ICD 0557

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S.D. GUMEL

HANDY SIZE TRAILING SUCTION HOPPER DREDGER FOR NIGERIAN PORTS PLC

Builders : Rynwaal Shipyards, Hardinxveld, The Netherlands
Owners : Nigerian Ports Plc, Lagos, Nigeria

Recently Hardinxveld-based *Rynwaal Shipyards* completed a twin screw trailing suction hopper dredger *'S.D. Gumel'* for *Nigerian Ports Plc* based in Lagos. Built under yard number 711, the 2,500m^3 hopper dredger is a larger and more powerful version of the in late 1996 delivered *'River Chalawa'* (described in depth in *HSB International*, December 1996), completed for the same owner. The hopper dredger features a hard chine hull form and is equipped with a trailing suction installation for dredging operations in waters with a maximum depth of 25m. The bottom section of the hopper features two rows of eight hinged hydraulically operated box-shaped bottom doors. Between these two rows of bottom doors a so-called chicken cage is fitted. The design and construction of the *'S.D. Gumel'* complies with the requirements stipulated in the legal instruments and/or authoritative rules and regulations in force. The vessel has been built under special survey and to the Rules and Regulations of *Lloyd's Register of Shipping*, class notation: ✠ 100 A1 ✠ LMC Hopper Dredger.

The dredger also meets the following international rules and regulations:
- Marpol regulations
- International Convention for Safety of Life at Sea, 1974;
- International Convention on Load Lines, 1966;
- International Conference on Tonnage Measurements of Ships, 1969;
- IMO regulations.

Performance Criteria

Named the *'S.D. Gumel'*, the trailing suction hopper dredger is designed to dredge silt/clay soils with a maximum mean mixture density of 1,200-1,300kg/m^3.
As such the dredger can perform the following dredging operations:

- dredging by means of the trailing suction pipe and discharging the spoil into the hopper, or directly overboard in case of too light spoil;
- discharging the spoil through the bottom doors, operated by a hydraulic cylinder;
- emptying the hopper of water, prior to dredging;
- emptying the hopper of soil, and discharging the soil to the shore over the bow.

Construction

The hull of the *'S.D. Gumel'* is subdivided into watertight compartments with all major tanks incorporated in the hull construction. In way of engines, winches, gantries, anchors, etc. the construction and/or plate steel sections have been reinforced. From stern to stem the hull is subdivided into the following watertight compartments viz. aftpeak, engine room, stores, buoyancy compartment section, pumproom, and forepeak.

The *'S.D. Gumel'* features the following characteristics:

Principal particulars

Length o.a.	89.30 m
Beam mld.	15.50 m
Depth mld.	6.00 m
Draught loaded	5.00 m
Accommodation	18 crew

Dredging installation

Dredging depth	25.00 m
Hopper capacity	2.500 m^3
Number of bottom doors	16
Number suction pipes	2
Diameter suction pipes	600 mm

Installed power

Dredging pumps	2 x 595 kW
Jet pumps	2 x 78 kW
Propulsion	2 x 885 kW
Speed	9.5 knots

Tank capacities

Fuel oil	182.00 m^3
Lube oil	5.60 m^3
Dirty oi	4.70 m^3
Fresh water	43.30 m^3
Sewage	7.00 m^3

Shell plating thickness has been increased in way of propeller units, sea inlet chests and hawse pipes. A sheerstrake of 30mm is arranged at deck level. The construction of the hull is strengthened by transverse and longitudinal framings with 600mm frame spacings. All frames are welded to the shell by means of continuous weldings. The upper part of the stem is constructed of steel plate, the lower of round bar. The aft ship features a double plate skeg. The single bottom section is strengthened in way of the bottom doors to withstand the operational loads when loading and unloading via the sixteen box-type bottom doors.

A bulwark is fitted on the forecastle deck and constructed of 7mm thick steel plate with a HP profile toprail and flanged support brackets. Railing work is constructed of heavy flat bar stanchions and galvanised steel toprail and intermediate rails. All staircases and platforms are provided with railing work. The steel chain locker is of a self-stowing type. A large mud space has been arranged under the 20mm thick perforated bottom plate.

Hawse pipes are of ample diameter and feature steel covers. The lower end of the chain pipes are cylindrical of shape and strengthened with round bar. An arrangement for slipping of the anchors near the entrance of chain locker has been provided. Further, the forecastle features two double mooring bollards and four at the quarterdeck. Cast iron mooring ports are integrated in the forecastle bulwark and quarterdeck. All outside staircases are of steel with non-skid steps and galvanized handrails.

All steel of the vessel has been shot blasted in advance to SA 2.5 and treated with one coating layer of 22 micron *Sigmaweld MC* shop primer. The wet surface area of the hull is protected by an adequate cathodic protection system with anodes fitted in way of propellers and boxcoolers. The cathodic protection system includes an ample number of anodes for a two year protection period.

The dredgemaster's console provides an unobstructed view to the hopper section

Accommodation

The accommodation deckhouse with wheelhouse on top is of rigid steel construction, framed and provided with steel subdivision bulkheads for wet spaces and machinery equipment.

The complete deckhouse is resiliently mounted on the quarterdeck by means of heavy adjustable *Dunlop* rubber shocks. Adjacent to the aft section of the accommodation deckhouse and separated by a covered corridor, is the engine room casing, comprising the funnel shafts, engine room ventilation shaft, CO_2 room and engine room entrance. On the foreship, at main deck level, adjacent to the forecastle deck, pumproom entrance and funnel casings are situated. All casings are of rigid steel construction and sufficiently framed. Aluminium *Freeman* hatches have been fitted in engineroom and pumproom.

The complete accommodation including cabins, messrooms and wheelhouse is climate controlled with an airconditioning installation. In addition the galley is also connected to the ac system for spot-cooling only. The ac plant is based on the following summer conditions:

Outside temperature .....38°C at 75% R.H.
Inside temperature .....30°C at 50% R.H.
Seawater temperature ....32°C.

