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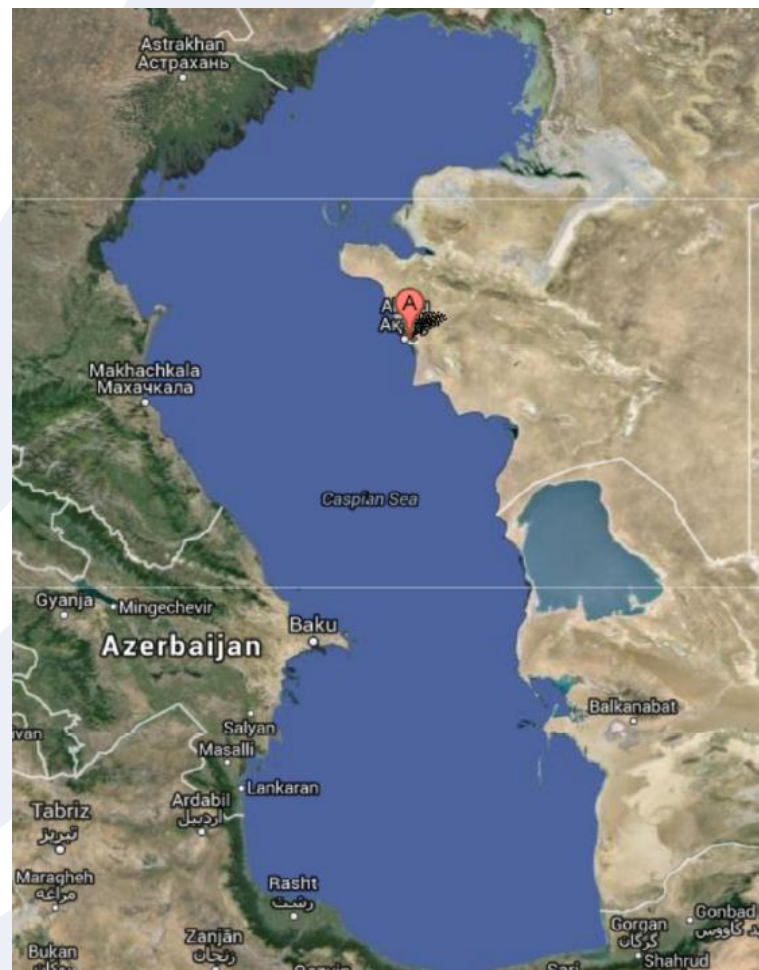
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## LNG powered RO-RO ferry solution

The project MM 155 RO-RO LNG is a project of an automobile and railway ferry. The ferry is designed for the transportation of railway and road transport between the ports of the Caspian basin.

The primary types of cargo are rail cars containing petroleum products, which head from the port of Aktau to the ports of other countries of the Caspian basin.

A distinctive feature of the ferry's power system is the use of dual-fuel main engines running on fuel oil and liquefied natural gas (LNG).



## LNG powered RO-RO ferry solution



Length overall	154.40	m
Length between perpendiculars	151.97	m
Breadth moulded	17.50	m
Depth to MD	7.50	m
Depth to UD	13.50	m
Load Line draught	4.77	m

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## *LNG powered RO-RO ferry solution*



The capacity of fuel oil tanks is accepted to ensure cruising range of 1500 miles.

The capacity of LNG tanks is accepted to ensure cruising range of 1000 miles.

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## *LNG powered RO-RO ferry solution*

1. Main engine WARTSILA 9L20DF
2. Reduction gear
3. Shaft line
4. Shaft generator, 600 kW, coefficient of generator efficiency 0.95
5. Adjustable pitch propeller

Main engines will correspond to IMO Tier III, according to the Convention MARPOL 73/78, Annex VI.

