

Outline Specification

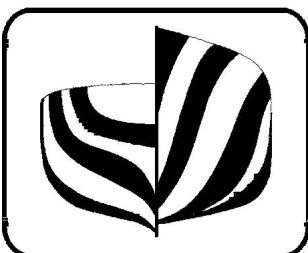
RAstar 3200 Class Tugboat

Prepared for:

Prepared by:

Robert Allan Ltd.

Naval Architects and Marine Engineers
230 - 1639 West 2nd Avenue
Vancouver, BC V6J 1H3 Canada



Outline Specification

RAstar 3200 Class Tugboat

PART 100 - GENERAL

101. GENERAL

This Outline Specification describes the general requirements of a new Class of high-performance, terminal support tug, designated as the *RAstar 3200* design.

RAstar Class tugs have been developed to offer truly superior ship-handling and seakeeping performance at exposed terminal locations, docking ships in more extreme sea-states than is the norm. The unique sponsoned hull form provides proven dramatic reductions in roll amplitude and accelerations, in comparison to more conventional hull forms.

RAstar Class tugs are of robust, all-welded steel construction, with scantlings in excess of the minimums of any Classification Society.

RAstar 3200 is intended as a dedicated terminal and harbour support tug, working off a forward hawser winch, but it is also equipped for coastal towing and offshore emergency towing with a heavy duty towing winch and tow-pins aft.

102. PARTICULARS

102.1 Dimensions

- Length overall = 32.00 metres
- Beam, moulded, extreme = 12.80 metres
- Depth, moulded (hull) = 5.37 metres
- Navigation draft = 5.80 metres, approximate

102.2 Capacities (approximate)

- Fuel oil = 190,000 litres
- Fresh water = 30,000 litres
- Lube oil = 2,600 litres
- Used oil = 4,500 litres
- Oily water = 4,500 litres
- Foam = 13,000 litres
- Dispersant = 13,000 litres

102.3 Complement

- Crew = up to 10 persons on extended voyages (subject to final design)
= normal operating crew of 4–6

102.4 Performance

- The following are the minimum predicted for this Class of tug, based on the propulsion machinery defined in Part 500:
 - bollard pull, ahead = 80 tonnes
 - bollard pull, astern = 76 tonnes (approximate)
 - free running speed, ahead = 12.5 knots
 - cruising speed = 12 knots

103. SERVICE CONDITIONS

- Vessel is designed for operation in international waters, based on the following maximum ambient temperatures:
 - summer:
 - 40 °C air temperature at 70% RH
 - 32 °C sea water temperature

winter:

- -20 °C air temperature at 85% RH
- 0 °C sea water temperature

104. CLASSIFICATION

- Vessel to be Classed by ABS:
 - ✕ A1, ⑤, ✕ AMS, Towing Vessel, Unrestricted Navigation, ✕ ABCU
 - Escort Vessel
 - Fire-Fighting Vessel Class 1
 - Oil Recovery Capability Class 2 (Flash Point > 60 °C)

105. REGISTRY AND CERTIFICATION

- Registry -
- Port of Registry -
- Loadline - ABS
- Certificates - Class, Loadline, MARPOL ,Asbestos Free, EIAPP, Cargo Ship Safety Equipment, Safety Construction, Safety Radio, IOPP, IAPP, IAS, Singapore Regulation Safety Non-Convention, GMDSS Radio, Deck Crane statement of fact, Rescue Boat Davit Statement of fact, Bollard Pull

PART 300 - OUTFIT AND FURNISHINGS

305. ACCESS, LIGHT, AND CLOSURES

- Escape/access hatches
 - steel covers, quick-acting type on steel coamings, to Regulatory requirements. All fittings in 316L stainless steel
- Windows
 - bronze framed with steel-welded coaming
 - glazing to Class minimum thicknesses
 - flush, tinted windows in overheads; bonded in place
 - horizontal, straight-line wipers on three forward windows, and on centreline aft window
 - fitted with deadlights to Class requirements
- Portlights
 - bronze framed with steel-welded coaming, opening type; 350 diameter in cabins and common spaces, 300 diameter in WCs
 - glazing to Class Rules
 - opaque glazing in WCs
 - fitted with deadlights to Class requirements
- Weathertight doors
 - steel (according to Fi-Fi Class) in steel frame on main and upper deck to Loadline standards, single-acting type, with all stainless steel hardware
 - maximum size windows in wheelhouse doors
 - 300 mm diameter ports in doors at main deck
- Watertight doors
 - steel, single-acting, multi-dog type

