



COMPACT RELIQ

REVOLUTIONARY PRODUCT BASED ON PROVEN TECHNOLOGY

基于成熟技术的革命性产品

GROWING LNG BUSINESS REQUIRES MORE FLEXIBLE SOLUTIONS

LNG业务的不断增长要求更加灵活的解决方案

- It will be a boost in new built of large LNG carriers.
- 它将推动大型LNG船新船建造。
- Reliquefaction systems has become a standard feature on large LNG Carriers
- 再液化系统已然成为大型LNG船的标配。
- With the changing LNG supply chain new sizes and type of vessels enter the market
- 随着LNG供应链的不断变化，全新尺寸及类型的船舶将进入市场。
- LNG becoming a common accepted fuel, increasing the use of Small Scale LNG Carriers
- LNG成为一种被人们普遍接受的燃料，由此增加了小型LNG船的使用。
- Retrofit market requires compact solutions that fits well on existing ships.
- 改装市场要求非常适合现有船舶布置的紧凑型解决方案。
- Compact Reliq is attractive to Bunkering operations due to proper BOG reliquefaction
- 由于合适的BOG再液化，Compact Reliq对船舶燃料加注操作具有吸引力。
- Being the pioneer in BOG reliquefaction Wärtsilä has continued to develop with the market
- 作为BOG再液化领域的先行者，瓦锡兰始终与市场共同发展。



**Developing with the
market**
与市场共同发展

PROPER BOG RELIQUEFACTION – CONTROLLING TANK PRESSURE IN THE MOST FLEXIBLE AND ENERGY EFFICIENT

合适的BOG再液化 – 以最灵活且最具能源效率的方式控制货舱压力

- A portion of the BOG may be utilized as fuel for the ship engine
- 一部分BOG可用作船用发动机的燃料
- Excess BOG is liquefied and sold together with the LNG in the cargo.
- 多余的BOG经过液化并与货物中的LNG一并出售。
- Keeping cargo cool to increase holding time
- 让货物保持冷却，从而延长保温时间



LNG Carrier cargo tank BOG handling
LNG船货舱BOG处理

Market Leader -
50 + BOG Reliquefaction References
市场领导者 – 50多个BOG再液化业绩

The LNG in the cargo- or storage tank is at it's boiling point and will produce boil off gas (BOG) which is reliquefied and returned to the storage tank.

