WÄRTSILÄ

Wärtsilä Solutions for Marine and Oil & Gas Markets

Table of Contents

Table of Contents

Marine Markets
Oil & Gas Markets

At Wärtsilä we understand the marine and oil & gas industries. We know the current regulations and anticipate those to come, we listen to our customers and appreciate their needs, developing innovative leading technologies that move the industry forward, and integrating our extensive range of products, systems and solutions to provide lifecycle reliability and efficiency. By connecting all these individual dots, we provide real value for our customers.

Wärtsilä's heritage and experience dates back to 1834. Over the years we have accumulated the world's most complete offering of marine solutions, ranging from ship design, to propulsion and power generating machinery, to complete electrical & automation systems, to vessel positioning solutions, to environmental and emissions control systems, to gas handling and much, much more. We continuously strive to develop innovative technologies that provide greater efficiency, lower operating costs, and that make compliance with environmental legislation easier to achieve.

Wärtsilä has become an established leader – not by chance, but by connecting the dots that bring greater value to our customers' businesses around the world.

Environmental Excellence

Our products are designed to be optimally efficient, both operationally and environmentally. Through efficient fuel consumption and by eliminating or reducing emissions of harmful pollutants, you're able to to operate without restrictions anywhere in the world.

Wärtsilä offers a host of products and solutions that enhance environmental performance. We have led the way in making LNG a viable marine fuel, and we were the first company to be awarded a marine exhaust scrubber certificate. We offer leading technologies in ballast water treatment, and systems to manage sewage, oil and bilge.

Helping you maintain a safe and clean operating environment is part of our everyday service.

Fuel Flexibility

Natural gas is a clean burning fuel. Wärtsilä has long pioneered the technologies that today make it a viable, safe, and environmentally sustainable marine fuel.

We were the first to introduce dual-fuel engine technology for marine applications, and we have continued to develop the use of a range of alternative fuels, such as ethane gas and bio fuels, that increase fuel flexibility. You can select the fuel you need based on cost, availability and environmental restrictions.

Operational Efficiency

Through being a total solutions provider, Wärtsilä can integrate a vessel's propulsion, control, and automation systems to provide the most efficient overall result. We can even create highly efficient initial ship designs. We never forget that operational efficiency leads to lower operating costs and greater profits for you.

Wärtsilä's emphasis on efficiency is exemplified by the fact that Guinness World Records has recognised the Wärtsilä 31 as being the world's most efficient 4-stroke diesel engine.

Lifecycle Support

Our global Wärtsilä Services business also serves to improve lifecycle efficiency by preventing the unexpected, lessening the environmental footprint, and optimising performance. Our unrivalled network covers the globe, 24/7.

Integrated Solutions

Wärtsilä's unique capabilities in harnessing innovation and digitalisation form the basis of our support for our customers as we enter a new age of shipping. It is no longer always enough to provide individual products or systems, since the essential global need for optimal efficiency and minimal risks demand that all these individual parts function together, as a single integrated, harmonious entity. When Wärtsilä talks about connecting the dots, integration of all the various elements that go into producing the most efficient and cost-effective operational performance is central to this concept.

The Future of Shipping

Wärtsilä has set out its visions for the future of the shipping industry. The work on future visions has been prompted by the inevitable effect that growing global energy demand and increasingly stringent environmental legislation to combat climate change will have on the shipping sector.

Already today, we provide technologies that supports eg. the next steps of autonomous shipping and we are heavily investing for the future. A significant effort has been put on intelligent engine control and diagnostics, remote monitoring and optimization of plants. One example if this is the recent acquisition of Eniram. In addition to this, Wärtsilä has a strong foothold in electric propulsion and dynamic position systems and we hence possess the technical building blocks for entering the digital space of shipping. This is further enhanced by development projects on-going in our radical innovation program called Winnobooster.

Ballast Water Management Solutions for all Ship Types

The IMO Ballast Water Convention was introduced in 2004 to address the Control and Management of Ships' Ballast Water and Sediments. The regulation specifies that all sea going vessels greater than 400 gross registered tonnes need to install a Ballast Water Management System.

In recognising that no one solution will be suitable across all ship types, Wärtsilä is uniquely placed to offer owners & operators a choice of Ballast Water Management Systems (BWMS). Wärtsilä also offer a tailored installation package solution – AQUARIUS® READY. The engineering and onboard preparations can be made in advance, and the actual installation of the Wärtsilä AQUARIUS® BWMS can be planned as and when required.

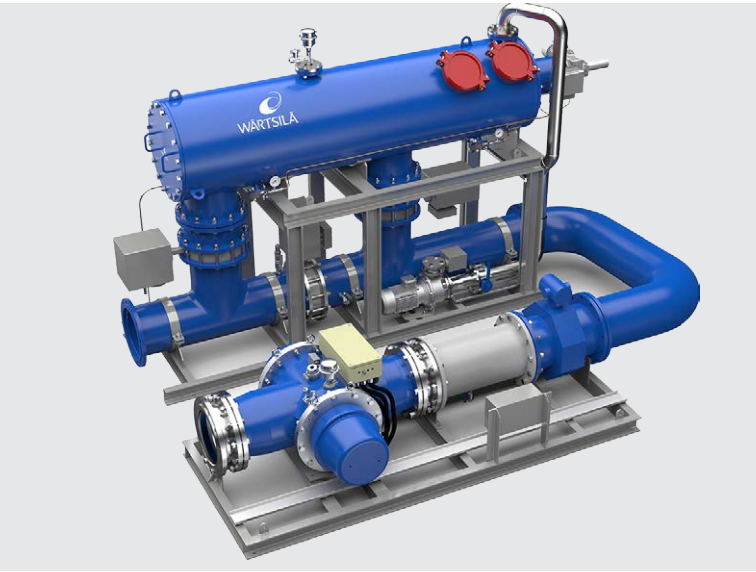
The two Wärtsilä AQUARIUS® BWMS are designed to use a common filter module, and a different disinfection technology - medium pressure Ultra Violet (UV), or electro chlorination (EC) technology.

Ballast Water Management

The Wärtsilä AQUARIUS® BWMS range offers the following advantages:

- Proven performance to meet D2
- Low total cost of ownership
- Fully automatic operation
- Condition-based monitoring – optional functionality
- Flexible upscaling and modular design
- Suitable for both new build and retrofit projects
- Technology choice

By virtue of Wärtsilä AQUARIUS® BWMS range modular design, the system's inherent flexibility allows application across the full range of ship types and sizes, for both the new build and retrofit markets. Wärtsilä offers customers a range of flexible supply options, from equipment only, to a full 'turnkey' service covering all phases, from the initial survey through to the project management, supply, installation, and commissioning of the hardware, and continuing with lifecycle after sales service and support.



Wärtsilä AQUARIUS® UV

Wärtsilä AQUARIUS® UV Ballast Water Management Systems (BWMS) provide robust technology for the treatment of ballast water using ultra-violet (UV) irradiation, across the full range of ship operating and environmental conditions.

The Wärtsilä AQUARIUS® UV BWMS uses a simple two stage process involving filtration and UV irradiation. During uptake, seawater is first passed through a 40 micron backwashing screen to remove particulate, sediment, zooplankton and phytoplankton. Disinfection of the filtered sea water is then carried out using medium pressure UV lamps, and controlled by the BWMS control system. Upon discharge, the filter is by-passed but the ballast water is again disinfected with UV treatment before safe discharge back into the sea.

The system has a modular design enabling it to be arranged to suit conditions onboard the ship. The system can be designed and supplied to treat ballast water covering the full range of ballast pump sizes. There are

Wärtsilä AQUARIUS® UV system	Capacity (m^3/h)	Total installed power (kW)
AQ-50-UV	0-50	19.0
AQ-80-UV	50-80	19.0
AQ-125-UV	80-125	19.0
AQ-180-UV	125-180	38.6
AQ-250-UV	180-250	40.1
AQ-300-UV	250-300	47.7
AQ-375-UV	300-375	47.3
AQ-430-UV	375-430	51.5
AQ-500-UV	430-500	62.6
AQ-550-UV	500-550	93.0
AQ-750-UV	550-750	93.0
AQ-850-UV	750-850	100.0
AQ-1000-UV	850-1000	100.0

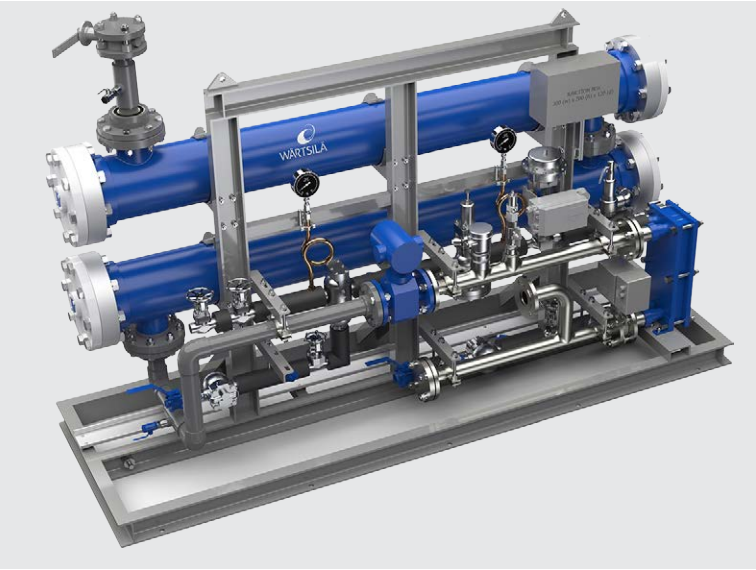
Pressure drop	
Normal operation	0.3 barg
Backwash set point	0.8 barg

13 distinct Wärtsilä AQUARIUS® UV BWMS standard modules available with capacities ranging from 50 m^3/h to 1000 m^3/h. Capacities above 1000 m^3/h up to 6000 m^3/h are achieved by installing multiple modules in parallel.

Available in two configurations for installation in safe environments as well as an explosion proof version certified by DEKRA for hazardous areas. The flexible scope of supply can include standard modules or part kits that meet the individual requirements of our customers.

All Wärtsilä AQUARIUS® UV BWMS units have been granted IMO Type Approval by The Ministry of Infrastructure and the Environment of The Netherlands in accordance with Resolution MEPC.174(58) G8, and have been tested to meet the D2 performance discharge standard.

USCG AMS acceptance has been granted in accordance with the requirements of 33 CFR 151.2026 in all salinity ranges (fresh, brackish & sea water)



Wärtsilä AQUARIUS® EC

Wärtsilä AQUARIUS® EC Ballast Water Management Systems (BWMS) provide robust technology for the treatment of ballast water using in-situ electro-chlorination, across the full range of ship operating and environmental conditions.

The Wärtsilä AQUARIUS® EC BWMS uses a simple and efficient two stage process involving filtration and electro-chlorination (EC). During uptake, seawater is first passed through a 40 micron backwashing screen filter to remove particulate, sediment, zooplankton and phytoplankton. Disinfection of the filtered sea water is then carried out using hypochlorite generated from the side stream EC process, and controlled by the BWMS control system. Upon discharge, the ballast water by-passes the filter and any residual active substance is neutralised using sodium bisulfite, to ensure that the ballast water is safe to discharge back to the sea in full compliance with MARPOL requirements.

The system has a modular design enabling it to be arranged to suit conditions onboard the ship. The system can be designed and supplied to treat ballast water covering the full range of ballast pump sizes. There are 16

Wärtsilä AQUARIUS® EC system	Capacity (m^3/h)	Total Installed power (kW) Installed /Nominal
AQ-250-EC	0–250	25.9 / 22.6
AQ-300-EC	250–300	29.4 / 25.2
AQ-375-EC	300–375	34.6 / 28.9
AQ-430-EC	375–430	38.8 / 32.0
AQ-500-EC	430–500	44.5 / 36.4
AQ-550-EC	500–550	50.8 / 41.0
AQ-750-EC	550–750	60.6 / 48.2
AQ-850-EC	750–850	71.1 / 55.9
AQ-1000-EC	850–1000	85.8 / 68.3
AQ-1200-EC	1000–1200	110.4 / 87.0
AQ-1500-EC	1200–1500	123.0 / 96.9
AQ-2000-EC	1500–2000	167.9 / 126.2
AQ-2400-EC	2000–2400	216.1 / 159.5
AQ-3000-EC	2400–3000	264.8 / 193.1
AQ-3300-EC	3000–3300	319.7 / 233.2
AQ-3600-EC	3300–3600	365.5 / 264.7

Pressure drop	
Normal operation	0.3 barg
Backwash set point	0.8 barg

distinct Wärtsilä AQUARIUS® EC BWMS standard modules available with capacities ranging from 250 m^3/h to 3600 m^3/h.

System capacities above 3600 m^3/h are achieved by installing multiple modules in parallel.

A flexible scope of supply includes standard modules or part kits to meet the customer's individual requirements.

The Wärtsilä AQUARIUS® EC BWMS received IMO Basic Approval at MEPC 64, with Final Approval following at MEPC 65 in May 2013.

All Wärtsilä AQUARIUS® EC BWMS units have been granted IMO Type Approval by The Ministry of Infrastructure and the Environment of The Netherlands in accordance with Resolution MEPC.174(58) G8, and have been tested to meet the D2 performance discharge standard. USCG AMS acceptance has been granted in accordance with the requirements of 33 CFR 151.2026.

Wärtsilä Hamworthy Air & Gas Compressors

Wärtsilä is an established supplier of compressor and ejector systems for the oil, gas and petrochemical industries. Our compressors can be configured to suit a diverse range of high pressure applications for both air and other gases: Argon, Biogas, Carbon Dioxide, Helium, Heliox, Hydrogen, Methane, Natural Gas, Nitrogen (both compression and generation).

We offer a range of options, from a basic compressor block to a fully integrated compressor package solution for high pressure air or gas. We are also able to incorporate ancillary items, such as nitrogen generation and air/gas driers, into the scope of supply. The units are designed to comply with European and other International standards for a range of industries and applications.

We offer 2, 3 and 4 stage compressors with inlet pressures up to 7 bar g, and discharge pressures up to 350 bar g.

Wärtsilä Hamworthy CNG Compressors

We offer biogas or natural gas solutions for CNG refueling stations to serve buses, trucks and other vehicles.

CNG is a more environmentally acceptable alternative than petrol, diesel, or propane/LPG, and is significantly lower in price. Our offering covers a range of options, from a basic compressor block to a fully installed and commissioned CNG refueling station that includes the compression module(s), cascade storage, priority panels and fuel dispensers. The units are designed to comply with European and International standards.

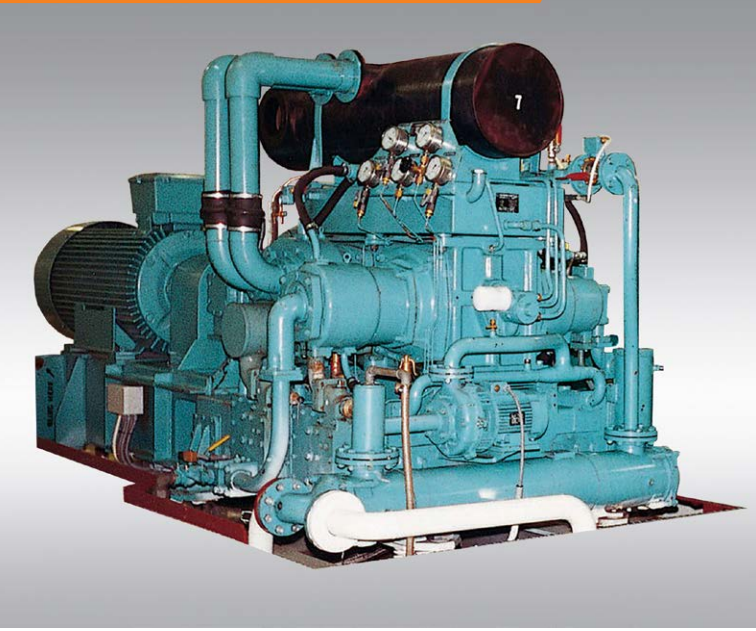
We provide systems for either ‘fast fill’ (temperature compensated) or ‘timed fill’ with 200 or 250 bar g filling pressures. The gas composition may be required to ensure correct compressor and material selection.

Wärtsilä Hamworthy Rig Tensioning Compressors

Our rig tensioning compressors and heave compensation compressor packages are fully integrated, lightweight, compact, and engineered for the offshore environment.

The combination of a 4 stage compressor, dryer, and filtration package with a contained cooling system, produces filtered and dry, high pressure air or gas suitable for riser tensioning and other offshore applications. The packages are designed to ensure that upgrades, refurbishment, and servicing can be easily carried out. We also offer high pressure nitrogen booster compressors, along with nitrogen generation systems, for riser tensioning, motion compensation, drill stream compensation and other applications.

These units can be supplied as integrated packages, fully assembled, tested and ready for installation. The module also meets the requirements of the major marine classification societies.



Wärtsilä Hamworthy Seismic Compressors

Our seismic compressors offer an integrated and compact solution to your high-pressure needs.

Wärtsilä Hamworthy seismic compressors feature a low lift concentric valve and generous inter-stage cooling to minimise the amount of absorbed power. This results in very high overall efficiency. Each machinery package includes a choice of drive, skid base and control system, and is engineered to suit your seismic requirements.

The low unit noise and vibration improves reliability and reduces interference with survey results. Flexibility in vessel utilisation is available to contractors and operators via the containerised option. Thanks to the easy access features and simple modular construction, it enables low and easy maintenance. A multiple unit control system provides local and remote operation of two or more compressors.

Electrical & Automation

Our product scope includes electric propulsion and drives, power generation and distribution systems, navigation, automation and communication systems, dynamic positioning, safety and security solutions, entertainment systems, as well as sonar and sensor technology for vessels of all types and sizes. Our state-of-the-art products and solutions are efficient, reliable

and cost effective, and are supported by 24/7 customer service around the world.

Under the motto “from bridge to propeller” we provide full integration of all electric and electronics systems, typically in close partnership with the shipyard. The level of system integration varies from a package delivery of products, with related engineering included, to complete system integration (the turnkey solution).

Control Systems

Integrated Vessel Control Systems

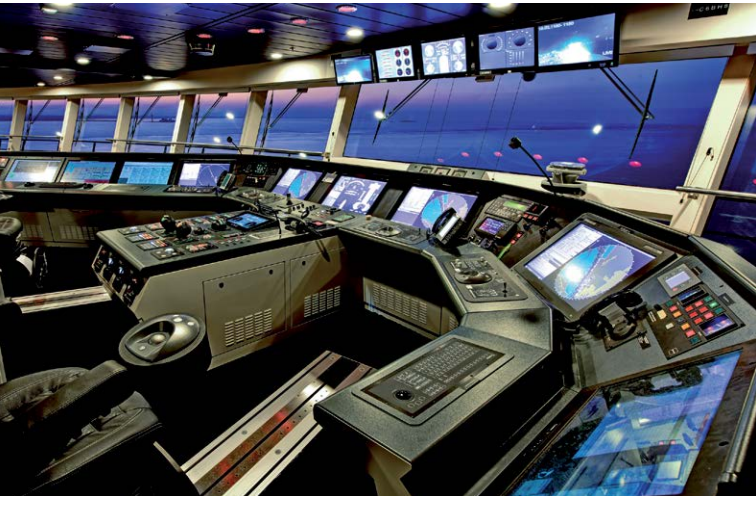
Wärtsilä NACOS Platinum is the core product for a complete series of next-generation navigation, automation and control systems, including dynamic positioning. The entire portfolio for this series is based on shared software and joint hardware components, and utilises a common network.

The use of modular components ensures unprecedented levels of usability and scalability. The design of the networked system architecture is flexible, ranging from small independent systems requiring limited integration, through to highly complex systems with unlimited integration possibilities. Moreover, each system can be easily expanded, upgraded, or modified to provide increased functionality.

The IP-radar, which is directly connected to the ship's IP network. This enables the complete radar image to be accessible from any workstation. The HSC option with increased antenna speed provides consistent tracking of fast targets, and is ideal for use on high-speed crafts (HSC).

Consistency and tight integration between products simplifies and smooths the installation, while enabling efficient lifetime support from one of the largest global suppliers.

All products are developed according to User Centred Design principles. In co-operation with a leading international Human Factors institute, a very ambitious collaborative design process has been undertaken. This has



Control Systems

resulted in a Human Machine Interface (HMI) which is intuitive, transparent, and completely consistent across the full range of products.

Automation Products

- Integrated Automation Systems (IAS)
- Compliant with notations DP0 to DP3, NAUT, OSV and similar
- Ballast Control and Monitoring
- Cargo Control and Monitoring
- Bilge Control and Monitoring
- Power Management (available as fully redundant with advanced generator protection functions)
- Propulsion Control
- Engine Governor Control
- HVAC/Fire Monitoring
- Emergency Shutdown
- Safety Management
- Information Management
- Asset Management
- Fleet Management
- Vessel Performance Monitoring

Manoeuvering, Dynamic Positioning

- Thruster Control
- Joystick Operation
- Dynamic Positioning

Navigation Products

- Radar
- ECDIS
- Conning
- Track Control
- Integration of Radar, ECDIS, Conning and even Automation in one compact workstation
- VDR, AIS, BNWAS
- Integrated Bridge Systems (IBS)
- Integrated Navigation Systems (INS)
- Navigation Sensors

Remote Service enables service engineers to access the on-board systems almost anywhere in the world. This simplifies the diagnosis of faults and problems, and allows the needed spare parts to be delivered to the nearest port in good time. In many cases, Remote Service enables faults to be remedied even when the ship is still underway, thus eliminating servicing or even the extension of docking times.

An ever increasing number of on-board security systems are IT-based and networked with LAN from radar to bilge. Interfaces to other systems and externally (to land) enable new functions, such as automatic updates of electronic sea charts and remote service. Wärtsilä offers a wide-ranging security solution that provides appropriate responses to key issues in IT security. Depending on the details of the system, the customer has access to a range of security functions to ensure the fleet is protected against all relevant threats.

Electric Propulsion

Diesel-electric Propulsion

Wärtsilä is fully aligned with the growing trend in the market for diesel-electric propulsion systems. Frequency converter fed propulsion systems offer advantages for ships with the following special requirements in the 400 kW up to 30 MW power range:

- Low noise and vibration
- High redundancy
- Maximum payload capacity and optimal utilisation of available space
- Economical operation
- Essential higher reliability, dependability and availability
- Flexible use of the torque speed characteristic
- Excellent dynamic characteristics
- High quality mains
- Reduced emissions
- High degree in automation including remote maintenance
- Reduced wear and tear

Because of these features, electrical propulsion systems are being used, particularly on ships with special requirements, such as cruise liners, ferries, cable and pipe layers, research vessels, icebreakers, multipurpose vessels, patrol boats, supply and rescue vessels, and LNG tankers.

PWM Converter Systems

PWM converters can be used to supply induction motors, synchronous motors or permanent magnet motors used for electric propulsion, pumps, compressors, winches and for drilling operations.

These converter systems use power transistors in the motor inverter and can be configured with either a 6, 12, 18 or 24 pulse rectifier front end, or an active front end inverter which allows regeneration and can also remove the need for transformers and a braking resistor.

Electric Propulsion

Furthermore, these can be configured into the Wärtsilä Low Loss Concept topology, or as a Multidrive with a common DC link.

DC Multidrive Systems

For inverters connected to the same DC link, our patented electronic DC breakers work independently of each other. The multidrive system connects to the main grid through either active or diode rectifiers, or can be harnessed to DC sources such as batteries, solar panels or fuel cells. The system allows electrical operation with variable speed engines.

LCI Converter System

Frequency converters with line controlled inverters (LCI = synchro-converters) are designed with direct current (DC) intermediate circuits. They comprise thyristor rectifiers on the mains side and a thyristor inverter on the motor side. LCI converters are available for supplying synchronous motors in the high power ranges.

Low Loss Concept

Harmonic voltage distortion causes disturbances for the network and loads, and impairs the performance of the vessel. By reducing these to a minimum, the Total Harmonic Distortion (THD) has no influence on the vessel's operations. Wärtsilä reduces THD by splitting the distribution bus into two sections, and placing the transformer between the two buses = Low Loss Concept (LLC).

This means that fewer transformers are needed for installations with more than 2 x drive power output connected. Where more than 2 x drives are installed, the advantage of having fewer transformers becomes even more important. In some installations, the installed transformer capacity is reduced by more than 75%.

The design of the LLC also improves system redundancy. This means that in the case of failure in one of the switchboards, the drive can continue to operate – albeit with reduced power.

Hybrid Propulsion

Hybrid Energy Storage Systems (ESS)

The Hybrid Power System combines different power sources with energy storage devices. The introduction of the hybrid power system, and its integration with conventional diesel or dual-fuel engine generating sets, offers a significant improvement in efficiency by running the engines on optimal load and absorbing many of the load fluctuations through batteries.

The introduction of Hybrid Power Systems with energy storage is a new and attractive way of reducing both fuel consumption and exhaust emissions. Utilising the latest inductive charging technology, Wärtsilä can offer total electrical plug-in solutions and completely integrated vessel design concepts.

Wärtsilä's system design incorporates energy storage capabilities in the form of battery packs, hybrid control systems, power transfer systems, and energy storage systems.

Fuel saving and reduced emissions

Less fuel consumption ensures a substantial reduction in emissions, and supports sustainable operations with different fuels. Annual fuel savings have proven to be between 10-20%, depending on the type and configuration of the engines.

Optimised engine operation

By optimising performance, the engines can be operated with optimal specific fuel consumption.

Reduced engine transients

Wärtsilä's ESS reduces transient loads in engines. Transients increase both fuel consumption and emissions.

Hybrid Control System

The Wärtsilä Hybrid Control System controls and monitors the overall operation of the battery system, which includes:

- Charging and discharging of batteries taking into account battery characteristics.
- Versatile control for Battery (Power) and Battery (Safety) notations.
- Control strategies to optimise the performance and reduce the transient loads of engines.
- Grid support for black out prevention.
- Interface to vessel PMS and IAS systems.

Engine peak shaving in combined battery and engine modes is a configuration whereby the batteries take the load required to run the thrusters, while the engine is running with a stable load profile.

Hybrid Propulsion

Increased redundancy and efficient operations

Power redundancy needs require engines to run at low loads. With the battery providing the redundant power, the engine can operate more efficiently at higher loads.

Reduced maintenance

Thanks to more stable operations and reduced engine running hours, maintenance costs will be lowered.

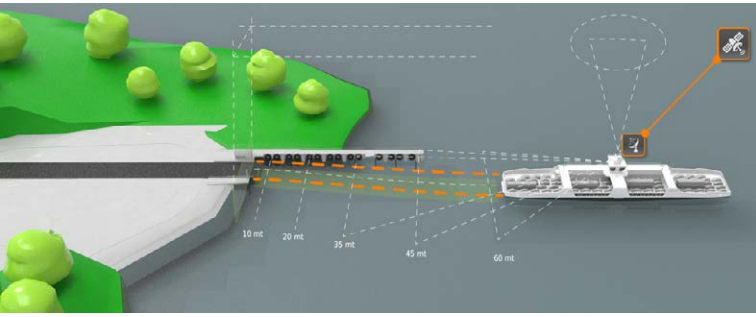
Better performance

The fast power response from the energy storage system means that vessel performance will also be more responsive. This may also increase dynamic performance in critical operations.

Energy Management System

The EMS gathers input and calculates the parameters for optimum performance of the ship in different modes and conditions. This includes route planning, and propulsion costs based on actual ship and propulsion system conditions. The EMS provides the optimal route and ship speed, and is controlled on a continuous basis while meeting performance criteria.

Other performance criteria offered by the EMS include optimal ship trimming, heavy-sea operation, and adjustment of the free vessel and propulsion system parameters to obtain the desired ship speed at minimum cost, or with minimal emissions of greenhouse gas emissions, or with a weighted combination of these. The EMS incorporates a user interface (HMI) for controlling the performance criteria that the vessel should meet, i.e. the monetary values of fuel costs, emission controls (environmental performance), or a combination of both.



Power Distribution

Power Distribution

Wärtsilä provides both low voltage and medium voltage switchboards that meet the most stringent requirements. Due to the growing demand for more available power, medium voltage – instead of low voltage distribution systems – are provided in the 6.6 kV or 11.0 kV range.

For the protection and control of power supply systems, Wärtsilä integrates its own developed protection system. The micro-processor based protection system covers all necessary protection functions for low and medium voltage power supply systems, as well as for the generators and power consumers. If required, a power management function for controlling the power supply system is also available. The protection system can be operated as a stand-alone solution, or in combination with other systems via data bus. Interfaces to automation systems and other control systems can be provided.