310. LININGS AND PARTITIONS

- Linings
 - 25 mm vinyl-faced steel/ sandwich type panel system;
- Partitions
 - 50 mm vinyl-faced steel/ sandwich type panel system;
- Wet space linings
 - 25 mm vinyl-faced steel/ sandwich type panel system;
- Deckhead liners
 - "plank" style acoustic ceiling panels. (subject to owner's acceptance) Perforated in control and sleeping spaces, non-perforated elsewhere. Install an off-white colour in wheelhouse, and an off-white colour elsewhere
- Accommodation/
wheelhouse
 - all panelling within these spaces shall be of high noise reduction type

315. INSULATION

- Machinery spaces (boundaries exposed to accommodation spaces):
 - 75 mm on plates; 25 mm on frames/beams; foil-faced A-60 rated

- Machinery spaces (boundaries exposed to decks and hulls exposed to atmosphere):
 - 50 mm foil-faced on plates between frames for acoustic insulation
- Accommodation spaces:
 - 50 mm on plates, 25 mm over frames/beams; foil-faced, B-15 rated
- Insulation where subject to mechanical damage shall be covered by light gauge expanded sheet metal

320. DECK COVERINGS

- Crew rooms/mess/corridors - commercial grade, non-skid, wood-grain vinyl;
- Galley/lavatories/laundry - monolithic trowelled decorative epoxy,
- Wheelhouse - commercial grade non-skid wood-grain vinyl;
- Machinery space floorplates - 5 mm steel treadplate, screwed to steel angle bearers, steel treadplate at escape routes where required by Class. Use stainless steel screws for all floor plates

325. DOMESTIC OUTFITTING

- Officers' rooms (two off):
- Crew rooms, doubles (four off):
- Mess room:
- Lavatories, en suite:
- Lavatories, lower accommodation deck:

360. FIRE SAFETY EQUIPMENT

- Gas-smothering system - CO₂ of appropriate capacity
- Fire detection/alarm - approved system, indicating at central display in wheelhouse
- Portable extinguishers - 2.5 kg dry chemical type
 - number to approval of local authorities
- Fire stations - 5 off, hydrants, complete with hose, nozzle, and rack
- Miscellaneous - fire axes (2)
- See also - Section 730, "Fire-Fighting System"

365. LIFESAVING EQUIPMENT

- Liferafts - 2 x 10-person ILRs, in launching racks; to Class approval
- Lifejackets - 14 adult size
- Lifebuoys - four (4) in total: two (2) with light and smoke signal, two (2) with heaving lines
- Distress signals - to Regulatory requirements
- EPIRBs (1) - Class I
- Line throwing apparatus

380. PAINTING AND PROTECTION

- First quality marine paint system, International Paints or equal, below waterline minimum 5 year system
- Non-skid on all working decks
- Owner's markings, draft marks, and name, etc., per Drawings
- Zinc anodes for 60-months protection

395. FENDERS

- Fit vessel with heavy duty rubber fender system as follows:
 - bow:
 - upper course - 800 mm OD x 400 mm ID cylindrical
 - lower course - 800 mm OD x 400 mm ID cylindrical
 - 400 mm deep keyhole or "W" fenders
 - sheer - 300 x 300 mm hollow "D" fender
 - stern - 400 mm deep keyhole or "W" fenders
- Secure cylindrical fenders with SWR/chain pennant and stainless steel turnbuckles, and nylon web sling straps at approx. 900 c/c

In addition to above, thirty three (33) Air craft tyres to be installed as directed.

