

				船名 SHIP		24m 供油船 24m FUEL SUPPLY SHIP		技术设计 TECHNICAL DESIGN	
				图名 TITLE					
				船体说明书 HULL SPECIFICATIONS					
版本 REV.		说明 DESCRIPTION		日期 DATE		图号 DRAWING NO.		质量 (Kg)	
船级社 CLASS		CCS		船号 HULL NO.		WUT543A-100-01SM		比例 SCALE	
船东 OWNER		英柏斯领航私人有限公司 IMPEX NAVIGATION PTE LTD		控制号 CONTROL NO.				页数 PAGES	
档案号 (SERIES NO.)		船厂 BUILDER						1/15	
		设计 DRAWN		会签 COUNTERSIGN					
入库日期 (STORE DATE)		校对 CHECKED		会签 COUNTERSIGN					
		审核 VERIFIED		会签 COUNTERSIGN					
		审定 APPROVED		日期 DATE		2012-08			

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## 1 总体 General

### 1.1 船型 Type of Ship

本船为钢质全电焊结构，具有单甲板、单壳、双层底、尾机型，尾部上甲板以上设有一层甲板室，全船设有 6 个货油舱，由柴油机驱动螺旋桨推进的双桨、双舵的油船/供油船。

The vessel is designed and built as all-welded steel structure, with single deck, single hull, double bottom and aft engine type. There are one deck houses above the aft upper deck and 6 cargo oil tanks. The vessel is a product oil / bunkering (fuel oil supply) tanker driven by two diesel engines with twin screws and twin rudders.

### 1.2 航区及用途 Navigation Area and Purpose

本船航区为沿海航区，主要用于运输/供应闪点 $>60^{\circ}\text{C}$  成品油。

The vessel is of coastal navigation and designed to carry and supply product oil of flash point  $> 60^{\circ}\text{C}$ .

### 1.3 船级、规范及规则 Class, Rules and Regulations

#### 1.3.1 船级与挂旗 Class and Flag

本船由中国船级社（CCS）登记入级，拟取得如下船级符号与附加标志：

The vessel is to be classed with CCS and shall get the following class notation:

★CSA OIL TANKER,FP $>60^{\circ}\text{C}$ ,

30-NMILE LIMIT VOYAGE OR PLYING WITHIN THE PORT(SINGAPORE),

★CSM

本船挂新加坡旗。

Flag : Singapore

#### 1.3.2 规范与规则 Rules and Regulations

本船船体、机械、设备的设计和建造基于建造合同生效日的下列规范、规则 and 所有修改通报要求进行。

The hull, machinery and equipment shall be designed and built according to the following rules and regulations with all relevant amendments effective at the date when the building contract comes into force:

1. 钢质海船入级规范 2012（CCS）；

Rules and Regulations for the Construction and Classification of Sea Going Steel Ships2012（CCS）

2. 新加坡非公约船规定

Singapore merchant shipping (non-convention ships) safety regulations

## 3. 国际防止污染公约 (MARPOL), 1973 及 1978 年草案和修正案

International Convention for the Prevention of Pollution from Ship (MARPOL) protocol and amendment in 1973 and 1978

## 4. 国际载重线公约, 1966 和 1988 草案和所有的修正案

International Load Line Convention (ILLC) protocol and amendment in 1966 and 1988

## 5. 国际船舶吨位丈量公约, 1969

International Convention on Tonnage Measurement of Ships in 1969

## 6. 国际海上避碰规则 (1972 年) 及 1982 年修订本

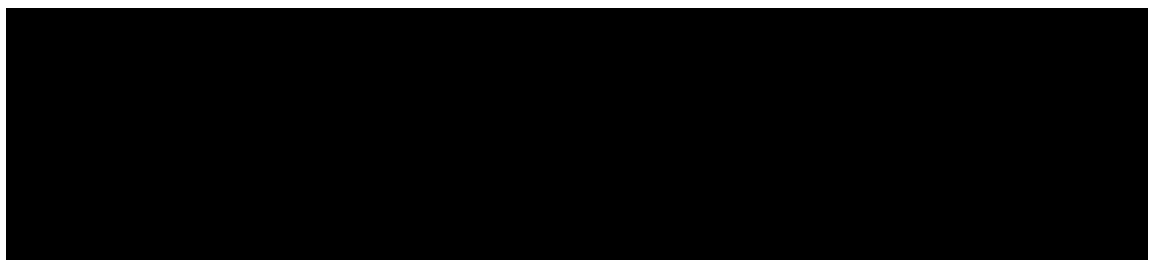
International Regulations for Preventing Collisions at Sea (COLREGS) in 1972 and revision in 1982