- Operation, control and monitoring of all important generator data, status indication of circuit breakers and alarms
- Integrated power management functions
- Simple parameter setting onsite (password protected)
- Online visualisation of plc-process functions
- Generator/ships main supply protection and control functions
- Interfaces to external monitoring and control systems
- Integrated plc for free programmable functions and controls (programming according to IEC 1131)
- Also available with transformer, bus-tie-breaker and motor protection functions

Power Distribution

The system is mainly intended for the protection and control of the following listed applications:

- Diesel generators
- Shaft generators
- Emergency generators
- Coupling circuit breakers
- Transfer line circuit breakers
- Transformers
- Motors
- Shore connections
- Filters
- HR grounding

Low Voltage Switchboards

Nominal voltage: up to 690 V 3AC

Bus bar system capability:

- Rated current I^{N}: up to 10,000 A
- Rated peak current I^{pk}: up to 330 kA
- Rated short-time current I^{CW} 1sec: up to 120 kA

Protection grade: IP54, bottom open

- Ambient temperature: 45°C or 50°C acc. to Class Requirements
- Basic requirements: I^{EC}, Classification

Power Distribution

Medium Voltage

- Rated voltage 7.2 kV to 17.5 kV
- Thermal rated current (1s) 50 kA
- Rated current Bus bar 4000 A
- Rated current droppers 4000 A
- Enclosure doors closed (open) IP32 (IP20)
- Flame arc test IEC62271-200 50 kA

Motor Control Center

Nominal voltage: up to 690 V 3AC

- Bus bar system capability:
- Rated current I^{N}: up to 3150 A
- Rated peak current I^{pk}: up to 220 kA
- Rated short-time current I^{CW} 1sec: up to 100 kA

Protection grade: IP54, bottom open

- Ambient temperature: 45°C or 50°C acc. to class requirements
- Basic requirements: I^{EC}, Classification

Plug-in motor starters

- Different sizes up to 630 A

Special Switchboards

Distribution Boards

- Nominal voltage: up to 690 V 3AC
- Protection grade: up to IP54
- Feeder circuits: moulded case circuit breakers or fuse switch combination

Lighting Distribution Boards

- Nominal voltage: up to 400/230 V 3AC
- Protection grade: up to IP54
- Feeder circuits: miniature circuit breakers

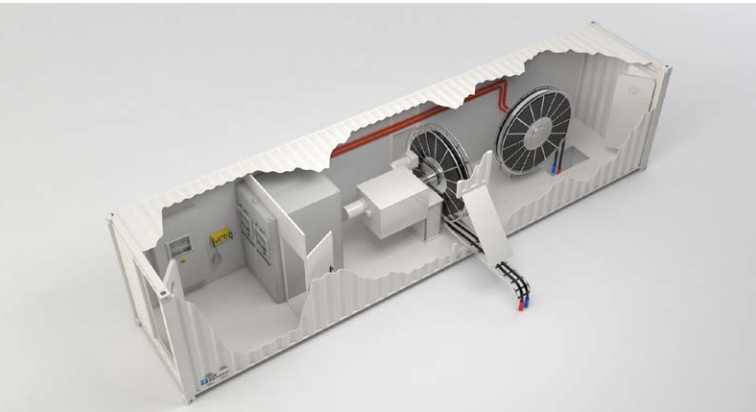
Single Motor Starters and Control Boxes

- According to demands

Special Boards

- Shore connection box
- Test panel etc.
- 24 V DC power supply switchboard

Power Distribution



GPM 500 Protection System

For protection and control of the power supply, Wärtsilä integrates its own developed protection system, the GPM 500.

The system covers all necessary protection functions for low and high voltage systems, as well as for generators and consumers.

High Voltage Shore Connection

The system design is essentially based on meeting port needs while also conforming to ICE/ISO/IEEE 80005-1 requirements. A typical configuration comprises the key components, such as the cable reel, a medium voltage switchboard, and a control and monitoring facility that includes an interface between ship and shore. A complete assembly can either be installed separately on-board the vessel, or containerised for siting at a specific on-board location. Upon request, we can develop tailor-made solutions for all vessel types. We offer the full range of turnkey integration options.

Inductive charging technology

Inductive charging (wireless charging) uses an electro-magnetic field to transfer energy between two conducting coils. The system currently has a capacity transferring power of 2 MW within a range of 15-50 cm between the coils. The inductive charging technology is very flexible to integrate and can be introduced in new market areas and applications. Charging rates of some 2-3 times the nominal battery capacity are usual with current battery technologies, but with high power battery chemistry the charging rates can be in the area of 6 times the battery capacity.

Power Generation

Shaft Generator

Wärtsilä provides Shaft Generators (SG), driven by the main engine to supply power to the mains within the 500 kW to 8,000 kW range. The power generation has to function properly at changing propulsion shaft speeds, when the ship travels at different speeds, or in the case of very fast speed changes caused by heavy seas. To allow a stable frequency and voltage in the mains while the main engine speed is changing – a frequency converter with PWM technology is used.

Using shaft alternators is a particularly economical and environmentally friendly method of generating electrical power. For this reason, more and more ships are being equipped with such systems. The use of shaft generators provides many advantages:

- Reduced maintenance costs
- Lowerfuel and lubrication costs
- Return on investment in 3 to 4 years
- Added safety for ship and crew
- Low noise power generation
- Smaller or fewer diesel generator sets
- Continuous parallel operation together (two SG systems) or with diesel generator sets

On ships with fixed pitch propellers, the speed is set via the propeller speed. If using controllable pitch propellers, the shaft speed and the propeller pitch are adjusted simultaneously in order to achieve optimum

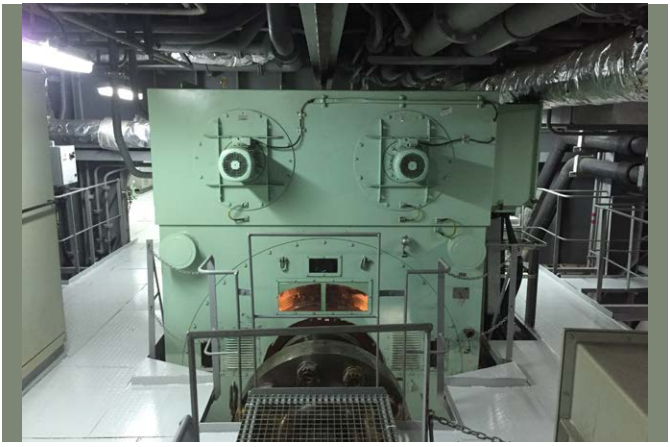
Power Generation

propeller efficiency in this so-called combinator mode. Even with this type of propeller, it is nevertheless economical to use shaft alternator systems with a frequency converter for variable speeds in order to enable a combinatory mode from pier to pier.

All requirements of the ship's mains are met without restrictions during shaft generator operation:

- Unrestricted operation during main engine speed variations resulting from heavy seas and manoeuvring
- Continuous parallel operation together (if 2 shaft generator systems are provided) and with diesel generator sets
- Generation of the required active power and reactive power
- Selective tripping of short circuits without failure of the overall system
- Starting and shut-down of large consumers without inadmissible voltage and frequency fluctuations
- Operation, including synchronisation, in the same way and with the same operating controls as with diesel generator sets
- Simple integration in automated power generation systems

For applications in combination with exhaust-gas and steam turbine generators, PTI/PTO shaft generator systems with a power range of 3.0 MW to 8.0 MW with 6.6 kV are required. They are also required for lower power demand with high redundancy of the propulsion system, PTI/PTH/PTO SG. Systems including power take home drive are possible with LV and MV applications.



UPS Systems, Resistors

UPS Systems

Wärtsilä has a broad range of uninterruptible power supply systems for all kinds of ship applications. Our reliable power distribution systems are adapted to the specific needs of the customer. Whether automation, propulsion, navigation or communication, critical consumers are all dependent on a secure power network for safe operation.

Wärtsilä's UPS systems are customised according to the particular ship category, and take into consideration the special ship building codes of the respective classification society. These systems enable convenient monitoring and easy servicing.

Marine UPS systems are available up to 200 kVA

- Wärtsilä JOVYSTAR OCEAN, 5-20 kVA (3-ph. in-/1-ph. output) or 5-200 kVA (3-ph. in-/output)
- Wärtsilä JOVYTEC PNT, 1-3kVA for the supply of smaller service areas and consumers

Wärtsilä JOVYSTAR OCEAN (5–200 kVA)

Wärtsilä JOVYTEC PNT (1–3 kVA)

Resistors

Wärtsilä is a leading manufacturer of a broad range of resistor types for marine applications, including for bow thruster control on vessels, current controlled discharging of batteries on submarines, generator tests at harbour facilities, and more. We provide robust and reliable resistor systems adapted to the needs of the customer.

Resistors, Converters

Resistors are available for different applications

- Wärtsilä JOVYLOAD NGR, neutral grounding/starpoint earthing resistors
- Wärtsilä JOVYLOAD CONPOWER, load resistors for generator tests and controlled battery discharging
- Wärtsilä JOVYLOAD BRAKE, braking resistors for cranes on vessels or in harbour facilities

Wärtsilä JOVYLOAD BRAKE

Wärtsilä JOVYLOAD CONPOWER

Wärtsilä JOVYPHASE GPC Converters

Wärtsilä provides shore power conversion for yachts, cruise liners, and other vessels. The JOVYPHASE GPC converter with power rates of 20 kVA-640 kVA and more automatically adjusts the onshore network to the onboard system, no matter what the shore voltage and frequency are (input frequency 30-70 Hz). The converter can be operated in parallel to the on-board generators for short periods. Furthermore, the concept features a compact design and high efficiency of up to 97%.

Entertainment, Safety and Security

Wärtsilä Entertainment and Network Systems

Wärtsilä provides complete integrated entertainment solutions to enhance the passengers' experience, whilst using the latest technologies that benefit both the owner and the environment.

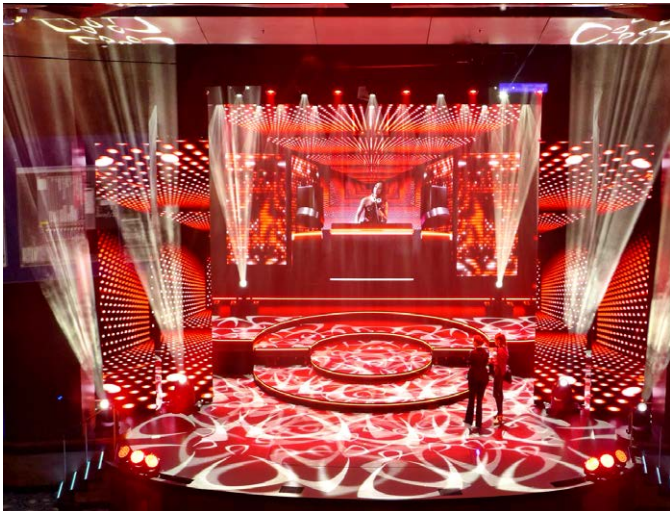
Ship Wide Systems

- The product scope covers Infotainment (IPTV) incl. BYOD
- SAT TV reception and head end distribution
- Digital signage
- Data networks
- Wireless network
- Cabin control
- Dimming systems

Local Entertainment Solutions (for public and crew venues)

- High end audio systems
- Effect Lighting systems
- Video projection systems incl. LED video walls
- Media control system
- Broadcast studio
- Architectural lighting solutions
- Stage rigging

These integrated systems are very complex. Normally they consist of an extensive array of materials in both hard- and software. The challenge is to design and assemble all these systems and their interfaces so that they are reliable and easy to use.



Safety and Security

Wärtsilä Safety & Security

Safety is of priority importance for the ship, its crew, passengers, and goods being transported. Regulations by flag states and classification authorities demand continuously higher levels of safety. In addition, security has also become a major concern of all ship owners. Wärtsilä has the expertise and experience to design and integrate comprehensive and highly integrated safety and security systems.

Wärtsilä's safety and security technologies include:

- Fire detection
- Safety management (SMS)
- Public address and general alarm PA/GA
- Automatic telephone
- DECT/wireless telephony
- Talk back
- Small alarms (hospital/ sauna/ cold store/lift/disabled persons)
- UHF/VHF walkie-talkie & paging
- Master clock
- VSAT incl. airtime
- CCTV camera system
- Access control
- Intruder detection
- People and object tracking
- Security monitoring & control centre

Underwater Technology

Underwater Technology – Sonars and Hydroacoustic Systems

Wärtsilä's underwater product portfolio includes underwater communication and navigation systems, as well as single and multi-beam survey systems. The equipment provided by Wärtsilä can be used for navigation and control, data collection and transmission, as well as for mapping the ocean floor. All products feature excellent reliability, state-of-the-art technology, and highly precise data acquisition.

Underwater Communication Systems

During recent years, the need for underwater communication has been rapidly growing in numerous applications.

- The Wärtsilä ELAC UT 2200 – An underwater communication system that can serve as a compact underwater telephone and as a submarine emergency pinger.
- The Wärtsilä ELAC UT 3000 – An underwater communication system combining analogue and digital communication in one unit. In addition to data voice and telegraphy mode, the system offers unique features such as its own noise measurement, horizontal distance measurement, and transmission of SOS signals.

Wärtsilä ELAC UT 3000

Survey and Navigation Systems

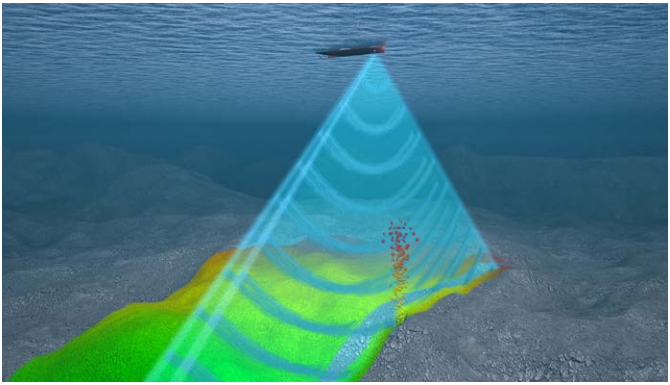
For hydrographic survey operations, Wärtsilä develops and manufactures state-of-the-art multi-beam echo sounder systems. Customers appreciate the precise charting of seafloor topography in the field of hydrography for the survey of harbours, lakes and oceans, as well as for oceanography, marine geology and marine biology.

Multi-beam Systems

Our multi-beam systems cover the complete survey range from shallow to full ocean depth. Our Wärtsilä ELAC SeaBeam multi-beam systems are known for their outstanding high-resolution and motion-stabilised features. In the field of precise surveys in extreme condition areas, they are second to none worldwide.

CLICK for more info

Underwater Technology



- Wärtsilä ELAC SeaBeam 1180 – A multi-beam system for shallow waters
- Wärtsilä ELAC SeaBeam 3050 – A multi-beam system for medium water depths
- Wärtsilä ELAC SeaBeam 3030 – A multi-beam system, including multi-ping operation
- Wärtsilä ELAC SeaBeam 3020 – A multi-beam system for deep water depths
- Wärtsilä ELAC SeaBeam 3020 ICE – An ice-hardened multi-beam system for deep water depths
- Wärtsilä ELAC SeaBeam 3012 – A deep-water multi-beam system including multi-ping operation
- Wärtsilä ELAC SeaBeam 3012 ICE – An ice-hardened deep-water multi-beam system including multi-ping operation.

Single-Beam System

Wärtsilä ELAC HydroStar 4900 – A modular survey sounder for hydrographic and commercial survey vessels. Thanks to its digital signal processing, the ELAC HydroStar 4900 allows exact bottom detection and penetration.

Navigation Systems

Wärtsilä provides navigation echo sounder systems to guarantee reliable detection of the seafloor in both shallow and deep waters.

- Wärtsilä ELAC LAZ 5100 – A navigation echo sounder for shallow and deep water navigation
- Wärtsilä ELAC ST 30 – A sonar transponder for collision avoidance with submarines, offshore wind farms, and offshore rigs.

Turnkey Solutions

Turnkey Solutions

Wärtsilä is one of the leading system houses for the supply of complete turnkey electrical and electronic system packages on vessels.

The turnkey solutions business unit offers system integration competences and acts as an EPC contractor for complete electrical packages – typically in close cooperation with the shipyard. The customer benefits from our systems engineering competence, and our ability to create clever solutions with less cost and shorter installation times. We combine these advantages with our overall detailed electrical system design responsibilities to offer a total on-board system that is fully optimised. Our turnkey activities also include the interfaces to all the shipyard's sub-contractors.

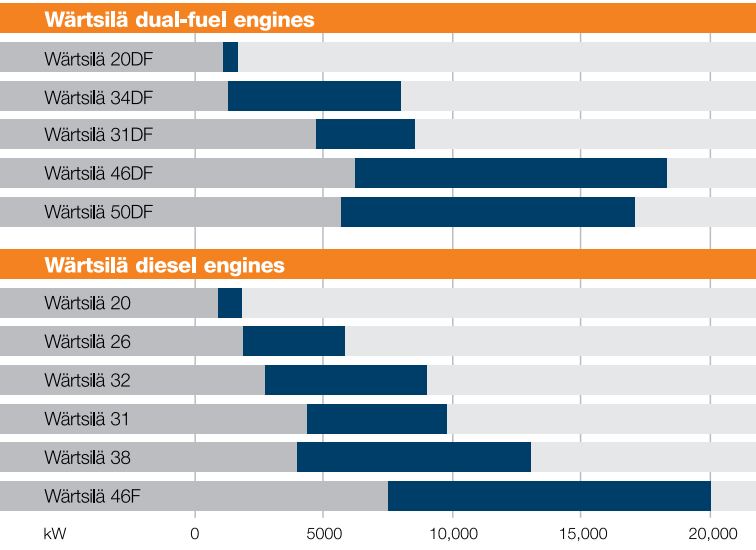
Turnkey Solutions

Our core competencies are in systems integration, project management, procurement, and site supervision. We act as the shipyard's single point of contact for the integration of all systems, from bridge to propeller.

We provide:

- Project Management
- Systems integration
- Planning
- Cable engineering
- Cables and supports
- Cable installation
- Lighting system
- Testing and commissioning
- Procurement of sub systems
- Training
- Logistics support
- Service world wide

Power range for Wärtsilä engines



Wärtsilä Engines

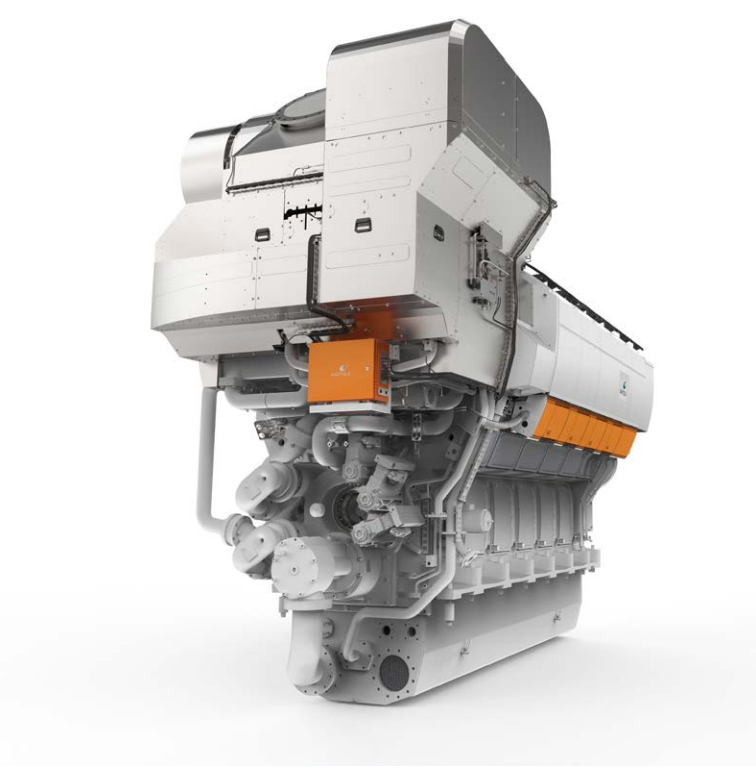
The design of the Wärtsilä engine range is based on the vast amount of knowledge accumulated over years of successful operation.

Robust engines derived from pioneering heavy fuel technology have been engineered to provide unquestionable benefits for the owners and operators of Wärtsilä engines and generating sets:

- Proven reliability
- Low emissions
- Low operating costs
- Fuel flexibility

Benefits for the shipyard include installation friendliness, embedded automation systems, and built-on modularised auxiliary systems.

CLICK for more info



Fuel flexibility

Wärtsilä is continuously developing its portfolio of gas and multi-fuel engines to suit different marine applications, be they offshore oil and gas installations where gaseous fuel is available from the process, or a merchant vessel operating in environmentally sensitive areas. The Wärtsilä engines offer high efficiency, low exhaust gas emissions and safe operation. The innovative multi-fuel technology allows the flexibility to choose between gas and liquid fuel. When necessary, the engines are capable of switching from one fuel to the other without any interruption in power generation.

CLICK for more info

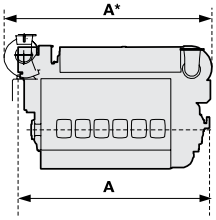
Dual-fuel Engines

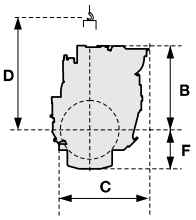
Wärtsilä 20DF		IMO Tier III	
Cylinder bore	200 mm	Fuel specification: Fuel oil	
Piston stroke	280 mm	700 cSt/50°C	7200 sR1/100°F
Cylinder output	185 kW/cyl	ISO 8217, category ISO-F-DMX, DMA and DMB	
Speed	1200 rpm		
Mean effective pressure	21.0 bar	BSEC 8460 kJ/kWh BSGC 8290 kJ/kWh	
Piston speed	11.2 m/s		

Rated power	
Engine type	kW
6L20DF	1 110
8L20DF	1 480
9L20DF	1 665

Engine dimensions (mm) and weights (tonnes)							
Engine type	A*	A	B	C	D	F	Weight
6L20DF	3 254	3 108	1 705	1 690	1 800	624	9.4
8L20DF	3 973	3 783	1 705	1 824	1 800	624	11.1
9L20DF	4 261	4 076	1 705	1 824	1 800	624	11.7

For definitions see page 56.





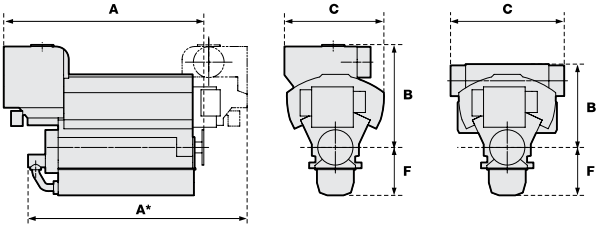
Dual-fuel Engines

Wärtsilä 31DF		IMO Tier III	
Cylinder bore	310 mm	Fuel specification: Fuel oil	
Piston stroke	430 mm	700 cSt/50°C	7200 sR1/100°F
Cylinder output	550 kW/cyl	ISO 8217, category ISO-F-DMX, DMA and DMB	
Speed	750 rpm		
Mean effective pressure	27.2bar	BSEC 7210 kJ/kWh BSGC 7120 kJ/kWh	
Piston speed	10.75 m/s		

Rated power	
Engine type	kW
8V31DF	4 400
10V31DF	5 500
12V31DF	6 600
14V31DF	7 700
16V31DF	8 800

Engine dimensions (mm) and weights (tonnes)						
Engine type	A*	A	B	C	F	Weight
8V31DF	6 180	5 585	3 205	3 100	1 500	56
10V31DF	6 820	6 225	3 205	3 100	1 500	62
12V31DF	7 500	6 905	2 550	3 500	1 500	71
14V31DF	8 140	7 545	2 550	3 500	1 500	77
16V31DF	8 780	8 185	2 550	3 500	1 500	85

* Turbocharger at flywheel end
For definitions see page 56.



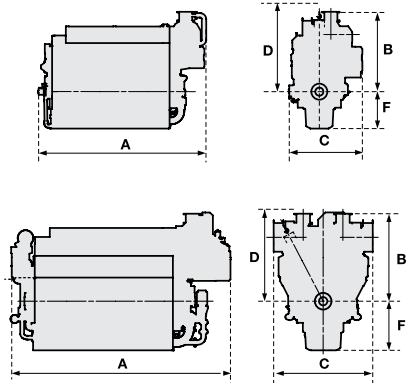
Dual-fuel Engines

Wärtsilä 34DF		IMO Tier III, EPA T3	
Cylinder bore	340 mm	Fuel specification: Fuel oil	
Piston stroke	400 mm	700 cSt/50°C	7200 sR1/100°F
Cylinder output	500 kW/cyl	ISO 8217, category ISO-F-DMX, DMA and DMB	
Speed	750 rpm		
Mean effective pressure	22.0 bar	BSEC 7530 kJ/kWh BSGC 7440 kJ/kWh	
Piston speed	10.0 m/s		

Rated power	
Engine type	kW
6L34DF	3 000
8L34DF	4 000
9L34DF	4 500
12V34DF	6 000
16V34DF	8 000

Engine dimensions (mm) and weights (tonnes)						
Engine type	A	B	C	D	F	Weight
6L34DF	5 325	2 550	2 380	2 345	1 155	35
8L34DF	5 960	2 550	2 610	2 345	1 155	44
9L34DF	6 870	2 550	2 610	2 345	1 155	49
12V34DF	6 865	2 435	2 900	2 120	1 210	61
16V34DF	7 905	2 570	3 325	2 120	1 210	77

For definitions see page 56.



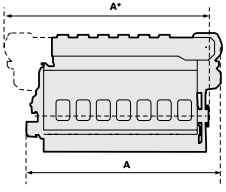
Dual-fuel Engines

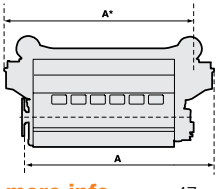
Wärtsilä 46DF		IMO Tier III, EPA T3	
Cylinder bore	460 mm	Fuel specification:Fuel oil	
Piston stroke	580 mm	700 cSt/50°C	7200 sR1/100°F
Cylinder output	1145 kW/cyl	ISO 8217, category ISO-F-DMX, DMA & DMB	
Speed	600 rpm		
Mean effective pressure	23.8 bar	BSEC 7490 kJ/kWh BSGC 7450 kJ/kWh	
Piston speed	11.6 m/s		

Rated power	
Engine type	kW
6L46DF	6 870
7L46DF	8 015
8L46DF	9 160
9L46DF	10 305
12V46DF	13 740
14V46DF	16 030
16V46DF	18 320

Dimensions (mm) and weights (tonnes)							
Engine type	A*	A	B	C	D	F	Weight
6L46DF	8 953	8 670	3 255	3 185	4 700	1 430	102
7L46DF	9 773	9 635	3 255	3 185	4 700	1 430	118
8L46DF	10 590	10 310	3 445	3 185	4 700	1 430	130
9L46DF	11 413	11 130	3 445	3 185	4 700	1 430	146
12V46DF	10 350	11 120	3 670	4 555	3 800	1 620	184
14V46DF	11 400	12 170	3 670	4 555	3 800	1 620	223
16V46DF	12 700	13 450	3 860	5 174	3 800	1 620	235

For definitions see page 56.





Dual-fuel Engines

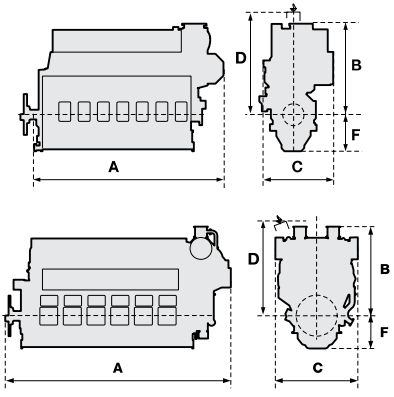
Wärtsilä 50DF		IMO Tier III, EPA T3	
Cylinder bore	500 mm	Fuel specification: Fuel oil	
Piston stroke	580 mm	700 cSt/50°C	7200 sR1/100°F
Cylinder output	975 kW/cyl	ISO 8217, category ISO-F-DMX, DMA and DMB	
Speed	514 rpm		
Mean effective pressure	20.0 bar	BSEC 7480 kJ/kWh BSGC 7430 kJ/kWh	
Piston speed	9.9 m/s		

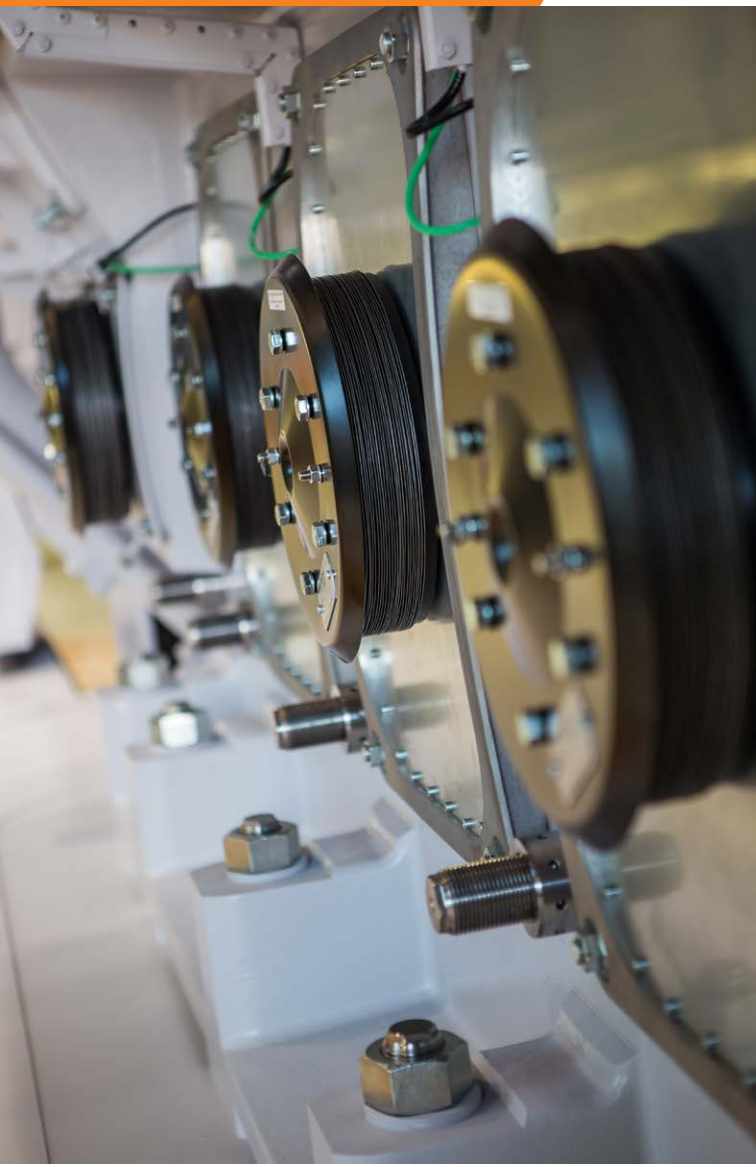
Rated power	
Engine type	kW
6L50DF	5 850
8L50DF	7 800
9L50DF	8 775
12V50DF	11 700
16V50DF	15 600
18V50DF	17 550

Generator output based on a generator efficiency of 96.5%.

Engine dimensions (mm) and weights (tonnes)						
Engine type	A	B	C	D	F	Weight
6L50DF	8 120	3 475	3 270	4 000	1 455	96
8L50DF	10 270	3 920	3 505	4 000	1 455	128
9L50DF	11 140	3 920	3 505	4 000	1 455	138
12V50DF	10 410	4 055	3 810	3 600	1 500	175
16V50DF	13 085	4 400	4 730	3 600	1 500	220
18V50DF	14 180	4 400	4 730	3 600	1 500	240

For definitions see page 56.