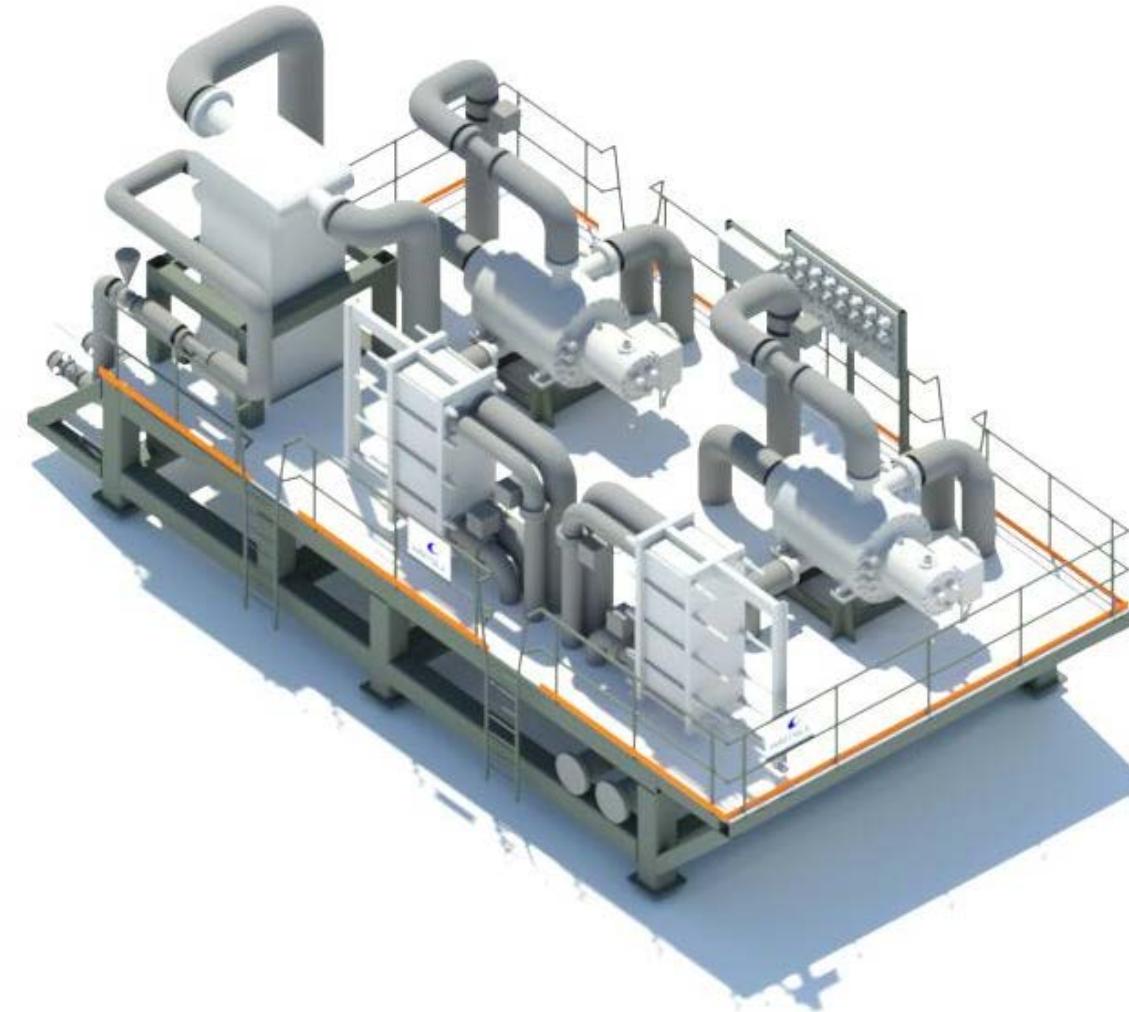
货舱或储存舱中的LNG处于沸点温度，将产生蒸发汽（BOG）。
BOG经过再液化后返回储存舱。



On-shore storage tank BOG handling
岸上储存舱BOG处理

LONG TIME EXPERIENCE AND PROVEN TRACK RECORD NOW TRANSLATED IN A
COMPACT, RELIABLE MODULE

如今瓦锡兰已将其长期的经验与良好的业绩记录转化为一款可靠的·紧凑式再液化模块



CR 1 700
Capacity –
1600 – 1800 kW
CR 1 700容量 – 1600-1800
千瓦

WARTSILA INTRODUCES COMPACT RELIQ

瓦锡兰推出COMPACT RELIQ

- **BASED ON BRAYTON TECHNOLOGY** proven technology in a vast amount of industrial applications
- 基于布雷顿技术：这是一项广泛用于各种工业领域的成熟技术
- **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
- 可配备**OPERIM**船舶智能：其配置可实现远程操作、健康监控及在线操作支持。系统交付时将配备**OPERIM**健康程序
- **LOW MAINTENANCE:** Minimal maintenance between docking – No scheduled maintenance on rotating equipment. Magnetic bearings - no oil change. Only few moving parts - Low maintenance cost during docking every fifth year.
- **低维护：**入坞检修时维护最少——无需定期维护转动设备。磁力轴承 - 无需换油。只有少数的活动件 – 每五年的坞修期间较低成本的维护工作。
- **COMMERCIAL GRADE NITROGEN AS REFRIGERANTS:** Easy obtainable refrigerant and provides **safe operation**
- 采用商用氮气作为制冷剂：可轻易获得的制冷剂且**操作安全**
- **DYNAMIC SIMULATION** The system is design verified and **parameter tuned** by dynamic simulator.
- 动态仿真：采用动态仿真器对系统进行设计验证及**参数调整**