## 7. 新加坡港务当局(MPA)对港口加油船标准的规定

Standards for port limit bunker tankers, Maritime and Port Authority of Singapore

## 1.4 主要尺度及要素 Principal Dimensions

## 1.4.1 主尺度和要素 Principal Dimensions



Length O.A.	23.92m	Dead weight	about 310t
Length water line	23.50m	M.E. type	NTA855-M 2 sets
Length B.P.	22.70m	Power rated	261 × 2 kW
Breadth Mld.	9.80m	Service speed	about 10.0 kn
Depth Mld	3.65m	Navigation areas	Coastal area
Designed draft	2.65m	Complement	6 persons

## 1.4.2 甲板间高 Height between Decks

上甲板至顶篷甲板 Upper Deck to Roof Deck 2.40m

顶篷甲板至罗经甲板 Roof Deck to Compass Deck 1.20m

## 1.4.3 全船肋距 Frame Spacing

全船肋距 Frame spacing 0.60m

## 1.4.4 双层底高度 Height of Double Bottom

Height of Double Bottom 0.80m

## 1.4.5 船员定额 Complement

全船船员定额 6 人。

Complement: 6 persons

### 1.5 舱容 Capacity

货油舱容积 Cargo oil tankers	about 337.52m <sup>3</sup>
柴油舱容积 Diesel oil tanks	about 14.68 m <sup>3</sup>
淡水舱容积 Fresh water tanks	about 12.52 m <sup>3</sup>

### 1.6 吨位及载重量 Tonnage and Deadweight

#### 1.6.1 吨位 Tonnage

国际船舶吨位丈量公约，1969 的规定计算。

Tonnage is calculated in compliance with International Convention on Tonnage Measurement of Ships (1969).

总吨位 Gross Tonnage (GT) 210

净吨位 Net Tonnage (NT) 79

#### 1.6.2 载重量 Deadweight

本船在满载设计吃水，海水密度为 1.025t/m<sup>3</sup> 时，载重量约 326.6t，本船实际最大载重量待船舶完工倾斜试验后，经空船重量测定后确定。

The deadweight shall be 326.6t at design draft and density of water is 1.025t/m<sup>3</sup>, the actual maximum deadweight is to be determined after the inclining test.

### 1.7 主机、齿轮箱及螺旋桨 Main Engine, Gearbox and Propeller

#### 1.7.1 主机 Main Engine

型号：NT855-M 二台， 标定功率：261X2 kW， 标定转速：1800r/min

Model: NT855-M, two sets, Rated power: 261X2 kW, Rated speed: 1800r/min

#### 1.7.2 齿轮箱 Gearbox

型号：300， 减速比：4.94:1

Model: 300, Reduction ratio: 4.94:1

#### 1.7.3 螺旋桨 Propeller

本船采用 MAU 型 4 叶螺旋桨，桨径约 1.40m，螺旋桨材料为 Cu4 锰铝青铜。

The type of propeller is MAU--4, diameter is 1.40m, and the materials of propeller is Cu4 manganese aluminum bronze.

### 1.8 航速、续航力及自持力 Speed, Endurance and Self-supportability

#### 1.8.1 航速 Service Speed

本船在设计吃水 2.65m，船体处于光滑无污底情况下，在风力小于蒲福风级 3 级的平静深水区域，主机发出 90% 的最大持续功率，5% 的海上风浪裕度时的服务航速约 10.0kn。

At designed draft of 2.65m with clean bottom, calm deep water, wind force less than Beaufort scale 3, 5% of the sea wave margin and the main engines running at 90% of the maximum continuous power the service speed is approximately 10.0 knots.