PART 400 - DECK MACHINERY AND FITTINGS

405. ANCHORING EQUIPMENT

- Anchors (2) - short shank, HHP, Hall's type stowed in pockets, P&S
- Anchor windlass - integral with hawser winch (ref. Section 415.1)
- Chain stoppers - manual type

410. LINE HANDLING EQUIPMENT

- Fit an electric-hydraulic/hydraulic capstan of 5 tonnes at 15 metres/minute capacity on aft deck

415. TOWING EQUIPMENT

- Fit heavy duty hawser winch forward for ship-assist duties
- Fit a towing winch aft for towage duties
- Fit a combined type wire roller and tow-pin system into aft bulwark
- Details of equipment as follows

415.1 Hawser Winch/Anchor Windlass

- Hydraulic-powered, split drum type, IBERCISA or equal
- Drum capacity = 150 metres of steelite superline rope on each side, approx. 60 mm OD; BS = ~240 tonnes (to Class requirements)
- Brake capacity = 200 tonnes (adjustable)
- Fully variable speed controls = 0 to 80 metres/minute
- Render/recover at variable line tension = 125 tonnes (102t : 0 ~7.6m/min)
- Remote (wheelhouse) and local controls
- Escort mode: constant tension system with progressive regulation control by potentiometers
- Remote "abort" mechanism from wheelhouse
- Line feed to top of drum
- Chain lifter: 22 mm K3 anchor chain with hand operated band brakes and claw clutches
- Warping end: cast steel nominal pull and speed at 7.3 tonne at 25 m/minute

415.2 Towing Winch

- Hydraulic powered with common power unit of the hawser winch, IBERCISA or equal
- Drum capacity = 800 metres of steel wire, approx. 52 mm OD
- Brake capacity = 200 tonnes
- Fully variable speed controls
- Line pull at low speed = 63.5 tonnes at up to 25 metres/minute
- Line pull at high speed = 28.1 tonnes at up to 58 metres/minute
- Remote (wheelhouse) and local controls
- Automatic Spooling gear device with torque limiter for emergency
- Warping head: cast Steel, starboard only; separately clutched

415.3 Tow Pins/Roller

- Smith Berger or equal two pin set with wire roller and hold-down block, 80 tonnes SWL (capacity to be confirmed), integrated into the bulwarks

425. Deck Crane

- Hydraulic knuckle-boom type, Palfinger
 - capacity to lift 2 tonnes at 8 metre radius (capacity to be confirmed)
 - mounted on main deck, aft
 - local controls, with wandering lead option
- Independent electro-hydraulic pump set

450. FITTINGS

- Towing staple, forward
 - A dual aperture, with stainless steel casting fairleads to suit towline leading from hawser winch drum. Design load to Class escort rule requirements; lined with 6 mm polished 316L stainless steel on all contact surfaces
- Mooring bitts
 - 324 mm OD double bitts; forward—integral with bulwarks
 - 324 mm OD double bitts; midships—integral with bulwarks
 - 324 mm OD double bitts on main deck aft
- Mooring pipes
 - 300 x 400 mm opening x 50 mm OD stainless steel solid round bar rings in bulwarks as shown

PART 500 - PROPULSION MACHINERY

510. MAIN ENGINES

- Two (2) high speed marine diesel engines, Caterpillar 3516C or equal
 - rated at 2,525 kW at 1,800 rpm
 - air start
 - current IMO emissions certification Tier 2
 - cooling by box coolers
 - high attenuation, spark-arresting silencers (35 dB insertion loss at 125 Hz band octave)
 - jacket water preheating
 - electronic monitoring display
 - resilient mounts with minimum static deflection of 6 mm; conical rubber mounts from Rubber Design, Vulkan,
Port M.E. PTO to drive: FF1 pump
Stbd M.E. PTO to drive: shaft alternator for bow thruster and hydraulic pumps

520. CLUTCHES

- Clutches to be hydraulic type, supplied by Rolls-Royce US255P.

525. SHAFTING

- Integrated shaft system complete with steel intermediate shafts, Cardan shafts, couplings, bearings, - and bulkhead seals

530. Z-DRIVE PROPULSION UNITS

- Standard production, Rolls-Royce US255P (CPP), CATERPILLAR Propulsion or equal units:
 - certified to deliver not less than 41 tonnes bollard pull at 2,525 kW input
 - hydraulic steering pumps
 - thrust augmenting nozzle with all stainless steel inner surface
 - uni-lever controls at wheelhouse
 - electronic load control system
 - thrust and steering angle indicators
 - hydraulic-actuated clutch

535. PTO/CLUTCH

- Fit a FFS or equal gearbox/clutch unit complete with flexible coupling on front of Port main engine to drive the Fi-Fi pump, ref. Section 730
- Fit a gearbox/clutch or direct drive unit complete with flexible coupling on front of Starboard main engine to drive a 400kW shaft alternator and Hydraulic pump.
- Provide gearbox ratios if necessary, which may be required by Fi-Fi pump and direct drive shaft alternator manufacturers.