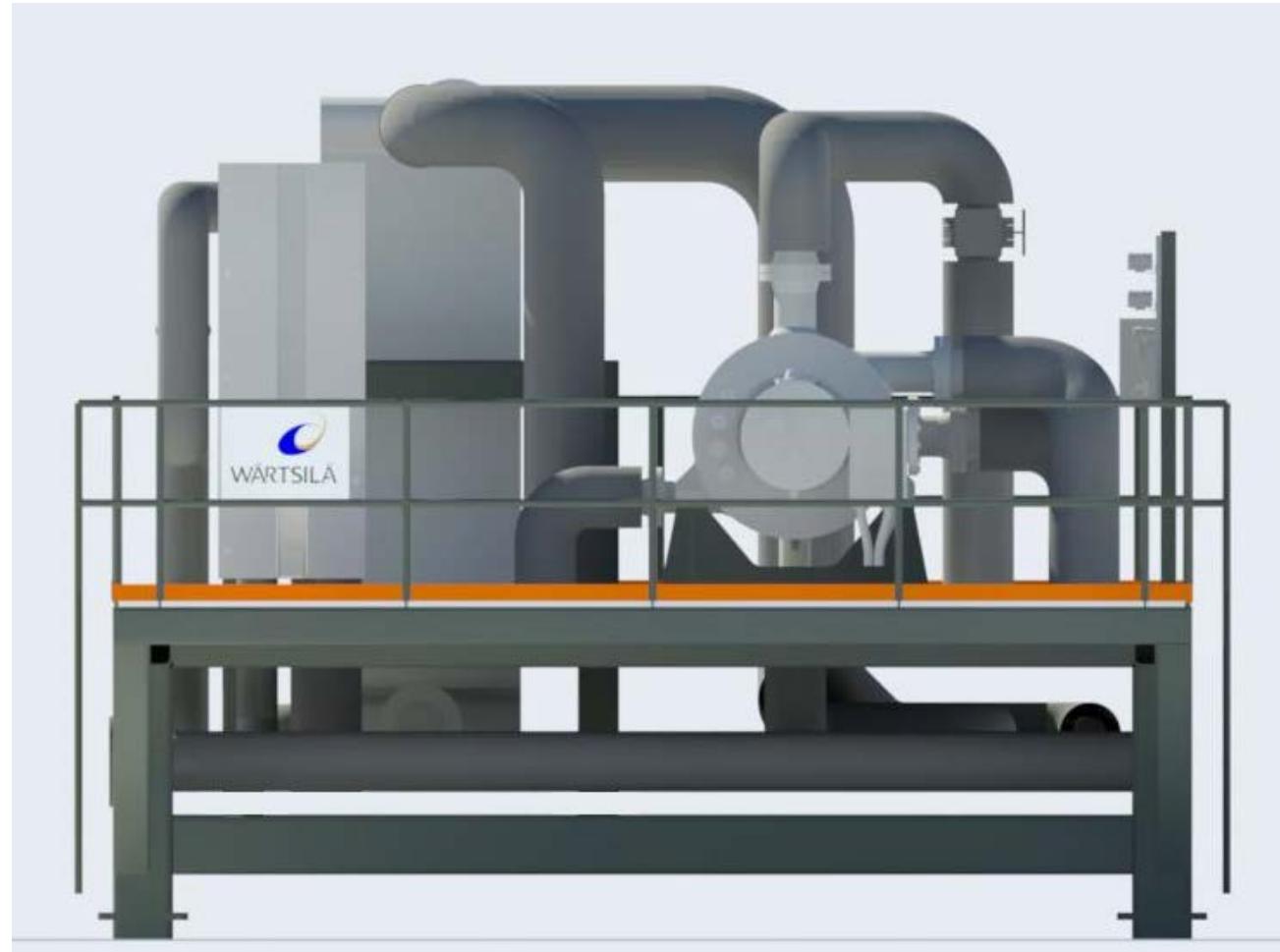
Model 型号	CR 850	CR 1 700
Capacity (kW) 容量 (千瓦)	800 - 900	1600 – 1800
Efficiency kW/kg LNG 效率, 千瓦/千克LNG	Better than 0.95 优于0.95	Better than 0.95 优于0.95

Wärtsilä - The Pioneer
in BOG reliquefaction
瓦锡兰 – BOG再液化的先
行者

WARTSILA INTRODUCES COMPACT RELIQ: 瓦锡兰推出COMPACT RELIQ :