Diesel Engines

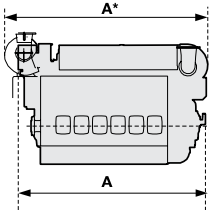
CLICK for more info

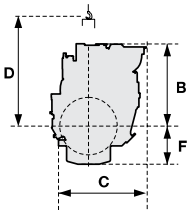
Wärtsilä 20		IMO Tier II or III	
Cylinder bore	200 mm	Fuel specification: Fuel oil	
Piston stroke	280 mm	700 cSt/50°C	7200 sR1/100°F
Cylinder output	200 kW/cyl	ISO 8217, category ISO-F-RMK 700	
Speed	1000 rpm	SFOC 190.0 g/kWh at ISO conditions	
Mean effective pressure	27.3 bar		
Piston speed	9.3 m/s		

Rated power	
Engine type	kW
4L20	800
6L20	1 200
8L20	1 600
9L20	1 800

Dimensions (mm) and weights (tonnes)									
Engine type	A*	A	B*	B	C*	C	D	F	Weight
4L20	–	2 510	–	1 348	–	1 483	1 800	725	7.2
6L20	3 254	3 108	1 528	1 348	1 580	1 579	1 800	624	9.3
8L20	3 973	3 783	1 614	1 465	1 756	1 713	1 800	624	11.0
9L20	4 261	4 076	1 614	1 449	1 756	1 713	1 800	624	11.6

* Turbocharger at flywheel end.
For definitions see page 56.





Diesel Engines

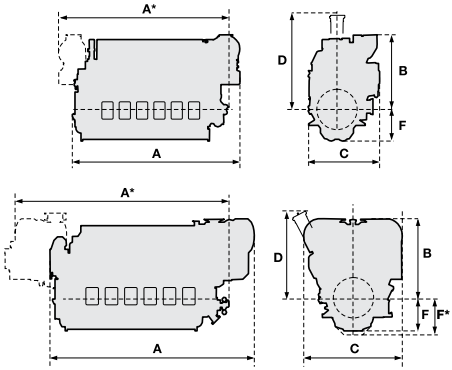
Wärtsilä 26		IMO Tier II or III	
Cylinder bore	260 mm	Fuel specification: Fuel oil	
Piston stroke	320 mm	700 cSt/50°C	7200 sR1/100°F
Cylinder output	340 kW/cyl	ISO 8217, category ISO-F-RMK 700	
Speed	1000 rpm	SFOC 188.7 g/kWh at ISO conditions	
Mean effective pressure	24 bar		
Piston speed	10.7 m/s		

Rated power	
Engine type	kW
6L26	2 040
8L26	2 720
9L26	3 060
12V26	4 080
16V26	5 440

Dimensions (mm) and weights (tonnes)

Engine type	A*	A	B*	B	C*	C	D	F dry sump	F wet sump	Weight dry sump	Weight wet sump
6L26	4387	4130	1882	1833	1960	2020	2430	818	950	17.0	17.2
8L26	5302	5059	2023	1868	2010	2107	2430	818	950	21.6	21.9
9L26	5691	5449	2023	1868	2016	2107	2430	818	950	23.3	23.6
12V26	5442	5314	2034	2034	2552	2602	2060	800	1110	28.7	29.0
16V26	6223	6025	2151	2190	2489	2763	2060	800	1110	36.1	37.9

* Turbocharger at flywheel end.
For definitions see page 56.



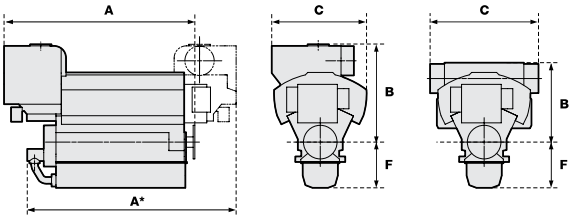
Diesel Engines

Wärtsilä 31		IMO Tier II or III	
Cylinder bore	310 mm	Fuel specification: Fuel oil	
Piston stroke	430 mm	700 cSt/50°C	7200 sR1/100°F
Cylinder output	610 kW/cyl	ISO 8217, category ISO-F-RMK 700	
Speed	750 rpm	SFOC 170.6 g/kWh at ISO conditions	
Mean effective pressure	30.1bar		
Piston speed	10.75 m/s		

Rated power	
Engine type	kW
8V31	4 880
10V31	6 100
12V31	7 320
14V31	8 540
16V31	9 760

Engine dimensions (mm) and weights (tonnes)						
Engine type	A*	A	B	C	F	Weight
8V31	6175	6114	3205	3113	1496	56.7
10V31	6813	6754	3205	3113	1496	62.0
12V31	7900	7840	2628	3500	1496	73.0
14V31	8540	8480	2660	3500	1496	81.0
16V31	9130	9070	2660	3500	1496	89.0

* Turbocharger at flywheel end
For definitions see page 56.



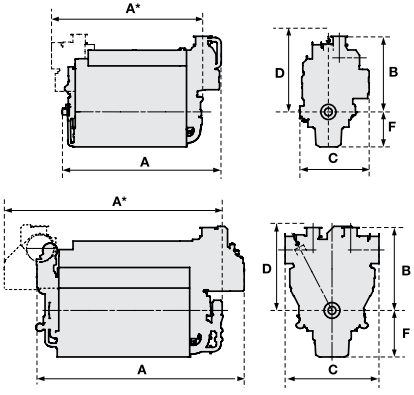
Diesel Engines

Wärtsilä 32		IMO Tier II or III	
Cylinder bore	320 mm	Fuel specification: Fuel oil	
Piston stroke	400 mm	700 cSt/50°C	7200 sR1/100°F
Cylinder output	580 kW/cyl	ISO 8217, category ISO-F-RMK 700	
Speed	750 rpm	SFOC 178.8 g/kWh at ISO conditions	
Mean effective pressure	28.9 bar		
Piston speed	10.0 m/s		

Rated power	
Engine type	kW
6L32	3 480
8L32	4 640
9L32	5 220
12V32	6 960
16V32	9 280

Dimensions (mm) and weights (tonnes)								
Engine type	A*	A	B*	B	C	D	F	Weight
6L32	4 980	5 260	2 560	2 490	2 305	2 345	1 155	33.3
8L32	5 960	6 245	2 360	2 295	2 305	2 345	1 155	43.4
9L32	6 450	6 730	2 360	2 295	2 305	2 345	1 155	46.8
12V32	6 935	6 615	2 715	2 665	3 020	2 120	1 475	58.7
16V32	8 060	7 735	2 480	2 430	3 020	2 120	1 475	74.1

* Turbocharger at flywheel end.
For definitions see page 56.



Diesel Engines

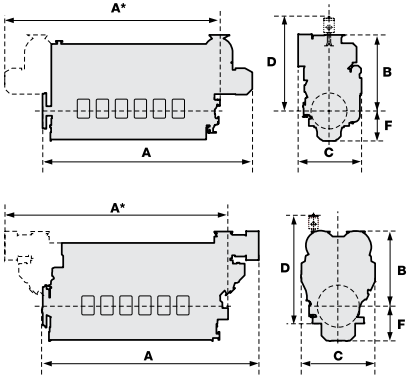
Wärtsilä 38		IMO Tier II	
Cylinder bore	380 mm	Fuel specification: Fuel oil	
Piston stroke	475 mm	700 cSt/50°C	7200 sR1/100°F
Cylinder output	725 kW/cyl	ISO 8217, category ISO-F-RMK 700	
Speed	600 rpm	SFOC 180.6 g/kWh at ISO conditions	
Mean effective pressure	26.9 bar		
Piston speed	9.5 m/s		

Rated power	
Engine type	kW
6L38	4 350
8L38	5 800
9L38	6 525
12V38	8 700
16V38	11 600

Dimensions (mm) and weights (tonnes)

Engine type	A*	A	B*	B	C	D	F	Weight
6L38	6 345	6 215	2 830	2 830	2 122	3 135	1 115	51
8L38	7 960	7 844	2 996	2 972	2 209	3 135	1 115	63
9L38	8 560	8 444	2 996	2 972	2 209	3 135	1 115	72
12V38	7 461	7 344	3 080	3 080	3 030	2 855	1 435	88
16V38	9 018	8 904	3 281	3 281	3 030	2 855	1 435	110

* Turbocharger at flywheel end.
For definitions see page 56.



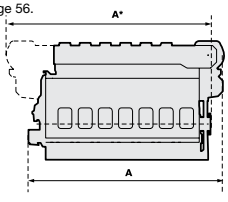
Diesel Engines

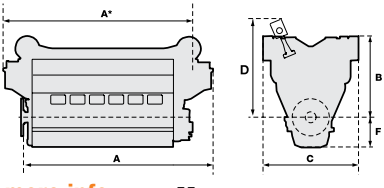
Wärtsilä 46F		IMO Tier II or III	
Cylinder bore	460 mm	Fuel specification: Fuel oil	
Piston stroke	580 mm	700 cSt/50°C	7200 sR1/100°F
Cylinder output	1200 kW/cyl	ISO 8217, category ISO-F-RMK 700	
Speed	600 rpm	SFOC 172.5 g/kWh at ISO conditions	
Mean effective pressure	24.9 bar	Option: Lubricating oil module integrated on engine.	
Piston speed	11.6 m/s		

Rated power	
Engine type	kW
6L46F	7 200
7L46F	8 400
8L46F	9 600
9L46F	10 800
12V46F	14 400
14V46F	16 800
16V46F	19 200

Dimensions (mm) and weights (tonnes)							
Engine type	A*	A	B	C	D	F	Weight
6L46F	8 430	8 620	3 500	2 905	4 020	1 480	97
7L46F	9 260	9 440	3 800	3 130	4 020	1 480	113
8L46F	10 080	10 260	3 800	3 130	4 020	1 480	124
9L46F	10 900	11 080	3 800	3 130	4 020	1 480	140
12V46F	10 080	10 150	3 770	4 050	3 800	1 820	177
14V46F	11 650	11 729	4 243	4 678	3 800	1 820	216
16V46F	12 700	12 779	4 243	4 678	3 800	1 820	233

* Turbocharger at flywheel end.
For definitions see page 56.





Diesel Engines

Definitions and notes for Wärtsilä engines

Engine dimensions

A* Total length of the engine when the turbocharger is located at the flywheel end.

A Total length of the engine when the turbocharger is located at the free end.

B Height from the crankshaft centreline to the highest point.

B* Height from the crankshaft centreline to the highest point when the turbocharger is located at the flywheel end.

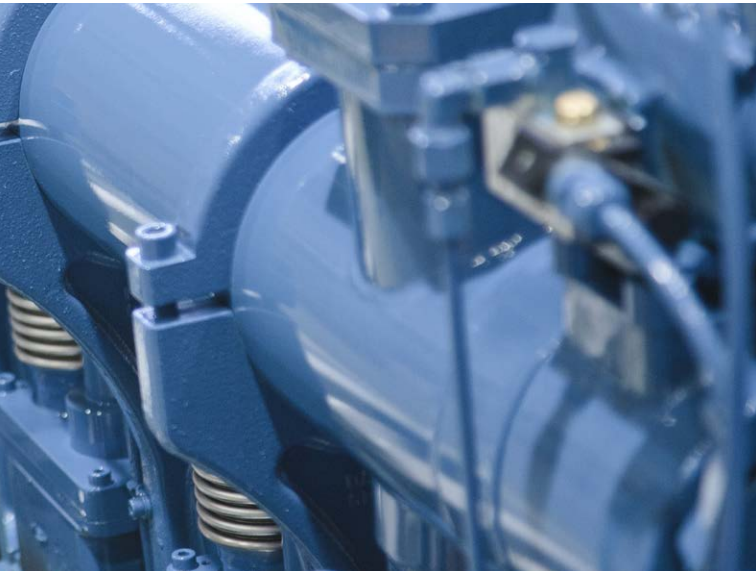
C Total width of the engine.

C* Total width of the engine when the turbocharger is located at the flywheel end.

D Minimum height from the crankshaft centreline when removing a piston.

F Distance from the crankshaft centreline to the bottom of the oil sump.

Diesel Engines



Dimensions and weights

- Dimensions are in millimetres and weights are in metric tonnes. Indicated values are for guidance only and are not binding.
- Cylinder configurations: L = in-line and V = v-form.

Specific fuel energy consumption

- At ISO standard reference conditions at 85% load
- Lower calorific value of fuel 42 700 kJ/kg
- Tolerance 5%
- With engine driven pumps
- Natural gas
- Methane number min. 80
- Lower heating value min. 28 MJ/Nm^3

ISO standard reference conditions

Total barometric pressure ..... 1.0 bar
Suction air temperature ..... 25°C
Charge air cooling water temperature ..... 25°C
Relative humidity 30%

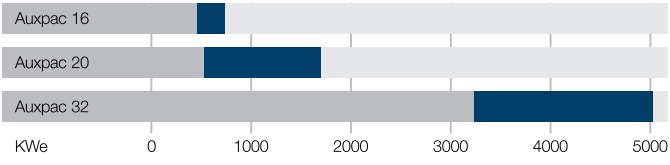
Generating Sets

Wärtsilä Auxpac

Wärtsilä Auxpac generating sets are available in a selected range as pre-engineered and pre-commissioned auxiliary generating sets. The common baseframe is optimised for the package, which together with the compact design of the engine and the selected generator, offers unmatched power-to-space and power-to-weight ratios. Auxpac generating sets are offered as 400 V / 690 V / 6600 V – 50 Hz and 400 V / 690 V / 6600 V – 60 Hz in the power range 500 kW to 4300 kW.

Pre-Engineered Medium-Speed Generating Sets				
Main data of generators	**60 Hz**	**50 Hz**	IMO Tier II or III	
Voltage	450	400	Fuel specification:	
Protection class	IP 23, IP 44 *	IP 23, IP 44 *	Fuel oil	700 cSt/50°C
Temperature rise and isolation	Class F	Class F	ISO 8217, category ISO-F-RMK 55	
Cooling	Air, water *	Air, water *	* Option	

Power Range for Wärtsilä Auxpac



CLICK for more info

Generating Sets

A16 – Dimensions (mm) and weights (tonnes)

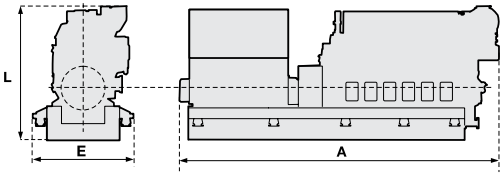
60Hz	Output kWe	A	E	L	Weight
525W5L16	525	4 530	1 400	1 960	9.8
630W6L16	630	4 787	1 400	1 960	10.8
735W7L16	735	5 050	1 400	1 960	11.8
50Hz	**Output kWe**	**A**	**E**	**L**	**Weight**
455W5L16	455	4 530	1 400	1 960	9.8
545W6L16	545	4 787	1 400	1 960	10.8
635W7L16	635	5 050	1 400	1 960	11.8

A20 – Dimensions (mm) and weights (tonnes)

60 Hz	Output kWe	A	E	L	Weight
520W4L20	520	4 407	1 700	2 248	13.6
685W4L20	685	4 457	1 700	2 248	14.3
760W6L20	760	5 057	1 700	2 248	17.3
875W6L20	875	5 227	1 700	2 248	17.3
975W6L20	975	5 227	1 700	2 248	17.7
1040W6L20	1 040	5 227	1 700	2 248	18.0
1200W8L20	1 200	5 852	1 920	2 373	21.3
1300W8L20	1 300	5 852	1 920	2 373	21.3
1400W8L20	1 400	5 852	1 920	2 373	22.4
1600W9L20	1 600	6 507	1 920	2 455	23.4

A32 – Dimensions (mm) and weights (tonnes)

60Hz	Output (kWe)	A	E	L	Weight
3230W6L32	3 230	8 030	2 690	3 725	57
3770W7L32	3 770	8 360	2 690	3 920	64
4300W8L32	4 300	9 110	2 690	3 875	70
4840W9L32	4 840	10 475	2 890	3 925	84
50Hz	**Output (kWe)**	**A**	**E**	**L**	**Weight**
3340W6L32	3 340	8 030	2 690	3 725	57
3900W7L32	3 900	8 360	2 690	3 920	64
4450W8L32	4 450	9 110	2 690	3 875	70
5010W9L32	5 010	10 475	2 890	3 925	84

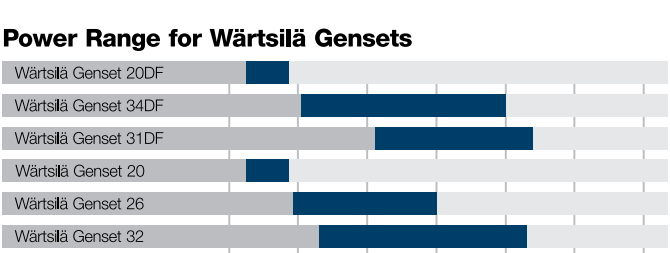


Generating Sets

Wärtsilä Gensets

A wide range of generating sets, comprising the generator and diesel engine mounted on a common baseframe, are available for both service power generation and for diesel-electric propulsion. All generating sets listed in this section are based on medium-speed diesel engines designed for operating on heavy fuel oil. These generating sets are resiliently mounted and the generator voltage can be selected in all cases, except for the Auxpac generating sets, which are Low Voltage only. Larger diesel generators are delivered for separate mounting of the diesel engine and generator.

Power Range for Wärtsilä Gensets



Generating Sets

Wärtsilä Genset 20DF		IMO Tier III	
Cylinder bore	200 mm	Fuel specification: Fuel oil	
Piston stroke	280 mm	700 cSt/50°C	7200 sR1/100°F
Cylinder output	160/185 kW/cyl	ISO 8217, category ISO-F-DMX, DMA and DMB	
Speed	1000/1200 rpm		
Mean effective pressure	22.0, 21.0 bar	BSEC 8390 kJ/kWh BSGC 8220 kJ/kWh	
Piston speed	9.3, 11.2 m/s		
Generator voltage	0.4–13.8 kV		
Generator efficiency	0.95–0.96		

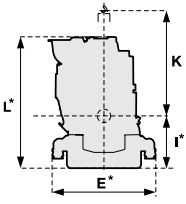
Rated power

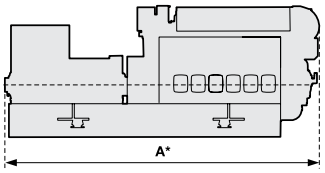
Engine type	60 Hz		50 Hz	
	185 kW/cyl, 1200 rpm		160 kW/cyl, 1000 rpm	
	Engine kW	Gen. kW	Engine kW	Gen. kW
6L20DF	1 110	1 065	960	920
8L20DF	1 480	1 420	1 280	1 230
9L20DF	1 665	1 600	1 440	1 380

Dimensions (mm) and weights (tonnes)

Engine type	A*	E	I*	K	L*	Weight
6L20DF	5 325	2 070	895/975/1025	1 800	2 731	16.9
8L20DF	6 030	2 070	1025/1075	1 800	2 781	20.8
9L20DF	6 535	2 300	1075/1125	1 800	2 831	23.9

For definitions see page 69.





Generating Sets

Wärtsilä Genset 31DF		IMO Tier III	
Cylinder bore	310 mm	Fuel specification: Fuel oil	
Piston stroke	430 mm	700 cSt/50°C	7200 sR1/100°F
Cylinder output	530, 550 kW/cyl	ISO 8217, category ISO-F-RMK 700	
Speed	720, 750 rpm		
Mean effective pressure	27.1, 27.2 bar	BSEC 7220 kJ/kWh BSGC 7105 kJ/kWh	
Piston speed	10.3, 10.75 m/s		
Generator voltage	0.4-13.8 kV		
Generator efficiency	0.95-0.97		

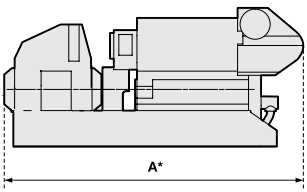
Rated power

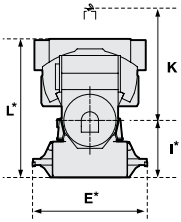
Engine type	60 Hz		50 Hz	
	530 kW/cyl, 720 rpm		550 kW/cyl, 750 rpm	
	Engine kW	Gen. kW	Engine kW	Gen. kW
8V31DF	4 240	4 070	4 400	4 225
10V31DF	5 300	5 090	5 500	5 280
12V31DF	6 360	6 100	6 600	6 335
14V31DF	7 420	7 120	7 700	7 390
16V31DF	8 480	8 140	8 800	8 450

Dimensions (mm) and weights (tonnes)

Engine type	A*	E*	I*	K	L*	Weight*
8V31DF	9 100	3 110	1 700	2 390	4 880	90.0
10V31DF	9 750	3 110	1 700	2 390	4 880	101.0
12V31DF	10 150	3 500	1 700	2 390	4 350	115.0
14V31DF	10 800	3 500	1 700	2 390	4 350	120.5
16V31DF	11 400	3 500	1 700	2 390	4 350	131.0

* Dependent on generator type and size.
For definitions see page 69.





Generating Sets

Wärtsilä Genset 34DF		IMO Tier III, EPA T3	
Cylinder bore	340 mm	Fuel specification: Fuel oil	
Piston stroke	400 mm	700 cSt/50°C	7200 sR1/100°F
Cylinder output	480, 500 kW/cyl	ISO 8217, category ISO-F-DMX, DMA and DMB	
Speed	720, 750 rpm		
Mean effective pressure	22.0 bar	BSEC 7590 kJ/kWh BSGC 7490 kJ/kWh	
Piston speed	9.6, 10.0 m/s		
Generator voltage	0.4–13.8 kV		
Generator efficiency	0.95–0.97		

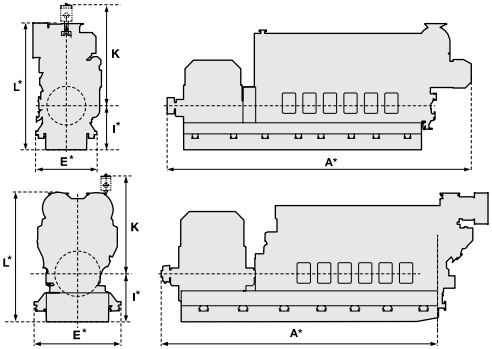
Rated power

Engine type	60 Hz		50 Hz	
	480 kW/cyl, 720 rpm		500 kW/cyl, 750 rpm	
	Engine kW	Gen. kW	Engine kW	Gen. kW
6L34DF	2 880	2 770	3 000	2 890
8L34DF	3 840	3 690	4 000	3 840
9L34DF	4 320	4 150	4 500	4 320
12V34DF	5 760	5 530	6 000	5 770
16V34DF	7 680	7 370	8 000	7 680

Dimensions (mm) and weights (tonnes)

Engine type	A*	E*	I*	K	L*	Weight
6L34DF	8 765	2 290	1 450	2 345	4 000	60
8L34DF	10 410	2 960	1 630	2 345	4 010	76
9L34DF	10 610	2 890	1 630	2 345	4 180	87
12V34DF	10 260	3 060	1 900	2 120	4 335	99
16V34DF	11 465	3 360	1 850	2 120	4 445	124

* Dependent on generator type.
Generator output based on a generator efficiency of 96%.
For definitions see page 69.



Generating Sets

Wärtsilä Genset 20		IMO Tier II or III	
Cylinder bore	200 mm	Generator voltage	0.4–13.8 kV
Piston stroke	280 mm	Generator efficiency	0.95–0.96
Cylinder output	185, 200 kW/cyl	Fuel specification: Fuel oil	
Speed	900, 1000 rpm	700 cSt/50°C	7200 sR1/100°F
Mean effective pressure	27.3, 28.0 bar	ISO 8217, category ISO-F-RMK 700	
Piston speed	8.4, 9.3 m/s	SFOC 190.3 g/kWh at ISO conditions	

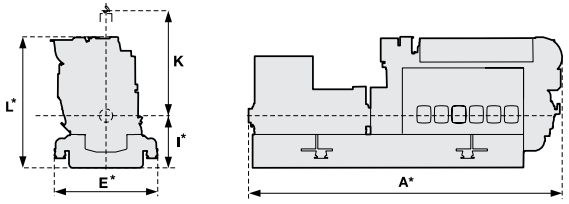
Rated power

Engine type	60 Hz		50 Hz	
	185 kW/cyl, 900 rpm		200 kW/cyl, 1000 rpm	
	Engine kW	Gen. kW	Engine kW	Gen. kW
4L20	740	700	800	760
6L20	1 110	1 055	1 200	1 140
8L20	1 480	1 405	1 600	1 520
9L20	1 665	1 580	1 800	1 710

Dimensions (mm) and weights (tonnes)

Engine type	A*	E*	I*	K	L*	Weight*
4L20	4 910	1770/1920	990	1 800	2338	14.0
6L20	5 325	1770/1920/2070	895/975/1025	1 800	2243/2323/2373	16.8
8L20	6 030	1920/2070	1025/1075	1 800	2474/2524	20.7
9L20	6 535	2070/2300	1075/1125	1 800	2524/2574	23.8

* Dependent on generator type and size.
For definitions see page 69.



Generating Sets

Wärtsilä Genset 26		IMO Tier II or III	
Cylinder bore	260 mm	Generator voltage	0.4–13.8 kV
Piston stroke	320 mm	Generator efficiency	0.95–0.96
Cylinder output	325, 340 kW/cyl	Fuel specification: Fuel oil	
Speed	900, 1000 rpm	700 cSt/50°C	7200 sR1/100°F
Mean effective pressure	23.0, 25.5 bar	ISO 8217, category ISO-F-RMK 700	
Piston speed	9.6, 10.7 m/s	SFOC 185.8 g/kWh at ISO conditions	

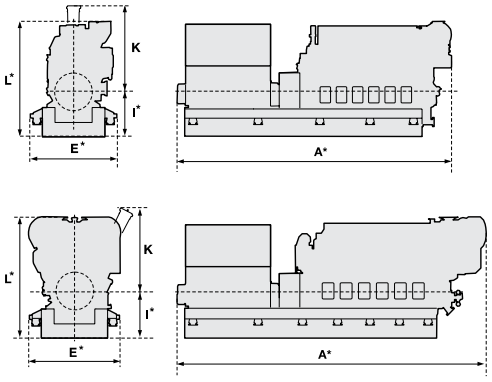
Rated power

Engine type	60 Hz		50 Hz	
	325 kW/cyl, 900 rpm		340 kW/cyl, 1000 rpm	
	Engine kW	Gen. kW	Engine kW	Gen. kW
6L26	1 950	1 870	2 040	1 960
8L26	2 600	2 495	2 720	2 610
9L26	2 925	2 810	3 060	2 940
12V26	3 900	3 745	4 080	3 915
16V26	5 200	4 990	5 440	5 220

Dimensions (mm) and weights (tonnes)

Engine type	A*	E*	I*	K	L*	Weight*
6L26	7 500	2 300	1 200	2 430	3 033	35
8L26	8 000	2 300	1 200	2 430	3 068	45
9L26	8 500	2 300	1 300	2 430	3 168	50
12V26	8 400	2 700	1 560	2 765	3 686	60
16V26	9 700	2 700	1 560	2 765	3 716	70

* Dependent on generator type and size.
For definitions see page 69.



Generating Sets

Wärtsilä Genset 31		IMO Tier II or III	
Cylinder bore	310 mm	Generator voltage	0.4–13.8 kV
Piston stroke	430 mm	Generator efficiency	0.95–0.97
Cylinder output	590, 610 kW/cyl	Fuel specification: Fuel oil	
Speed	720, 750 rpm	700 cSt/50°C	7200 sR1/100°F
Mean effective pressure	30.3, 30.1 bar	ISO 8217, category ISO-F-RMK 700	
Piston speed	10.3, 10.75 m/s	SFOC 169.6 g/kWh at ISO conditions	

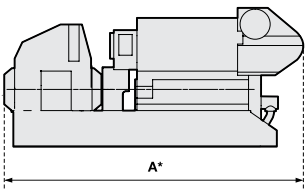
Rated power

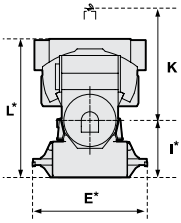
Engine type	60 Hz		50 Hz	
	590 kW/cyl, 720 rpm		610 kW/cyl, 750 rpm	
	Engine kW	Gen. kW	Engine kW	Gen. kW
8V31	4 720	4 530	4 880	4 685
10V31	5 900	5 665	6 100	5 855
12V31	7 080	6 800	7 320	7 030
14V31	8 260	7 930	8 540	8 200
16V31	9 440	9 060	9 760	9 370

Dimensions (mm) and weights (tonnes)

Engine type	A*	E*	I*	K	L*	Weight*
8V31	9 100	3 110	1 700	2 390	4 880	90.0
10V31	9 750	3 110	1 700	2 390	4 880	101.0
12V31	10 150	3 500	1 700	2 390	4 350	115.0
14V31	10 800	3 500	1 700	2 390	4 350	120.5
16V31	11 400	3 500	1 700	2 390	4 350	131.0

* Dependent on generator type and size.
For definitions see page 69.