The ac plant is based on 50% return air and consists of a central airconditioning unit (with filter, a V-belt driven centrifugal fan, including electric motor, a cooling section with air cooler, a thermostatic expansion valve and a discharge box. This unit supplies conditioned air to cabins, messrooms and galley); a pre-insulated spiroduct air pipe system with necessary room units; a R22 refrigerating plant. Low pressure equipment consists of axial flow fans (engine room, pumproom), and centrifugal fans (sanitary spaces, galley).

The accommodation is designed for a complement of 18 persons. On the main deck are the crew cabins, a galley, messrooms, a dry provision store, and the sanitary rooms. On the accommodation deck are situated the crew cabins, first officer cabin, the dredgemaster's cabin, the office and a sanitary room. On the bridge deck are situated the captain's cabin, the chief engineer's cabin, the wheelhouse, and the AC room. The captain's cabin, chief engineer's cabin and first officer's cabin have their own bathroom. All other cabins are provided with washbasin and mirror.

Division Bulkheads

All division bulkheads of the accommodation section are of 19mm thick cape marine board covered with plastic laminate on both sides. In galley and sanitary spaces wall lining consists of 19mm thick cape marine board with laminate on both sides only. Ceilings are of 12mm thick cape marine board with plastic facing. All division bulkheads, linings and ceilings are of fire-retardant quality. Inner doors are executed as B15 doors. All door frames are provided with stainless steel door steps. All decks have a sound-insulating floor covered with vinyl. Floor coverings in galley and sanitary spaces consist of concrete with non-skid ceramic tiles. The messrooms, cabins and allyways are covered with vinyl and the wheelhouse flooring is coverd with rubber. The galley is provided with the following household equipment: electric cooking range with four plates and oven; refrigerators and freezers with a total capacity of 1650ltrs; a dresser with stainless steel top and one sink.

- hopper delivery valve control;
- hopper drain valve control;
- shore delivery valve control
- light mixture overboard valve control;
- bottom doors control;
- launder doors control;
- window wiper control;
- wave compensator.

Navaids & Communications Systems

The wheelhouse of the *'S.D. Gumel'* is fitted with a comprehensive range of navigational aids and communications systems supplied and installed by both *Alphatron* and *Kelvin Hughes Observator*. *Litton Marine* supplied the gyro-compass. In bad weather conditions such as heavy rain fall, visibility to the vessel's surroundings is guaranteed by sturdy window wipers fitted in front windows, side and aft windows. A talk-back installation has been provided as well as a loudhailer fitted on the wheelhouse topdeck. A sound powered emergency telephone takes care of the communication between bridge and engine room. An extra head set has been installed to be used for communication with the bridge in case of operating with the emergency control systems in the engine room. Navigational aids fitted in the wheelhouse include:

- two *Kelvin Hughes* Nucleus 5000 colour radar systems;
- two VHF sets with DSC;
- one rate-of-turn indicator;
- one river pilot;
- one rudder indicator;
- one GMDSS SSB radio;
- one electro-magnetic speed log;
- one echosounder;
- one shallow depth echosounder;
- one sea pilot;
- one Navtex;
- one homing device;
- one EPIRB;
- two SARTS;
- three GMDSS portables.

The wheelhouse is further fitted with consoles with combined alarm systems and remote controls for main engines and auxiliary engines.

Engine Room

The *'S.D. Gumel'* is fitted with a twin screw propulsion installation, consisting of two fixed pitch propellers and two resiliently mounted main diesel engines with *Masson* reduction gearboxes. The propulsion plant consists of two *Deutz MWM* air started, 4-stroke diesel engines, each developing 885kW at 1.800rev/min. The diesel engines in the pumproom are served by a separate fuel oil tank, which can be filled by means of a transfer pump which has its suction from the main bunkers. The steel exhaust pipes of all ship's diesel engines are led through the funnels on aft and fore ship and provided with 35dB(A) silencers, expansion bellows and thermal insulation.

In the foreship section, in the pumproom, a two channel bowthruster installation - supplied by *Veth Motoren* - with built-on diesel engine has been fitted for optimum manoeuvrability. An engine room workshop is situated in the forward part of the engine room. The workshop is fitted with a workbench, a grinding machine with two grinding disks of 150mm diameter, a column-type drilling machine suitable for workpieces with a maximum diameter of 23mm. In the engine room two stores are provided with shelves and racks for the storage of spares, ropes and loose fire-fighting equipment.

Electrical Installation

The electrical installation on board the *'S.D. Gumel'* embraces five circuits of which two AC circuits and three low voltage DC circuits, viz.:

- a 415V AC 3-phase circuit for power consumers;
- a 240VAC 1-phase circuit for small consumers and lighting;
- two 24VDC circuits for starting of diesel engines;
- a 24VDC circuit for controls, alarms and navaids;
- a 24VDC circuit for emergency lighting.

The electrical installation is fed by two main generator sets and one harbour genset, and features one shore supply connection, one lighting transformer, one 24VDC board net battery, two 24VDC starting batteries, one 24VDC radio battery, and a main switchboard.

Electric power is generated by three diesel driven AC generator sets installed in the engine room. The two main gensets are capable of coping with the full vessel's load on its own. The harbour set is for domestic purposes only. Gensets are fitted in a sound-isolated canopy and are fitted with stand-still heating system. Each main genset consists of a *Deutz* diesel engine driving a *Newage Stamford UCM 274 F* alternator developing 135kVA and supplying 240/415VAC at 50Hz. The harbour genset consits of a *Deutz* diesel engine driving a *Newage Stamford UCM 274E* altenator developing 112kVA.

The ship's main lighting installation consists of a 240V/50Hz circuit. Emergency lighting is with a 24VDC circuit. Navigation lighting is with a 24VDC system supplying five navigation lights, type *DHR 70*. Dredging lighting installation also consists of a 24VDC circuit powering eleven signal lights - single type *DHR 70*. A searchlight 240V/50 Hz with a 1000W halogen lamp is mounted on the wheelhouse topdeck and hand-operated from inside the wheelhouse.