550. BOW THRUSTER

- Provide one (1) CPP tunnel type, Brunvol approx. 200 kW
- Electric motor drive, vertical mount
- Wheelhouse controls

PART 600 - ELECTRICAL SYSTEMS

601. SYSTEM DESCRIPTION

601.1 General

- Equip vessel with an up-to-date marine electrical power generation system, comprising two (2) identical gensets with paralleling capability for load transfer only
- Design system for normal ship service loads on one genset at about 90% of rated capacity
- 415 volt generating voltage, 3 phase, 50 Hz
- Transform voltage to 230 volt for other services
- Shore power connection for 150 Amp service, 415 volts

602. POWER GENERATION

602.1 Ship's Service Gensets

- Two identical sets - Caterpillar, Volvo
- Operating frequency - 50 Hz
- Continuous service rating - 130 ekW
- Output voltage - 415 volt
- Electric start - 24 volt
- Box cooler type heat exchangers
- Resiliently mounted
- High attenuation, spark-arresting silencer (minimum 35 dB insertion loss at 125 Hz band octave)

610. SWITCHBOARD

- Dead front type
- Front access
- One section per generator
- Incorporate main 415 volt power distribution
- Transfer switch (automatic and manual)

625. LIGHTING

625.2 Interior

- Standard fluorescent fixtures in accommodation
- Vapour-tight fluorescent fixtures in machinery spaces
- Emergency lighting to Regulations

625.3 Exterior

- 4 x 1,000 Watt floodlights located as per General Arrangement
- 2 x 2,000 Watt incandescent searchlights with one manual and one remote control

PART 700 - SHIP'S SERVICES

730. FIRE-FIGHTING SYSTEM

- Fit vessel with an off-ship fire-fighting capability; with a Fire-Fighting Vessel 1 Class notation.
Provide pumps and monitors from FFS or equal:
 - main fire pump (1)
 - driven through dual output gearbox/hydraulic clutch and flexible coupling off front of one main engine
 - minimum capacity of 2,720 m³/hour
 - pressure to meet Class monitor throw requirements
 - non-self-priming centrifugal type
 - cast iron body, bronze trim, stainless shaft
 - monitors (2)
 - FFS or equal, foam/water monitor type
 - remote operated, electric controls
 - capacity for 1,200 m³/hour water
 - capable of 120 m water throw, minimum
 - foam system
 - storage tank, capacity per Section 102.2
 - foam proportioner suitable for 3% to 6% solution.
Foam branch to each monitor
 - deluge system
 - served from branch of main fire pump discharge
 - use vertical spray type nozzles as opposed to header pipes/nozzles; integrate into handrails as shown on General Arrangement
 - miscellaneous equipment
 - fireman's outfits (6)
 - two fire hose connection manifolds per side, main deck aft
 - breathing apparatus (2)
 - breathing air compressor (1)

735. MACHINERY COOLING SYSTEM

735.1 Main Engines and Z-Drives

- Each main engine and Z-drive to be cooled by suitably-sized box coolers

735.2 Generator Engines

- Each genset cooled through box cooler

735.3 Auxiliary Systems

- Z-drives served by main engine box coolers as per manufacturer
- Gearboxes served by box coolers

740. COMPRESSED AIR SYSTEM

- To serve main engine starting, control, whistle, and utility services
- Air compressors (2)
 - electric; Sperre
 - air cooled, two-stage
 - 32 m³/hour capacity (to be verified with Class starting air calculations)
 - 30 bar
- Air receivers, main (2)
 - 0.25 m³ capacity each (to be verified with Class starting air calculations)