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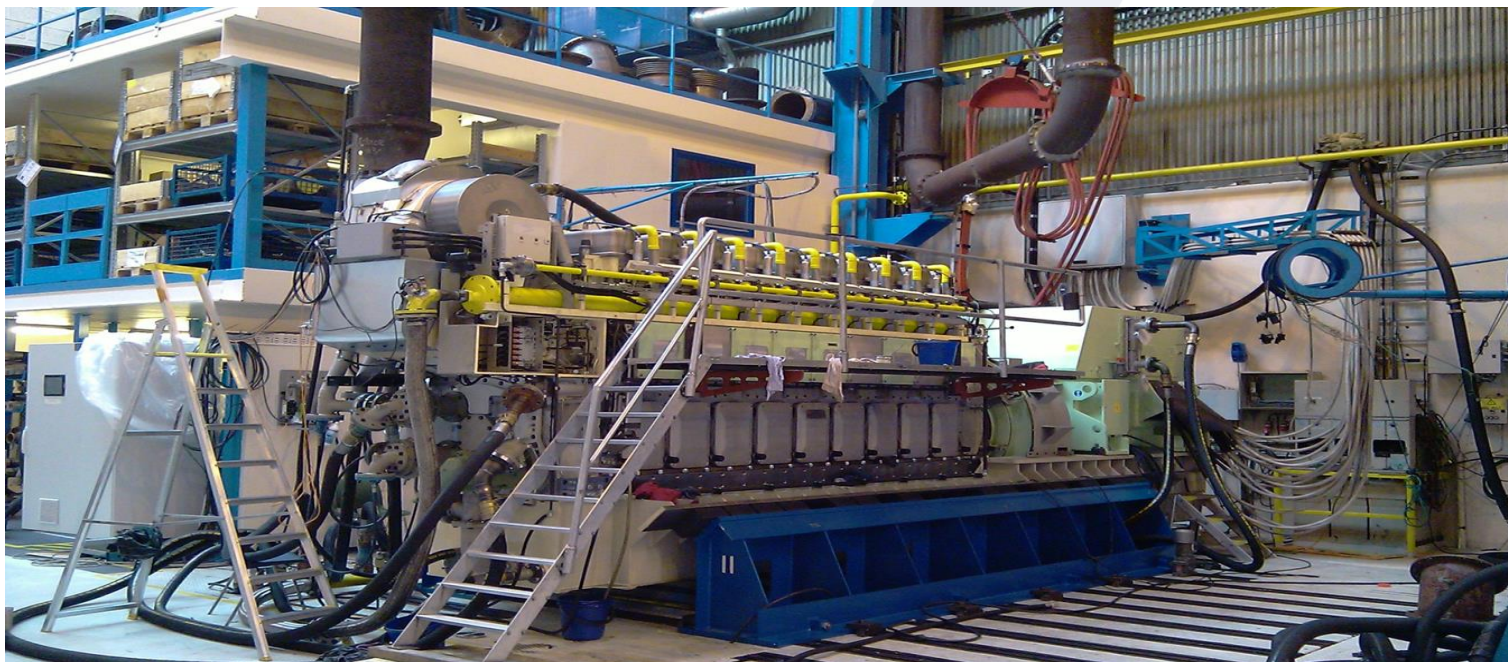
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## LNG powered RO-RO ferry solution



Operation of the main engines (ME) on the marine diesel oil (MDO) or on the liquefied natural gas (LNG) will be provided.

The minimum volume of methane in the LNG, used for main engine run, - 70%.