Auxiliary Systems

Auxiliary systems in the engine room includes two *Sihi* general service pumps with a capacity of approximately 50m³/h at 30m head. Both pumps serve the bilge/ballast system and the fire-fighting/deckwash system. Further a diesel driven gland pump, make and type *Sihi AKHK 6101* with a capacity of approximately 20m³/h at 45m head. The pump is driven by the pump engine and serves as cooling water pump for the dredge pump gearboxes and hydraulic system, and flush pump for dredge pump shaft seal and dredge pipeline valves. Two *Sihi* diesel driven pumps with a capacity of approximately 500m³/h at 40m head serves as a jet pump for ease of emptying of the hopper. One *Sihi* fuel oil transfer pump with a capacity of 3m³/h at 25m head has been provided for transferring fuel oil from the main fuel oil tanks the daily fuel tanks. Also an *Alfa Laval* fuel oil separator is installed.

All diesel engines are provided with manually operated sump pumps. All diesel engines are provided with a lube oil pump incorporated in the engine lay out. Two *Sihi* dirty oil pumps with a capacity of 3m³/h at 2.5 bar are provided for emptying the dirty oil tanks in the engine room and pumproom. One *Sihi* sewage pump with a capacity of approximately 3m³/h at 2.5 bar has been provided for emptying the sewage tank. Two *Sihi* automatic fresh water hydrophores with 415VAC pump and 200ltr pressure vessel are provided for serving the freshwater system incorporating a 2 x 120ltr electric, 1-phase, 240V/50Hz calorifier with a heating capacity of 2kW. Two bilge water separators with a capacity of 0.5m³/h and one back to bilge system by oil alarm (more than 15ppm) are also fitted in the engine room as well as in the pumproom. Compressed air is delivered by two service air compressor fitted in the engine room and pumproom with service connections in engine room and workshop/store, and for the remote control of the hopper jet pipe valves, main engines and dredge pump engines.

Bilging & Ballasting

All watertight compartments, including the buoyancy compartments, and the water ballast tank are connected to the bilging/ballast system, which is served by the two general service pumps. All pipe sections are fitted with strainer boxes. Bilge water of engine room and pumproom are led through a bilgewater separator in advance of discharging overboard.

The deckwash/fire-fighting system is served by two general service pumps, and fitted with discharge connections in engine room, pumproom and at deck. A fresh water tank is integrated in the ships construction and connected to the fresh water hydrophore in the engine room. From the fresh water hydrophore a pressure distribution line lead to the showers, water closets, washbasins, and the galley sink in the accommodation. Hot water is supplied by two calorifiers. All fresh water piping is of copper.

The sanitary/sewage system comprises a sloped discharge line from drains to tank, a sewage tank situated in the engine room's double bottom, an electric sewage pump and a tank discharge line with deck connection and direct overboard connection. A waste oil system is situated in the engine room and pumproom. Both tanks are equipped with fill at site and electric discharge pump with deck connection.

The vessel's main hydraulic systems control the bottom doors, launder doors, hopper suction channel doors, valves and the suction line gantries and winches. All hydraulic pipe lines consist of seamless steel precision pipes and high pressure flexible hoses.

Fire-fighting Installation

The engine room and pumproom are protected against fire hazards with a fixed CO_2 fire extinguishing system. The system is designed for total flooding of engine spaces in compliance with the regulations of the authorities. The cylinders are installed in a separate CO_2 room. The cylinders have a nominal capacity of 67.5 litres and are each charged with 45kg CO_2 as per international standard. The cylinders are connected to a common discharge manifold with flexible hoses and spring loaded check-valves.

The cylinders are equipped with a pressure/manual operated quick opening valve, safety valve and internal sifon tube. The manifold is equipped with a pressure/manual operated main valve in the feed pipe to the engine room. From this valve the carefully graded discharge piping is leading to the engine room

The pre-fabricated deckhouse section is lifted into its position

View on the lowered part suction pipe

where it will terminate in multi-jet discharge nozzles arranged both above and below the floor plates. System controls are fitted in a steel plate box and consist of two door switches, one for ventilation stop and one for triggering the evacuation alarms.

Life-saving Appliances

Life-saving appliances fitted in accordance to the requirements of national authorities include:

- one 6-person m.o.b. boat;
- two inflatable 20-person life rafts;
- life buoys with self-igniting lights;
- life buoys with grab line;
- life jackets;
- one line throwing apparatus;
- parachute signals.

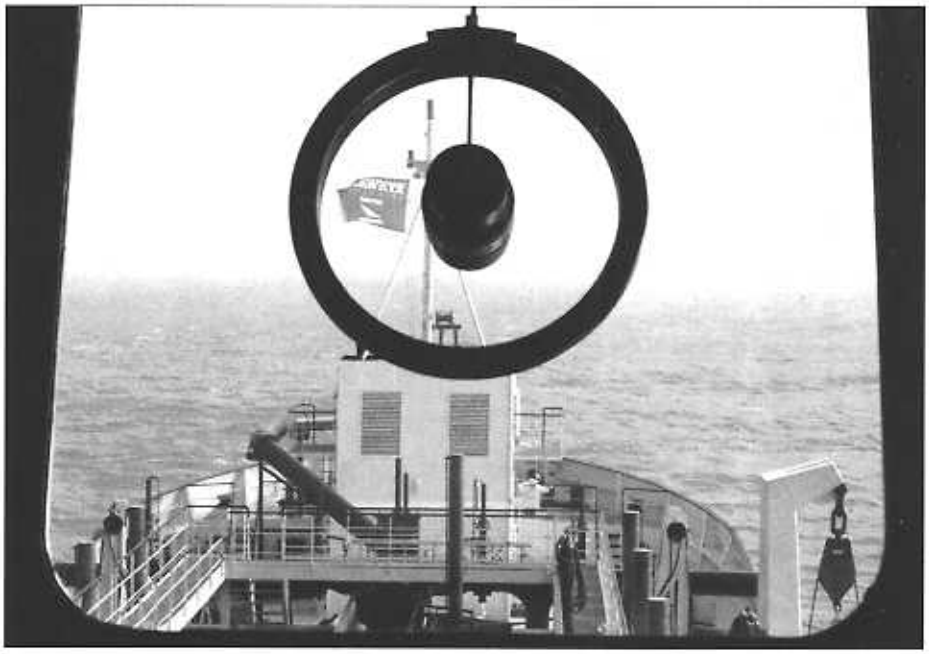
Further, a single arm mechanical stored power davit with rescue boat release hook, suitable to handle a rescue boat with a weight of 945kg fully equipped and manned with six persons. The davit is situated portside in front of the superstructure.