Generating Sets

Wärtsilä Genset 32		IMO Tier II or III	
Cylinder bore	320 mm	Generator voltage	0.4–13.8 kV
Piston stroke	400 mm	Generator efficiency	0.95–0.97
Cylinder output	560, 580 kW/cyl	Fuel specification: Fuel oil	
Speed	720, 750 rpm	700 cSt/50°C	7200 sR1/100°F
Mean effective pressure	28.9 bar	ISO 8217, category ISO-F-RMK 700	
Piston speed	9.6, 10.0 m/s	SFOC 178.8 g/kWh at ISO conditions	

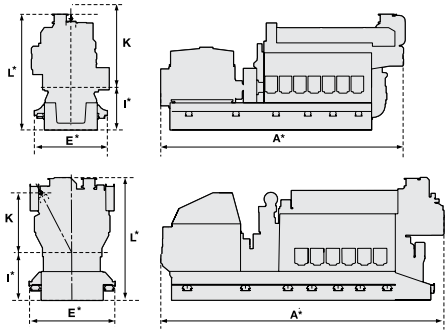
Rated power

Engine type	60 Hz/720 rpm		50 Hz/750 rpm	
	560 kW/cyl		580 kW/cyl	
	Engine kW	Gen. kW	Engine kW	Gen. kW
6L32	3 360	3 230	3 480	3 340
7L32	3 920	3 770	4 060	3 900
8L32	4 480	4 300	4 640	4 450
9L32	5 040	4 840	5 220	5 010
12V32	6 720	6 450	6 960	6 680
16V32	8 960	8 600	9 280	8 910

Dimensions (mm) and weights (tonnes)

Engine type	A*	E*	I*	K	L*	Weight*
6L32	8 505	2 490	1 450	2 345	3 745	57
7L32	9 215	2 690	1 630	2 345	4 010	69
8L32	10 410	2 690	1 630	2 345	4 010	76
9L32	10 505	2 890	1 630	2 345	4 010	86
12V32	10 700	3 060	1 700	2 120	4 130	100
16V32	11 465	3 360	1 850	2 120	4 445	127

* Dependent on generator type and size.
Generator output based on a generator efficiency of 96%.
Final measurements might differ depending on selected turbocharger execution.
For definitions see page 69.



Generating Sets

Wärtsilä Genset 38		IMO Tier II	
Cylinder bore	380 mm	Generator voltage	0.4–13.8 kV
Piston stroke	475 mm	Generator efficiency	0.95–0.98
Cylinder output	725 kW/cyl	Fuel specification: Fuel oil	
Speed	600 rpm	700 cSt/50°C	7200 sR1/100°F
Mean effective pressure	26.9 bar	ISO 8217, category ISO-F-RMK 700	
Piston speed	9.5 m/s	SFOC 182.0 g/kWh at ISO conditions	

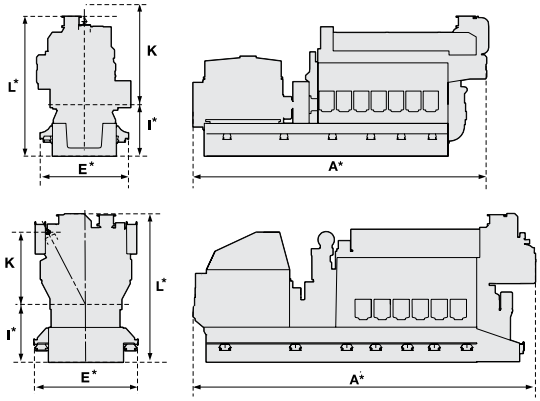
Rated power

Engine type	50 Hz, 60 Hz	
	Engine kW	Engine kW
6L38	4 350	4 200
8L38	5 800	5 600
9L38	6 525	6 300
12V38	8 700	8 400
16V38	11 600	11 200

Dimensions (mm) and weights (tonnes)

Engine type	A*	E*	I*	K	L*	Weight*
6L38	9 600	2 900	1 655	3 135	4 485	90
8L38	12 000	2 900	1 705	3 135	4 475	110
9L38	12 300	3 100	1 805	3 135	4 575	130
12V38	11 900	3 600	2 015	2 855	4 945	160
16V38	13 300	3 800	2 015	2 855	5 120	200

* Dependent on generator type and size.
For definitions see page 69.



Generating Sets

Definitions and Notes for Generating sets

Generating set dimensions

A Total length of the generating set.

E Total width of the generating set.

I Distance from the bottom of the common baseframe to the crankshaft centreline.

K Minimum height from the crankshaft centreline when removing a piston.

L Total height of the generating set.

Dimensions and weights

Dimensions are in millimetres and weights are in metric tonnes. Indicated values are for guidance only and are not binding.
Cylinder configurations: L = in-line, and V = V-form.

Specific fuel energy consumption

- At ISO standard reference conditions at 85% load
- Lower calorific value of fuel 42 700 kJ/kg
- Tolerance 5%
- With engine driven pumps
- Natural gas
- Methane number min. 80
- Lower heating value min. 28 MJ/Nm^3

ISO standard reference conditions

Total barometric pressure ..... 1.0 bar
Suction air temperature ..... 25°C
Charge air cooling water temperature ..... 25°C
Relative humidity 30%

Auxiliary Systems

Engine Auxiliary Systems

All auxiliary equipment needed for the engines can be delivered by Wärtsilä. Some equipment can be built onto the engine, and the rest can be delivered separately or grouped in modules.

Depending on the engine type and application, a lubricating oil pump, HT- and LT-cooling water pumps, fuel pump, oil filters and coolers, prelubricating oil pump and thermostatic valves can be added to the engine.

Stand-by pumps, seawater pumps, central coolers, starting air vessels, lubricating oil automatic filters, exhaust gas silencers and boilers are typically delivered for separate mounting.

Standardised modular auxiliary units

- Fuel oil booster
- Fuel oil separating
- Lubricating oil separating
- Cooling water preheating
- Starting air compressors
- Oil mist separator
- Oily water bilge separator

Maximum compatibility is ensured when auxiliary systems are delivered together with the main propulsion engines and generator sets. Whenever necessary, the auxiliary systems are tailored to optimise the operating performance for a specific trade. The systems are specified to minimise building costs and operating costs for a specific combination of main and auxiliary engines.

Customised modular auxiliary units are available on request.

Fuel booster unit.

Auxiliary Systems

Preheating unit

Oil mist
separator module.

Fuel oil transfer pump
module with heater.

SO_X Abatement

Due to existing and upcoming regulations on emissions to air, including MARPOL Annex VI from the International Maritime Organisation (IMO) and additional regulations from the European Union, marine industry operators need to decide on the best means for achieving compliance. Wärtsilä exhaust gas cleaning technology is an economical and environmentally friendly solution for tackling all new and existing rules and regulations concerning sulphur oxides and water discharge. The systems are suitable for both new buildings and the retrofitting of existing vessels having either 2-stroke or 4-stroke engines, as well as for oil-fired boilers.

Having an extensive list of references with long experience of scrubbing in the marine market has enabled Wärtsilä to optimise their products to be reliable, easy to operate, and easy to install.

Scrubber System Designs

Wärtsilä has developed two kinds of standard scrubber designs to better meet the demands of our customers. Wärtsilä can offer the conventional V-SO_X with a venturi, as well as the more compact I-SO_X scrubber type.

Both scrubber designs have benefits and drawbacks dependent on vessel type and layout, so it's important to look at the specific project needs. Both designs can be utilized for open loop, closed loop and hybrid scrubber systems.

SO_X Abatement

Wärtsilä Hybrid Scrubber System

Wärtsilä provides hybrid scrubber system solutions which have the flexibility to operate in both open and closed loop using seawater to remove SO_X from the exhaust. This provides a flexibility of operation in low alkaline waters, as well as the open ocean.

When at sea the switch can be made to open loop using only seawater. The sulphur oxides in the exhaust react with the water to form sulphuric acid. Chemicals are not required since the natural alkalinity of seawater neutralizes the acid.

When required to switch to closed loop, for instance whilst entering a port in a low alkalinity area, the natural alkalinity of seawater is boosted by an alkali which uses caustic soda (NaOH) as a buffer.

SO_X Abatement

Wärtsilä Open Loop Scrubber System

The Wärtsilä open loop scrubber systems are designed to remove SO_X from the exhaust and operates utilising seawater. The open loop scrubber system is our most straightforward scrubbing method. It utilizes the natural alkalinity in seawater for scrubbing, and does not need caustic soda. This method can be used in most seas around the world, where alkalinity levels are high.

Exhaust gas enters the scrubber and is sprayed with seawater, the SO_X in the exhaust reacts with water and forms sulphuric acid. Chemicals are not required since the natural alkalinity of seawater neutralises the acid. Wash water from the scrubber is treated and monitored to ensure that it conforms to the criteria from MEPC and can be discharged into the sea with no harm to the environment.

Wärtsilä Closed Loop Scrubber System

The Wärtsilä closed loop scrubber system is designed to remove SO_X from the exhaust and operates utilising wash water. The system works continuously in closed loop, which means no unnecessary concern

SO_X Abatement

regarding sea water alkalinity levels and is best suited for full time operation in low alkalinity areas (e.g. the Great Lakes).

In a closed loop scrubber system, the exhaust gas enters the scrubber and is sprayed with sea water that has been mixed with caustic soda (NaOH). The sulphur oxides in the exhaust react with this mixture and are neutralised. A small bleed-off is extracted from the closed loop and treated to fulfil IMO requirements. Cleaned effluents can be safely discharged overboard with no harm to the environment.

If operation in zero discharge mode is requested, the effluent can be led to a holding tank for scheduled and periodical discharge.

Wärtsilä 2020 Scrubber Solution

Wärtsilä has developed an optimized scrubber solution to reach the global sulphur cap of 0.5%. The solution has a smaller footprint and power demand than the conventional scrubber system due to a lower water amount. This means savings both in space and cost for the customer, optimal for vessels operating most of the time outside Emission Control Areas. This solution can be utilized for all Wärtsilä scrubber types and systems.

NO_X Abatement

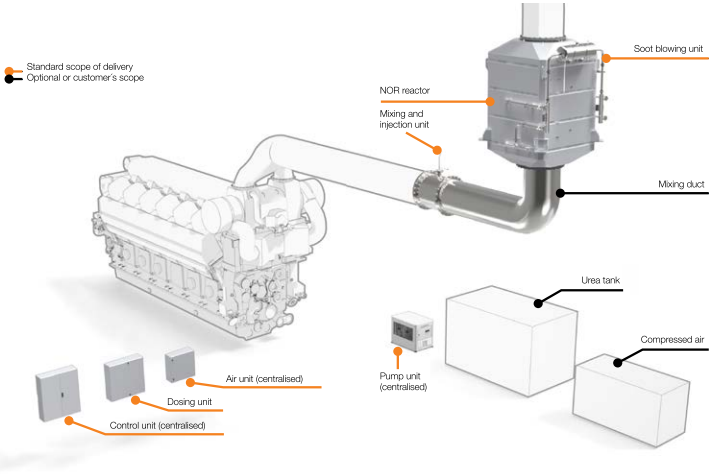
Wärtsilä NO_X Reducer (NOR)

The Wärtsilä NO_X Reducer (NOR) is an emission after-treatment system based on the Selective Catalytic Reduction (SCR) technology for Nitrogen Oxide (NO_X) reduction. The system is compliant with various NO_X emission reduction needs, such as the IMO Tier III rules.

The NOR is optimized and validated for medium speed engines in terms of reliability, flexibility and size. It is available for both newbuild and retrofits and is compatible for operation on both distillate and heavy fuel oils.

The main component of the NOR installation is the Reactor with a soot blowing unit and the catalyst elements. Other modular essential parts of the NOR system are a Urea pump unit, a Urea dosing unit, an Urea Injection and mixing unit, an Air unit and the Control unit which controls the NOR operation by monitoring engine parameters. For the purpose of easy installation, several auxiliary units are centralized, so that same units can be utilized in case of multiple NOR installations.

Wärtsilä NOR provides clear additional value to the customer by providing combined IMO Tier III certified engine + SCR package. This enables riskless compliancy and minimised operation costs and maximised space utilisation on-board



NO_X Abatement

Wärtsilä is a market leader in the development, design, manufacture and servicing of advanced inert gas and nitrogen solutions for marine and off shore oil and gas applications.

Our leading-edge, customised solutions ensure high quality and advanced levels of safety for vessels operating in regulated areas. We are certified by ISO 9001:2000, ISO 14001:2004 and OHSAS 18001:2007.

Our strong reputation in inert gas solutions is based on over 50 years' experience and unique full-scale R&D facilities located in Moss, Norway. Our references include over 2 500 vessels installed with our inert gas equipment. Performance testing of inert gas systems can be executed in the company's own test hall in Moss, the only facility tailor-made for this purpose in the world today.

Wärtsilä Moss systems are vital systems to ensure a high level of safety for vessels where they are installed. Consequently, product quality is always the number one priority. All our systems are designed based on compact modules, offering important savings in space and installation cost both for newbuildings and for retrofit on existing vessels.

Wärtsilä ensures our customers a global network for lifetime support. This is vital to secure uninterrupted operation. Furthermore, we also offer Service Agreements, product training (from our facilities in Moss) and system upgrades to support our customers in their efforts to optimize operational performance as well as cost. Our in-house spare parts department will provide anticipated spares on short notice.

Moss Inert Gas Generators are advantageous compared to other competitive makes on the following important areas:

- Less space requirement/burner design.
- Cleanness of gas with regard to water, salt, SO_X and NO_X content.
- Better cooling efficiency.
- Independence of orientation and ship's motions.
- High graded materials in critical areas exposed to corrosion.
- Lower emissions (Best Available Technique) and lower operational costs
- Interoperable control system(s)

Wärtsilä Moss Inert Gas Generators for Tankers

Our inert gas generator system, specialised for Tankers, ensures the correct atmosphere in the cargo tanks to minimize the risk of explosion.

Our systems are designed to a high level of safety and are based on compact modules, offering important savings in space and installation cost both for newbuildings and retrofitting existing vessels.

Our most recent developments include automatic regulation based on deck pressure setting. During off-loading the system optimizes the inert gas production to only produce the necessary quantum of Inert Gas to maintain the tank pressure. This system reduces oil consumption providing cost efficiency, as well as an environmental benefit.

Benefits:

- Unique turbulent burner design based on more than 50 years of experience
- Concentric vertical combustion chamber fitted inside the scrubber unit provide compact units, minimum space requirement and independence of ship's motion
- High grade steel for heat/corrosion resistance
- Low maintenance cost

Wärtsilä Moss Mult-Inert™ system

The Wärtsilä Moss Mult-Inert system combines a flue gas system and an inert gas generator to offer maximum flexibility onboard product tankers transporting petroleum products.

Wärtsilä Moss Mult-Inert™ systems are vital systems ensuring a high level of safety for use onboard tankers intended to carry both crude oil and refined products, and combine into one compact unit where quality is the number one priority.

The Wärtsilä Moss Mult-Inert™ system can run as an inert gas generator or, when the boilers are in use, as a flue gas system. They are designed based on compact modules, offering important savings in space and installation cost for newbuild and retrofit vessels.

When discharging crude oil or less refined petroleum products, our Mult-Inert™ Generator System can be run in flue gas mode as the boilers are run to heat the cargo. The cargo is less sensitive to contamination. When discharging more sensitive cargo, the system can be switched to inert gas generator mode burning marine fuel.

Wärtsilä Moss Flue Gas

Flue gas systems are used to channel exhaust gases from a ships boiler uptake.

Wärtsilä Moss flue gas systems are vital systems to ensure a high level of safety for the vessels where they are installed. Consequently, product quality is always the number one priority.

They are tailor made for use on board crude oil carriers and are designed based on compact modules, offering important savings in space and installation cost both for newbuildings and for retrofit on existing vessels.

The system also uses a topping up generator making high inert gas quality possible by a purposeful designed combustion chamber.

Benefits of the Moss design:

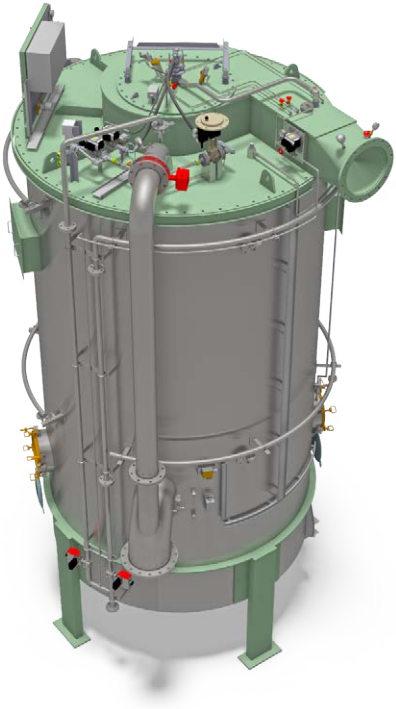
- Unique concentric venturi scrubber design based on more than 50 years' experience
- Minimum space requirement
- High efficiency
- Low maintenance costs
- Safe and easy operation
- Scrubber unit
- Combining three scrubbing principles for high efficiency calling and cleaning: venturi scrubbing, wet filter and spray section
- Concentric arrangement independent of ships pitching and rolling
- Internally coated with GRE and venturi tube in corrosion and heat resistant steel

Wärtsilä Moss Inert Gas Generators for Gas Carriers

Our inert gas generator system, specialised for Gas Carriers, ensures the correct atmosphere in the cargo tanks to minimize the risk of explosion.

Our system offers a high level of safety and are designed based on compact modules, offering important savings in space and installation cost for both newbuildings and retrofitting existing vessels.

Our most recent developments include higher capacity Wärtsilä Moss inert gas generator systems for new and larger LNG carriers requiring dry inert gas on-board, plus a combined inert gas system and gas combustion unit (GCU). Our newly developed integrated solution eliminates the need for a separate GCU and a safe and reliable gas combustion mode is implemented using the same equipment as the Wärtsilä Moss inert gas generator system.



Wärtsilä Inert Gas System and Gas Combustion Unit (IGG/GCU)

Wärtsilä have supplied combined IGG-GCU systems since its introduction in 2013. IGG-GCU uses an existing Wärtsilä Moss inert gas generator to burn the boil-off gas, thereby eliminating the need for a conventional gas combustion unit. This results in considerable capital expenditure savings. At the same time, by using the boil-off gas as fuel for creating inert gas, the combined system also provides notable operating cost savings.

The combined IGG-GCU system has a minimal environmental footprint. This is achieved through the replacement of a separate onboard system, and by using the boil-off gas for inert gas generation, which together minimise the extra use of marine diesel oil (MDO) fuel.

Wärtsilä Moss Nitrogen Generators

Wärtsilä Moss Nitrogen Generators are dependable outlets for nitrogen. As the name implies, these systems are designed to generate, or create, a dry, clean inert gas. The use of nitrogen generators eliminates the problems associated with handling gas cylinders. Our nitrogen generators are designed for their flexibility and efficiency.

Wärtsilä Moss Nitrogen Generators are also designed to deliver various purities in the same system, giving our customers even greater flexibility. We supply niche, supplementary, small volume systems with capacities from 10 to 6 000 Nm^3/h at purities from 95 to 99% nitrogen.

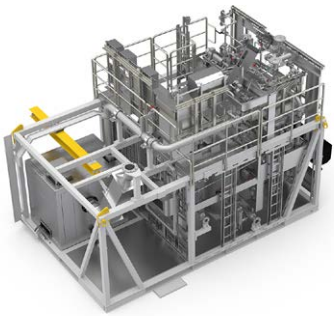
The system is particularly suited for marine and offshore applications, where the demand for high quality and challenging specifications is present. We always adapt to our customer`s needs, and are capable of installing our systems into the most challenging locations.

Wärtsilä Moss Offshore Inert Gas Systems

Due to more than 50 years of experience in design and manufacturing of inert gas generator systems, the Wärtsilä Moss Inert Gas Systems are known for their high inert gas quality and overall reliability.

The systems fulfil requirements for 20-40 years of design life in demanding offshore environments and apply to stringent HSE legislations, which requires highly sophisticated engineered solutions.

High efficiency, low maintenance and safe operation in combination with minimum space requirements, low noise and close to zero emissions are important features of the unique design. The Wärtsilä Moss Offshore Inert Gas Systems can be installed on new builds or be retrofitted on-board existing vessels. The systems can be provided as loose items, containers or plug-and-play skids.



Offshore Inert Gas Package solution for SPAR platform

Gas Recovery

Wärtsilä Gas Solutions offers innovative and energy efficient systems and solutions related to a number of oil & gas segments. The scope includes marine LNG and LPG cargo systems, fuel gas systems for marine vessels, onshore gas terminals, biogas systems, flare gas ignition, oil separation and tank control systems.

Wärtsilä Flare Gas Ignition system

The Wärtsilä Flare Gas Ignition system is designed to handle gas that is normally flared in oil, gas, and petrochemical applications.

The Wärtsilä Flare Gas Ignition system has been developed to guarantee safe and reliable ignition of the flare whenever required.

The system combines high reliability and availability throughout the lifetime of the facility. It features low maintenance requirements and is easily retrofitted into existing installations.

More than one hundred low pressure ballistic pellet ignition systems have been supplied by Wärtsilä worldwide for both offshore and onshore projects.

Gas Recovery

The first VOC condensation system with zero emissions was installed on the shuttle tanker Stena Alexita, operated by ExxonMobil in the North Sea oil fields.

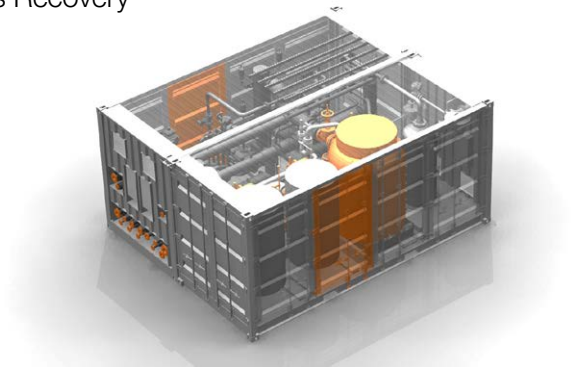
Wärtsilä VOC Recovery

Our field proven system is self-supplied with energy and results in zero VOC emissions.

These emissions from the global sea transportation of crude oil and associated products, account for a total of more than 5 million tonnes per year. The Wärtsilä VOC plant ensures that cargo tank pressures are maintained low enough to keep the vent valve closed. This prevents VOC from being emitted to the atmosphere, and the gas is instead fed to the VOC recovery module, where it is treated by compression and condensation. The liquefied gas is then fed to the VOC fuel tank.

We have also developed a system for VOC recovery in offshore oil loading applications. It exceeds the Norwegian authorities' requirements for Non-Methane Volatile Organic Compounds (NMVOCs) by reducing VOC emissions by 100%, including methane, which is not currently specified in the regulatory requirements.

Gas Recovery



Wärtsilä GasReformer

The WärtsiläGasReformer enables the utilisation of gaseous side streams that either contain large amounts of heavier hydrocarbons or vary in their composition. Gases that were previously considered as waste can now be converted into a valuable resource of energy. Together with Wärtsilä dual-fuel (DF) engines, this is the most efficient and flexible solution for utilising associated or stranded gas, natural gas liquids (NGLs), LPG, boil-off gases (BOGs) or volatile organic compounds (VOCs) recovered from oil and gas industry.

The main application area is in offshore, but also shuttle tankers or very large gas carriers (VLGCs) with high rates of BOG as well as onshore applications with degraded gas quality are seen as potential. Wärtsilä GasReformer has been developed and designed to meet the standards of the offshore industry and is the first of its kind in the world. Wärtsilä GasReformer received the Approval in Principle from DNV-GL for Shuttle Tankers (marine) in 2015. In 2016 for the first time liquefied VOCs of a shuttle tanker were converted with a 1 MW GasReformer into natural gas powering a Wärtsilä 6L20DF engine at the test facilities in Bermeo, Spain.

The technology is based on steam reforming (SR), a catalytic process known from the petrochemical industry, where traditionally hydrogen is produced from various hydrocarbon feeds. The Wärtsilä GasReformer exploits the same catalytic process but operates under more moderate conditions. In the Wärtsilä GasReformer the methane number (MN) of any fuel gas is improved up to 100 ± 5 by converting the heavier hydrocarbons to synthesis gas (H_2 + CO) and finally to methane (CH_4).

Environmental excellence

Offshore gas flaring is increasingly recognised as a major environmental problem, causing 400 million tons of CO_2 in annual emissions, not to

Gas Recovery

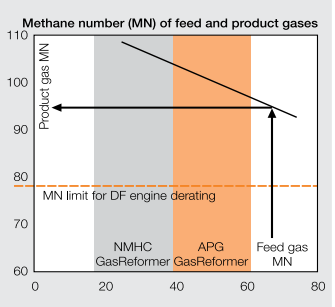
mention the valuable resources that go to waste. When considering the vented BOGs i.e. the VOCs from the marine industry, the overall GHG effect becomes even stronger.

With the Wärtsilä GasReformer, this undesired gas can be reliably and efficiently utilised by Wärtsilä dual-fuel engines. When utilising associated gas or recovered BOGs from tankers or gas carriers as a reliable source of energy, the operator can achieve self-sufficiency in terms of energy supply and thus the need for fuel bunkering or BOG reliquefaction, both costly operations, decreases. With a Wärtsilä 10 MW GasReformer combined with a DF engine, the operator can reduce the need for bunkered fuel oil by 39 TPD and reduce flaring by more than 1.1 MMSCFD which equals to >100 TPD CO2eq. Where VOCs are usually vented, GHG emissions are reduced by 10.6 TPD CO2eq per ton recovered VOC.

Key benefits

- Reduction of Green House Gas (GHG) emissions
- Flared and vented gases can be utilised for power production
- No need for flaring
- Reduced fuel consumption, storage and fuel bunkering
- Low NO_X emissions from proven dual-fuel engines
- Dual-fuel engines can operate at full load and efficiency
- Operator can change gas source during operation
- Decreased carbon footprint for operating company.

Product specification	
Pressure (design)	7–10 (11) barg
Temperature (design)	300-450 (500) °C
Feed gas	165–190 g/kW/h
Product gas	195–260 g/kW/h
Steam demand of which recycled water of which fresh water	200–250 g/kW/h 170 g/kW/h 50–80 g/kW/h
Cooling demand Electrical heater demand Nitrogen consumption start-up (flushing)	360-720 kJ/kWh 36-54 kJ/kWh 1 (5) Nm^3



Dimensions (mm) and weights (tonnes)					
GasReformer capacity	Application	Consists of	Footprint (L x W)	Height	Weight
4 MW (NMHC)	Marine / Shuttle tankers	2 modules	7175 x 4150	4600	25
10 MW (APG)	Offshore / Onshore	2 containers	6058 x 4876	2896	30
*Conceptual design	NMHC = Non-methane hydrocarbons, APG = associated petroleum gas				

Gas Cargo Handling Systems

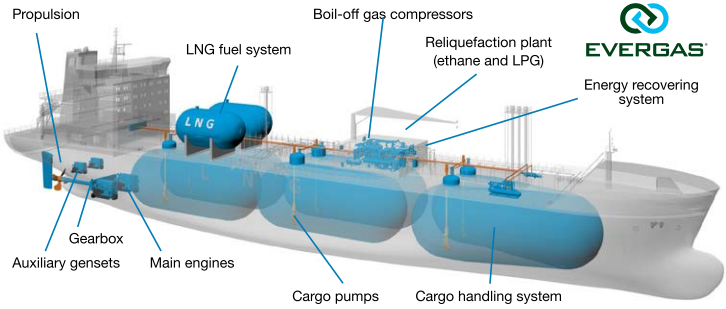
Wärtsilä Cargo Handling for small LNG Carriers

There is a growing demand for small-scale transportation of LNG to end users that are located in areas where pipelines are not feasible or economically viable. Typically such end users are power generation plants, land based industries and suppliers of LNG as fuel for vehicles or ships. Wärtsilä has developed a Cargo Handling System that is designed on basis of the extensive experience that Wärtsilä Gas Solutions has accumulated in delivering such systems for LPG, LEG and LNG carriers. The available scope includes:

- Cargo handling system
- Boil-off gas handling
- Cargo tank design and complete tank delivery
- Ship design
- LNG fuel supply system

We provide designs for small size LNG Carriers carrying LNG only, or Multi Gas Carriers able to carry all types of gas cargo. Typically these ships are between 4000 and 40,000 m^3.

Gas Cargo Handling Systems



Wärtsilä Cargo Handling System for Ethylene/Multi Gas Carriers

The ethylene carrier segment has grown during the last years, from small size vessels to handy size, and now also includes a large-scale carrier purpose built for ethane trading.

Wärtsilä has become the largest supplier of complete cargo handling systems for vessels in this segment, covering the whole range of sizes requested in the market today. These vessels are known for their flexibility and can trade multiple types of cargoes from gas to chemicals. Deliveries also include carriers with LNG capacity and dual-fuel propulsion.

An increasing supply of ethane has created a new segment of shipping, namely the trade of ethane as feedstock to the petrochemical industry on a large scale. Wärtsilä is also delivering complete cargo handling system to these very large ethane carriers.

Gas Cargo Handling Systems

Wärtsilä Cargo Handling System for semi-refrigerated Gas Carriers

The semi-refrigerated segment covers the range from 4000 m^3 to 30,000 m^3. Wärtsilä Gas Solutions offers a cargo handling system including the design and delivery of C-type cargo tanks designed in either cylindrical or bilobe format.

Recent cargo handling design developments include the capability of handling propane cargo with high ethane content.

Wärtsilä Cargo Handling System for fully pressurized Gas Carriers

Most of the vessels in the Gas Carrier fleet are fully pressurized with cargo tank volumes typically in the range of 1000 m^3 to 13,000 m^3. Wärtsilä Gas Solutions offers modern and advanced solutions for such vessels.

Fully pressurized vessels carry LPG at ambient temperatures and with corresponding saturated gas pressures. The design pressure for fully pressurized Cargo tanks is typically 18 bar(g).

Wärtsilä Gas Solutions has developed the new and alternative QiCool design concept, which utilizes the best aspects of both fully pressurized and semi-refrigerated designs. With this approach, the cargo tank design pressure is reduced and cargo chiller units are installed.

The QiCool design allows an increased cargo loading rate up to 98% with design figures for SW and air temperatures. The QiCool design enables the achievement of cost savings and higher revenues.

Wärtsilä Cargo Handling System for fully refrigerated Gas Carriers

Wärtsilä Gas Solutions has for a long time been the preferred cargo handling system supplier to the leading owners of fully refrigerated vessels. When transported, LPG is normally kept at its coldest temperature and the required equipment has to be extremely reliable.

Our broad portfolio of innovative and energy efficient solutions has given Wärtsilä a leading position in the market. This extensive offering is supported by Wärtsilä's unmatched global service network.

Gas Cargo Handling Systems

Wärtsilä Ship and Cargo Tank Design

Wärtsilä Ship Design offer a ship design portfolio that is among the most extensive in the industry. This portfolio includes the design of Gas Carriers, for which we have focused on small to handy size vessels with the possibility to tailor the appropriate final design in cooperation with the owner and shipyard. Our services cover the spectrum from conceptual studies to class approved designs and yard workshop drawings.

