  
Propeller diameter  
Propeller efficiency  
Propeller speed  
Rake  
Skew, high skew  
Slip  
Vibration  
Wake

## 40. BILGE SYSTEM

### Standard nomenclature

Bilge alarm

Bilge manifold

Bilge pump

**Bilge suction pipes** – bilge main, bilge branch

**Bilge system** – alternative bilge system, combined bilge system, independent bilge system, machinery space bilge system

Bilge valve

Bilge water, oily bilge water

Bilge water tank

Bilge water treatment

Bilge well

Coalescence

Direct bilge suction

Emergency bilge suction

Emulsion

Flow rate

Mud box, strainer, strum box, tail pipe

Oil discharge

Oil-in-water emulsion

Oil-in-water monitor

Oil pollution prevention

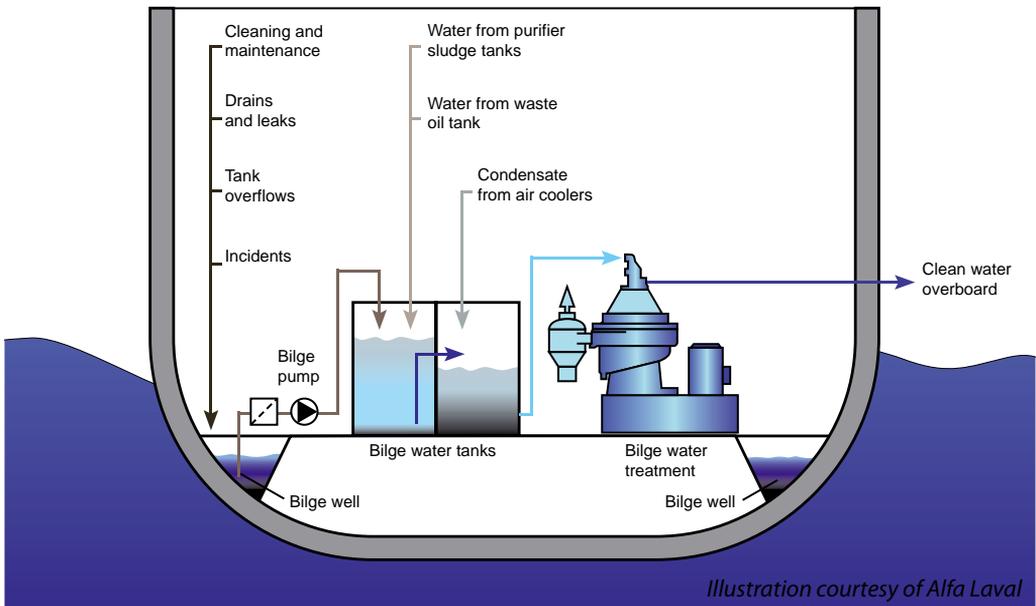
Oily water separator (OWS)

Overboard outlet

Ppm – parts per million

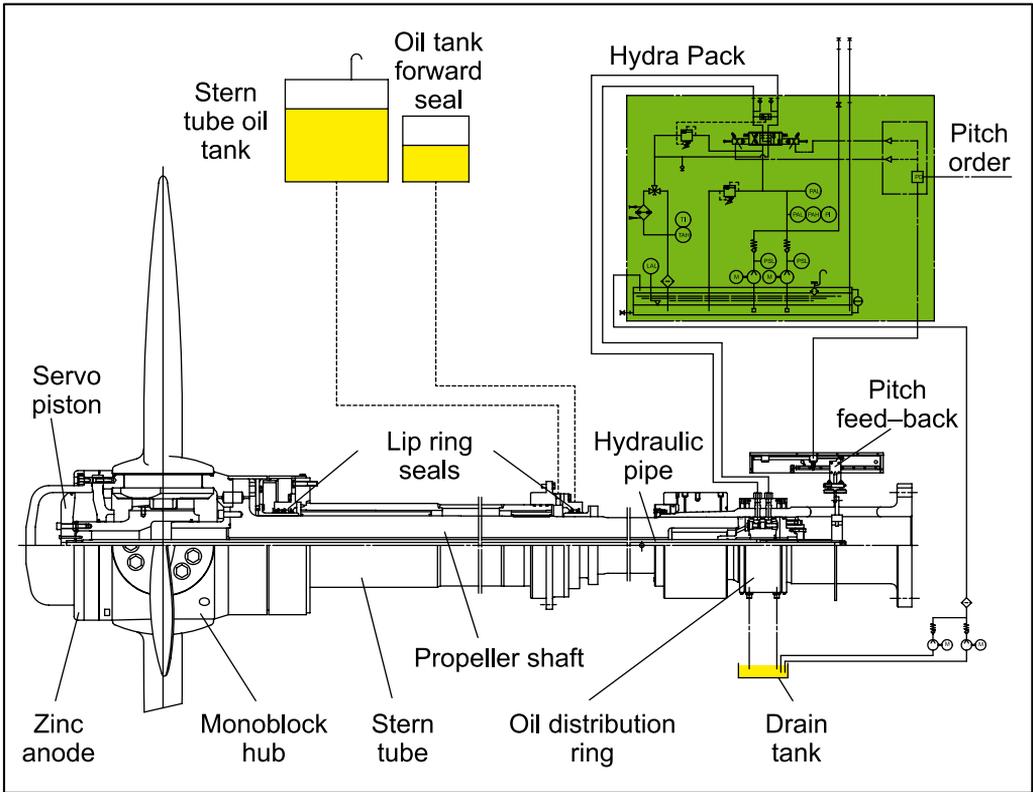
Sampling point

Sludge tank



*Alfa Laval EcoStream bilge water treatment system*

## 42. PROPULSION SYSTEM



**Equipment for direct-driven two-stroke propulsion system**

*Illustration courtesy of MAN Diesel*

### Standard nomenclature

Alignment

Bearing

Clutch

Controllable pitch propeller (CPP)

Coupling flange

Hydraulic power unit

Hydraulic servo motor

Liner

**Oil Distributor Box (OD box)** – gearbox integrated OD-box, gearbox mounted OD-box, shaft mounted OD-box,

Oil distributor ring

Pitch control

Pitch feed-back

Pitch regulating mechanism

Pitch setting

Reduction gearbox

Seal

Servo oil pump

Servo oil system

Servo piston

**Shaft** – cardan shaft, intermediate shaft, propeller shaft, tailshaft

Shaft bearing

Shaft earthing device

Shaft locking device

Shafting

Stern frame boss

Stern tube

**Stern tube seals** - forward (inboard) seal, outer seals

Torsional vibration

White metal liners