Fire-fighting appliances fitted include:

- 18m 2-inch diameter nylon fire hoses with nozzle and *Storz* couplings;
- portable powder and CO_2 extinguishers;
- fireman outfits;
- breathing apparatus complete with face mask.

Subcontractors and suppliers of equipment fitted on board the 'S.D. Gumel'
(partial list)

Alfa Laval, Maarssen . . . . . : fuel oil separators
Alphatron, Rotterdam . . . . . : navaids & communications systems
Blokland, Sliedrecht . . . . . : coolers
Breejen den, Sliedrecht . . . : paint application
De Jongs Pijpleidingen Fabriek, Sliedrecht . . . . . : pipe work
Drumarkon, Werkendam . . . : *Cape Marine Board,* profiles, *Rockskill* insulation, *Polyrey* laminate and *Momek* fire doors
Dunlop, Rotterdam . . . . . : rubber shock deckhouse mountings
Econosto, Capelle a/d IJssel . . . . . : valves & fittings
Gebhard-Electro, Oosterhout . . . . . : electrical installation
Hollandsche IJssel, Oudewater . . . . . : dredging equipment
Hydraudyne Pneumatiek, Rotterdam . . . . . : pneumatic equipment
JVS, Papendrecht . . . . . : *ETB* silencers
Kelvin Hughes Observator, Hoogvliet . . . . . : navaids
KHD Deutz Nederland, Rotterdam . . . . . : main engines & auxiliary engines
Lasco, Sliedrecht . . . . . : dredging pipes
Litton Marine, Vlaardingen . : gyro compass
Lloyd's Register of Shipping, Rotterdam . . . . . classification
Nederlek Piping, Krimpen a/d Lek . . . . . : hydraulic piping
Noordenne, Hardinxveld-Giessendam . . . : steel
Novenco, Bergschenhoek . . : ventilation
Poppeliers, Hoogvliet . . . . . : fire-fighting equipment
Prohand, Berkel . . . . . : anchors & anchor chain cables
Promac, Zaltbommel . . . . . : steering gear; rescue boat; davit windlass
Ridderinkhof, Hasselt . . . . : windlass
Rob Snel, Sliedrecht . . . . . : doors
Rubaflex, Rotterdam . . . . . : rubber seals bottom doors
Rubber Design, Heerjansdam . . . . . : exhaust suspension/ compensators
Scale Models Weston, UK . : scale model
Shell Nederland, Rotterdam . . . . . : lubricants
Sigma Coatings, Rotterdam . . . . . : paint systems
Simac CSI, Spijkenisse . . . . : ER alarm systems
Slivar, Ridderkerk . . . . . : galley inventory
Sperre, Ridderkerk . . . . . : starting air compressors
Sterling Sihi, Beverwijk . . . . : pumps
Stigt Van, Gorinchem . . . . . : reduction gearboxes
Taats, Dordrecht . . . . . : design
Theunissen, Malden . . . . . : *Aqua Signal* lighting & *Pesch* search lights
Transport & Offshore Services, Rotterdam . . . . . : training & delivery voyage
Unisol, Made . . . . . : insulation exhaust pipeline
Unistrut Benelux, Schiedam . . . . . : floor support systems
Veth Motoren, Papendrecht . . . . . : bowthruster units
Viking, Zwijndrecht . . . . . : life-saving appliances
Voorden Van, Zaltbommel . . : cp-propellers
Wingerden van, Gorinchem : portholes & windows
Winteb, Winschoten . . . . . : ventilation cowls



A type approved bow coupling is used to connect the discharge line to the floating pipeline

Dredging and Hopper Equipment

The suction pipes fitted on SB and PS of the *'S.D. Gumel'* are of a solid design, each with an internal diameter of 600mm and a wall thickness of 12.5mm. The articulated-type suction pipes, make *Hollandsche IJssel*, are hinged at the upper end and have a cardan in the middle. The upper end of the pipe is connected to the dredger in a sliding rail which is integrated in the dredger's hull. The rubber suction hoses in the hinge and in the cardan feature a thick wear-resistant inside layer and are suitable to withstand occurring suction and bending forces. The draghead, of a universal design, is suitable to dredge mud deposits, and is provided with a sight flap and Nihard IV wearings blocks on underside of the draghead. A screen fitted in the draghead prevents big stones from entering the suction pipe.

The delivery pipe and light mixture discharge pipe is of the same solid construction as the suction pipes, with a diameter of 500mm and a wall thickness of 10mm. The delivery pipe is connected to the launder over the hopper at main deck. The launder is constructed of 10mm grade A steel and is fitted with a wide diffuser at the aft end and three hydraulically operated launder doors.

Dredge Pumps

Emptying the hopper is with the dredge pumps and through two suction pipes fitted in the void spaces next to the hopper. The dredge pumps are driven by 595kW *Deutz* diesel engines through a *Masson* reduction gearbox with clutch. Double gear couplings with breaking bolt devices are fitted between reduction gearboxes and dredge pumps. The breaking bolt devices protect the reduction gearbox and the diesel engine in case an impeller suddenly blocks. On the front side of the diesel engines a hydraulic pump is driven which supplies the hydraulic power for gantries, winches, bottom door cylinder and the gate valves.