Having the in-house resources to design C-type cargo tanks allows us to be a complete partner for the building of Gas Carriers. Our IMO C-type cargo tank designs include the cylindrical tanks, bilobe tanks, and tanks for LPG FP (-10 °C), ethylene (-104 °C) and LNG (-163 °C).

Read more about Wärtsilä Ship Design on pages 162-167.

LNG Solutions

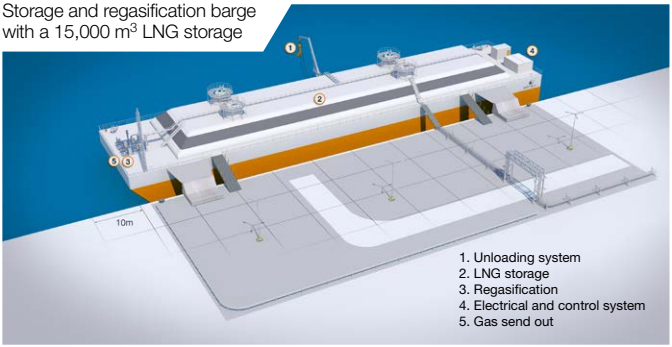
Storage and Regasification Barges

The smallest FSRUs today are around 120,000 m^3. There are no small LNG carriers available that can be converted to FSRUs. Wärtsilä has created a solution for this problem by designing a barge containing storage tanks (1000-30,000 m^3) and regasification systems. These can be an attractive alternative to onshore satellite and bunkering terminals. The LNG barge can be equipped with the similar processes as the land-based solution. The process can also be split between the barge and land. This can be done, for example, by locating the LNG storage on the barge and process equipment and support facilities onshore.

Wärtsilä prefers to deliver the barge and necessary infrastructure onshore as a complete EPC. Wärtsilä can also provide services and maintenance solutions for the total solution.

- Ideal for providing fast and flexible access to gas in new areas.
- For land that is unsuitable for onshore LNG tanks, or where it is difficult to obtain permits.
- Where there is a lack of skilled labour and local construction material.
- A mobile asset, possible to relocate or trade – ideal for temporary demand and uncertain market conditions.

Storage and regasification barge with a 15,000 m^3 LNG storage



LNG Solutions

Input

LNG transport
- Carriers
- Tanker trucks
- Containers
- Rail cars

Terminal

Tank capacity 100-160,000 m³ (26,400-42 million gallons)
- Jetty & marine facilities
- Unloading systems
- Storage tanks
- Boil-off gas handling
- Regasification
  - Up to 1000 tonnes per hour (TPH), 1000 million standard cubic feet per day (MMSCFD)
- Export systems

Satellite terminals for gas power plants

Small satellite terminals

Storage & regasification barges

Medium-scale terminals

Output

LNG transport
- Carriers
- Tanker trucks
- Containers
- Rail cars

Peak shaving gas send-out

Ship bunkering

Terminals

An LNG terminal is a liquid gas processing plant which main purpose is to receive, store and further distribute natural gas. The storage tank is usually the most expensive part of a terminal unless marine facilities are part of the scope, and the terminals are usually defined according to the size of the tanks. Wärtsilä's portfolio consists of terminals with various functions combined with a storage capacity in the range of 100 to 160,000 m^3.

- Specifically adapted for the requirements of small-scale LNG through elimination of complexity and increase of flexibility
- Single use (e.g. providing fuel for a power plant) or multi-use (e.g. gas send-out, ship bunkering, truck loading)
- Available for both hub and spoke operations
- Onshore and near shore (barge) concepts
- Stringent safety regulations during both construction and operation

CLICK for more info

LNG Solutions

The Kollsnes II plant located near Bergen, Norway features a complete LNG plant including a total gas cleaning system.

LNG plants – small scale liquefaction technology

REVERSED BRAYTON CYCLE – THE RELIABLE SOLUTION FOR SMALL SCALE LIQUEFACTION

Wärtsilä's larger liquefaction plants are easy to operate, reliable, and fully automated. They represent a low lifecycle cost solution in the small to medium size liquefaction capacity range.

These liquefaction plants are based on the Reversed Brayton cycle. Nitrogen is the sole refrigeration medium, and is used in a process of compressing and expanding the nitrogen to obtain the required cryogenic temperature.

Main technical data:

- Energy consumption: ~ 0.38 kWh/kg LNG
- Capacities between 60–800 tons/day (3–41 MMSCFD)
- Based on proprietary reversed Brayton technology
- Simple process and less equipment needed because the refrigerant (Nitrogen) is always in gas phase
- Smaller plants designed for unmanned operation
- Delivery time: 18–22 months.

Small scale liquefaction plants open new market opportunities for the development of local or regional gas distribution networks, where gases did not previously exist as an alternative environmentally friendly and competitive energy source.

LNG Solutions

The biogas liquefaction plant was delivered to the municipality of Oslo. For this plant, Wärtsilä also delivered a molecular-sieve absorption system for CO_2 cleaning stage.

LNG plants – mini scale liquefaction technology

MIXED REFRIGERANT (MR) PROCESS – THE PERFECT SOLUTION FOR BIOGAS LIQUEFACTION

Wärtsilä offers the energy efficient Mixed Refrigerant (MR) liquefaction technology for low liquefaction capacities. Together with our fast track engineering model, this technology results in low investment costs and short manufacturing time.

The liquefier system uses mixed refrigerant technology, where one single MR compressor and one aluminium plate-fin heat exchanger (PFX) are the main components in the system. A standard chiller (pre-cooling unit) is incorporated to improve energy efficiency and to ensure stable operation of the MR process.

Main technical data:

- Energy consumption: ~ 0.7 kWh/kg LNG
- Capacities up to 50 tons/day (2.6 MMSCFD)
- Based on Mixed Refrigerant technology
- Designed for unmanned operation
- Space requirement for liquefaction system: 15 x 15 m^2
- Delivery time: 12 months
- Standard capacities: 10, 17 and 25 ton LNG/day.
- Using standard and robust components.

Wärtsilä provides the complete process plant, which can also be supplied as an EPC delivery. Once installed, Wärtsilä further offers Operation & Maintenance agreements that are tailored to the customer's specific needs.

CLICK for more info

LNG Solutions

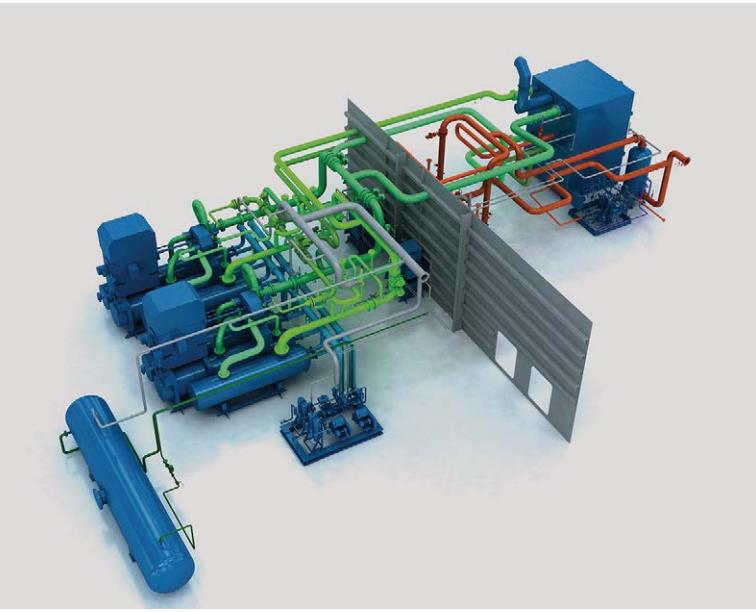
Wärtsilä LNG Regasification

Our portfolio of LNG regasification technologies represents an industry benchmark in terms of energy efficiency, robustness, and operational flexibility.

Wärtsilä has delivered and commissioned numerous floating LNG regasification plants based on either closed loop regasification technology, using steam with water/glycol as the intermediate heating medium, or open loop regasification technology using sea water with propane as the intermediate heating medium. An open seawater solution using glycol as intermediate medium is also under development.

We have also delivered modularised regasification plants for jetty installations. These facilitate a much shorter construction time compared to conventional land based LNG regasification terminal projects.

LNG Solutions



Wärtsilä LNG Reliquefaction

Wärtsilä is a leading designer, developer and supplier of energy efficient LNG Boil-Off Gas (BOG) reliquefaction plants. These systems are designed to be efficient, reliable, safe, robust and flexible.

With 35 systems in operation and an additional 8 plants under construction, Wärtsilä has the highest number of BOG reliquefaction plants installed in the global LNG carrier fleet. Similar solutions could also be installed with onshore LNG terminals.

We work closely with our customers to develop technological solutions that meet their needs for increased fuel flexibility, energy efficiency, and environmental performance in today's fast changing LNG market.

Fuel Gas Handling

Wärtsilä LNGPac™

Wärtsilä LNGPac™ is a complete fuel gas handling system for LNG fuelled ships and includes the bunkering station, LNG tank and related process equipment as well as the control and monitoring system. The LNG fuel system can be offered as a standalone product, as well as a part of a complete propulsion system. Wärtsilä can deliver LNG systems for propulsion and power generation for any applicable types of ship or engine.

Complete solution

The Wärtsilä LNGPac™ system is based on an IMO type C LNG storage tank with either double walled vacuum or single walled polyurethane insulation. Bunkering takes place from the bunkering station to the LNG tank via an insulated pipe. All necessary process equipment is installed in a separate unit which can be either mounted directly to the LNG tank or placed remotely from the LNG tank. The main process equipment ensures correct gas temperature and pressure for the engines and other gas consumers. All operations of the LNGPac are controlled by the automation system which provides excellent safety and control of the LNG system with a HMI adopted to customer needs. Control system that can be delivered Integrated with the Vessel Automation (IAS) and with Monitoring & Remote access to diagnostics (CBM) of Wärtsilä Life Cycle Service. Compliance

Fuel Gas Handling

with international safety requirement and operational standards specific to a gas processing facility. The LNGPac system can be customised to the needs of each project on a case to case basis. Dedicated engineering is conducted from the beginning of the project to match the specific operational requirements, safety and classification society requirements.

Features

Our innovative features have made the LNGPac™ a simple plug and play solution with the following benefits:

INTEGRATED AIRLOCK
The Airlock can be integrated with the LNGPac™. This reduces the floor foot print, increases safety aspects and makes the installation for the yard much easier.

INTEGRATED CONTROL CABINET
The Control Cabinet can be integrated with the LNGPac™. This innovation results in a dramatic reduction of interfaces since the electrical cabling from the LNGPac™ to the external switchboards can be reduced to only a few cables. LNGPac automation can be connected to the Wärtsilä engine digital ecosystem for global maintenance support during complete vessel life cycle. One supplier for automation design, project execution, commissioning work and services – reducing project risk and minimizing delays in communication.

INTEGRATED GAS VALVE UNIT (GVU)
The functional components of the GVU can be integrated as part of the LNGPac™. By combining the LNGPac™ and the GVU into a single system, considerable space can be saved. The solution will also save installation time and costs for the yard.

REMOVAL OF THE HEATING MEDIA SKID
A new evaporator type allows the engine LT-water to be directly connected to the LNGPac without the need of an intermediated heating media circuit. This leads to fewer interfaces and less installation work is required.

SEAMLESS INTEGRATION OF WÄRTSILÄ SVANEHØJ ECA FUEL PUMP
The LNGPac can be equipped with the Wärtsilä Svanehøj ECA fuel pump both for vacuum insulated tanks with the fuel pump placed in a cryosump integrated in the tank connection space or alternatively as a deepwell installation on single shell tanks.

MAINTENANCE ORIENTED DESIGN
LNGPac™ design focuses on enabling safe service and maintenance of all core equipment related to the operational functionality of LNG bunkering and gas consumption without any need for emptying the tank.

Tank Control Systems

Wärtsilä Tank Control Systems for Whessoe Products

If your product is LNG, LPG or ammonia, Wärtsilä Tank Control Systems can provide an application-specific solution for your business needs. Today, the liquid gas industry is driven by the economics of operational scale. In order to apply efficient business management, while adhering to stringent safety regulations, operations personnel must have access to correct information.

Throughout the production cycle, from storage to distribution, the availability of precise data is essential, and it needs to be relayed to the control room in real time.

Whether your operation is large or small, our solutions are custom designed to suit your requirements. They can operate independently, or be interconnected within a plant-wide system. Our vast experience, research, instrumentation technology, and service support will add value to your business.

Marine gauging

LNG secondary tank gauging systems

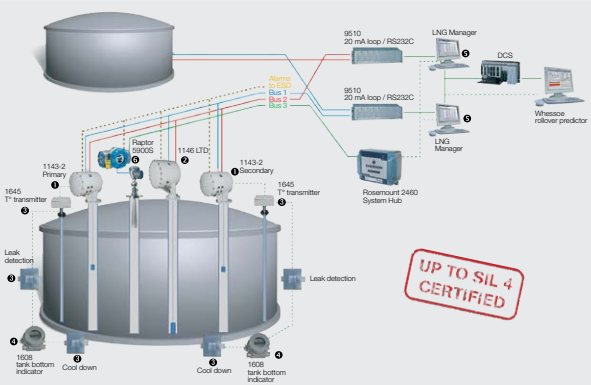
- World leaders in LNG marine gauging, more than 320 vessels supplied worldwide
- FLIV isolation valves.

Product and chemical carriers

- LPG level gauging
- Alarm systems
- Supervisory control and data acquisition system.

CLICK for more info

Tank Control Systems



Liquefied natural gas (LNG)

Total LNG tank gauging system

Our total LNG storage tank instrumentation solution comprises the following, fully integrated system components:

- SIL-3 certified servo level gauges
- High/high level alarm gauges
- Product temperature probes
- Fully automatic LTD gauges
- Leak detection and cooling temperature transmitter system
- PC based SCADA package
- Roll-over predictive alarm software
- LNG sampling system.

The entire system communicates via a redundant communication link.

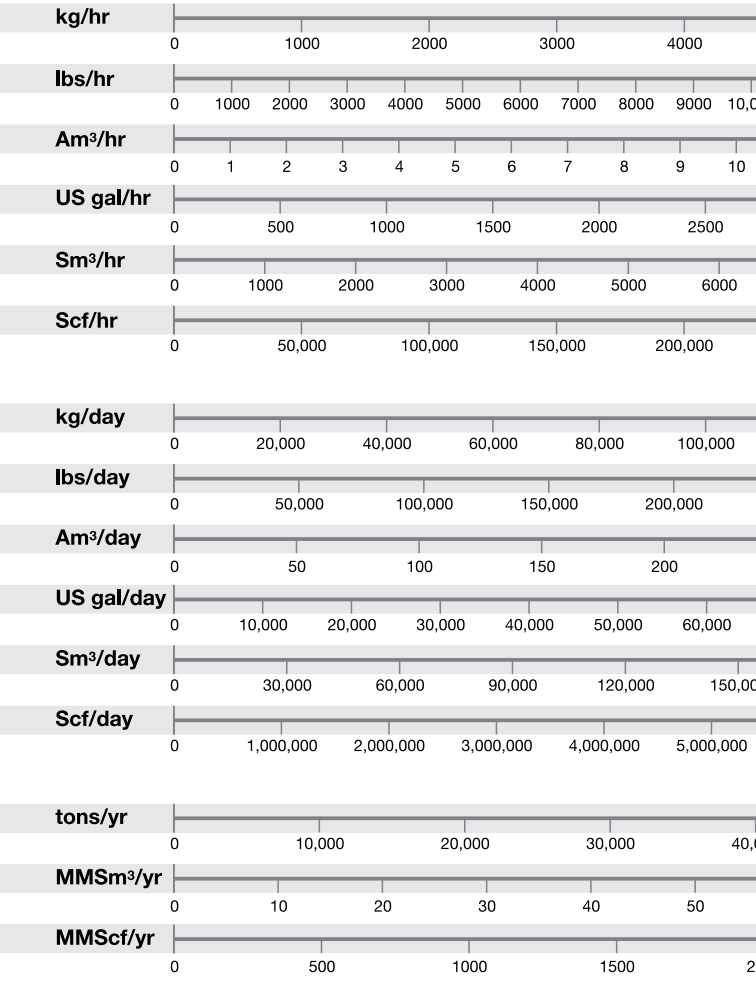
Liquefied petroleum gas (LPG)

Wärtsilä Tank Control Systems lead the industry in liquefied gas storage instrumentation and safety systems. We offer complete pressurised tank solutions for LPG and liquefied chemical gases (vinyl chloride, ethylene, propylene, butadiene, ammonia, etc.). These include level gauging or safety shut-off valves systems with hydraulic panel remote, that enable the full protection, control, and supervision of the storage plant.

Wärtsilä Tank Control Systems is a key player in LPG cavern storage applications. We have developed, in close collaboration with key customers, a unique and dedicated range of products that meet the specific needs of this type of storage.

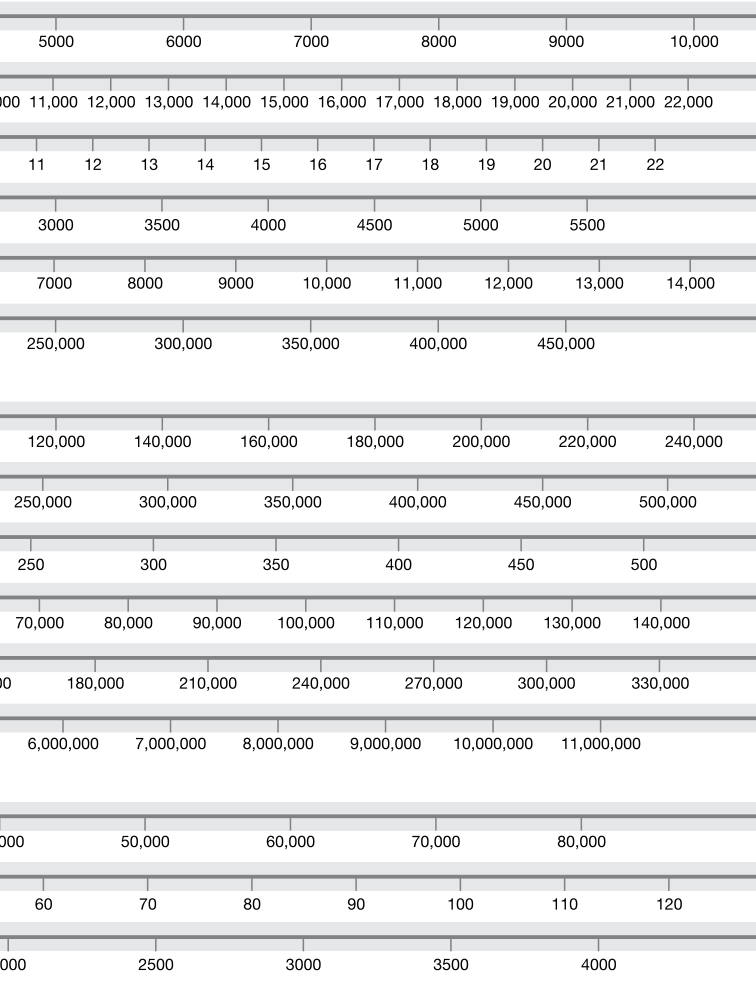
Fuel Gas Handling

LNG quantity converter



Note: Volumetric values are based on saturated LNG of approximately 96.2% C1, 3.7% C2, 0.4% C3, 0.15% C4 and 0.55% N2 (at -161.8 °C, 1.1 bara)

Fuel Gas Handling



Wärtsilä Gears

Wärtsilä gears have been designed to meet the highest standards of operational efficiency, reliability and low noise and vibration.
Gear configurations:

- 1-speed gearboxes, for installations with a single engine and propeller operating at a constant propeller speed. The Wärtsilä SCV designation indicates a vertical offset, while SCH represents a horizontal offset.
- 2-speed gearboxes, for installations with a single engine and propeller able to operate at two selectable propeller speeds. The Wärtslä SCV/2 designation indicates a vertical offset, while SCH/2 represents a horizontal offset.
- Double gearboxes, for installations with two engines and one propeller operating at a constant rotational speed. “Twin-in single-out” gears with Wärtsilä designation TCH.
- Special gearboxes, for instance gearboxes with both horizontal and vertical offsets, are available upon request and are customised for the specific application.
- All Wärtsilä gears can be supplied with built-in multi-disc clutches for engaging the propeller.

Power take-off (PTO)

All Wärtsilä gears can be equipped with one or more PTOs for driving shaft alternators, compressors or pumps. A clutch is optionally available for the PTO.

Power take-in (PTI)

Most Wärtsilä gears can be supplied with a combined PTO/PTI. In PTI mode the shaft alternator can be used as an electric motor to enable additional power for demanding operations via the ‘PTI booster’. This functionality does not require any additional clutch.

- “PTI take me home” – an electrical drive mode used for emergencies if the prime mover is out of operation. This functionality requires two clutches: one to disconnect the prime mover and one to engage the propeller in PTI mode.

Hydraulic system for the gear & controllable pitch (CP) propeller can be integrated or separate

Most Wärtsilä gears are designed with an integrated propeller hydraulic system. This provides a space efficient and highly reliable solution since the hydraulic pump is driven mechanically by the gearbox. Optionally, all gears can be interfaced to a separate hydraulic power unit as well.

Wärtsilä 2-speed gear

The Wärtsilä 2-speed gear is designed to serve vessels having multiple operational modes or reduced transit speeds. In particular, RoPax ferries, offshore support vessels, tug boats and fishing vessels can gain notable economic and environmental benefits. Single screw vessels with redundant propulsion system ("take me home system") will also benefit from this type of gear.

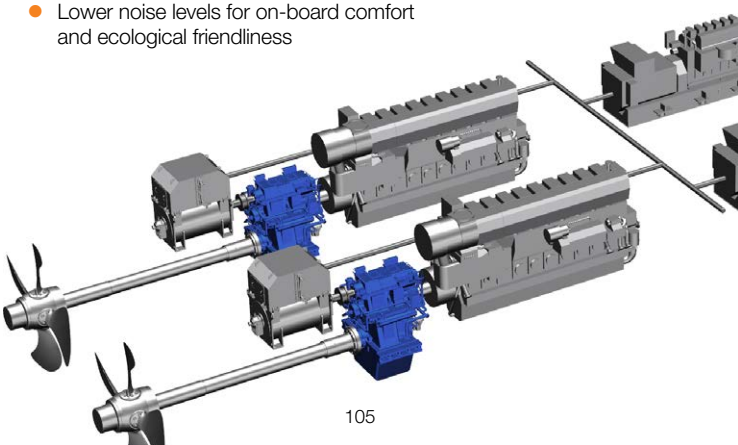
The key feature of the 2-speed gearbox is that it provides the possibility to reduce the propeller speed while the speed of the vessel remains constant. This results in fuel savings of up to 15% when compared to a single speed mechanical propulsion system. At the same time, nitrogen oxide (NOX) and sulphur oxide (SOX) emissions are reduced accordingly.

The reduction in fuel consumption and emissions is the result of the propeller being able to run at close to its optimal design point.

When switching between propeller speeds, both the engine speed and PTO speed are kept constant, enabling uninterrupted electrical power generation at any time.

Benefits

- Fuel consumption and exhaust gas emissions reduced
- Reliable performance with low transmission losses
- Acts as a systems enabler for vessels with variable operational modes and/or a need for a redundant propulsion system
- Two selectable propeller speeds at 100% engine speed
- Provides efficient utilisation of the main engine
- PTO power at 100% of the engine power
- PTO power uninterrupted when changing propeller speed
- Reliable and simple to operate with mode changes from the bridge
- Lower noise levels for on-board comfort and ecological friendliness

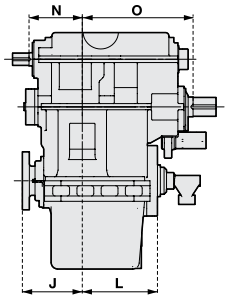


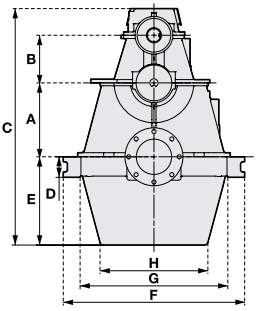
Single Input Gears

Single input gears, vertical offset, dimensions (mm)

Gear type/ size	A	B Std- Max	C	D	E	F	G	H	J	L	N	O SCV/SV	Weight tonnes*
SCV38	380	290	1305	115	465	1000	750	530	340	538	230	650	2.1
SCV42	420	320	1435	125	510	1500	830	585	530	558	255	715	2.7
SCV46	460	350	1570	140	560	1580	910	640	570	595	280	785	3.4
SCV50	500	380	1724	150	590	1340	1024	720	470	592	420	1035	4.2
SCV56	560	410	1848	160	645	1500	1110	800	530	650	450	1100	6.0
SCV62	620	440-470	2210	180	740	1580	1240	880	570	662	350	1150	7.0
SCV68	680	460-510	2370	200	800	1720	1360	960	625	720	370	1250	8.0
SCV75	750	480-530	2460	220	880	1850	1480	1040	660	800	450	1300/1095	10.0
SCV85	850	510-560	2720	250	1000	2100	1680	1178	730	915	550	1470/1220	13.0
SCV95	950	580-630	3025	280	1145	2350	1880	1327	800	1025	450	1640/1350	19.5
SCV105	1050	600	3328	250	1125	2628	2192	1668	1410	624	618	970	24.0
SV112	1120	600	3550	260	1198	2804	2272	1772	1500	660	615	800	24.0
SCV112	1120	700	3650	260	1198	2804	2272	1772	1500	660	595	1800	29.0
SV118	1180	600	3610	300	1190	2824	2268	1758	1520	716	615	827	30.0
SCV118	1180	700	3710	300	1190	2824	2268	1758	1520	716	595	1800	32.0
SV125	1250	600	3805	300	1325	1954	2396	1888	1600	808	615	860	31.0
SCV125	1250	700	3905	300	1325	1954	2396	1888	1600	808	595	1950	36.5
SV132	1320	600	3940	300	1390	3084	2516	2018	1630	850	615	875	34.0
SCV132	1320	700	4040	300	1390	3084	2516	2018	1630	850	610	2020	39.0
SV140	1400	600	4250	350	1500	3250	2600	2150	1700	900	720	920	40.0
SCV140	1400	700	4350	350	1500	3250	2600	2150	1700	900	680	2200	44.0

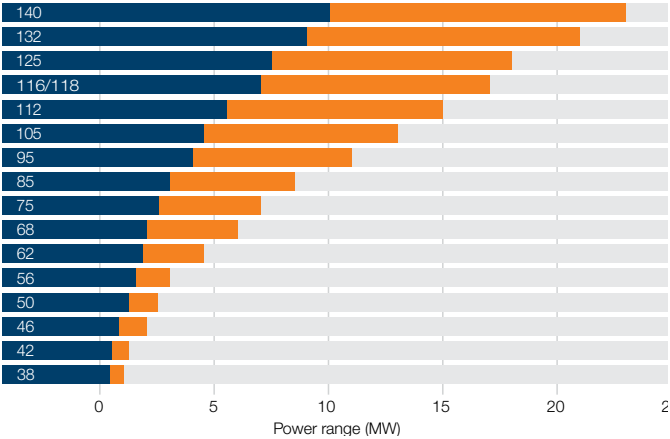
* Not binding





Single Input Gears

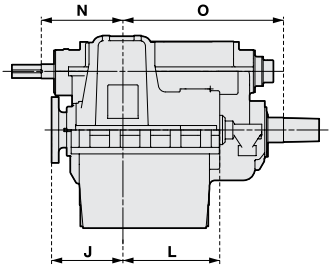
Single input gears, power range

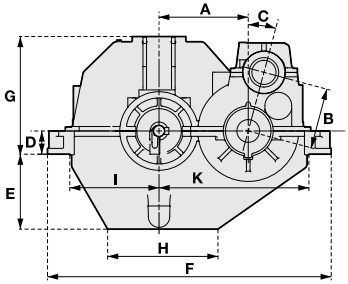


Single input gears, horizontal offset, dimensions (mm)

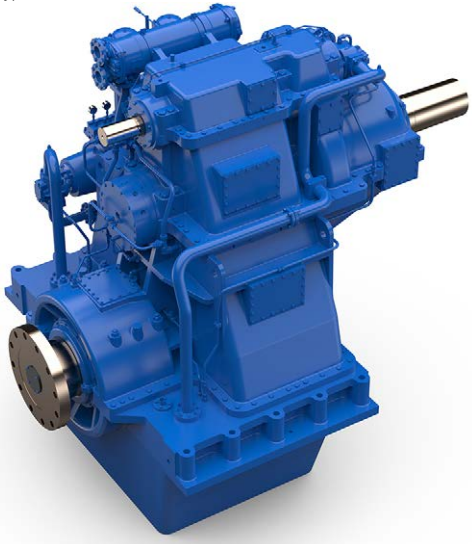
Gear type/ size	A	B	C	D	E	F	G	H	I	J	K	L	N	O SCH/ SH	Weight tonnes*
SCH68	680	510	0	100	700	2000	840	650	515	570	1095	730	500	1245	8.0
SCH75	750	530	15	280	885	2230	1220	865	735	660	1115	800	515	1670	11.5
SCH85	850	580	15	320	1000	2495	1440	970	830	730	1245	915	550	1800	15.0
SCH95	950	580	15	450	750	2710	1520	2250	830	1215	1420	540	700	1640	20.0
SCH105	1050	630	20	500	771	2995	1658	2195	910	1405	1545	560	750	1700/ 1510	30.0
SCH116	1160	670	20	550	850	3300	2240	2500	1015	1435	1715	725	830	1100/ 1800	40.0