745. LUBE OIL SYSTEM

- Main engine lube oil storage tank
 - ref. Section 102.2
- Z-drive lube oil storage tank
 - 500 litres
- Oil transfer
 - 60 L/m electric gear pump

750. OILY WATER/SLUDGE SYSTEM

- System to comprise:
 - double bottom waste oil tank
 - ref. Section 102.2
 - double bottom oily water tank
 - ref. Section 102.2
 - oily bilge/waste oil transfer pump
 - screw pump, electric; 3 m³/hour
 - oily water separator
 - IMO approved
 - discharge
 - to deck connection
 - suction branches
 - to engine room bilge, plus 10 m hose

755. HYDRAULIC SYSTEM

- Common system to supply forward and aft winches
- Electro-hydraulic power pack for forward, aft winches and capstan
- Separate electro-hydraulic power units for:
 - deck crane
 - wire roller/tow-pin unit

760. MACHINERY EXHAUST SYSTEMS

- Fit high attenuation minimum 35 dB insertion loss in 125 Hz band, spark-arresting silencers to all engines
- Fit removable blanket-type lagging to all exhaust pipes and silencers
- Resiliently mount all silencers and exhaust pipe runs
- All exposed exhaust system piping to be polished Schedule 20 or equal, 316L stainless steel

760.1 Main Engine Exhaust Silencers

- Absorptive type silencers
- Spark-arresting
- Minimum 35 dBA insertion loss in 125 Hz octave band

760.2 Generator Set Silencers

- One absorptive type, one reactive type silencer for each genset
- Spark-arresting (one only for each genset)
- EM Products Type or equal of absorptive type.

PART 800 - DOMESTIC SYSTEMS

805. HEATING

- Systems to be tailored to operating locale—ambient temperature ref. Section 103

805.1 Accommodation Heating

- All accommodation air-conditioned spaces shall have forced hot air system with up to 80% recirculation capability

805.2 Machinery and Store Spaces Heating

- 3.5 kW blower unit heaters in engine room (4)
- 3.5 kW blower unit heater in Z-drive compartment (2)

810. VENTILATION, ACCOMMODATION

- Forced air system (ref. Section 805.1)
- Fresh air supply to IMO crew accommodation standards
- Provide a supply fan in accommodation below main deck
- Provide a separate low velocity/low noise wall-mounted or standing fan for wheelhouse
- Separate exhaust fans for lavatories, stores, and galley
- All fan capacities to be verified during design process

811. VENTILATION, MACHINERY SPACE

- Fit two (2) engine room supply fans, axial flow type, at 11 m³/second at 450 Pa (to be verified by final analysis)
- Natural exhaust through stacks
- Provide moisture eliminating intake louvers sized for maximum fan capacity
- Fit manual closures to intakes and outlet vents
- All fan capacities to be verified

815. AIR-CONDITIONING

- Provide a direct expansion fresh water cooled type air-conditioning system to achieve the following performance:
 - outdoor conditions per ISO 7547 = +40° C at 70% relative humidity
 - indoor conditions = +22° C at 50% relative humidity

- Provide air-conditioning to wheelhouse, accommodation areas and switchboard room
- Provide independent zoned systems for (a) wheelhouse and (b) switchboard room, each with individual local controls
- Provide fresh air makeup air unit to condition outside air and supply to conditioned spaces according to IMO standard.
- Provide intake louvres and removable filters for each air intake
- Provide fire dampers on each intake and outlet
- Fit adjustable volume dampers in supply air duct branches to balance air flow
- Piping materials:
 - fresh water system
 - galvanized steel
- Provide an automatic, programmable system control
- Provide all accessories for a complete operating system and install as per manufacturer's requirements
- Heating system per Section 805.1

825. POTABLE WATER SYSTEM

- Hull storage tank
 - Fresh water pressure tanks (2)
 - Hot water tank (1)
- capacity per Section 102.2
 - electric, diaphragm type, 2x100 litre capacity, 207/345 kPa
 - electric, 2 x 1.5 kW elements, 200 litre capacity

830. BLACK WATER SYSTEMS

830.1 Sewage Collection/Treatment System

- Gravity collection system
- IMO/MARPOL approved sewage treatment plant
- Aerobic black water/grey water type, Facet International STP 0.5 or equal
- Sewage transfer/discharge pump, progressing cavity type
- Shore discharge connection; fittings isolated & distinct from others
- An approved overboard bypass is to be fitted

830.2 Sanitary Fresh Water

- Use potable water system.