Each side of the hopper space has four suction connections. These suction openings are controlled by hydraulically operated valves from the dredging operation desk. At the aft side of the suction line a connection has been made to draw water from outboard to be mixed with soil by opening the hopper suction valves. The outboard connection is closed as soon as the required density is obtained.

Delivery to shore is with a shore delivery pipe with a hydraulically operated valve and a shore/hose connection flange, fitted to the delivery side of the dredge pump, and leading to the bow. A type approved bow coupling is used to connect the discharge pipeline to the floating pipeline.

Hydraulic valves are fitted in the suction pipe, viz. one between the pump and outboard suction pipe, and one between the pump and the hopper emptying suction pipe. A third valve is fitted in the hopper emptying suction pipe and is used to restrict the amount of seawater and to increase the vacuum during emptying the hopper. The discharge line of the pump features four hydraulic valves. With these valves the mixture can either be directed to the hopper, to the light mixture discharge, and to the outboard bow connection.

Draghead Gantries

Three gantries situated in each side of the main deck position the suction pipes when dredging and hoisting the pipes onto the main deck. The intermediate and the draghead gantries are provided with a trunnion and a hydraulic cylinder. The trunnion gantries are mounted on rails and can be moved both in inboard and outboard direction by means of a hydraulic cylinder. All gantries are provided with an independent hydraulically operated hoisting winch. The trunnion and intermediate winches are of 2t capacity and are used with a pulley block on the suction pipes as well as on the gantries. The draghead winches feature a 3.5t capacity. The cables are directly guided over single pullies to the suction pipes (near the dragheads). The trunnion and intermediate winches are hoisting winches which means that in all cases, when the winch is not operated, the winch is stopped mechanically. In case the winch is operated for hoisting or veering, the brake is released automatically. In veering mode a hydraulic brake takes over automatically, which allows easy and proportional control in all circumstances. Gantries and winches cannot be operated simultaneously with the bottom doors.

Hopper Bottom Doors

The hopper is features sixteen box-shaped bottom doors of watertight steel construction fitted and sealed in heavy steel frames with solid rubber seals, all incorporated in the ship's bottom section. Each door is provided with two hinges and two lifting eyes. The operating mechanism of the bottom doors is fitted at the PS and SB side of the hopper coaming and consists of hydraulic cylinders fitted at the top of the hopper coaming, one for each bottom door. The forward section of the hopper space is fitted with an adjustable cylindrical overflow. The overflow is remotely controlled from the dredgemaster's operating console.

The hydraulic system for operating the bottom doors, gantries and winches, valves and launder doors, includes the following equipment:

- variable plunger pumps driven by the dredge pump diesel;
- a tank unit situated in the pumproom;
- *Danfoss* proportional load-independent valves;
- hydraulic cylinders with stainless steel rods with hardchrome protection;
- oil control and auxiliary components.

For calamities an electric driven emergency pump is installed having sufficient power for all functions.

