

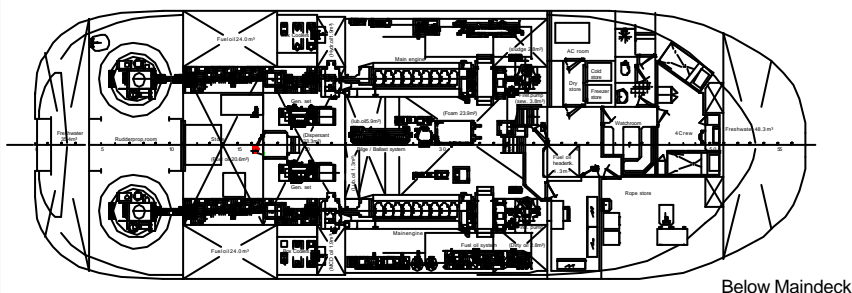
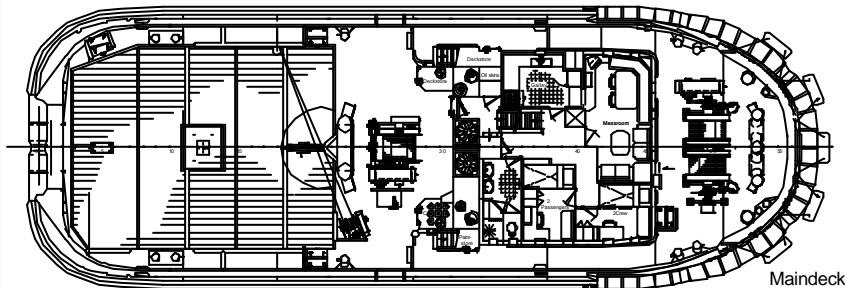
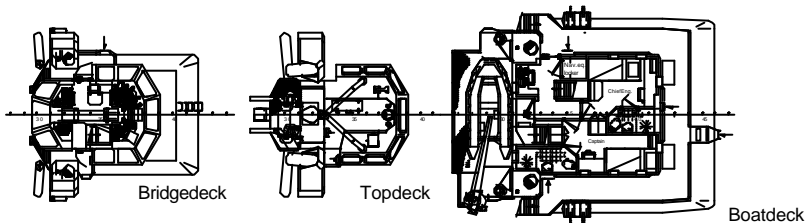


Double azimuth stern drive tug

**KAKULO**

68 metric ton bollard pull ahead

65 metric ton bollard pull astern



**DAMEN DESIGN**

Type ASD 3211

KAKULO is designed to assist offshore oil and gas off-loading tankers.

Highly manoeuvrable, with two azimuth thrusters, this boat has its double drum towing winch located on the forecastle, thus allowing to switch from towing to pushing within seconds.

Each drum is equipped with a complete tow line giving redundancy. A towing winch is fitted on the main deck aft, giving an even higher operational flexibility.

In addition, it offer a 75m<sup>2</sup> deck space for material and 20 ft containers, even refrigerated, as well as a fire-fighting capability.

It also has two oil dispersant spray booms.

07-11-2006



# Double azimuth stern drive tug

# KAKULO

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### MAIN CHARACTERISTICS

Length overall: .....106.60 ft. (32.50 m)  
Beam overall (incl. rubber fender): 39.30 ft.(12.00 m)  
Depth main deck midship:.....16.40 ft. (5.00 m)  
Loaded draft: .....16.00 ft. (4.90 m)  
Deadweight: .....183.40 st. (170 mt).

### REGISTRATION

Type: .....Double Azimuth Stern Driven Offshore Tug.  
Owner:.....SONASURF INTERNACIONAL SHIPPING LDA.  
Year built: .....2003.  
Builder: .....DAMEN SHIPYARDS (Holland).  
Flag: .....French.  
Classification: .....BUREAU VERITAS. 1 3/3 E ✚ Tug-Fire fighting ship/water spray  
Deep Sea. ✚ AUT MS. ✚ MACH.

### PERFORMANCE

Maximum speed: .....13 knots.  
Economic speed: .....10 knots.  
Consumption: .....4,755 USG/day at 100% bollard pull (17 t/24 h).  
2,774 USG/day at economic speed (10 t/24 h).