830.3 OIL DESPERSANT SYSTEM

400LPM suitable Oil Despersant spray nozzle at P & S to be provided
ODL Pump 9.8m³/h @ 8Bar with eductor and mixing valve to be fitted.

PART 900 - CONTROL, COMMUNICATION, AND NAVIGATION

901. GENERAL

- Provide local and wheelhouse controls suitable for a periodically unattended machinery space to Class requirements. Operations controlled from wheelhouse include:
 - operation of main propulsion system, including engine stopping and starting
 - steering control
 - starting, stopping, and operation of both winches and hydraulic pump system

905. STEERING SYSTEMS

905.1 System Description

- Vessel is steered directly by Z-drive units, as described in Section 530
- Single steering control station is located in wheelhouse
- Configure system to enable safe and accurate vessel operation both ahead and astern
- Provide controls for VHF radios, winch, etc., using combination of hand and foot switches
- Entire control arrangement to be ergonomically designed and approved by Owner *prior* to any construction

905.7 Autopilot

- Provide an autopilot control integrated with Z-drive control system complete with alarm, with follow-up from the gyro compass, and interfaced with satellite compass if fitted

910. SHIP CONTROL SYSTEMS

910.1 General

- Provide a complete integrated control system to Class and Regulatory Authority requirements for a machinery installation with a periodically unattended engine room, and with remote control of propulsion plant from wheelhouse
- Fit local controls and instrumentation on or immediately adjacent to machinery being controlled
- Fit remote controls in wheelhouse control consoles
- Arrange controls for maximum operating efficiency and ease of control

910.2 Propulsion Machinery Controls/Instrumentation

910.2.1 Main Engine Starting/Stopping

- Provide engine electrical starting and stopping capability from wheelhouse
- Provide local engine starting and stopping
- Provide local and remote (wheelhouse) emergency stops for engines
- Provide interlocks so main engines cannot be started with any clutch engaged

910.2.2 Engine Speed Controls

- Provide local speed controls at each main engine
- Provide wheelhouse engine controls (separate P&S controls) with speed setting increments as recommended by Z-drive manufacturer
- Provide a P/B activated constant rpm mode for fire-fighting

910.2.3 Clutch Control

- Install local clutch engage/disengage control and indication
- Install remote clutch control as part of the remote propulsion machinery controls

910.2.6 Telegraphs

- In lieu of an emergency engine telegraph, provide a sound-powered telephone for communication between wheelhouse, engine room, and steering compartment (ref. Section 935)

910.2.7 Engine Tachometers

- Provide local and remote tachometers for each main engine

910.2.8 Shaft Tachometers

- Provide local and remote shaft tachometers for each shaft line indicating shaft speed

910.3 Auxiliary Machinery Controls

- Provide local controls for all equipment including safety lockouts to Class and Regulatory Authorities' requirements

910.3.1 Electrical System

- Provide controls for electrical system at gensets and switchboard as specified in Part 600

910.3.2 Deck Machinery

- Provide controls and status monitoring system for hawser winch in wheelhouse console

- Provide controls for the aft towing winch, tow pins and hold back at the wheelhouse control console
- Provide an emergency abort control for towing winch in wheelhouse console
- Provide controls for other deck machinery locally at the deck control station for each item

910.4 Consoles

910.4.1 General

- Provide consoles for mounting of control, communication, and monitoring equipment in wheelhouse as indicated on General Arrangement
- Design and arrange consoles for efficient and convenient visibility of, and access to all equipment. Group components logically and conveniently according to function and operational priorities
- Provide main control console forward, incorporating the following:
 - main engine controls
 - Z-drive steering controls
 - hawser winch controls
 - towing winch controls
 - tow pin and hold back controls
 - Fi-Fi system controls

910.4.2 Construction

- Construct consoles of light gauge steel with powder-coated matte epoxy finish, dark grey or dark blue colour
- Arrange console components to be panel mounted for "drop-in" installation. Secure all such panels by stainless steel knurled head screw fasteners, over anti-rattle gasket
- Provide polished stainless steel handrails