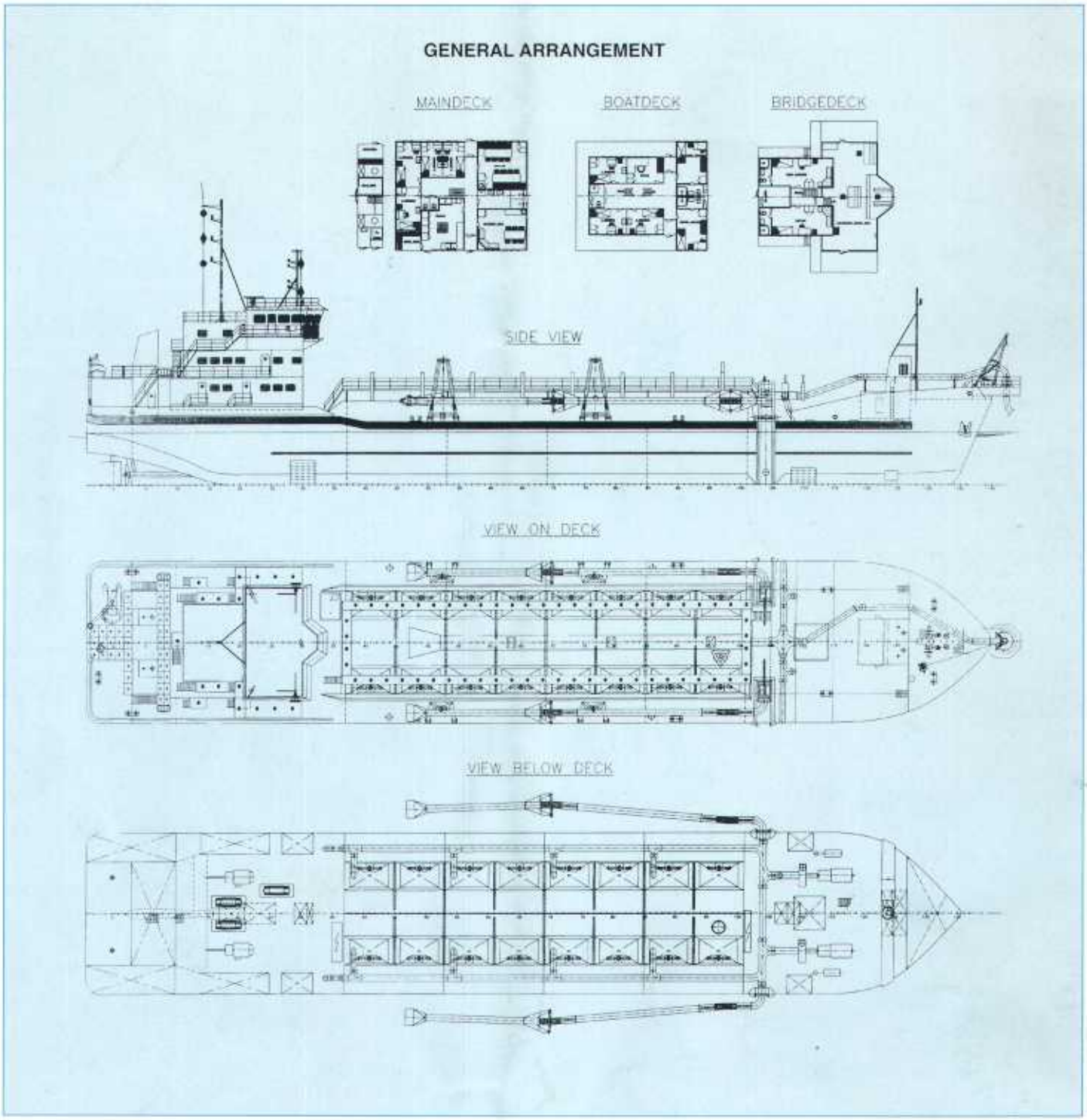
Deck Equipment

Deck equipment includes one electric *Ridderinkhof* windlass, provided with two cast steel cable lifters, hand-operated screw spindle brakes and dog clutches, all situated on the foredeck. For mooring purposes the winch is provided with two cast iron warping heads, one at each side. The nominal hauling speed is approximately 10m/min. The windlass is locally controlled and provided with two chain stoppers of the glide type, and handles two stockless bower anchors of the HHP/MV type, each weighing 1575kg and fitted with 440m stud link chain cable of grade U2 steel. Anchors and anchor chain cables were delivered by *Prohand*. A *Ridderinkhof* capstan is fitted on the aftdeck.

Dredge Control Systems

All dredging operations are controlled and monitored from the dredgemaster's control desk fitted on the centreline of the vessel. The control desk is fitted with the following instruments and control systems:

- vacuum meter dredge pump;
- gland pump pressure gauge;
- depth indicator cardan;
- depth indicator draghead;
- hydraulic pressure gauges;
- constant tension pressure (draghead winch only);
- position indicators outboard gate valve (open/shut);
- bottom doors position indicator;
- pump diesel engine and coupling controls and instruments;
- gantries in/out controls;
- winches hauling/veering controls;
- draghead winch;
- outboard valve control;



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DATA SHEET

S.D. Gumel

Rijnwaal Shipyards te Hardinxveld-Giessendam heeft eind oktober de sleephopperzuiger S.D. Gumel, bouwnummer 711, overgedragen aan de Nigerian Ports PLC in Lagos. Een jaar eerder had de werf voor dezelfde opdrachtgever al de veel kleinere zuiger River Chalawa gebouwd (SWZ 2-97, blz. 7). Het zijn de eerste schepen van dit type die door de werf zijn gebouwd.

Langsscheepse indeling:
- Voorpiek, doorlopend tot bakdek, bestemd voor waterballast.
- Pompkamer, waarin ook de dwarsschroefinstallatie is ondergebracht.
- Ladinggedeelte; naast de hopper bevinden zich 2 x 4 droge zijtanks.
- Machinekamer.
- Achterpiek/hekcompartiment.

Pompkamer en machinekamer zijn van een dubbele bodem voorzien; hierin zijn smeerolietanks, vuilwatertanks e.d. ondergebracht.
In de machinekamer liggen in de zijden (achter de beunkoelers) de brandstoftanks.
In achterpiek/hek zijn in de zijden waterballast tanks aangebracht; daartussen liggen de drinkwatertank en de stuurmachinekamer.

Algemene gegevens

Hoofdafmetingen:

Lengte o.a.	89,30 m.
Lengte l.l.	82,70 m.
Breedte mal	15,50 m.
Holte	6,00 m.
Diepgang	5,00 m.
Waterverplaatsing	5900 t.
Draagvermogen	4228 t.
Gross tonnage	2761.

Snelheid:
Dienstsnelheid 9,5 kn op 5,00 m diepgang en bij 1770 kW.

Klasse:
Lloyd's Register of Shipping:
+ 100 A 1, Hopper Dredger, + LMC.

Tankinhouden:

Gasolie	182 m³.
Smeerolie	7 m³.
Vuile olie	5 m³.
Drinkwater	43 m³.
Vuil water	7 m³.
Waterballast	247 m³.

Baggersystemen

Zuigbuizen:
2 stuks, diameter 600 mm; elk behandeld door drie hydraulisch werkende bokken en hydraulisch werkende lieren, alles fabrikaat Hollandsche IJssel.
Deiningscompensatie op achterste bokken, door middel van hydraulische cilinders en stikstof buffer.
Maximale baggerdiepte: 25 m.

Pompen:
2 x fabrikaat Hollandsche IJssel baggerpomp, 5.000 m³/h bij 2,5 bar, aangedreven door Deutz dieselmotor, TBD 616 V12, 595 kW, 1800 tpm via Masson tandwielkast, reductie 5,077:1.
2 x fabrikaat Sterling-Sihi jetpomp, 500 m³/h bij 40 m.w.k., rechtstreeks aangedreven door Deutz dieselmotor, BF 4M 1013E, 78 kW, 2100 tpm.

Jetsysteem:
De zuigbuizen zijn niet van jetleidingen voorzien. De jetpompen worden alleen gebruikt voor het fluïdiseren van de lading bij het lossen. Hiertoe zijn in de zijkasten ter plaatse van de zuigmonden in totaal 8 nozzles aangebracht.

Hopper:

Lengte	38,40 m.
Breedte	9,90 m.
Coaminghoogte	2,00 m.
Inhoud	2640 m³.

Beladen: via goot op hart schip, met drie kleppen en vrije uitstroming aan het einde.
Overvloei: telescopisch, hydraulisch, van stuurhuis uit verstelbaar.
Lossen: via hydraulisch bediende, enkele bodemdeuren, 8 stuks aan elke kant van de kippenkooi.