### ACCOMMODATION

- Officers: .....2 cabins with 1 berth.  
1 cabin with 2 berths.
- Crew: .....1 cabin with 4 berths.
- Passengers: .....1 cabin with 2 berths.  
(the regular crew being 6, 2 additional bunks remain available for charterer's personnel, except during tug's crew changes).
- Messroom, sanitary spaces, stores.
- Fully air-conditioned.

### PROPULSION - MACHINERY

- **Main diesel engines:** .....2 BERGEN KRM B9.  
Cont. output: .....2 x 2,030 kW.
- **Gear boxes:** .....2 MCD Twin-Disc.
- **Azimuth propellers:** .....2 AQUAMASTER US 3001.  
(diameter: 2,700 mm).
- **Bollard pull ahead:** .....75.0 st. (68.1 mt).
- **Bollard pull astern:** .....71.9 st. (65.2 mt).
- **Auxiliary generators:** .....2 CATERPILLAR 3304 T, 100 kVA  
380 V - 50 Hz each.

### TOWING EQUIPMENT

#### Forecastle deck:

- 1 double drum towing winch.
  - Line pull (towing drums): .....33 st. on 1<sup>st</sup> layer (30 t).
  - Brake hold (towing drums): .....165 st. on 1<sup>st</sup> layer (150 t).
  - Speed (towing drums): .....65 ft/min. at 1<sup>st</sup> layer (20 m/min).
  - Wire capacity (towing drums): .....up to 984 ft each (300 m).
  - Tow line: .....492 ft of steelite rope (150 m/diam.80 mm).
  - Spare tow line: .....1 complete tow line per tug (ready for use on the 2<sup>nd</sup> drum).

#### Aft deck:

- 1 single drum towing winch.
  - Line pull: .....121 st on 2<sup>nd</sup> layer (110 t).
  - Brake hold: .....165 st on 2<sup>nd</sup> layer (150 t).
  - Speed: .....32.8 ft/min. at 2<sup>nd</sup> layer (10 m/min).
  - Wire capacity:.....2,297 ft (600 m/diam. 52 mm).

### SPECIAL EQUIPMENT

#### Tugger winch:

An electro-hydraulic driven tugger winch is fitted on aft deck.

- Pull: .....5.51 st. (5 t).
- Speed: .....59 ft/min. (18 m/min).
- Drum capacity: .....98 ft of 0.59 in. wire (30 m/diam.15 mm).

#### Stern roller:

- Diameter: .....35 in.
- Length: .....6.60 ft.
- SWL: .....138 st.

#### Dispersant booms: .....2.

- Length: .....21 ft.
- Flow: .....50 to 53 USG per 107,639 sq.ft.

### CARGO CAPACITIES

Cargo deck area: .....807 sq.ft (75 m<sup>2</sup>).  
Deck cargo: .....83 st (75 m.t).  
Deck loading: .....5.50 st/sq.ft (5 t/m<sup>2</sup>).  
Total fuel oil: .....34,342 USG (130 m<sup>3</sup>).  
Total water: .....26,417 USG (100 m<sup>3</sup>).  
Foam: .....9,246 USG (35 m<sup>3</sup>).  
Dispersant: .....6,604 USG (25 m<sup>3</sup>).  
Sewage: .....1,057 USG (4 m<sup>3</sup>).

### ELECTRONICS

- 2 radars.
- 1 gyrocompass.
- 1 echo sounder.
- 1 speed log.
- 1 autopilot.
- 1 GPS (DGPS).
- 1 anemometer.
- 1 INMARSAT M telephone and fax.
- 1 radio system compliant with GMDSS (A3) rules  
including: 2 INMARSAT STD C, 2 VHF, 1 NAVTEX, 1 SSB.

### LIFE-SAVING EQUIPMENT

- 2 x 20 persons inflatable liferafts.
- 1 x ZODIAC RB6 rescue-boat (SOLAS IMO 47 compliant)  
with 1 YANMAR D27 diesel engine.
- Jacob Lader.

### FIRE-FIGHTING SYSTEM CLASS FI-FI I (10,567 USG/min) (2,400 m<sup>3</sup>/hr)

- Monitors: .....2.
- Water capacity: .....5,283 USG/min. each.(1,200 m<sup>3</sup>/hr)
- Fire-fighting pumps: .....2 x 5,723 USG/min. each.(1,300 m<sup>3</sup>/hr)
- Foam system.
- Deluge system.

All particulars believed to be correct but not guaranteed.

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