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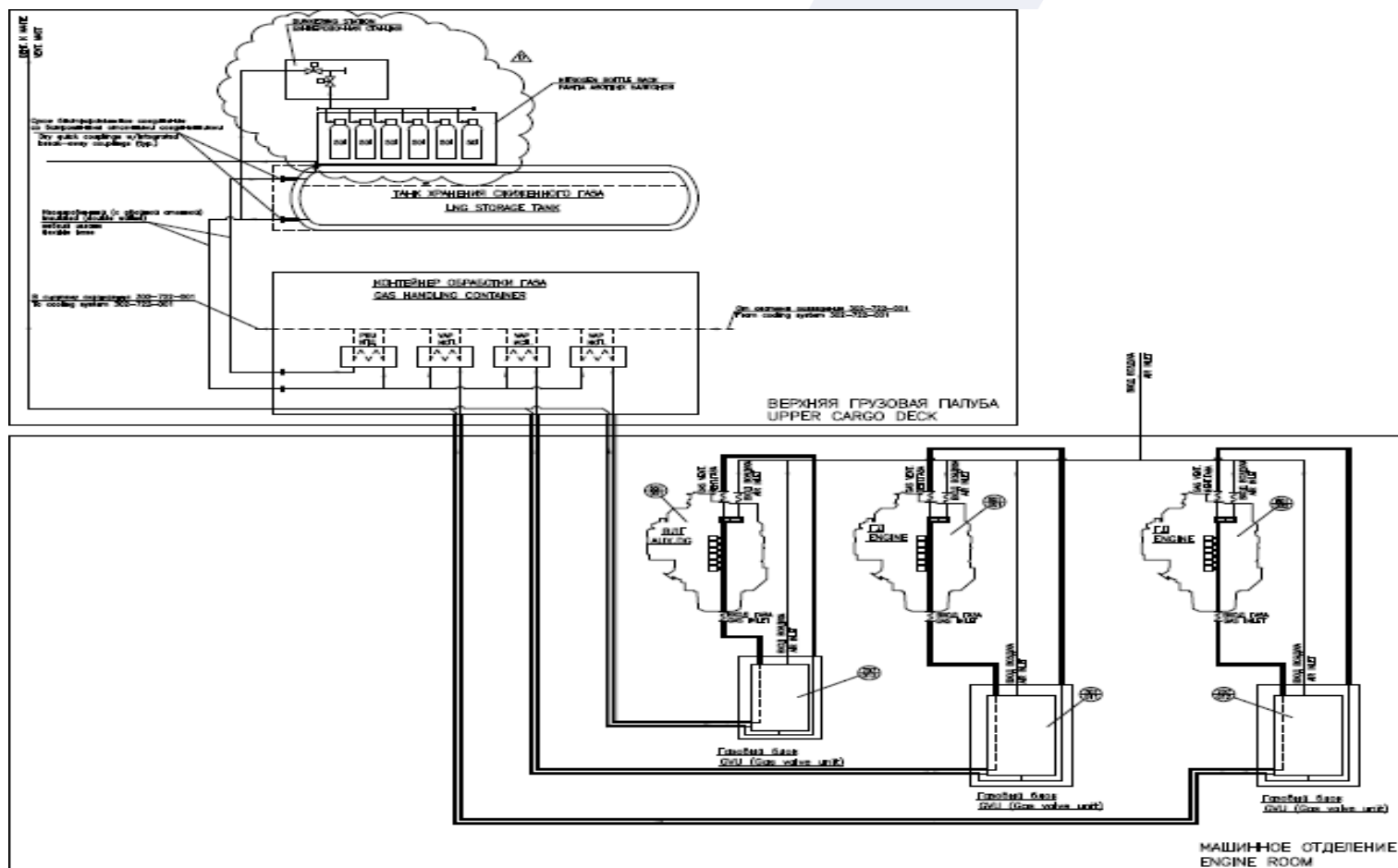
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# LNG powered RO-RO ferry solution



## *LNG powered RO-RO ferry solution*

For storage of LNG, module of LNG Pac 145 type is assumed, production of WARTSILA:

Geometrical volume - 145 m<sup>3</sup>

Net volume (90%) - 131 m<sup>3</sup>

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## *LNG powered RO-RO ferry solution*

LNG (methane CH<sub>4</sub>) will be used for the main engine operation. Storage of LNG will be provided in the two-wall tank, located on the upper deck.