Pijpleidingen:
In pompkamer crossover, diameter 600 mm, tussen de aansluitingen van de zuigbuizen; aan de voorkant zijn hierop de zuigen van de baggerpompen aangesloten, aan de achterkant de zuigleidingen uit de hopper.
De persleidingen van de baggerpompen zijn aangesloten op een crossover (diameter 500 mm) aan dek; op hart schip heeft deze aan de achterzijde een aansluiting op de goot voor het beladen van de hopper en aan de voorzijde is de walpersleiding (diameter 500 mm) er op aangesloten; in de zijden kan arm mengsel overboord worden gezet.

Persen naar de wal:
Maximale persafstand: 2 km.
De zuigleidingen (diameter 500 mm) zijn in de zijtanks aangebracht en hebben elk vier zuigen in de hopper.
De baggerpompen werken in serie: de pers van de SB baggerpomp is dan verbonden met de zuig van de BB pomp (deze leiding is op het algemeen plan niet getekend).
Op het voorschip een v.d. Graaf boegkoppelinstallatie en een hydraulisch aangedreven koppellier, fabrikaat Hollandsche IJssel, trekkracht 10 t.
Rainbowing is mogelijk met een hulpstuk, dat op de boegkoppelinstallatie wordt geplaatst.

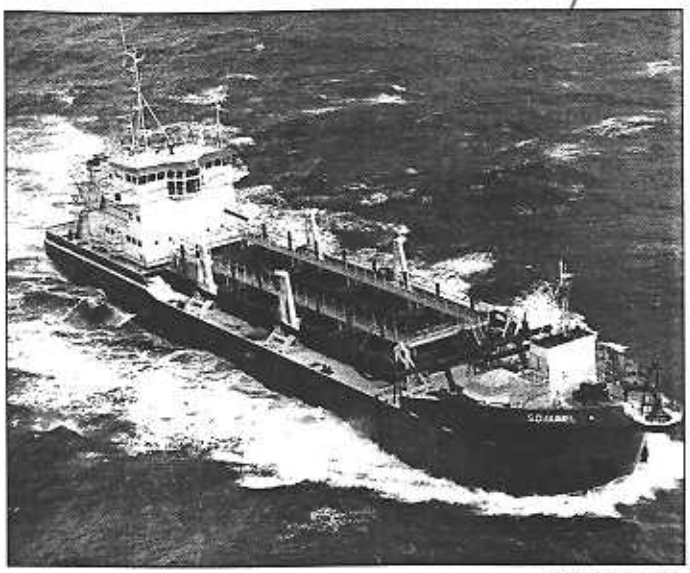


Foto: Flying Focus.

Hydraulische installatie:
2 x hydrauliek pomp, aangedreven door baggerpompmotoren via PTO.

Machinekamersystemen

Hoofdmotoren:
2 x Deutz, TBD 620 V8, m.c.r. 885 kW, 1800 tpm.
Koppelingen:
2 x Vulkan, Rato-S 1521.
Tandwielkasten:
2 x Masson, RSD 701, reductie 6,054:1.
Schroeven:
2 x Van Voorden, vier vaste bladen, diameter 1850 mm.

Generatorsets:
2 x Deutz dieselmotor, BF 6M 1013EC, 121 kW, 1500 tpm en Stamford Newage UCM 274 F generator, 135 kVA, 415 V, 50 Hz.
1 x Deutz dieselmotor, BF 6M 1013E, 101 kW, 1500 tpm en Stamford Newage UCM 274 E generator, 112 kVA.

Koeling:
Blokland non ferro beunkoelers voor alle dieselmotoren (ook in pompkamer).

Pompen:
1 x Sterling-Sihi brandstoftrimpomp, 3,3 m³/h bij 20 m.w.k.
2 x Sterling-Sihi smeerolietrimpomp, 3,3 m³/h bij 20 m.w.k.
2 x Sterling-Sihi vuiloliepomp, 3,3 m³/h bij 20 m.w.k.
1 x Sterling-Sihi spoelwaterpomp, 100 m³/h bij 34 m.w.k.
2 x Sterling-Sihi algemene dienst pomp, 50 m³/h bij 30 m.w.k.
1 x Sterling-Sihi AC-koelwaterpomp, 19 m³/h bij 25 m.w.k.
2 x Sterling-Sihi hydrofoorpomp, 1,7 m³/h bij 25 m.w.k.
1 x Sterling-Sihi vuilwaterpomp, 3 m³/h bij 25 m.w.k.

Verdere werktuigen:
2 x Sperre startluchtcommpressor, HL2/90, 34 m³/h, 30 bar.
1 x Alfa Laval brandstofseparator, 600 l/h.
2 x RWO/Birkenfeld lenswaterreiniger, 0,5 m³/h.
2 x Novenco ventilator, 25.000 m³/h.
In pompkamer:
2 x Novenco ventilator, 15.000 m³/h.

Uitrusting

Stuurgerei:
Roeren: 2 x Promac vrijhangend balansroer.
Stuurmachine: Promac, tweerams.
Dwarsschroef: Veth, 2-K-1200, aangedreven door Deutz dieselmotor, TBD 616 V8, 397 kW, 1800 tpm.

Anker-en meergerei:
Voorschip: 2 x 1575 kg HHP-Pool-TW anker met in totaal 440 m ankerdamketting van 40 mm; behandeld door een Ridderinkhof elektrische ankerlier met twee verhaalkoppen.
Achterschip: 1 x Ridderinkhof elektrische kaapstander.

Brandbestrijding:
Detectie apparatuur: fabrikaat Thorn, met rooksensoren in accommodatie, machinekamer en pompkamer.
Poppeliers CO_2-systeem voor machinekamer en pompkamer.
Brandbluspomp: algemene dienstpomp in machinekamer.
Noodbluspomp: een van de jetpompen.

Reddingmiddelen:
1 x Promac rescue boot onder elektrohydraulische kraan.
2 x Viking opblaasbaar vlot voor elk 20 personen.