* Not binding

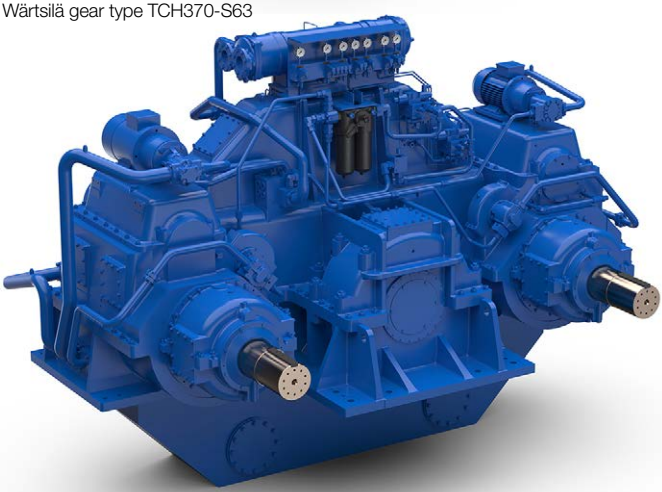




Wärtsilä gear type SCV132



Wärtsilä gear type TCH370-S63



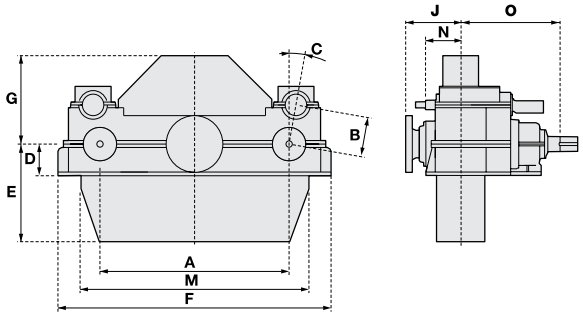
Double Input Gears

Double input gears, dimensions (mm)

Gear type/ size	A	B	C	D	E	F	G	J	M	N	O	Weight tonnes*
TCH190	1900	460	10	320	980	2750	890	555	2300	360	995	15.0
TCH240	2400	490	20	450	1315	3580	1455	730	3135	570	1220	20.0
TCH250	2500	530	12.5	450	1400	3700	1150	800	3230	570	1290	28.0
TCH270	2700	580	10	500	1330	3900	1690	880	3410	600	1560	28.0
TCH350	3500	580	10	700	1855	5370	1630	1270	4380	790	2140	50.0
TCH370	3700	630	10	700	1855	5565	1645	1270	4580	880	2140	60.0
TCH380	3800	630	0	700	1700	5600	2000	1270	4700	900	220	55.0

* Not binding

TCH type



Double input gears vs Wärtsilä engines

Gear type	Engine offset (mm)	Engine type
TCH190	1900	W20
TCH240	2400	Electric motors
TCH250	2500	W26 (L-version)
TCH270	2700	W32 (L-version) and W34DF (L-version)
TCH350	3500	W12V32, W6L46F, W6L50DF
TCH370	3700	W16V32, W18V32,W8L46F, W9L46F, W8L50DF, W9L50DF, W12V34DF, W16V34DF, W46DF (L-version)
TCH380	3800	W8V31, W10V31

2-speed Gears

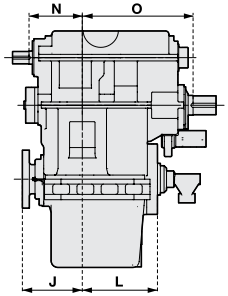
2-speed gears, vertical offset, dimensions (mm)

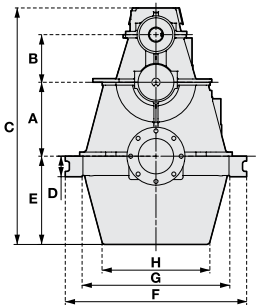
Gear type/ size	A	B	C	D	E	F	G	H	J	L	N	O	Weight tonnes
SCV80/2-P54	800	540	2680	220	880	1960	1580	1150	660	800	580	1325	14.0
SCV90/2-P58	900	580	2760	250	1075	2210	1800	1300	730	915	650	1350	17.0
SCV100/2-P68	1000	680	3350	260	1100	2500	2000	1470	800	1036	915	1800	24.0
SCV112/2-P68	1120	680	3500	260	1200	2805	2320	1772	1500	665	900	1800	32.0
SCV118/2-P68	1180	700	3700	300	1200	2800	2320	1750	1520	715	1050	1800	35.0

2-speed gears, horizontal offset, dimensions (mm)

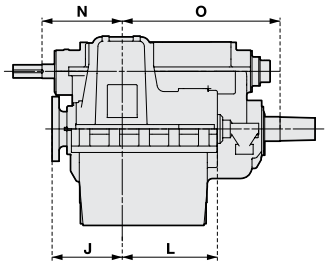
Gear type/ size	A	B	C	D	E	F	G	H	J	L	N	O	Weight tonnes
SCH80/2-P54	800	540	15	220	700	2450	1050	950	660	800	580	1325	15.0
SCH90/2-P58	900	580	15	260	820	3000	1160	1130	730	985	650	1350	18.0
SCH100/2-P68	1000	680	15	260	840	3180	1870	1240	800	1036	915	1800	25.0
SCH112/2-P70	1120	680	15	260	950	3200	1950	1400	665	1500	1735	965	30.0
SCH118/2-P70	1180	700	15	300	1000	3500	1650	2000	1520	715	1050	1800	37.0

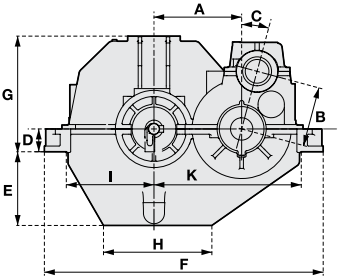
Vertical offset





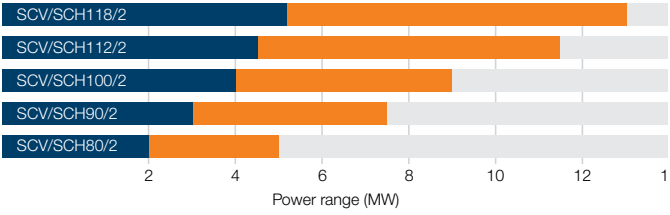
Horizontal offset





2-speed Gears

2-speed gears, power range



Wärtsilä gear type SCV90/2-PDC58

WCP Propeller Systems

Wärtsilä Controllable Pitch Propeller Systems

Wärtsilä Controllable Pitch (WCP) propeller systems provide excellent performance and manoeuvrability, and are recommended for vessels with frequent sailing routes that involve multiple operating conditions. These can be, for example, vessels requiring full power in both bollard pull and free-sailing conditions, or that make frequent port calls. WCP propeller systems can also be applicable for vessels that encounter varying weather conditions or demanding operational requirements, such as dynamic positioning. A controllable pitch propeller can be the optimal choice for installations with a shaft generator operating at constant rotational speed. Full propulsion power is available in both heavy and light conditions through an automatic pitch adjustment. Engine overload is avoided regardless of the conditions.

The WCP propeller system is the ideal choice for diesel-mechanic propulsion with both medium-speed and low-speed diesel engines. By integrating a suitable gearbox and Power Take Off/In, the WCP propeller system can be transformed into a hybrid propulsion system that enables:

- High operational efficiency and flexibility
- A power boost mode
- Emergency propulsion power.

WCP Propeller Systems

A Wärtsilä Controllable Pitch (WCP) propeller system comprises a hub, propeller blades, shafting, hydraulics, control system and any further accessories required. The system is fully customised to meet the specific needs of the customer. Wärtsilä's hydrodynamic experts tailor the propeller for each application to achieve the optimum balance between fuel consumption and comfort levels, according to the customer's wishes.

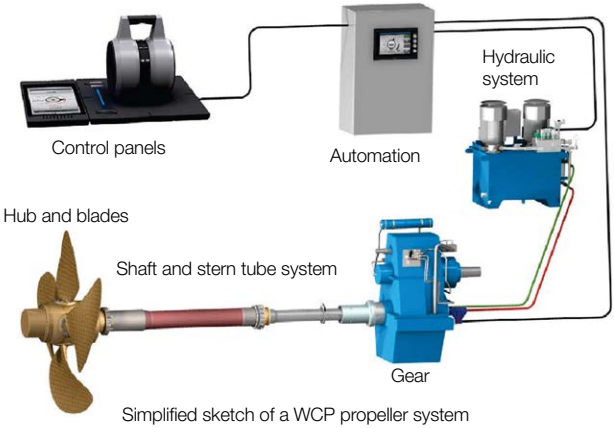
Technical data

Power range starting from 500 kW, no upper limit

- 4- or 5-bladed propellers starting at a diameter of 1200 mm
- Bronze or stainless steel propellers
- Various hub types, depending on the application
- Compliant with all ice classes.

Options

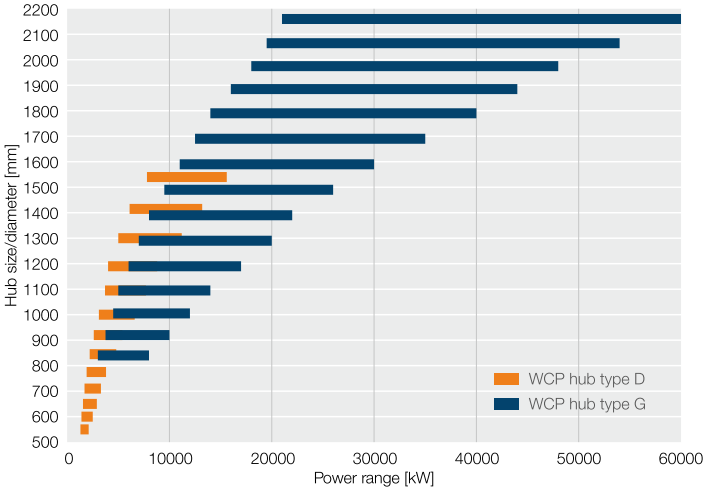
- US EPA Vessel General Permit 2013 compliance
- Zero pollution sterntube
- Under water replacement of propeller blades
- Trailing propellers or full blade feathering optimal selection from CFD calculations and installation benefits
- Navy requirements for low noise signature
- Energopac rudder for increased efficiency
- Continuous oil monitoring for increased reliability
- Wärtsilä High Performance (HP) Nozzle
- Energy saving devices such as the EnergoProFin
- MON-SHAFT for increased shaft withdrawal intervals.



Simplified sketch of a WCP propeller system

WCP Propeller Systems

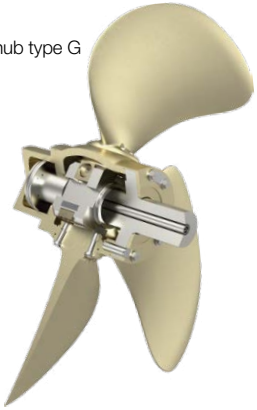
Power range for Wärtsilä standard 4 bladed bronze hubs, without ice class notation



Wärtsilä is uniquely positioned to select various controllable pitch hub principles up to 16 MW. The WCP hub type D is the right solution for light and moderately loaded propellers. The WCP hub type G is selected for vessels requiring high power of having a highly loaded propeller. With these two types of hub, Wärtsilä successfully covers all applications requiring controllable pitch propellers. Stainless steel propellers are also included in our portfolio.

WCP hub type D

WCP hub type G



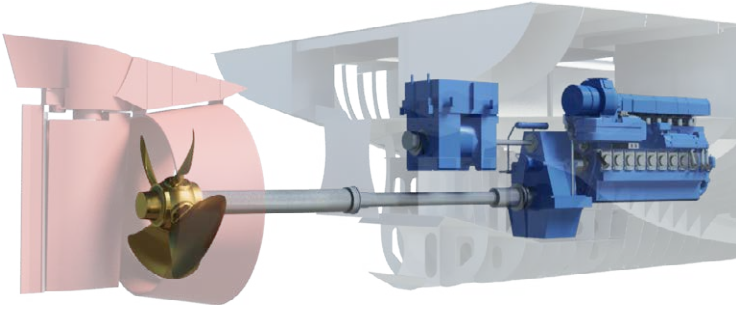
WCP Propeller Systems

Wärtsilä propulsion package

Wärtsilä offers an unrivalled range of products, systems and solutions, including ship machinery, propulsion equipment and control systems, for all types of marine vessels. The offering is based on technological expertise and close customer support. Our customer support extends throughout the entire process, from initial design to construction and operation.

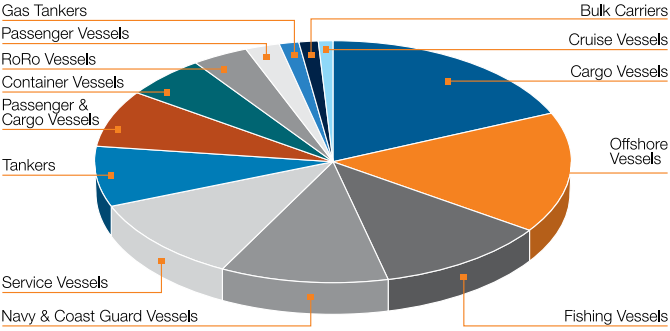
The benefits of integrated packages comprising a WCP system include:

- In-house design, manufacturing and project management
- Matching components and integrated design to ensure functionality and efficiency
- Easy installation and commissioning
- Simple mechanical and automation interfaces to shipyard systems.



Wärtsilä integrated package for a trawler. WCP-1095 propeller system, SCV 112/2 gear, W9L32 engine and control system

WCP propeller systems – Application base



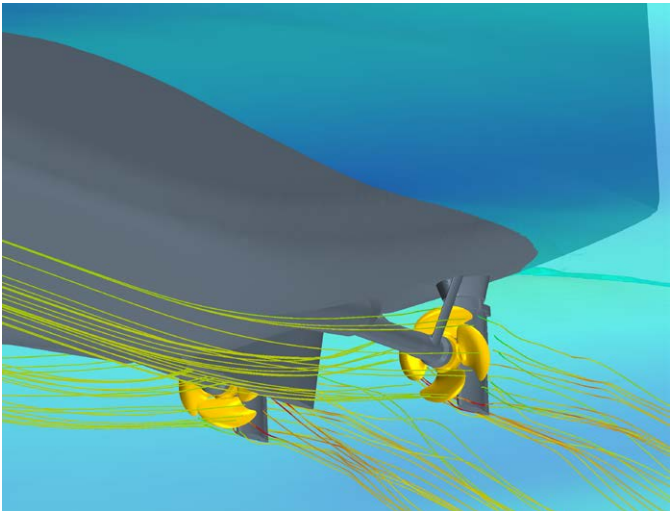
WCP Propeller Systems

Wärtsilä's hydrodynamic design

The hydrodynamic design covers propellers for vessels ranging from heavy-duty ships, such as AHTS to high-speed passenger ferries, and from small fishing boats to enormous ice classed container vessels. Wärtsilä's extensive hydrodynamic know-how is based upon the company's long history and vast experience in the design of propellers. Our design tools are continuously developed and validated by a large number of model test results, full-scale measurements, and research and development efforts. The latest addition to Wärtsilä's design capability is the OPTI Design methodology.

OPTI Design

With OPTI Design the focus is on the vessel's total propulsive efficiency, which in the end determines its fuel consumption. This propulsive efficiency depends in turn on the efficiency of the propeller and the interaction between the propeller and the vessel. With modern Computational Fluid Dynamics (CFD) it is possible to make a flow simulation of the complete vessel and propulsion unit. With such simulation, paying attention to both the propeller design and the details, such as brackets and nozzle connections and the propulsion unit to the vessel, the overall performance can be determined. Design features that can be further improved are also revealed, thus improving the vessel's overall performance.



WCP Propeller Systems

Polar Logistics Vessel for Terre Australes et Antarctiques Françaises (TAAF) and the French Polar Institute (IPEV)
WCP-1080 propeller system, DNV Polar Class 5

Passenger ferry for Rederi AB Gotland
WCP-1540 propeller system, Energopac rudder
28.5 knots, DNV ice 1A

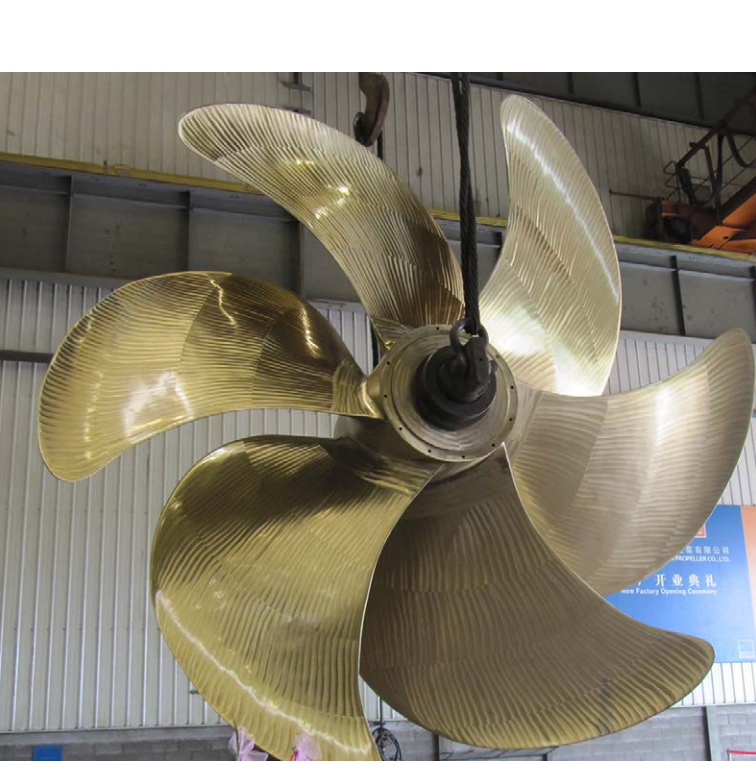
Chemical tankers for Gothia Tanker Alliance
WCP-1415 propeller system, HP Nozzle,
Energopac rudder, OPTI Design and ProTouch

Fixed Pitch Propellers

Wärtsilä Fixed Pitch Propellers

Wärtsilä fixed pitch propellers are manufactured by the Wärtsilä CME Zhenjiang Propeller Co., Ltd joint venture company. At this facility fixed pitch propellers with diameters from 1 to 12 meters and up to 120 tons in weight can be produced. Since the joint venture company was established in 2004, more than 2000 propellers have been produced. Furthermore, Wärtsilä CME is able to take advantage of the extensive experience and databases of LIPS and Wärtsilä with regard to propeller design and production technology.

The propeller and shaft line design tools are based upon long experience with calculations, model test results, Computational Fluid Dynamics (CFD), and full scale results.



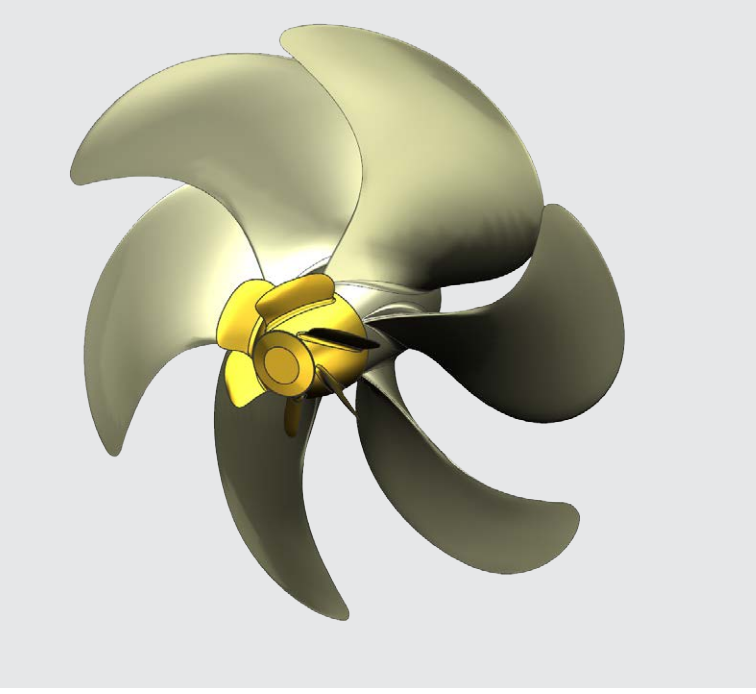
Fixed Pitch Propellers

Propeller efficiency, noise, and vibration requirements are the main considerations for propeller designs that can be applied for a wide variety of speeds and power densities, and for any type of ship. The unique Wärtsilä Cunial® propeller material provides excellent casting, machining and fatigue properties.

Replacement Propellers

By re-designing and replacing existing propellers using Wärtsilä state-of-the-art design tools, notable efficiency improvements can be achieved. For example, by designing a Fixed Pitch Propeller to accommodate slow steaming at reduced vessel speed and power levels, efficiency improvements of up to 15% are possible.

Redesigning and replacing propellers is not restricted to Wärtsilä Propulsion products only!



Fixed Pitch Propellers

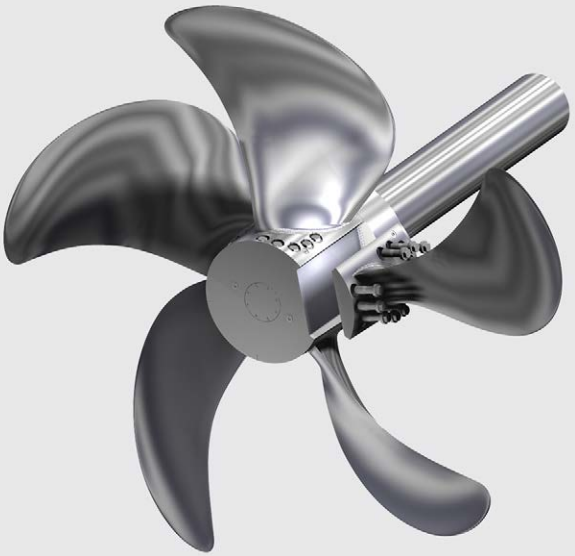
Wärtsilä Built-Up Propellers

The Wärtsilä Built-Up Propeller (BUP) is an attractive alternative for a monobloc propeller. The easily (de)mountable blades and the possibility of under water (de)mounting enable the propeller blades to be replaced or repaired with minimum interruption to the normal operating service.

The BUPs are supplied in stainless steel or bronze. Connections to the propeller shaft are made using a flange and fit bolts. Most BUPs are delivered with 4- and 5-blade propellers, but 6-bladed propellers can also be delivered on request. There are no propeller diameter or weight limits. The flush and compact hub design in combination with efficiency optimised propeller blades makes the BUP fit for applications where low fuel consumption is important.

Built-up propellers are typically installed on ice-breakers and offshore patrol vessels operating in heavy ice conditions, or conditions where there is an increased risk of damage to the propeller. Extended scheduling interruptions are avoided thanks to rapid (underwater) replacement of the blades.

The short replacement time needed also benefits vessels with a fixed operating schedule, such as cruise and ferries.



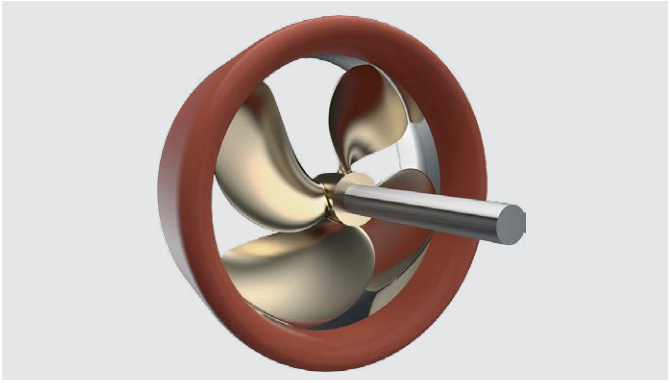
Fixed Pitch Propellers

Coastal and Inland Waterway Propellers

Coastal and inland propulsion systems are specialized for vessels operating on local waterways, and for coastal and fishing vessels. Wärtsilä has considerable expertise in designing propulsion systems for large, fast luxury yachts and government-owned ships as well as a variety of special vessels, all with their own characteristics. Wärtsilä supplies fixed pitch propellers, nozzles, and propeller shaft assemblies complete with sterntube systems as part of the propulsion equipment for such vessels.

Coastal and Inland Waterway Propellers are available in bronze or stainless steel. They are tailor-made with 3, 4, 5, 6 or 7 blades. The accuracy can be according to ISO class II, I or S. Wärtsilä has the capability to deliver fixed pitch propellers for any diameter above 1000 mm, although for the coastal and inland waterway segment they are seldom larger than 3500 mm.

Nozzles and Rudders



Wärtsilä High Performance Nozzle

Fitting a nozzle increases the thrust at relatively low ship speeds. This allows for significant savings to be achieved in terms of fuel consumption, depending on the number of revolutions and the capacity of the engine. The improved Wärtsilä High Performance nozzle, the type HP nozzle, when combined with Wärtsilä propellers, can provide up to 5% more thrust than conventional nozzles in bollard pull conditions. The nozzle profile offers a double profiled cross section at the inlet side of the nozzle.

Wärtsilä Energopac

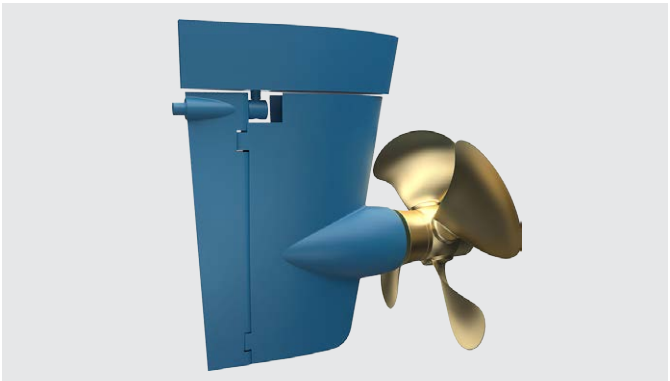
Energopac is the optimised propulsion and manoeuvring solution for coastal and ocean going vessels. The key objective is to reduce the vessel's fuel consumption by integrating the design of both the propeller and rudder. Each Energopac is designed to fit the intended vessel and to meet its specific requirements; this allows Energopac to be optimised fully for energy efficiency, whilst not compromising on either manoeuvrability or comfort levels.

- Improved propulsive energy efficiency
- Reduced fuel consumption
- Excellent maneuverability
- Lower vibration levels and higher on-board comfort
- Reduced levels of emissions
- Integrated propeller and rudder design.

Fuel savings

Energopac reduces fuel consumption because it effectively reduces the flow separation behind the propeller hub. Extended studies show that for

Nozzles and Rudders



the same course-keeping capabilities, Energopac will create less drag than conventional rudder systems.

Typical applications

Energopac can effectively reduce the operational costs for any vessel with a considerable share of free sailing time in its operational profile. It works very well for propellers with a relatively large propeller hub. The potential savings are large for vessels with highly loaded controllable pitch propeller systems, such as Ro-Ro vessels, ferries, container/multipurpose vessels, and vessels with an ice class notation. In addition to controllable pitch propeller applications, Energopac can also be applied on vessels with fixed pitch propellers.

Cost savings

The reduction in fuel consumption depends very much on the vessel type, its operational profile, and on the reference propeller and rudder. For any application, the power savings can be estimated by Wärtsilä. The estimate is based on the vessel design, its operational profile and other factors. Proven savings in the power required for a vessel's trial speed vary between 2 and 9% with Energopac.

EnergoProFin

The Wärtsilä EnergoProFin is an energy saving propeller cap with fins which are connected to the rotating propeller. It improves propulsive efficiency by weakening the hub vortex, and by recovering kinetic energy from the rotating flow aft of the propeller blades.

The EnergoProFin provides average fuel savings of 2%, with payback times of less than one year.

Steerable Thrusters

Wärtsilä Steerable Thrusters

Wärtsilä steerable thrusters are available in different series covering a wide range of customer needs.

Specific configurations, such as the retractable thruster and underwater mountable thruster series, are based on the reliable designs of the standard steerable thruster series. Together they form a steerable thruster range that covers the most advanced ship design options.

The Wärtsilä Thruster series:

Wärtsilä Steerable Thrusters

The Wärtsilä Steerable Thruster (WST) series is intended for tug or offshore support vessel applications, and for river/inland waterway vessels. These thrusters have a light ice class capability and can be combined with high-speed engines of up to 1800 rpm. Two nozzle types can be selected depending on customer requirements: a bollard pull nozzle or a nozzle optimised for free-sailing. Configurations with open propellers are available on request.

Wärtsilä Retractable Thrusters

Wärtsilä Retractable Thrusters are available at power ratings up to 6500 kW. Retractable thrusters up to 4500 kW are available in L- and Z-drive configurations with tilted nozzles and an optional hull closing plate. The upper part of the retractable range is covered by the WST-65RU retractable underwater mountable thruster, whereby the outboard part can be exchanged under water to optimise maintenance when docking of the vessel is not possible. WST-65RU features an 8° tilted propeller gearbox.

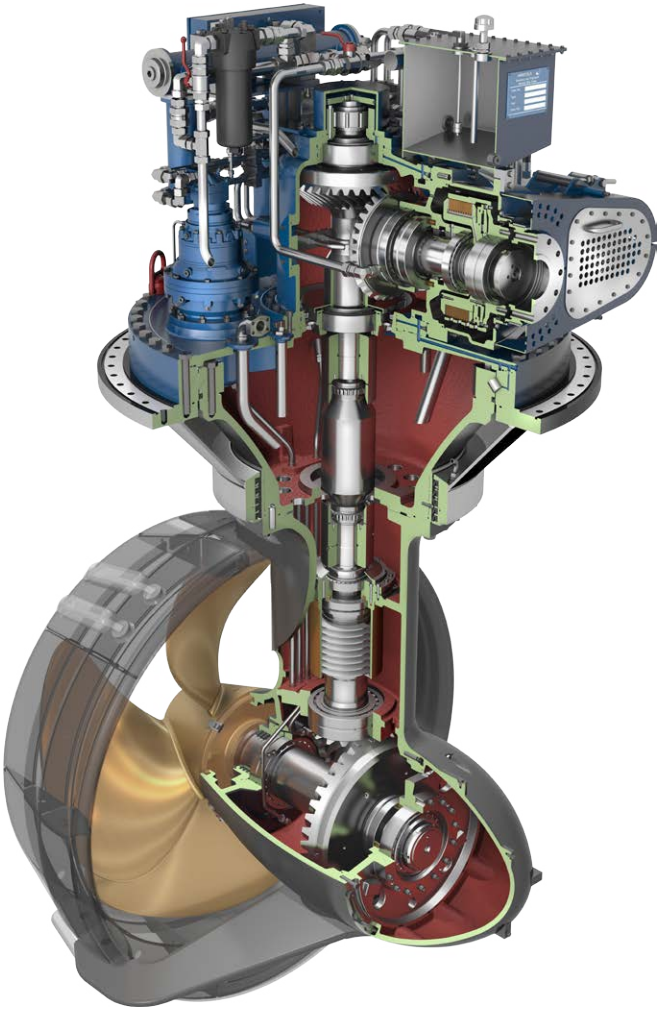
Wärtsilä Underwater Mountable Thrusters

The Wärtsilä WST-U designated underwater mountable thrusters belong to a series with several added features, such as an increased power range, an 8° tilted propeller gearbox, and the Wärtsilä Thruster Nozzle to provide superior and reliable DP performance. The underwater mountable thrusters from the LMT series are available for the lower end of the power range.