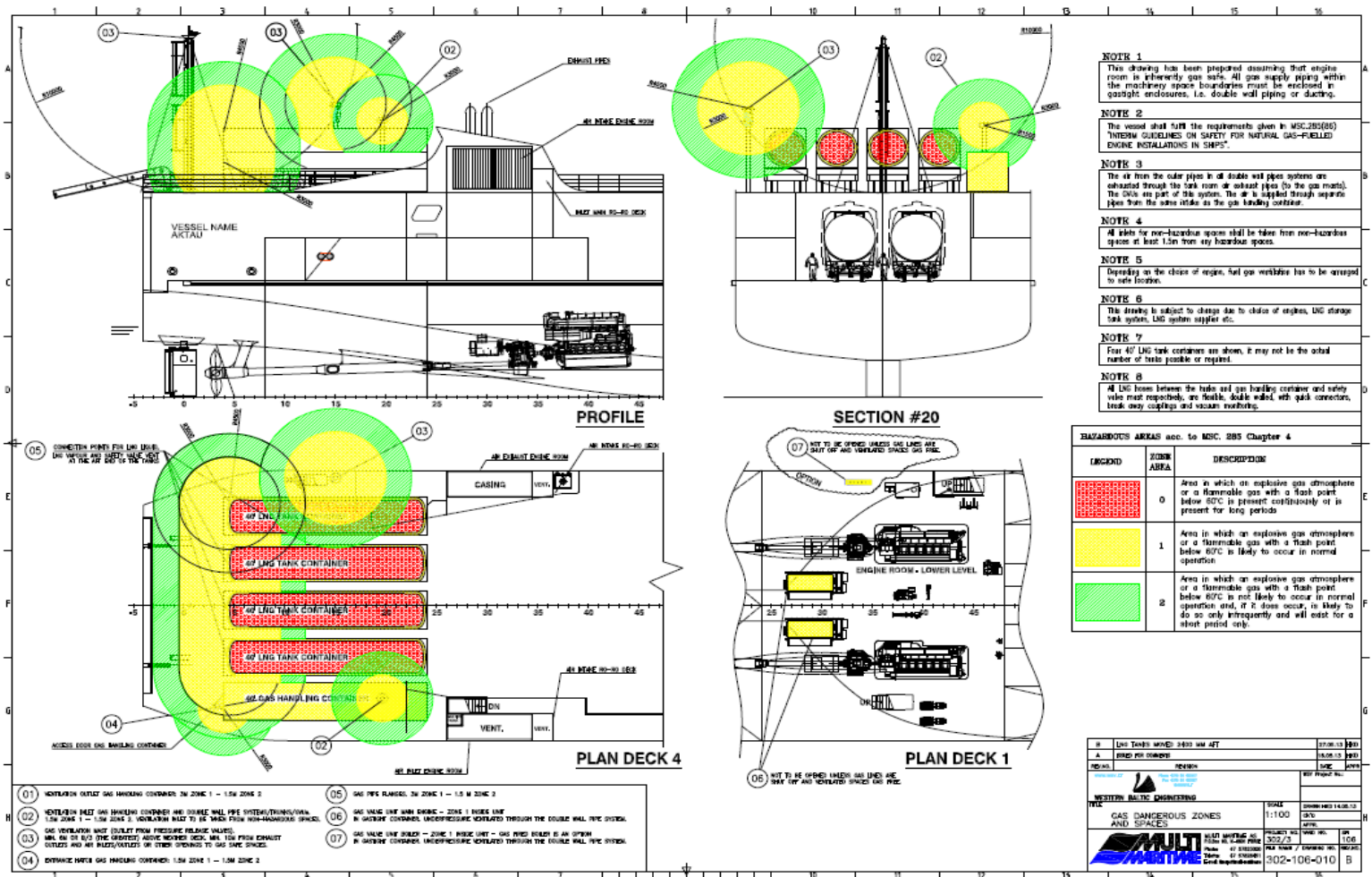
The tank inner walls are made of stainless steel.

The space between walls will be vacuumed and filled with the insulation, providing LNG storage for a long time at a temperature - minus 162°C.

The tank will be designed for the temperature of minus 196°C and working pressure of 9 bars inside the tank.

The outer casing of the tank serves as a protection against gas leakage in case of the tank inner walls damage and may be made of stainless steel or of carbon steel with a nickel content of 9%.

# LNG powered RO-RO ferry solution



## LNG powered RO-RO ferry solution

- Approx. 30% lower bunker price.
- Reduced maintenance costs, approx. 20%.
- Reduced lub.oil costs, approx. 50%.
- 100% SOx reduction.
- 100% Particulate reduction.
- 80-90% NOx reduction.
- 31% CO<sub>2</sub> reduction (compared to SCR alt.).
- Meets requirements in IMO TIER III (2016).

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*Thank you for your attention!*

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