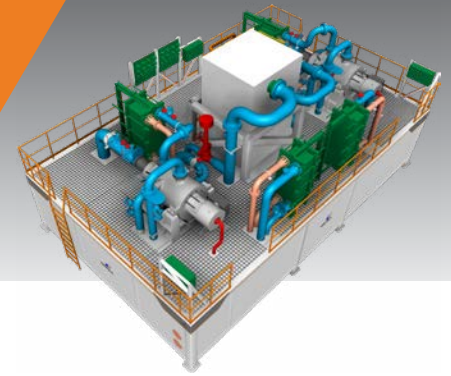


Compact Reliq™

BOG Reliquefaction Unit



Wärtsilä Gas Solutions is a trusted provider of integrated solutions and market leader with excellent quality, supplying customers with digitally enabled, integrated solutions that help them increase operational efficiency and lower the environmental footprint.

The offering consist of treatment, handling and processing of cryogenic gases (LPG, LNG, ethylene, biogas etc.) for marine and onshore applications such as cargo handling, fuel gas supply, liquefaction and gasification and biogas plants.

Wärtsilä introduces the Compact Reliq Unit, a BOG Reliquefaction module.

BASED ON BRAYTON TECHNOLOGY: proven technology in a vast amount of industrial applications.

SMART MARINE READY WITH OPERIM: instrumented for remote operations, health monitoring and online operational supports. The system will be delivered with Wärtsilä OPERIM health program.

LOW MAINTENANCE: Minimal maintenance between docking – no scheduled maintenance on rotating equipment. Magnetic bearings – no oil change. Only a few moving parts. Low maintenance cost during docking every fifth year.

COMMERCIAL GRADE NITROGEN AS REFRIGERANTS: Easy obtainable refrigerant and provides safe operation.

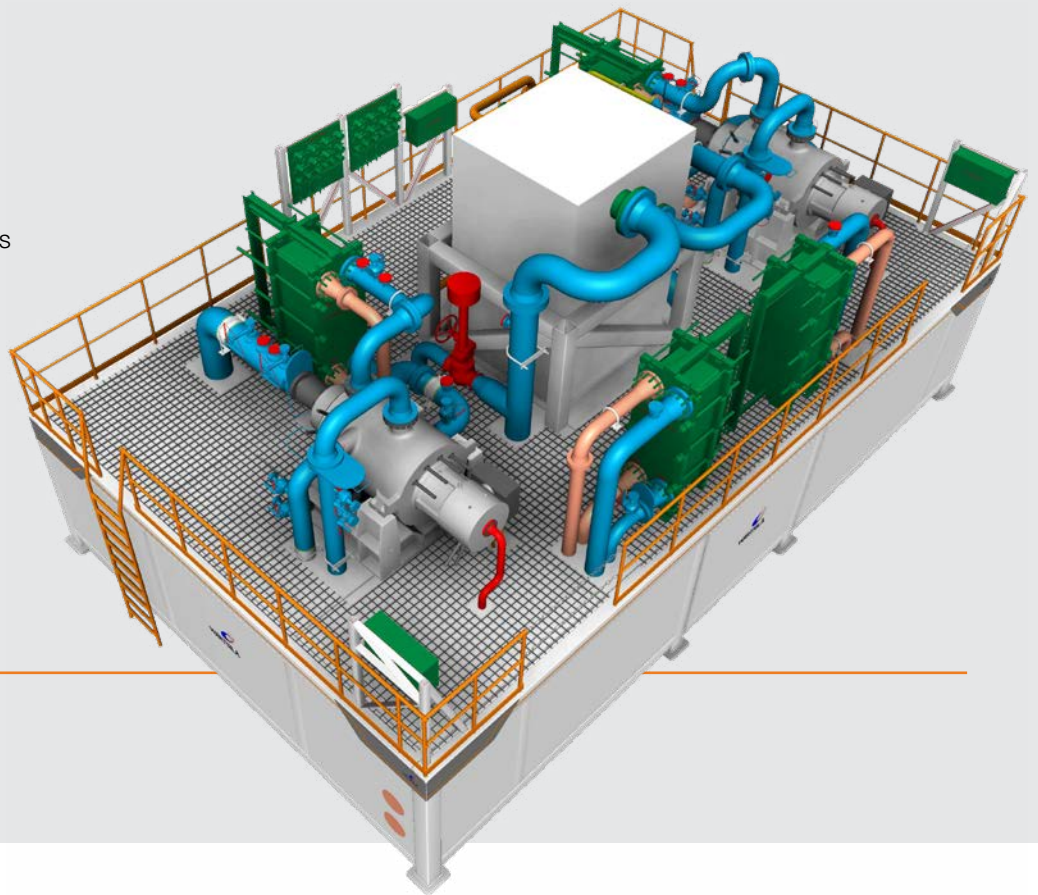
DYNAMIC SIMULATION: The system is design verified and parameter tuned by dynamic simulator.

The Compact Reliq™ is delivered as a single module, which is ready for plug & play integration at the yard.



The Compact Reliq™ module consists of the following equipment:

- Integrated compressor expander
- Inter- and aftercooler for the refrigerant
- BOG recondenser
- Instrumentation
- Internal piping and insulation
- Control system
- Smart marine connection
- Variable frequency drive (VFD) and active magnetic bearings (AMB) control cabinets supplied loose



Compact Reliq features

The Compact Reliq™ is a Reversed Brayton reliquefaction system with nitrogen (N₂) as refrigerant.

The main attributes for the Compact Reliq™:

- Direct control of cargo tank pressure by liquefying BOG.
- BOG reliquefaction ensures stable cargo tank pressure at all ship operations, also in ballast voyage. Minimum heel is required.
- Well-known process with latest machinery technology. Process control is based on experience from numerous reliquefaction plants in the past.
- N₂ as single refrigerant ensures a safe and easy operation.
- The solution is fully automated and adapted to all LNG applications.
- Smart marine ready (OPERIM®). Instrumented for remote monitoring, health monitoring and online operational support.
- One module for easy integration on the vessel.
- Compact compander and module give high cooling capacity per m².
- Integrated Compressor Expander unit with magnetic bearings. Hermetically sealed system ensuring:
 - no seal gas system
 - no gearbox
 - no oil
 - no gas leakage – completely sealed system
- Market leading turndown capabilities.
- Long service intervals. Planned maintenance during docking every five years.

The system can be installed onboard vessels regardless of engine type: DFDE, XDF, ME-GI or equivalent.

Technical specifications

	Pure methane			0.5% N ₂		
	Capacity [kg/hr]	Refrigeration duty [kW]	Efficiency [kW/kg]	Capacity [kg/hr]	Refrigeration duty [kW]	Efficiency [kW/kg]
CRS	850	133	1.02	830	122	1.08
CRS + booster	1500	234	0.59	1450	210	0.64
CRD	1700	266	1.04	1650	239	1.12
CRD + booster	2400	374	0.74	2350	341	0.78

The system is designed to handle BOG at pressures ranging from 4.5 to 22 bara. Cooling water temperature used is 36°C.