Special thruster designs

Based on the above mentioned thruster series, special thruster designs are available, such as inboard demountables, icepods and containerized (retractable) thrusters.

Steerable Thrusters



Steerable Thrusters

Wärtsilä Steerable Thrusters

Thruster type	Engine power [2] (kW)	Input speed (rpm)	Propeller diameter (mm)	Bollard pull [1] (tonnes)
WST-11	900	750 1000 1200 1600 1800	1600	30
	1050		1800	36
WST-14	1150		1800	39
	1275		1900	43
	1350		2000	46
WST-16	1400		2000	47
	1600		2200	55
WST-18	1700		2200	57
	1800		2400	63
WST-21	2050		2400	69
	2100		2600	73
WST-24	2400		2600	80
	2400		2800	84
WST-28	2800	720 1000 1200	2800	94
	2800		3000	97
WST-32	3200		3000	107
	3200		3200	111

1) Based on two installations, 100% power, nozzle designed for bollard pull and 2% thrust deduction
2) In case of ice class notation, maximum power level is reduced

Key benefits

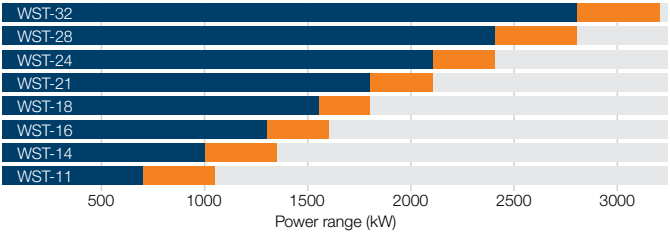
- Superior hydrodynamic performance for high bollard pull or maximum propulsion efficiency.
- Compatible with high speed engines (up to 1800 rpm).
- Compact dimensions with a high level of integration.
- Reliable propeller shaft and steering seals with monitoring.
- Robust design for reliable operations.
- Maintenance friendly design to minimize downtime.
- Reduced number of external connections and field bus technology for ease of installation.
- Wärtsilä ProTouch controls with ergonomic levers and intuitive touch screen displays.

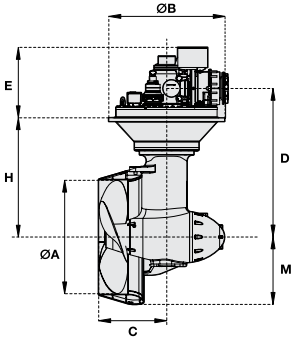
Options

- Diesel-mechanical Z-drive configuration compatible with engine speeds ranging from 750 rpm to 1800 rpm (intermediate ratio's available on request)
- Diesel-mechanical configurations have an integrated power take off for steering, lubrication, clutch and pitch hydraulics
- Diesel-electric Z-drive configuration with electric steering and auxiliary systems
- 2 propeller diameters per size (3 diameters for WST-14)
- FP propeller and integrated medium duty clutch (slipping range up to 50% engine rpm) or CP propeller with on/off clutch
- Two nozzle types: optimized for bollard pull or free sailing (FP propeller only)
- Finnish-Swedish (Baltic) ice class up to 1B, Russian (RMRS) ice class up to Ice-3 or equivalent Russian river register (RRR) ice class
- EPA VGP 2013 compliance
- Mounting method: bolt-in, weld-in, can-mounted or split installation
- L-drive versions are available on request.

Steerable Thrusters

Wärtsilä Steerable Thrusters range





Wärtsilä Steerable Thrusters dimensions (mm)

Thruster Type	Dimensions					Weight[1] [kg]
		Weld-in	Bolt-in	PAL options D [mm]		
	A [mm]	ØB [mm] (well diameter [mm])				
WST-11	1600 1800	1942 (2000)	1948 (2000)	2400	2700	10000/11800
WST-14	1800 1900 2000	1942 (2000)	1948 (2000)	2500	2800	10900/12860
WST-16	2000 2200	2342 (2400)	2326 (2400)	2800	3150	17050/20400
WST-18	2200 2400	2342 (2400)	2326 (2400)	2900	3250	18600/21950
WST-21	2400 2600	2542 (2600)	2512 (2600)	3200	3500	24800/27500
WST-24	2600 2800	2692 (2750)	2660 (2750)	3500	3800	28500/31500
WST-28	2800 3000	2862 (2920)	2825 (2920)	3900	4200	32800/36100
WST-32	3000 3200	3042 (3100)	3000 (3100)	4000	4500	37000/41000

1) Estimated minimum (FPP and smallest prop / nozzle / propeller arm length (PAL)) and maximum (CPP and biggest prop / nozzle / PAL) weights

Retractable Thrusters

Wärtsilä Retractable Thrusters

Thruster type		LMT CS/FS175		LMT CS/FS200		LMT CS/FS225		LMT CS/FS250	
Power	kW	1000		1200		1500	1600	2000	
Frequency	Hz	50	60	50	60	50	60	50	60
Input speed	rpm	1000	1200	1000	900	1000	900	750	720
Propeller diameter	mm	1700		1900		2100		2400	
Propeller speed	rpm	378	380	341	307	302	308	276	265
Max. thrust at zero knots									
With nozzle	kN	165		200		260		320	

The information in the table is valid for L-drive configurations

Thruster type			1510	2510	3500		WST-65RU	
Power (input speed)	Z-drive	kW	2145	3250	3650	4500		
		rpm	1200	900	900	720		
	L-drive	kW	2435	2850	3850	4500	5500	6500
		rpm	720	720	720	470	720	600
Propeller diameter (in nozzle)		mm	2500	3000 3200	3400 3600		4200	

Other input speeds and power levels for LMT type retractable thrusters available on request

Remarks

The propellers are designed for bollard pull condition at 100% MCR power level and valid for uni-directional Dynamic Positioning (DP) application.

Final selection depends on the chosen classification society. Selections are not valid for classification with ice class.

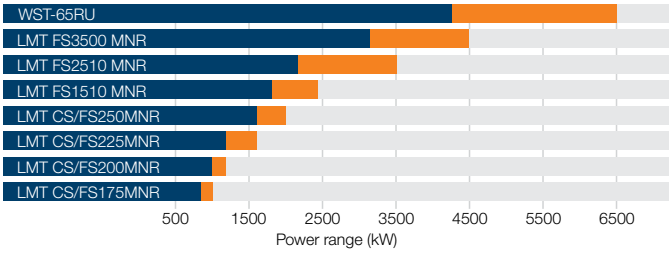
Benefits

- Fast retraction and deployment
- Fully retracted during transit; optional hull closing plate
- High thrust performance
  – 3° tilted Wärtsilä HR Nozzle (LMT type)
  – WTN type nozzle in combination with 8° tilted propeller shaft (WST-RU type)
- L- and Z-drive options enable integration in a wide range of vessel types and sizes
- Outboard part exchangeable under water for maintenance or overhaul (WST-65RU)

Options

- 2 propeller diameter options (LMT type FS2510/3500)
- L- and Z-drive with horizontal floating shaft and quick connect clutch (LMT type)
- Fixed pitch (FP) or controllable pitch (CP) propeller (LMT types CS/FS 175/200/225/250)
- 3° tilted nozzle (standard) or 0° nozzle (LMT type)
- Hull closing plate

Wärtsilä Retractable Thrusters range



Retractable Thrusters

Thruster type		Dimensions (mm)								Weight [2]
		A	B	C	D	E	F	H_{min} [1] L-drive	motor height	kg
LMT FS/ CS175MNR	FS	1700	2700	2950	4050	2200	2400	7700	1850	18000
	CS		2850							19000
LMT FS/ CS200MNR	FS	1900	2850	3050	4160	2450	2700	8600	1900	20000
	CS		3000							21000
LMT FS/ CS225MNR	FS	2100	3300	3590	4625	2650	3000	9000	2000	22000
	CS		3450							23000
LMT FS/ CS250MNR	FS	2400	3710	3666	4625	3000	3370	10000	2200	34000
	CS		3710							32000

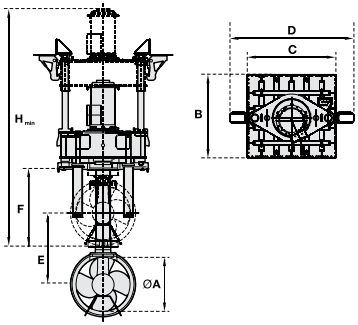
1) Minimum total height of the thruster unit depends on the selected electric motor

2) Indicative weight for L-drive execution excluding the E-motor and oil, actual weight can vary depending on project specific customizations

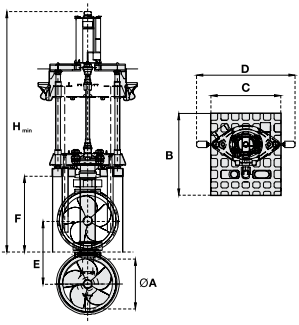
Thruster type	Dimensions (mm)										Weight [2]
	A	B [1]	C	D	E	F	H_{min} L-drive	H_{min} Z-drive	PAL Z-drive	Estimated motor height	kg
LMT FS1510 MNR	2500	3570	3695	4745	3200	3714	10960	8756	6894	2160	55000
LMT FS2510 MNR	3200	4900	4500	4805	4105	4770	14460	11573	8854	3150	110000
LMT FS3500 MNR	3600	5845	4770	4770	4720	5540	16745	14232	10372	3190	132000
WST-65RU	4200	5550	5980	–	5750	7200	20100	–	–	3250	212500

1) Dimension includes space for nozzle removal (except WST-RU type)

2) Indicative weight for Z-drive execution (except WST-65RU types) excluding the E-motor and oil, actual weight can vary depending on project specific customizations



LMT FS/CS175-200-225-250MNR



LMT FS1510-2500-2510-3500MNR

Underwater Mountable Thrusters

Wärtsilä Underwater Mountable Thrusters

Main technical data				
Thruster type	Power [1] (kW)	Input speed (rpm)	Propeller diameter (mm)	Tilt
LMT FS1510NU	2435	720	2600	3° [2]
LMT FS2510NU	3500	539	3200	3° [2]
WST-45U	4000	720	3600	8°
	4500	600		
WST-55U	4500	720	3900	8°
	5500	600		
WST-65U	5500	720	4200	8°
	6500	600		

1) The power level is for dynamic positioning (DP) operation
2) Tilted nozzle

Dimensions (mm)										Weights (kg)		
Thruster type	A	B	C	D	E	F	G	H [1]	R	Outboard part [2]		Recept-acle [3]
										dry	in water	
LMT FS1510NU	2600	1936	1045	1642	1900	900	1188	1000	1350	19000	16920	2170
LMT FS2510NU	3000	2123	1266	1911	2220	900	1347	1000	1550	30000	26410	3055
	3200	2194	1266	1911	2220	900	1347	1000	1550	31800	27780	3055
Thruster type	A	B	C	M	L	H				Outboard part [2]		Well [4]
										dry	in water	
WST-45U	3600	3300	2518	2324	2570	1242				51000	34500	9500
WST-55U	3900	3625	2648	2516	2763	1390				63500	41800	11900
WST-65U	4200	3820	3006	2719	3025	1390				77500	49500	13200

All weights and dimensions for 3° tilted nozzle (1510 through 2510 type) or 8° tilted propeller shaft (WST-45/55/65U type)

1) options: 1200, 1600, 2000, 2400; project specific lengths on request
2) Indicative weight, with oil
3) Including pipe covers and valve
4) Including top cover, bottom cover, pipe covers, valves and position sensor

Key benefits

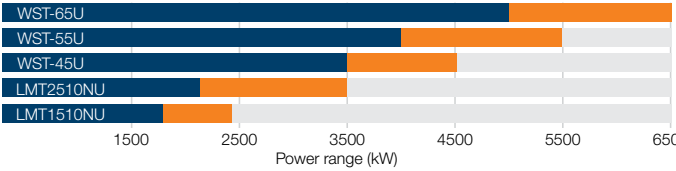
- Maintenance or overhaul without the need for dry docking the vessel
- High bollard thrust and propulsion efficiency
- Effective DP operations thanks to the 8° tilted propeller shaft or 3° tilted nozzle
- Electric L-drive up to 6500 kW
- High reliability
- Wide power range
- Easy installation

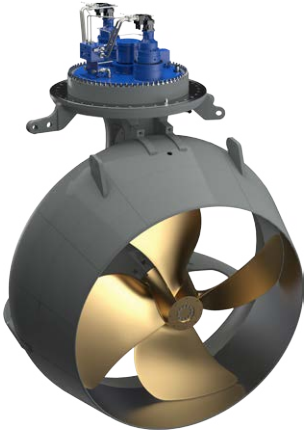
Options

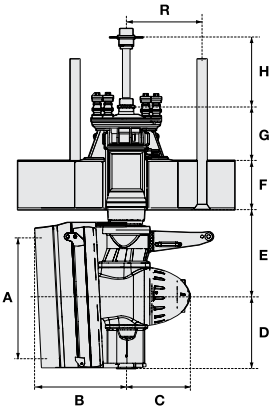
- Condition monitoring (PCMS)
- Oil condition monitoring
- Redundant lubrication and steering hydraulic systems
- Face type propeller shaft seals
- Seal monitoring
- Extended time between overhauls (TBO)
- Diver-less underwater mounting (WST-U type)

Underwater Mountable Thrusters

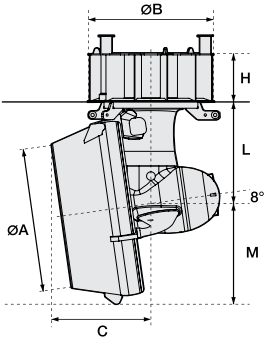
Wärtsilä Underwater Mountable Thrusters range







LMT UWM



WST-U

Transverse Thrusters

Wärtsilä Transverse Thrusters

Benefits

- Superior hydrodynamic performance for high thrust - diameter ratio
- Robust, reliable and maintenance friendly design
- Easy installation; high level of integration
- Maintenance friendly design
- Ergonomic controls with intuitive touch screen displays

Options

- CP or FP propeller
- Auxiliary (AUX) or Dynamic Positioning (DP) application
- Redundant pumps and/or lubrication filters
- Compatible with environmentally acceptable lubricant (EAL) for EPA VGP 2013 compliance
- Face-type seal
- Tailor-made tunnel with tunnel ends cut according to hull form and additional circular or longitudinal stiffeners
- L-drive with intermediate shaft and separate E-motor foundation
- De-mountable, low noise, horizontal drive variants
- Package with electric motor and starter or variable frequency drive (VFD)

Wärtsilä Transverse Thrusters dimensions

Thruster type	Electrical Frequency	Input speed	Max. power[1]		Propeller Diameter (D)	Length (L)	Weight[2]
	(Hz)	(rpm)	Manoeuv-ring AUX (kW)	Dynamic positioning DP (kW)	(mm)	(mm)	(kg)
CT/FT 125 H	60	1780	614	603	1250	1550	2820
	50	1480	516	501			
CT/FT 150 H	60	1780	880	789	1500	1800	4200
	50	1480	735	656			
WTT-11	60	1180	1100	1000	1750	1970	5672
	50	980					
WTT-14	60	1180	1450	1300	2000	2195	8050
	50	980					
WTT-16	60	1180	1650	1475	2200	2115	11300
	50	980		1490			
WTT-18	60	1180	1850	1825	2200	2275	12250
	50	980					
WTT-21	60	1180	2100	1825	2400	2275	12975
	50	980					
WTT-24	60	880	2400	2150	2600	2390	13775
	50	980					
WTT-28	60	880	2800	2400	2800	2970	20029
	50	735					
WTT-32	60	710	3200	2800	3000	*3150*	*21380*
	50	735					
WTT-36	60	710	3600	3200	3200 / 3300	3350	29530
	50	735					
WTT-40	60	710	4000	3600	3400	3520	30500
	50	735					
WTT-45[3]	*60*	*710*	*4500*	*4050*	*3600*	*3950*	*35350*
	50	*735*					
WTT-55[3]	*60*	*600*	*5500*	*4900*	*4000*	*4300*	*47650*
	50	*600*					

1 Maximum power level is valid for uni-directional rotation (CPP). Depending on propeller type and class society, lower power levels may apply.

2 Version with CP propeller including a standard tunnel with E-motor support, excluding E-motor.

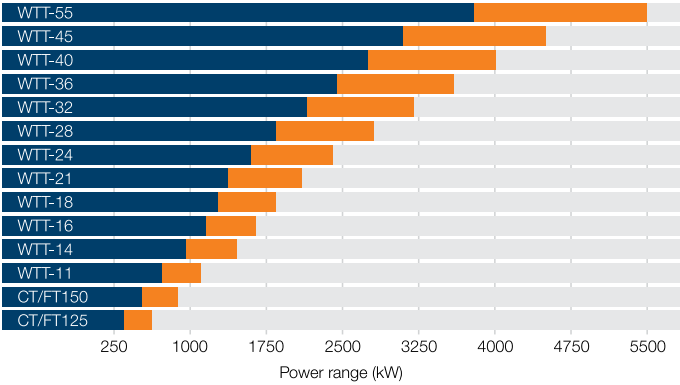
3 Available on request.

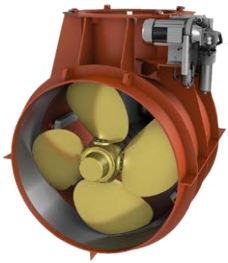
Values in italics are preliminary

CLICK for more info

Transverse Thrusters

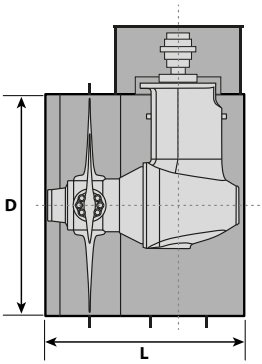
Wärtsilä Transverse Thrusters range

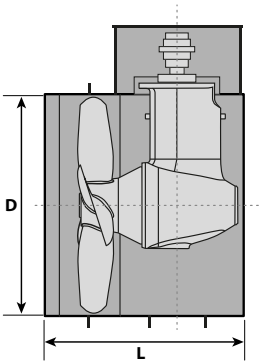




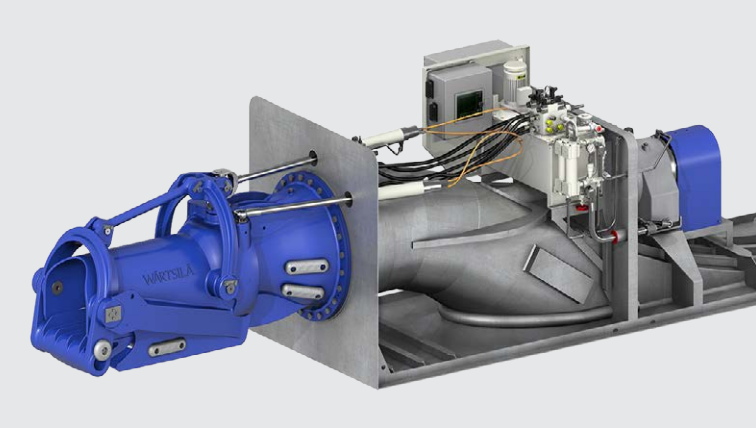
WTT-11 CP

WTT-11 FP





Waterjets



Wärtsilä Midsize Waterjets

- A compactly designed axial pump with excellent efficiency, cavitation and noise characteristics.
- The waterjet unit is completely pre-assembled, thereby reducing installation time.
- High performance components in stainless steel to prevent wear and corrosion.
- The water lubricated bearing in the stator bowl provides an environmentally friendly solution.
- Water lubricated Face type sterntube seal with an optional inflatable emergency seal.
- Inboard mounted thrust bearing block, for increased life and easy maintenance.
- Inboard hydraulics provide an environmental friendly solution, increased life and easy maintenance.
- Machinery controls integrated within the unit.

Key Benefits

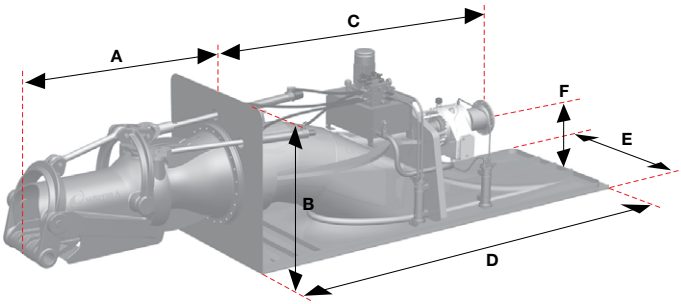
A Plug and Play waterjet concept, with all auxiliary systems pre-installed on the skid. The waterjet package is welded into the hull and the yard connections are reduced to a minimum.

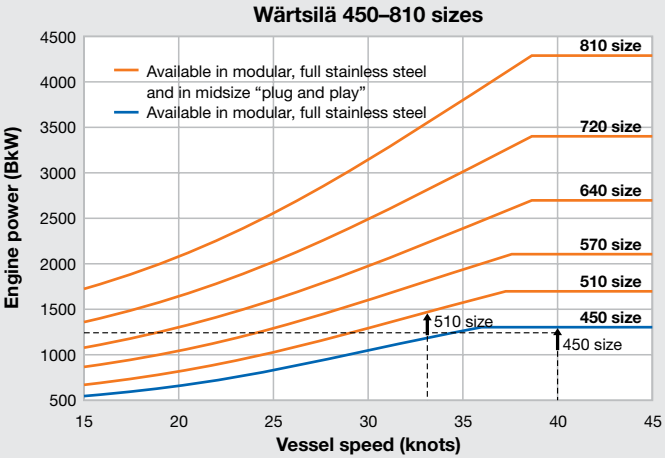
CLICK for more info

Waterjets

Weight & dimensions table

Size	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	Weight steering (kg)	Weight booster (kg)	Entrained water (l)
510	1 540	1 065	2 350	2 975	1 100	510	1 400	1 050	450
570	1 730	1 190	2 520	3 325	1 200	570	1 750	1 300	600
640	1 930	1 335	2 720	3 735	1 400	640	2 400	1 800	850
720	2 170	1 500	3 000	4 200	1 400	720	2 850	2 250	1 250
810	2 440	1 690	3 220	4 725	1 400	810	3 600	3 000	1 750





Waterjets

Wärtsilä Modular Waterjets

- The modular design allows flexibility in the scope of supply.
- A compactly designed axial pump with excellent efficiency, cavitation and noise characteristics.
- High performance components in stainless steel to prevent wear and corrosion.
- The water lubricated bearing in the stator bowl provides an environmental friendly solution.
- Water lubricated Face type sterntube seal with an optional inflatable emergency seal.
- Inboard mounted thrust bearing block, for increased life and easy maintenance.
- Tailor-made inlet design based on the shape and operational profile of the vessel.

Key Benefits

Wärtsilä axial waterjets provide an average reduction of 25% in transom space occupation.

For naval architects this creates the possibility to apply a larger power density onto narrower hulls for achieving top vessel performance.

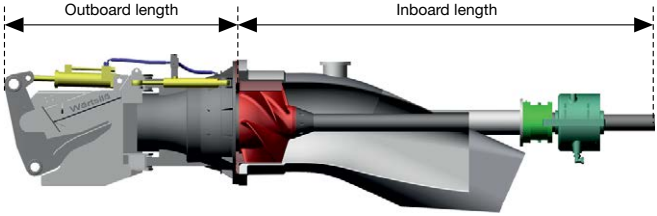
Jet sizes are indicated by the front side diameter of the impeller seat ring. Unlike a non-axial design, the Wärtsilä axial design waterjet does not expand in radial direction downstream.

Photo courtesy of Incat

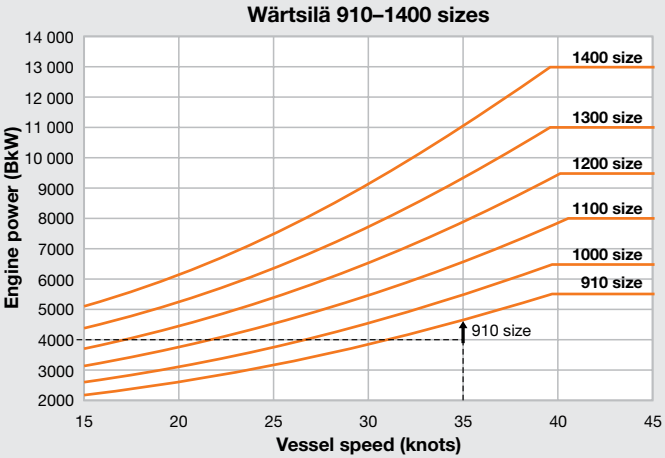
Waterjets

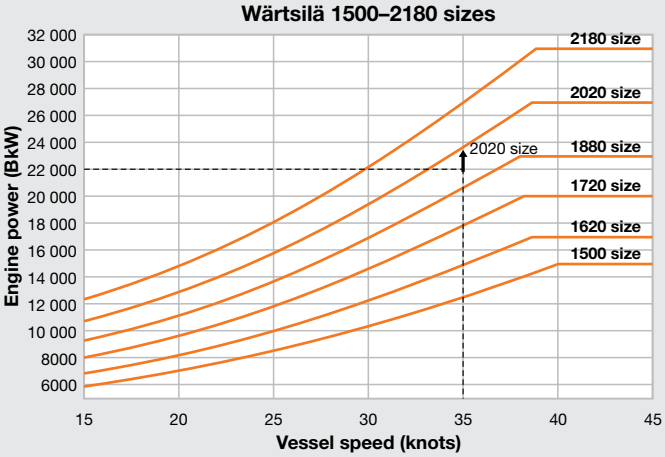
Weight & dimensions table					
Size	Outboard lenght (mm)	Inboard lenght (mm)	Transom flange (mm)	Weight steerable (kg)	Weight booster (kg)
510	1 390	2 285	655	700	500
570	1 550	2 495	730	960	700
640	1 710	2 865	820	1 400	1 100
720	1 960	3 155	920	1 900	1 350
810	2 195	3 550	1 035	2 700	1 900
910	2 475	4 020	1 165	3 700	2 450
1 000	2 710	4 350	1 280	4 600	3 350
1 100	3 000	4 735	1 405	6 200	4 200
1 200	3 250	5 095	1 535	7 900	5 700
1 300	3 520	5 625	1 665	10 100	6 900
1 400	3 790	6 005	1 790	12 000	8 100
1 500	4 050	6 370	1 920	14 500	10 000
1 620	4 350	6 965	2 075	17 900	12 500
1 720	4 655	7 340	2 200	21 200	15 100
1 880	5 070	7 910	2 405	27 800	18 900
2 020	5 465	8 530	2 585	32 800	23 200
2 180	5 880	9 120	2 790	40 500	27 700
2 350	6 325	9 710	3 005	49 500	33 800

(1) Inboard length may vary depending on the optimised shape of the inlet duct.



Waterjets


Wärtsilä 910–1400 sizes
Engine power (BkW)
14 000
13 000
12 000
11 000
10 000
9000
8000
7000
6000
5000
4000
3000
2000
15
20
25
30
35
40
45
Vessel speed (knots)
1400 size
1300 size
1200 size
1100 size
1000 size
910 size
910 size


Wärtsilä 1500–2180 sizes
Engine power (BkW)
32 000
30 000
28 000
26 000
24 000
22 000
20 000
18 000
16 000
14 000
12 000
10 000
8000
6000
15
20
25
30
35
40
45
Vessel speed (knots)
2180 size
2020 size
1880 size
1720 size
1620 size
1500 size
2020 size

Waterjets

Waterjet size selection

The selection graphs indicate the jet size required based on the relation between the vessel's engine power and design speed. For instance, a ship with four 1250 kW engines and a corresponding vessel speed of 33 knots will need four 510 size waterjets. A ship with a design speed of 40 knots at 1250 kW power can use 450 size waterjets. The correct jet size is thus indicated by the line above the intersection of the power and the corresponding vessel speed.

To ensure an optimised propulsion system for your vessel, we recommend that you contact Wärtsilä during the early stages of the design work. Please contact us for an optimised jet selection based on specific vessel design parameters, the operational profile, or for details of waterjets above 50 knots or 30 000 kW. DXF/DWG format general arrangement drawings of the most often used sizes are available.

Application

The characteristics of a waterjet make it a good propulsor for several types of applications.

- **High speed vessels;** waterjets have better propulsion efficiency at ship speeds over 25–30 knots.
- **Shallow draft vessels;** the integrated steering function provides benefits for rescue vessels, inshore passenger ferries, landing crafts & special work boats.
- **High power density;** the pressure built-up in the waterjet inlet allows small dimensions.
- **Maneuverability;** waterjets have integrated steering and reversing with quick response capability.

Control Systems

Wärtsilä Protouch Propulsion Control System

The Wärtsilä Propulsion Control System (PCS) is a comprehensive system of levers and touch-screen interfaces, designed to suit all the possible propulsion configurations of a modern ship.

Wärtsilä Protouch, represents the state-of-the-art answer to demands for safe, intuitive and compact design controls. ProTouch gives the power to the user.

Key benefits

Compact design: The entire footprint of the system is significantly reduced to allow ergonomic optimisation, and to meet functional requirements.
Modularity/flexibility: The extended modularity of the hardware and graphic user interfaces provides a flexible solution for any vessel layout. The system fits all the propulsion products and, as a result, all types of vessels.