#### 1.8.2 续航力及自持力 Endurance and Self-supportability

本船在主机发出 90% 的最大持续功率，风力为蒲福风级 3 级以下海况时，服务航速为 10.0kn 时的续航力为 50 小时。

The endurance is 50 hours when wind force is less than Beaufort scale 3, the main engines run at 90% of the maximum continuous power and the service speed is 10.0 knots

本船自持力为 100 小时。

The self-supportability shall be 100 hours.

#### 1.9 干舷和稳性 Freeboard and Stability

本船在设计吃水 2.65m 时的干舷为 1008mm，《新加坡商船法》第 179 章第 100 条要求所核算的最小干舷。

The freeboard is to be 1008mm at designed draft of 2.30m, complying with minimum freeboard of chapter 179, section 143 of 'Merchant Shipping Act'.

各种装载情况下的完整稳性及破损稳性满足新加坡《商船法（179）》及《2008 国际完整稳性规则》（MSC. 267 (85)）对油船稳性要求进行校核。

This calculation shall be checked according to the stability requirement for cargo ship by *Commercial ship law (179)* of Singapore and *International Code on Intact Stability, 2008, as contained in IMO*

*Resolution MSC.267(85)..*

液体密度按：

Liquid density as follows,

柴油 Diesel Oil : 0.90 t/m<sup>3</sup>

燃油 Fuel Oil : 0.95 t/m<sup>3</sup>

滑油 Lubricating Oil : 0.90 t/m<sup>3</sup>

淡水 Fresh Water : 1.00 t/m<sup>3</sup>

压载水 Ballast Water: 1.025t/m<sup>3</sup>

#### 1.10 总布置概况 General Arrangement

全船共设 5 道水密横舱壁，分别位于 FR2、FR13、FR18、FR28、FR33 肋位。依次设置舵机舱、淡水舱、机舱、6 个液货舱、首尖舱。

There are eight(5) water-tight transverse watertight bulkheads throughout the hull at frame number FR2, FR13, FR18, FR28, and FR33, dividing steering engine room, fresh water tank, engine room, 6 liquid cargo tanks, forepeak.

- (1) 双层底 Double Bottom
- (2) 货舱内双层底: FR24~FR33 为 NO.1 空舱(左/右);  
FR13~FR24 为 NO.2 空舱(左/右);

Double bottom

Frame number FR24~FR33: NO.1 void tank (P&S)

Frame number FR13~FR24: NO.2 void tank(P&S)

- (3) 尾部船舱及机舱 Stern Compartment and Engine Room

尾封板~FR2 设舵机舱;

机舱位于 FR2~FR13, 长 6.60m。

Stern transom plate ~ FR2: steering engine room

Frame number FR2 ~ FR13: engine room, the length is 6.60m.

- (4) 货油舱 Cargo oil tank

全船共设有 6 个货舱, FR28 ~ FR33 为 NO.1 货油舱(左、右), FR18~FR28 为 NO.2 货油舱(左、右), FR13~FR18 为 NO.3 货油舱(左、右)。

There are total 6 cargo holds,

Frame number FR28~FR33: NO.1 cargo oil tank (P&S)

Frame number FR18~FR28: NO.2 cargo oil tank (P&S)

Frame number FR13~FR18: NO.3 cargo oil tank (P&S)

- (4) 首尖舱 Fore Peak Tank

FR33~首为首尖舱。

Frame number FR34~bow: fore peak tank.

- (5) 上甲板 Upper Deck

尾~FR2 布置甲板机械。FR2~FR9 布置有厨房、餐厅、船员室、卫生间。

Stern ~ FR2: deck machinery

galley & mess room , toilet, crew cabins

- (6) 顶篷甲板 Roof deck

顶篷甲板 FR2~FR4 为烟囱, 左右舷各布置一艘 6 人抛投式救生筏。

Frame number FR2~ FR4: funnel and two 6-person life rafts on port and starboard fitted

- (7) 罗径甲板 Compass Deck

罗径甲板上, 设有雷达桅一座, 其上设有雷达天线一套以及各种号灯等。

There is one radar mast on compass deck on which a set of radar antenna and a variety of

signal lights are fitted.

### 1.11 备品和属具 Spares and fittings

本船配齐规范所规定的备品和属具。符合规范要求的机电产品及其随机备件和船东指定的备品备件由船厂安放在相应的适当位置。

All spares and fittings required by Rules shall be provided. The electric and mechanical products as well as the spare parts and spare & fittings ordered by the owner shall be stored at suitable place by the builder.