- **MODULARISED COMPACT DESIGN:** All equipment on one single skid unit including compressors, drive motor, heat exchangers, valves control, instrumentation, panel.
- 紧凑的模块化设计：所有设备位于同一橇装装置上，包括压缩机、驱动马达、热交换器、阀门控制器、仪表板。
- **EXCELLENT TURNDOW:** Turndown to near 0% with **rapid capacity** changes.
- 极好的调低负载操作：**快速容量**变换，调低至几乎0%。
- **INTEGRATED MAGNETIC BEARING COMPRESSOR** Centrifugal with compressors and expander on a single shaft. **Hermetically** sealed with low voltage integrated motor. Industry leader in **robust and compact** compressor solutions has signed an agreement with Wärtsilä.
- **一体式磁力轴承压缩机**：离心式压缩机和膨胀机位于同一传动轴上。采用低压集成马达，**气密密封**。**稳健、紧凑**的压缩机解决方案行业领袖已与瓦锡兰签订协议。
- **HEAT EXCHANGERS:** Main heat exchanger is a plate fin type. Other heat exchangers are standard plate type.
- 热交换器：主热交换器为板翅式。其他热交换器为标准板式。
- **FLEXIBLE SHIP OPERABILITY:** Wärtsilä BOG reliquefaction systems provides **full BOG reliquefaction** with low temperatures tanks in both laden and ballast voyage. The ship can run at any speed and still have reliquefaction.
- **灵活的船舶操控性**：瓦锡兰BOG再液化系统提供**完全BOG再液化**，在载货和压载航行时均可保持货舱较低温度。船舶可以任意航速运行，且仍可运行再液化。
- **EASY INSTALLATION – PLUG AND PLAY:** Minimal amount of interface connection points - cooling water, electricity and gas in/out, **small footprint**.
- 安装简便 – 即插即用：接口连接点最少 – 冷却水、电力和气体输入/输出、**占地面积小**。
- **INTERFACE WITH SHIP PMS:** Wärtsilä has a unique position with the extended port folio to help customers fully integrate the reliquefaction system into the PMS to provide **optimal ship operation**.
- **连接船舶PMS**：瓦锡兰有着独特的地位，利用其广泛的产品组合帮助客户将再液化系统完全集成到PMS中，由此实现**最优船舶运行**。

THE BEST JUST MADE MORE COMPACT
只为更紧凑



Model 型号	CR 850	CR 1 700
Length 长	10 000	11 000
Width 宽	4 500	5 500
Height 高	4 000	4 500
Weight 重量	50	70

Dimensions: mm

Weight: ton

尺寸 : 毫米

重量 : 吨

What is OPERIM®

什么是OPERIM®

Operational Performance Improvement & Monitoring

运行性能改善与监控

Data Collection Capabilities 数据采集能力



Operim Cloud Service Operim云服务



Smart Services 智能服务



Digitally enabling Wärtsilä products: 瓦锡兰产品数字化：

- Data Acquisition: Data collection capabilities from multiple sources 数据采集：从多种来源采集数据的能力
- Data Management, Modelling and Validation 数据管理、建模和验证
- Online Visualisation: Dynamic dashboards, process visualisation, account management 在线可视化：动态仪表板、过程可视化、账户管理

Analysis using Wärtsilä's unique competence: 利用瓦锡兰独特的竞争力展开分析：

- Digital Twin: Mathematical representation of the Process models 数字孪生：过程模型的数学表达
 - Virtual Instrumentation: Calculation of derived properties 虚拟仪表：所衍生特性的计算
 - Performance Insights: Efficiency calculations: Analysing the plant performance 性能洞察：效率计算：分析设备性能
 - Smart Notifications, (Human based, Partial automation) 智能提醒（人工、部分自动化）

Value Added Services 增值服务

- Performance optimization: ensure the asset operates at its optimal point. 性能优化：确保资产的最优运行。
- Asset health monitoring: preventive notifications and anomaly detection. 资产健康监控：预防性通知及异常检测。
- Remote support: faster and more comprehensive support 远程支持：更快、更全面的支持



WÄRTSILÄ