Navigatie- en communicatie-apparatuur, geleverd door Alphatron:

- 2 x Radar, Kelvin Hughes, Nucleus 5000R MK II R Colour.
- 1 x Echolood, Skipper 418.
- 1 x Echolood, Alphadepth EM 510.
- 1 x Seapilot, Anschütz, Pilot Star D.
- 1 x River pilot, Alphapilot.
- 1 x Bochtaanwijzer, Alphaturn.
- 1 x Richtingzoeker, Taiyo, TDL 1100.
- 1 x Log, Ben Marine, Phosec.
- 1 x SSB radiostation, Sailor, Compact 2000.
- 1 x Wachtontvanger, Sailor, RM 2150 MF/HF DSC WR.
- 1 x Wachtontvanger, Sailor, R 501 2182 kHz RX.
- 2 x VHF, Sailor, RT 2048.
- 2 x DSC ontvanger, Sailor, RM 2042.
- 1 x Navtex, JRC, NCR 300A.
- 1 x Epirb, Nova Marine, RT 260.
- 1 x Sart, Nova Marine, RT 900.
- 3 x Draagbare VHF, Navico, Axis 150.

Accommodatie

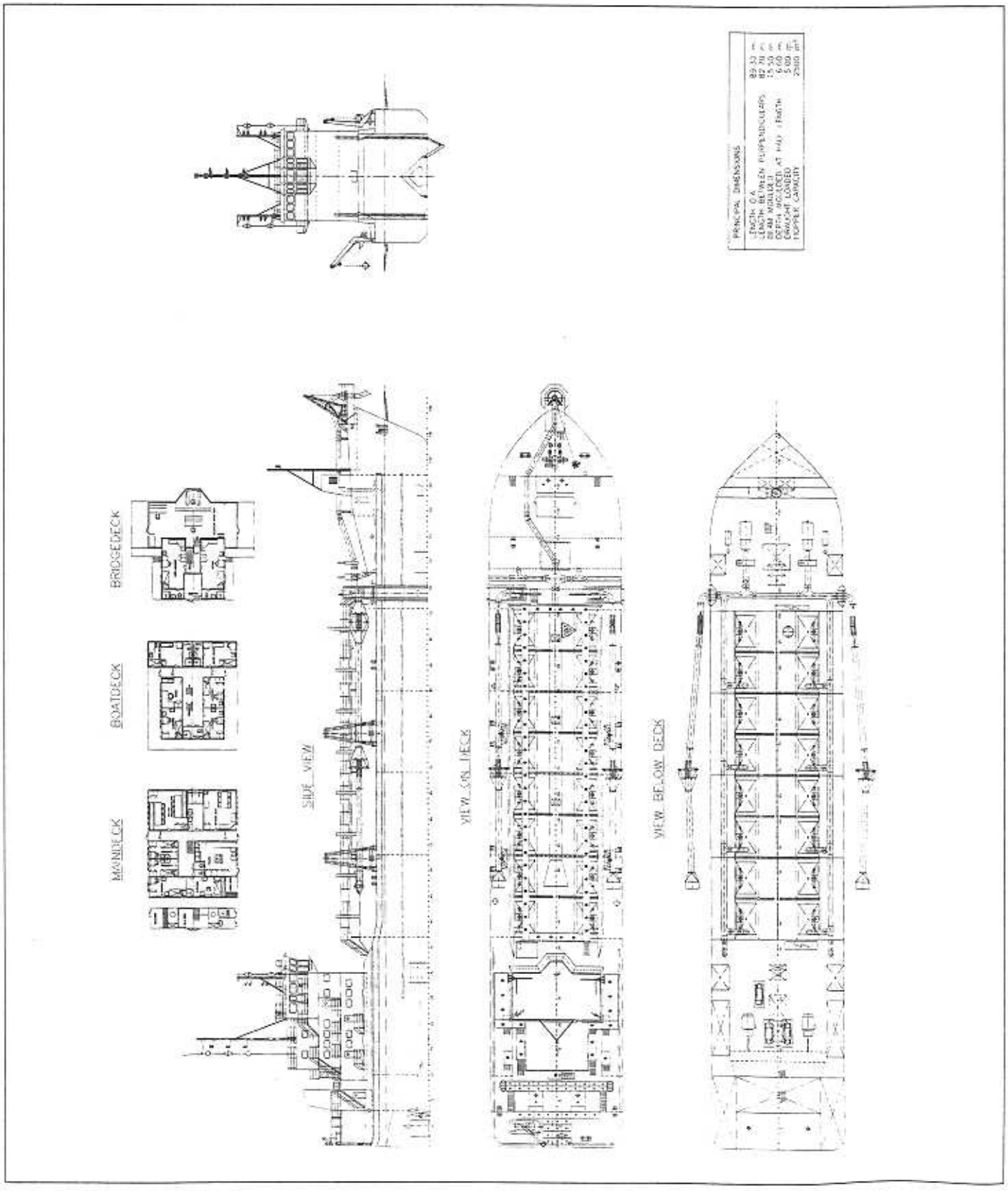
Op brugdek: stuurhuis, hutten (met toiletunit) voor kapitein en HWTK, AC-ruimte.

Op sloependek: hutten (met toiletunit) voor baggerbaas en 1e stuurman, 3 x tweepersoons hut voor bemanning, kantoor (BB), toilet en douche voor gemeenschappelijk gebruik.

Op hoofddek: messrooms voor officieren en bemanning, kombuis met proviandopslag, 4 x tweepersoons hut voor bemanning, was- en doucheruimte, twee toiletten.

De accommodatie is voorzien van een Novenco AC-systeem, 75 kW.

Het dekhuis is in zijn geheel op trillingdempers opgesteld. Daarachter een kort dekhuis met machinekamerschachten, wasserij en CO_2-kamer.



Algemeen plan sleephopperzuiger S.D. Cumel.