## 2 船体结构 Hull Structure

### 2.1 概述 General

#### 2.1.1 设计依据 Design basis

1. 船体结构按钢质海船入级规范 2012 (CCS) 对沿海双底、单壳油船的要求进行设计。

The primary members are to be designed refer to the requirement of Rules and Regulations for the Construction and Classification of Sea Going Steel Ships2012 (CCS) for coastal areas oil tanker.

#### 2.1.2 结构型式 Construct form

##### 2.1.2.1 概述 Summary

本船为单甲板、单壳、双层底、钢质全焊接结构的油船。货油舱区设双层底，其他区域为单底结构，货油舱区域外底、内底、边舱、上甲板为纵骨架式，舷侧为横骨架式。

The ship is all-welded steel structural oil tanker with single deck, with single deck, single hull, double bottom is located under cargo oil tank area and single bottom in other area. The hull structure is of combined framed type with longitudinal framing in regions of cargo oil tank, outer bottom, inner bottom, side tanks and the upper deck and transverse framing in all the other regions.

##### 2.1.2.2 肋骨间距 Frame Spacing

全船肋距 Frame spacing: 600 mm

##### 2.1.2.3 双层底高度及梁拱 Height of double bottom and Camber

货油舱区双层底高度 Height of double bottom in cargo oil tank region: 800mm

梁拱 Camber: 150mm

##### 2.1.2.5 建造材料及结构 Construction materials and structures

本船材料选用普通强度钢，材料级别应根据不同部位构件的应力状态，构件厚度以及工作环境、温度等条件按 CCS 《材料与焊接规范》对材料的要求来确认。材料的生产厂商



应由 CCS 认可，并盖有 CCS 印记。

The material of this vessel shall be ordinary strength steel. Grade of material shall be determined base on the stress condition of components in different position, thickness of structural members and the working environment, temperature etc and according to the Rules for Materials and Welding issued by CCS. Material manufacturers must be approved by the survey departments, and stamped with the imprint of survey departments.

主船体板材和型材均采用 A 级船用碳素钢。The plates and bars for the main hull shall be carbon steel of A class.

本船首柱为钢板焊接而成。货油舱舱壁采用油密平面纵、横舱壁。其他位置处的舱壁均为平面舱壁。

The stem post are welded by steel plates. Plane type of oil-tight longitudinal and transverse bulkheads are adopted for cargo oil tank. The bulkheads for all the other location are of plane ones.

货油舱舱底为双层底结构。内、外底各设间距为 550 mm 的内底纵骨和船底纵骨。

The structure under cargo oil tank region is of double bottom. Inner bottom longitudinal and bottom longitudinal of 550mm spacing to be fitted in tank top and bottom plate.

#### 2.1.2.6 船体结构焊接 Hull structure welding

船体结构的焊接，要求按“船体结构焊接规格表”进行。船厂应编制合理可行的焊接工艺和规程，以便尽量减少焊接引起的变形，焊接船体结构的焊接材料满足 CCS《材料与焊接规范 2012》的相关要求。

Welding of hull structure is to comply with ‘Hull Welding Specification’. Shipyard should plait reasonable and feasible welding procedures to reduce the distortion caused by welding. The welding material of the hull structure should be consistent with the requirement of Rules for Materials and Welding 2012 issued by CCS.

#### 2.2 表面预处理和涂装 Surface Preparation and Painting

所有钢结构构件在实施涂漆前都要经过预处理，除锈、上底漆，除锈按照下面的概要进行，并符合油漆厂商要求和建造方的标准。

All steel construction should be prepared to remove the surface rust and to have priming coat before painting. Rust removal to be done in accordance with the following summary and instruction / standard demanded by both paint maker and the builder.

所有锐利的边界，小孔的边界，例如切口、通焊孔和排水孔等，和结构的切割自由边都要磨光。所有分段的抛丸或喷砂处理和涂装作业都要在具备合适环境条件下完成，并符

合油漆厂商的规定。

All sharp and small hole boundaries, such as incisions, clearance holes, drainage holes and cutting free edges of structure etc. are to be grounded and polished before painting. Shot blasting or sand blasting and painting for all sections shall be done under suitable environmental conditions and in accordance with the requirement by paint maker.