910.4.3 Instruments and Controls

- Provide all pushbuttons, selector switches, and indicating lights for inclusion in consoles of miniature oil-tight type, Telemecanique Series or equal, with "run" indicating lights integral with the associated "start" pushbutton
- Match instruments of same function in size and detail. Provide instruments similar in trim and colour wherever possible
- Identify all gauges and instruments by screw-mounted Lamicoid nameplates with units of measurement identified on gauge dials. Coordinate units with machinery supply items
- Provide dimming control for all illuminated instruments in wheelhouse
- Provide protection to against accidental operation of all critical controls

915. INSTRUMENTATION, MONITORING, AND ALARM SYSTEMS

915.1 General Requirements

- Provide instruments and alarms compliant with Regulatory Authority requirements for periodically unattended machinery space operation

915.3 Machinery Alarm and Monitoring System, General

- Provide an electronic, LCD-based alarm and monitoring system, Noris, meeting all Class requirements for automation notation for:
 - machinery functions
 - high bilge level
 - fire and smoke alarms
 - tank gauging
- Fit master station in Switchboard room, with secondary stations in wheelhouse and in Chief Engineer's cabin
- Provide instruments and alarms in accordance with Regulatory Authorities requirements
- Provide 10% spare alarms in addition to the alarm points required by Regulatory Authorities

915.4 General Alarm

- Provide general alarm in compliance with Regulatory Authorities

915.5 Fire Detection and Alarm System

- Provide a fire detection system for protection of all machinery spaces, control spaces, accommodation areas, lockers, and store rooms to satisfy Regulatory Authorities requirements, and to detect abnormal air temperatures, rate of temperature rise, and/ or abnormal concentration of smoke as required
- Provide a continuously electrically supervised type system, capable of automatically indicating on alarm annunciator panel in wheelhouse, the zone and/or detector in which alarm occurs
- Provide an audible alarm for this system distinct from all others, plus light signals in high noise areas

915.6 H2S Alarm System

- Provide alarms for wheelhouse outside port and starboard, forecastle deck, engine room inside

915.7 Colour CCTV System

- Provide CCTV system for wheelhouse inside, engine room (2), deckhouse external port and starboard side, aft towing winch area and Z-drive compartment, total 7 locations.

920. NAVIGATION AIDS

- Install a comprehensive system of navi-aids and telecommunications to comply with requirements for safe navigation:
 - International Voyages; SOLAS
 - GMDSS; Zone A3
- The equipment listed below is indicative of class and kind to be installed. Final selection to be negotiated with Owner:
 - compass
 - gyro compass
 - digital clocks (2)
 - barometer
 - wind speed and direction indicator
 - radars (2)
 - depth sounder plus chart plotter and GPS display
 - GPS, secondary
 - magnetic; overhead reflector type (1master, with 2 repeaters)
 - 1 x X-Band; 20" colour display; 6' antenna
 - 1 x S-Band; 20" colour display; 10' antenna
 - Furuno FAR 21 x 7 series or equal
 - 10", Simrad CD 42
 - Simrad GN 33

925. SIGNALLING EQUIPMENT

- Air whistle
- Ship's bell
- EPIRB
- Kahlenberg/Air Chime or equal dual trumpet type with remote control unit
- 200 mm, chrome-plated brass, engraved

930. COMMUNICATION EQUIPMENT

- System defined to meet GMDSS, A3 requirements; including at least:
 - VHF DSC radio-telephones (2)
 - MF/HF DSC radio-telephones (2)
 - INMARSAT-C (2)
 - Portable VHF radios (2)
 - SART
 - Navtex
- Bridge Watch Keeping monitoring system as required by Class and IMO

935. INTERNAL COMMUNICATIONS

- Intercom:
 - master station in wheelhouse
 - call stations in galley, mess/lounge, and crew accommodation
 - high noise, weatherproof stations on weather decks (2)
 - high noise, headset station in engine room
 - plug-in headset stations in Z-drive compartment
- Sound-powered telephone from bridge to engine room system, complete with call signal indicators
- Emergency call system complete with two headsets for engine room and two weatherproof deck call stations

* * *