所有的喷漆要满足船体阴极保护的要求。

All spray painting shall meet the requirements of ship's cathodic protection.

通常, 超过 6mm 厚的船体结构板要抛丸处理至 Sa2.5 级。在抛丸处理不可行的情况下, 也可喷砂或手工和动力工具除锈处理至 Sa2.5 或 st3 级。管材、小型零部件及 6mm 以下的船体结构板, 可采用酸洗方式除锈或喷砂或手工和动力工具除锈处理至 Sa2.5 或 St3 级, 表面粗糙度应达到“涂装前钢材表面粗糙度等级的评定”规定的中级标准。分段接缝处的表面的预处理通过打磨来完成。

In general, hull plate of over 6mm thickness should be shot blasted to reach Sa2.5 level. In the case shot blasting is not applicable, de-rusting shall be done by sand blasting or manual and power tool to reach Sa2.5 or St3 level. Acid cleaning or sand blasting or manual and power tools de-rusting can be used to reach Sa2.5 or St3 level for tubes, small parts and hull plates of less than 6mm in thickness. The roughness of the surfaces should reach intermediate standard of 'Assessment of Steel Surface Roughness Level before Painting'. Surface preparation of section seams shall be carried out by grinding.

经过抛丸或喷砂或手工和动力工具除锈的初步表面预处理之后, 应及时涂上车间底漆予以保护。在第一次涂装前要用电动钢刷对预涂底漆进行除锌做第二次表面处理, 并进行涂漆前的表面清洁, 达到要求后再实施涂装。

After initial surface preparation by shot blasting or sand blasting or manual and power tools, prime coating should be done in time for all the polished parts. The second surface preparation to be done by electric brush to clean zinc on the primer before the first painting. Surface cleaning to be done to meet the painting requirements and then painting to be carried out.

### 2.3 涂装 Painting

油漆的涂装工艺应符合制造厂规定。

淡水舱内要求做环氧漆。

具体施工、涂装工艺及油漆配套方案详见《涂装协议》及《油漆配套方案》。

Painting workmanship should comply with paint maker's requirements.

Fresh water tanks should be epoxy painted.

Painting Agreement and Paint Matching Program describe in detail the painting scheme, workmanship and combination of paints.

### 3 甲板舾装部分 Deck Outfitting

#### 3.1 锚泊设备及系泊设备 Anchoring and Mooring Equipment

本船舾装数约为 155.25，据规范，本船锚泊设备按计算舾装数依表（1）的要求沿海航区的船舶舾装数降 1 档选取；系泊设备则按计算舾装数 N 依据表（3）的相应要求予以配置。

The outfitting number of this ship is 155.25. The selection of the equipment is based on item of the Rules, anchoring equipment is selected one level lower as per Ship Outfitting Number Table (1) (Coastal Navigation Ship) and the mooring equipment is selected as per the Table (3).

##### 3.1.1 锚泊设备 Anchoring Equipment

(1) 锚：艏锚采用斯霍尔锚 2 口，其中备用锚 1 口，每口锚重 420kg。

(2) 锚链：AM2 级有档电焊首锚链，直径  $\Phi 17.5$  mm，总长度 275m。

(3) 锚机：型号及数量：YMOE17.5 液压组合起锚机 1 台；适配锚链直径：AM2- $\phi 17.5$ mm；

(1)Anchor: two sets of fore anchors (one is spare), Hall's type, Weight: 420kg each

(2)Anchor Chain: AM2 stud welded anchor chain, Dia.:  $\Phi 17.5$ mm, Total length:275m

(3)Anchor windlass: model and number: 1 YMOE17.5 hydraulic combined windlass.

Anchor chain Dia.: AM2- $\phi 17.5$ mm;

##### 3.1.2 系泊设备 Mooring Equipment

(1) 14 ZAB 6×37S+FC 1570 ZS 101 纤维芯镀锌钢丝绳 1 根，破断负荷 101kN>98.1kN，长度 180m。

(2)  $\Phi 24 \times 8$  股丙纶长丝绳系船索 3 根，破断负荷为 91.8kN>49kN，每根长 120 m。

(3) 带缆桩：A200 型 12 只。

(1) One pair of 14ZAB 6×37S+FC 1570 ZS 101 Galvanized steel rope , Breaking load to be 101 kN>98.1kN, Length to be 180m.

(2) Three pairs of $\Phi 24 \times 8$  Unit Polypropylene long wire rope bridle, Breaking load to be 91.8 kN>49kN, length of each cable to be 120 m.

(3) Bollards: A200 type 12 pieces .

#### 3.2 舵 Rudder

(1) 舵设备 Rudder

舵面积 Area A  $1 \times 2 \text{m}^2$

展舷比 Aspect ratio  $\lambda$  1.464

平衡比 Balance coefficient  $\beta$  0.286

(2) 舵杆 Rudder stock

舵柄处舵杆直径为 130mm;

下舵承处舵杆直径为 180mm;

材料: 船体结构用锻钢。

Diameter of rudder stock at tiller to be 130mm;

Diameter of rudder stock at lower rudder bearing to be 180mm;

Material: forged steel for hull structures.

(3) 舵机 Steering gear

本船采用电动液压舵机 1 台。型式: 端铰摆缸式; 公称扭矩: 16kN-m; 转舵角度:  $\pm 32.5^\circ$ ;

One set of electro-hydraulic steering gear. Type: shift fork type. Nominal torque: 16kN-m.

Angle of helm:  $\pm 32.5^\circ$  ;

### 3.3 救生设备 Life-saving Appliances

救生设备按新加坡本地商船法（非公约船舶）对闪点大于60度的成品油船的要求配备。

Life-saving appliances are to be equipped as per the requirement for coastal product oil tanker under Singapore merchant shipping (non-convention ships) safety regulations.

(1) 救生筏 Liferaft

本船顶篷甲板尾部左右舷配备 6 人抛投式气胀救生筏 KHB-6 各一只; 登乘绳梯 2 部。

Two sets of 6-person liferafts KHB-6 with two rope ladders are to be equipped at port side and starboard side on Roof deck.

(2) 救生衣、救生服和救生圈 Life jacket、Life suit and life ring

全船配备 14 件救生衣, 每件救生衣配备救生衣灯与哨笛。每人还配备 1 套合适的救生服, 共 6 套。

全船配置救生圈 4 只, 其中带自亮灯 1 只, 带救生浮索每舷各 2 只。

14 sets of lifejackets with lights and whistles to be equipped. One set of life suit is also to be provided for each crew, 6 sets in total.

4 sets of life rings to be equipped and among which 1 sets are of self-lighting light type and 2 sets with buoyant rope placed at each side.

(3) 烟火信号设备 Pyrotechnic Signal Equipment

全船共配置经认可的火箭降落伞火焰信号 6 枚。

6 sets of approved rocket parachute flare signal to be equipped

### 3.4 消防设备 Fire-Fighting Equipment

消防设备按新加坡本地商船法（非公约船舶）对闪点大于60度的成品油船的要求配备。全船配有水灭火系统1套。

Fire fighting equipment is to be provided as per the requirement of Singapore merchant shipping (non-convention ships) safety regulations.

One set of water fire-extinguishing system shall be provided.

(1) 消火栓、水龙带箱及水龙带和水枪 Fire hydrant, hose locker, hose and squirt

全船设有 3 个消火栓和配 3 个水龙带箱，上甲板区域水龙带箱配备消防水带（15m）和水枪共 2 根，机械处所配备消防水带（10m）和水枪 1 根。水龙带箱的存放位置应尽量靠近消火栓。

The vessel to be equipped with Fire hydrant, hose locker, hose and squirt as below,

On upper deck

FIRE HYDRANT 2

FIRE HOSE(15m)& NOZZLE 2

Machinery space

FIRE HYDRANT 1

FIRE HOSE(10m)& NOZZLE 1

The hose locker shall be installed nearby the fire hydrant.

(2) 灭火器 Fire extinguisher

全船配有手提式 9L 泡沫灭火器 4 只，5kg 干粉灭火器 3 只。手提式 CO<sub>2</sub> 灭火器 (5kg) 2 只。

The vessel to be equipped with 5 portable foam fire extinguishers (9L) and 3 dry powder fire extinguishers (5kg), 2 portable CO<sub>2</sub> extinguisher s(5kg)

### 3.5 金属门、窗、盖 Metal doors, Windows and Covers

(1) 金属门 Metal Doors

本船所有舱室与外部相通的出入口以及作为采光或通风的窗均设置风雨密单扇钢质门和窗。所有外部的门均朝舷外开启，甲板室外侧壁上的门朝前开。

The access doors from outside to all compartments as well as the windows for light or for ventilation are of weather-tight single-leaf steel type. All external doors shall be opened towards outboard, the door on sidewall of deck houses shall be opened towards forward.

金属窗 Metal Windows

上甲板甲板室外围壁上装设焊接固定式组合舷窗（带棘爪式风暴盖）；其余各层甲板室（驾驶室前端壁和前侧壁除外）外围壁上均装设焊接安装可开启的船用普通矩形窗，每

个舷窗和矩形窗装设玻璃钢成型窗套盒；驾驶室前侧壁和前端壁上装设较宽大尺寸的焊接安装固定式船用矩形窗，且前端壁窗户上装有水平运动式雨刮器。

Fixed combined scuttles with storm cover of pawl type to be installed on external wall of deckhouse on upper deck. The ordinary openable marine rectangular windows to be installed by welding on the external wall of the rest deckhouses (the front bulkhead and forward sidewall of wheelhouse excluded). The fiberglass-reinforced glass holder to be equipped for each scuttle and rectangular windows. The fixed marine rectangular windows of bigger size to be installed by welding on front bulkhead and forward sidewall of wheelhouse. Clear view screen and shall be installed on the window of the front bulkhead of wheelhouse.

(2) 舱口盖及人孔盖 Hatch covers and the manhole covers

从上甲板进入液货舱、污油水舱设有转动式油舱盖；

The rotary oil hatch covers to be installed and lead the way from upper deck to cargo oil tanks and slop tanks.

### 3.6 扶梯、栏杆和扶手 Stairs, Guardrails and Handrails

(1) 梯：各层甲板封闭围壁内设垂向直通主梯，室外各层设有斜梯通达。斜梯采用 55°×600。

(2) 栏杆

上甲板、顶篷甲板四周均设有高度为 1000mm 的栏杆，栏杆撑柱采用 60×16 的扁钢，横杆采用  $\phi 20$  的圆钢，扶手采用  $\phi 42.3 \times 3.25$  的镀锌水煤气钢管。

(3) 风暴扶手

全船室内走道均设置不锈钢管风暴扶手；沿甲板室外围壁的外侧设镀锌钢管制成的风暴扶手。

(1) Stairs

There are vertical straight main stairs in the closed casing wall and inclined outside stairs leading the way between each deckhouse. The inclined stairs are made of steel 55°×600.

(2) Guardrails

Guardrails of 1000mm in height to be fitted on all around upper deck and the Roof deck. Guardrail daggers are of 60 × 16 flat steel, cross bars are of  $\phi 20$  round bar and guardrails are of  $\phi 42.3 \times 3.25$  galvanized water/gas pipes.

(3) Storm Rails

The storm rails made of stainless steel are to be installed in all inner aisles of deckhouses. The storm rails made of galvanized steel are to be welded on the external wall of deckhouses.

### 3.7 航行及信号设备 Navigation and Signal Equipment

航行及信号设备按国际海上避碰规则(1972年)及1982年修订本对沿海航区油船的要求配备。

#### (1) 雷达桅

罗经甲板上设置钢板焊接结构的雷达桅1座,其上设有雷达天线、号灯、号笛等。

#### (2) 号型、号旗及声响信号器具

信号设备除号灯、闪光灯设于指定位置外,号型(如锚球)、号旗、声响信号器具等按法规要求配齐。

Navigation and signal equipment shall be equipped as per the requirements of International Regulations for Preventing Collisions at Sea (1972) and revision in 1982 for oil tanker of coastal navigation.

#### (1) Radar Mast

On compass deck set one steel-welded radar mast on which the necessary navigational and radio equipment such as radar antenna, lights, whistle and lightning rod etc. are fitted.

#### (2) Shapes, Flags and Sound Signal Fittings

In addition to the lights and flashers at the specified location, signal fittings such as shapes ( anchor ball etc.), flags and sound signaling apparatus and other equipment are to be installed according to regulations