Control Systems

Safety: the system improves safety, both at sea and in port, by removing the visual challenge of finding critical information. It provides the user the relevant information when needed

User friendly, intuitive operations: Thanks to the modern displays with touchscreen technology, the operator has handy access to all functions and information. The system will guide the user when a more complex sequence or action is required. Furthermore, the system can support any language.

Simpler installation and maintenance: The system minimizes installation time and costs, simplifies commissioning, and reduces maintenance needs. This is because the PCS is fully pre-configurable and the components communicate by a redundant field bus with a minimal number of cables.

Integration with other systems: The system enables easy integration via serial interfaces with, for example, VDR, IAMCS and DP/AP systems.

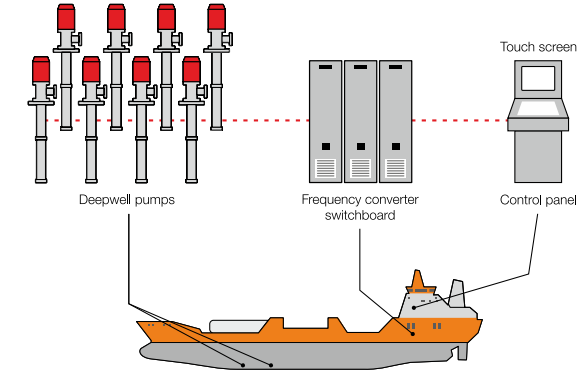
Deepwell Pumps

Wärtsilä Pumps & Valves is a leading designer and manufacturer of high quality deepwell and in-line pumps for a wide range of applications across the demanding marine and oil & gas sectors. We also specialise in high-grade, speciality material valves for the oil & gas and process industries.

Wärtsilä Svanehøj Deepwell Cargo Handling Systems

For safely offloading a wide range of liquid cargoes, we offer the most flexible and environmentally sound solutions.

Our high quality deepwell cargo pump systems are powered by efficient electric drives that are fast and easy to install.



Wärtsilä Svanehøj in Aalborg offers full-scale testing of deepwell pumps before delivery, giving customers complete confidence in immediate operational reliability.

CLICK for more info

Deepwell Pumps

We specialise in competitively priced full cargo and ballast systems including drive systems, switchboards and accessories.

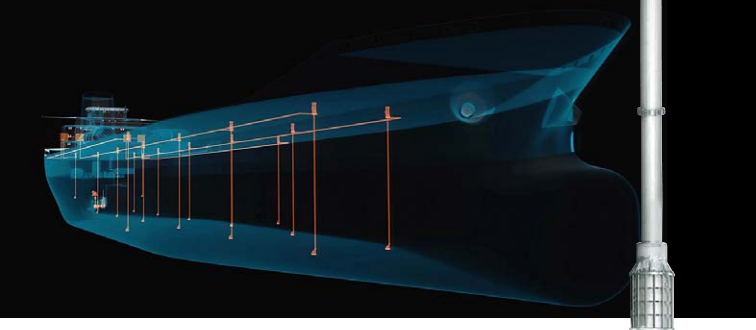
Around the world, we create custom-made turnkey solutions for any tanker, with full project management from start to safe on-time delivery and installation.

Wärtsilä Svanehøj Deepwell Gas Pumps

When absolute confidence in offloading safety and efficiency are critical, Wärtsilä Svanehøj is the natural choice among gas carriers worldwide for deepwell and cargo booster pumps. Our dedicated project teams deliver solutions for vessels from the smallest fully pressurized push barges and dedicated CO_2 carriers to the largest fully refrigerated VLGCs.

Our pumps handle all types of cargo at all temperatures and gravities without any component changes, offering potentially huge cost savings. Our range spans:

- Fully pressurised tankers, cargo at ambient temperature, tank pressure up to 18 bar.
- Fully refrigerated atmospheric tankers, cargo cooled to saturation temperature (typically -48°C).
- Semi-refrigerated tankers, cargo liquefied by cooling/ pressure process down to -104°C.
- We lead in long-shafted pumps for LNG at -163°C.



Wärtsilä Svanehøj deepwell gas pump

CLICK for more info

Deepwell Pumps

Wärtsilä Deepwell Offshore Process and Cargo Pumps

Based on Wärtsilä's world-renowned deepwell pump technology, our Offshore Process and Cargo (OPC) pumps have been specially developed to meet the extreme demands and specifications of the offshore industry.

Our high efficiency electrically driven explosion-proof pump systems deliver the highest standards of energy efficiency, safety and reliability the offshore industry demands such as 25,000 MTBR as per API 610.

Wärtsilä deepwell offshore process and cargo pump

Testing and inspection

Wärtsilä is well established in the offshore sector and can perform a number of tests and inspections prior to delivery, such as;

- **Material inspections:** Visual inspections, liquid penetrant testing, radiographic testing, material certificates and welding log.
- **Performance tests:** Hydrostatic pressure tests, Q/H performance test, NPSH test, 4 hours mechanical run test and complete unit test. The final product can be delivered with detailed documentation specifying welding procedures, preservation procedures, surface coating, weight procedure and traceability record. Furthermore the final documentation may include noise, vibrations and temperature data sheets for the various tests performed.

Seawater Lift Pumps

Wärtsilä Svanehøj Deepwell Ballast Pumps

Wärtsilä is the leading manufacturer of high quality deepwell in-line centrifugal ballast pumps for demanding offshore applications.

Our pumps offer outstanding reliability, low noise and efficiency for floating production units of all sizes.

The environmentally sound pump is designed for direct on-line starting, or alternatively with variable speed regulation available through a frequency converter.

Wärtsilä Seawater Lift Pumps

Wärtsilä's range of robust, efficient sea water lift pumps are designed specifically for the demanding offshore market. Our range of sea water lift pumps are based on well-known technology, offer safe operation and low maintenance cost.

Wärtsilä Svanehøj deepwell ballast pump

Wärtsilä in-line sea-water lift pump

Seawater Lift Pumps

Seawater Vertical Deepwell Pumps

The well proven and expertly engineered vertical suspended packages for vertical electrical submersible pumps and vertical line shaft pumps (API 610 VS1) are designed for MTBR of 25000 reliable operational hours, and are optimized for high efficiency and low NPSH. The design incorporates features to protect the caisson against scuffing and crevice corrosion hence minimising galvanic corrosion. Engineered hypochlorite dossing rings and air release valves are available, and the pumps can be delivered in duplex and super duplex material.

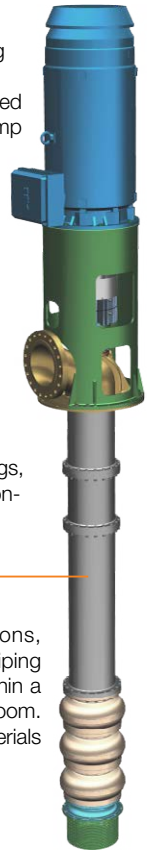
Vertical Electrical Submersible Pumps The vertical suspended multi-stage pumps are driven by a submersible motor. The pump assembly is generally designed according to AP1610 recommendations.

All cables and hoses are carefully fastened and supported along the column, and are spirally wrapped along the pump bowl assembly to allow safe installation. The well proven Indar submersible water/glycol motor has enhanced internal cooling circulation and a positive pressure header tank arrangement.

Capacity range: 400–3500 m^3/h
Differential heads up to 200 mlc
Motors up to 1.5 MW and 6.6 kV

Vertical Line Shaft Pumps (API 610 VS1) Vertically suspended, single casing diffuser line-shaft driven pumps with discharge through the column and driven by a dry mounted electrical motor which is configured to operate in harsh environments. VS1 design according to API 610 11th edition with open shaftline, carbon sleeve shaft bearings, enclosed impellers and single mechanical seal - API and non-API compliant seals are available.

Capacity range 50–3500 m^3/h
Differential head up to 200 mlc



Vertical line shaft seawater lift pump

In-Line Seawater Lift Pumps

Low NPSHr to meet stringent offshore specifications, configurations of inlet and outlet nozzles to suit every piping installation. Either directly coupled to an electric motor within a safe area or through a cardan shaft installed in the pump room. We supply a range of high quality casing and impeller materials including nickel, aluminium, bronze or super duplex.

Capacity range: 400–5000 m^3/h
Differential pressure: 08–10 bar

ECA Fuel Pump

Wärtsilä Svanehøj ECA Fuel Pump

Wärtsilä Svanehøj deepwell cargo pumps have proven their reliability for more than 50 years at sea. All the benefits of the existing larger Wärtsilä Svanehøj deepwell cargo pumps have now been attributed to the Wärtsilä Svanehoj ECA fuel pump.

The Wärtsilä Svanehøj ECA Fuel Pump (EFP) offers the advantages of no tank connections below liquid level, no electrical components inside the tank and hardly any contribution to Boil Off Gas generation. It is independent of weather, sloshing and thermal conditions and ensures a steady, reliable fuel gas supply with a fast response time.

The EFP model was developed in close cooperation with designers of LNG fuel gas systems to support highly efficient, environment friendly LNG fuelled engines driven by the implementation of Emission Controlled Areas (ECAs). It is also prepared for other fuel types such as Ethane and Methanol.

Main design criteria:

- Safety & Reliability
- 5 year service intervals or 25,000 operating hours
- Contingency: safe handling in emergencies.

Wärtsilä Svanehøj ECA Fuel Pump (EFP)

Pump Room Systems

Wärtsilä Pump Room Systems

When offloading flammable liquid cargo, it must be done safely, smoothly and efficiently. Wärtsilä has 50 years of experience and the know-how to optimise any kind of pump room system, from end-to end.

For tankers carrying less than four different segregations, our pump room solution is optimal since the cargo pumps can take suction from any cargo tank. All wear components of our pump room installed equipment are easily accessible and can be replaced at sea, and the entire Wärtsilä concept is maintenance friendly. Our expertly designed heavy duty centrifugal pumps are made of superior materials from own foundry. These are installed in the pump room together with our unique stripping system

Using superior materials, robust testing and our renowned pump technology, we can make any system as reliable, efficient and cost-effective as possible.

We can advise on and supply any prime mover arrangement that will optimise your efficiency, including high efficiency, low noise, low emissions electric systems and variable speed control to maximise flow rates and use less power.

Versatile driver option

ELECTRIC DRIVE

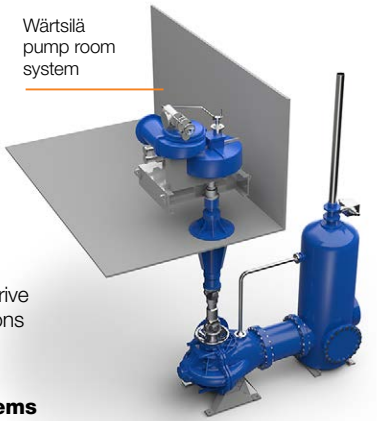
- Vertical or horizontal
- Single speed or two speed
- VFD/VSD solutions.

STEAM TURBINES

- Vertical or horizontal
- Single stage or multi stage.

DIESEL ENGINE DRIVE

- Horizontal with clutch direct drive
- Vertical with angle gear solutions
- Combined solutions for pump drive and gensets.


Wärtsilä pump room system

Performance stripping systems

Through our pioneering expertise with Eureka systems, we invented in stripping systems are remain specialists in maximising cargo offloading efficiency, speed and reducing risk. Priming and capacity regulating systems convert any centrifugal pump into a self-primed unit for optimal discharge and stripping performance. Systems consist of air/gas separators with built-in strainers, auto stop/start vacuum pump units, capacity regulating valves and the latest within PLC based all electric control units for minimum cargo wastage and maximum profits.

Engine Room Pumps

Control systems

Control systems put full pump room control in one convenient place. PLC based all electric control system for control and monitoring of all functions required for the scope within our system. We also provide remote valve control system solutions where all cargo and ballast valves with actuators are included in addition to the required hydraulic power pack and solenoid rack. Our control system can integrate optional functions like load calculator, level gauging system and vapor emission recovery systems.

The electric signals indicating pressures, temperatures, and vibration, as well as the automation required for our stripping system are transferred by transmitters via Zener barriers located in our interphase cabinet to the cargo control room, where the actual cargo handling control takes place.

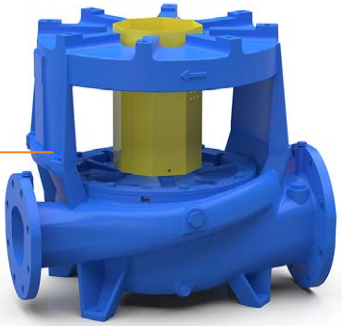
The pump room pumps are connected to drivers located in the engine room through gas tight type approved flexible power transmission units.

Wärtsilä Engine Room Pumps

Engine room pumps are critical for your operations. The costs of pump failures, such as loss of engine cooling water, are high. That's why Wärtsilä pumps are built for ultimate reliability in the toughest operating conditions.

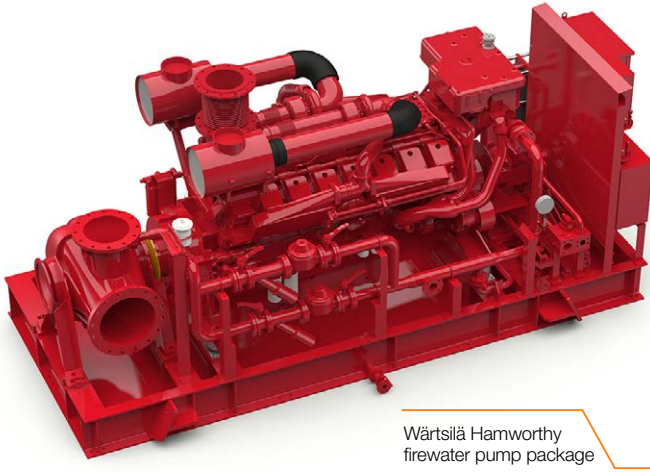
Highest quality materials, proven simplicity of design and responsive support add up to pumps you can trust absolutely – as thousands of vessels around the world do.

Our broad range is built on the world-renowned reliability of the Eureka and Dolphin centrifugal pump series. Whatever you need from engine room pump technology, talk to Wärtsilä.



Wärtsilä Hamworthy engine room pump (model C2G)

Fire Fighting Pumps



Wärtsilä Hamworthy
firewater pump package

Wärtsilä Firewater Pump Packages

Fire Water Pump Packages are safety critical for offshore operators. Wärtsilä designs system solutions to the highest NFPA 20 standards, with the reassurance of high quality Wärtsilä pump technology at the heart of the system.

Our range of in-line centrifugal pumps or deepwell submerged pumps is available with a wide choice of drives and configurations, either contained or open for fire compartments.

We work with you throughout, from pre-FEED to Detail Design stages, to create your optimum custom solution for complete peace of mind.

Pumps

Lifecycle support

Wärtsilä Pumps offers lifetime support for all products and installations. We provide a comprehensive portfolio of services, with skilled service personnel available globally in Aalborg, Rotterdam, Dubai, Singapore, Busan, Shanghai, and Hiroshima. Our experienced service coordinators support you by telephone and e-mail. Our spare parts are supplied on a sale and return basis when using Wärtsilä service engineers.

We also provide:

- Large spare parts stocks
- Quick response to all enquiries
- Pre-docking inspections and pump performance tests
- Upgrading packages
- Training:
  - Product training
  - Operator/crew
  - Onboard training
  - Training agreements

24 hours service hotline +45 40 26 39 74

Valves

Valves

Wärtsilä Valves Limited is a European based valve manufacturing group with over 80 years' experience supplying a wide range of manual and actuated valves in non-ferrous, high alloy, steel and composite materials for the global energy industries:

- Offshore Oil and Gas
- Floating Production Systems
- Petro-Chemical
- Power Generation
- LNG
- Naval Marine
- Marine Services
- Pipelines.

We are recognised around the world for our engineering excellence, superb customer service and high-performing products, and are the chosen valve supply partners of a growing and enviable list of global blue chip clients.

The world's preferred valve solutions partner

Wärtsilä Shipham Valves manufactures non-ferrous, high alloy and composite valve solutions for handling sea water and other corrosive media. For 80 years a key supplier to the British Royal Navy and Ministry of Defence, Shipham is now widely recognised as a global leader in the design and manufacture of valves used in severe service applications, handling sea water and other corrosive media.

CLICK for more info

Valves

Wärtsilä Shipham Valves offers a diverse range of valves by type, material, and size, providing gate, globe, check (swing and wafer style), ball, Y-type strainers and butterfly valves, in sizes from 1/4" to 48" in non-ferrous, composite and high alloy materials.

Speciality materials – 'our standard'

Nickel Aluminium Bronze, Bronze, Duplex / Super Duplex Stainless Steel, Hastelloy®, Titanium, Monel®, Zirconium, Inconel® & Glass Reinforced Epoxy (GRE).

Shipham Valves
ESTABLISHED 1798
a Wärtsilä product

Bespoke valve solutions for offshore, marine & industrial applications

Focused on short lead-times, Wärtsilä John Mills Valves manufactures bronze and nickel aluminium bronze gate, globe, check, strainers and storm valves for sea water service in the marine, oil & gas, Naval, water treatment and chemical industries.

In addition to our standard valve range we also manufacture specialty valves such as mud boxes, gland cocks, sight glasses, sounding cocks and storm valves.

Our complete in-house capabilities include design, pattern manufacture, casting production, machining and assembly & test which allows Wärtsilä John Mills to produce both standard and bespoke designed valves within industry leading timescales.

John Mills Valves
a Wärtsilä product

Pipeline ball & gate valves

Wärtsilä Cort Valves has over 70 years' experience in the design and manufacture of API-6D trunnion mounted ball valves & through conduit gate valves for the global oil and gas industry. Manufactured to order with reduced lead-times, the Wärtsilä CORT range of pipeline valves are available in sizes 2"–60" diameter and in pressure classes from ANSI 150–2 500.

With an enviable product population installed worldwide by major oil and gas end users, Wärtsilä Cort continue to support our clients assets from our extensive records with servicing, repairs and spares availability.

CORT®
a Wärtsilä product

Wärtsilä Seals, Bearings, Sterntubes & Others

Our Seals & Bearings product portfolio is the most comprehensive in the market, and we continuously develop innovative, environmentally compliant and longer lasting new products. At the same time, our global service network can provide the fastest response in the business, providing expertise anywhere in the world at very short notice when necessary.

Ship owners and operators are looking for solutions to reduce their maintenance costs in the highly contested shipping market. On one hand this means a growing price consciousness regarding spare parts. But on the other hand it also means that ship owners and operators are increasingly looking beyond the initial outlay and searching for longer lasting performance and lifecycle cost efficiency.

Lifecycle efficiency

As the seals & bearings solution provider with the widest range of products, both oil and water lubricated, Wärtsilä is uniquely positioned to help ship owners find solutions for improving lifecycle efficiency. Our complete product portfolio, technology know-how, constant innovation and a global service network means that we can always find the ideal solution for the customer instead of being forced to push a single technology for every need.

Risk reduction

The positive, agile and flexible attitude adopted in Wärtsilä Seals& Bearings, is our way to ensure we can say yes to customers' requests and offer the fastest service in the industry. The ability to be positive comes from an agile and flexible way of organising our operations. With our shipyard customers this means having our technological know-how in the frontline so that they can get quick answers to their questions, requests for quotations etc. For ship owners and operators it is a matter of knowing that, when needed, they can count on our global field service network's fast response to get uptime on their vessels.

Environmental leadership

Developments in environmental legislation are leading to a growing demand for environmental upgrades for existing vessels. Wärtsilä is able to answer these needs and assume full responsibility for service and maintenance over the entire vessel lifecycle. With the needed service capability and resources in place globally and armed with a deep understanding of different ship systems, we are ready to take on even large conversion projects involving extensive dismantling of the vessel.

Sealing Solutions

Wärtsilä Sealing Solutions

Wärtsilä stern tube seals – oil lubricated

STANDARD

Fwd	**Inland Waterways & Coastal**
	Wärtsilä Sternguard OLS2 compact lip seal, (136–362 mm)
	Wärtsilä Sternguard E series face seal, (50–320 mm)
	Conventional Commercial
	Wärtsilä Sternguard OLS2 lip seal, (80–1172 mm)
	Special & offshore
	Wärtsilä Sternguard Sequal face seal, (205–1004 mm) fully and partially split options available
	Wärtsilä Sternguard Sequal face seal, (66–1029 mm)
Aft	**Inland Waterways & Coastal**
	Wärtsilä Sternguard OLS3 compact lip seal, (136–362 mm)
	Wärtsilä Sternguard In water serviceable seal, (95–1065 mm)
	Wärtsilä Sternguard E-series face seal, (50–320 mm)
	Conventional Commercial
	Wärtsilä Sternguard OLS3 lip seal, (80–1172 mm)
	Wärtsilä Sternguard OLS4 lip seal, (286–1172 mm) (extra redundancy-stand-by)
	Wärtsilä Sternguard In water serviceable seal, (95–1065 mm)
	Special & offshore
	Wärtsilä Sternguard In water serviceable seal, (95–1065 mm)

ANTI-POLLUTION

Aft	**Merchant**
	Wärtsilä Airguard OLS3A lip seal, (286–1172 mm)
	Wärtsilä Airguard OLS4A lip seal, (286–1172 mm) (extra redudancy)

ABRASION RESISTANT

Aft	**Inland Waterways & Coastal**
	Wärtsilä Sternguard E-series face seal, (50–320 mm)
	Dredgers
	Wärtsilä Sandguard OLS3W lip seal, (286–1172)
	Wärtsilä Sandguard OLS4W lip seal, (286–1172) (extra redundancy)

Wärtsilä Sternguard

Sealing Solutions

Wärtsilä Enviroguard

Wärtsilä stern tube seals – water lubricated

OPEN WATER LUBRICATION (70–1040 MM)

	Commercial & Military
Fwd	Wärtsilä Enviroguard PSE face seal, (70–450 mm) (standard and composite options available)
	Wärtsilä Enviroguard MG4 face seal, (460–820 mm)
	Wärtsilä Enviroguard MD face seal, (150–1040 mm) (shock compatible)
	Wärtsilä Enviroguard MA face seal, (150–1040 mm) (shock compatible)
	Wärtsilä Enviroguard M9 face seal, (250–900 mm) (shock compatible with packing)

CLOSED WATER LUBRICATION

Ice class
Wärtsilä Iceguard FWD face seal, (320–1140 mm)
Wärtsilä Iceguard AFT face seal, (320–1140 mm)

Wärtsilä Floodguard

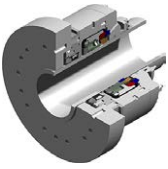
Wärtsilä bulkhead seals

STANDARD & HIGH SPEED

Commercial & Military
Wärtsilä Floodguard standard bulkhead seal, (50–680 mm)
Wärtsilä Floodguard high speed bulkhead seal, (50–680 mm)

Sealing Solutions

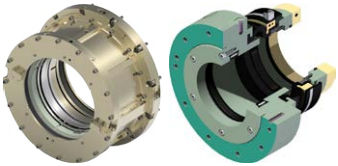
Wärtsilä Diveguard



SUBMARINE

Fwd	Wärtsilä Diveguard single barrier face seal, (200–700 mm)
	Wärtsilä Diveguard tandem barrier face seal, (200–700 mm)

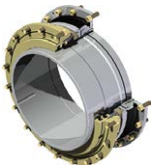
Wärtsilä Jetguard



WATERJETS

Commercial
Wärtsilä Jetguard PSE face seal, (110–410 mm) (standard and composite options available)
Military
Wärtsilä Jetguard ANW face seal, schock compatible, (120–380 mm) (standard and composite options available)

Wärtsilä Oceanguard



Wärtsilä special applications seals

Wärtsilä has extensive experience with customers having both specialised and original requirements. This has allowed us to develop our expertise in the creation and validation of bespoke sealing solutions. The fields of application are widespread, and include industrial, renewable power generation, and heavy lift vessel applications.

TIDAL TURBINES

Aft	Wärtsilä Oceanguard face seal, (125–1000 mm)
	Wärtsilä Sternguard OLS4 lip seal, (286–1172 mm)

Sealing Solutions

Wärtsilä Sternguard

Wärtsilä Steerguard

Wärtsilä thruster/pod seals

THRUSTERS

Aft	**Standard**
	Wärtsilä Sternguard OLS3 compact lip seal, (136–362 mm)
	Wärtsilä Sternguard OLS3 lip seal, (80–1172 mm)
	Wärtsilä Sterguard A-series face seal, (205–1004 mm)
	Wärtsilä Sternguard in-water serviceable seal, (95–1065 mm)
	Anti-Pollution
	Wärtsilä Airguard OLS3 lip seal, (286–1172 mm) (extra redundancy stand-by)
	Wärtsilä Oceanguard face seal, (125–1060 mm)

ELECTRIC PODS

Aft	**Standard**
	Wärtsilä Sternguard OLS4 lip seal, (286–1172 mm)
	Abrasion Resistant & Anti-pollution
	Wärtsilä Ocenguard face seal, (400–760 mm)

Wärtsilä rudder/stabiliser seals

RUDDER STOCKS (155–710 mm)

Oil lubricated
Wärtsilä Steerguard KLR2 lip seal, (155–710 mm)
Wärtsilä Steerguard KLR3 lip seal, (155–710 mm) (extra redundancy)

RUDDER STOCKS & STABILISERS (50–1300 mm)

Grease or water lubricated
Wärtsilä Steerguard ER standard face seal, (50–1300 mm)

Bearing Solutions

Wärtsilä Envirosafe

Wärtsilä Sternsafe

Wärtsilä Steersafe

Wärtsilä Bearing Solutions

Wärtsilä sterntube bearings (oil & water)

OIL LUBRICATED

Commercial
Wärtsilä Sternsafe white metal bearing, (136–1172 mm) (un-split oil lubricated white metal bearing)
Wärtsilä Sternsafe composite bearing, (70–1100 mm) (un-split oil lubricated composite bearing, mainly retrofits)

WATER LUBRICATED

Commercial & Military
Wärtsilä Envirosafe composite bearings, (70–1100 mm) (one piece, split bearing, split housing)

Wärtsilä rudder/stabiliser bearings

STANDARD

Commercial & Military Rudder
Wärtsilä Steersafe oil lubricated composite bearing, (70–1200 mm) (un-split)

DRY RUNNING CAPABILITY

Commercial & Military Rudder
Wärtsilä Steersafe oil lubricated composite bearings, (70–705 mm) (un-split)

Bearing Solutions

Wärtsilä Intermediate shaft bearings

STANDARD

Commercial (up to 0.8 Mpa)
Wärtsilä Sternguard intermediate shaft bearing, (126–825 mm) (self-aligning and forced lubrication)
Wärtsilä Sternguard intermediate shaft bearing, (126–825 mm) (self-aligning and self-lubrication)

HIGH LOAD

Commercial (0.8–1.5 Mpa)
Wärtsilä High load intermediate shaft bearing (high load and forced lubrication)

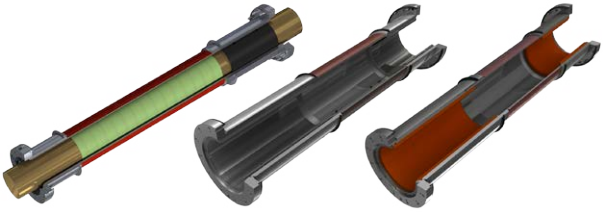
Wärtsilä Thrust bearings

Commercial & Military
Wärtsilä Thrust bearing, (110–560 mm) (forced lubrication (axial) with optional external lubrication)
Wärtsilä Thrust bearing, (110–560 mm) (self-lubrication (axial and radial loads) with optional external lubrication)

Wärtsilä generator bearings

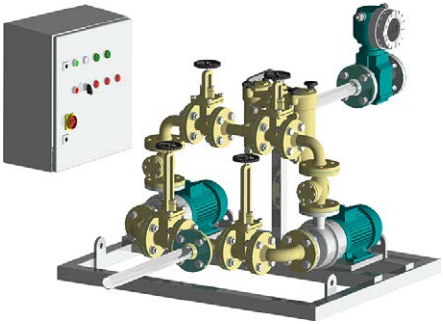
Commercial & Military
Wärtsilä Generator Bearing side flanged type, (80–500 mm)
Wärtsilä Generator Bearing central flanged type, (80–500 mm)
Wärtsilä Generator Bearing pedestal type, (80–500 mm)

Stern Tube Solutions



Wärtsilä Stern Tube Solutions

Our packages are all designed to meet certain standards and can be customised to suit specific applications. Options include oil lubricated sterntubes with white metal or composite bearings or water lubricated sterntubes with composite bearings.



Wärtsilä Other Seals & Bearings Products

Wärtsilä water quality systems

Pumped water flush supply systems with various filtration and temperature control options to improve and increase life of the seal and bearing products installed. Systems are adapted to suit applications either by filtering to required standards in silty/ gritty water environments or controlling closed water temperature in ice-class type applications. Suitable for both open and closed water lubricated sterntubes.

WATER QUALITY SYSTEMS

Flush Supply & Filtration
Wärtsilä Water Quality System: open water (clear)
Wärtsilä Water Quality System: open water (high performance -silty)
Flush Supply, Filtration & Temperature Control
Wärtsilä Water Quality System: closed water system

Other Products

Wärtsilä hydraulic equipment

Hydraulic couplings, nuts and bolts designed for easy handling and trouble free operation made from the highest quality steel in accordance with existing classification rules.

HYDRAULIC EQUIPMENT

Hydraulic Couplings
Wärtsilä Hydraulic Couplings: with flange, (100–800 mm)
Wärtsilä Hydraulic Couplings: with flange and longer body, (100–800 mm)
Wärtsilä Hydraulic Couplings: with flange in sleeve, (100–800 mm)
Wärtsilä Hydraulic Couplings: without flange, (100–800 mm) (no reamer bolts required)
Wärtsilä High Friction Hydraulic Couplings, (200–700 mm)
Hydraulic Nuts
Wärtsilä Hydraulic Nut: propeller nut
Hydraulic Bolts
Wärtsilä Hydraulic Bolt: for shaft coupling flanges

Wärtsilä rudders

Wärtsilä nozzle

Wärtsilä tunnel

Wärtsilä steel fabrication

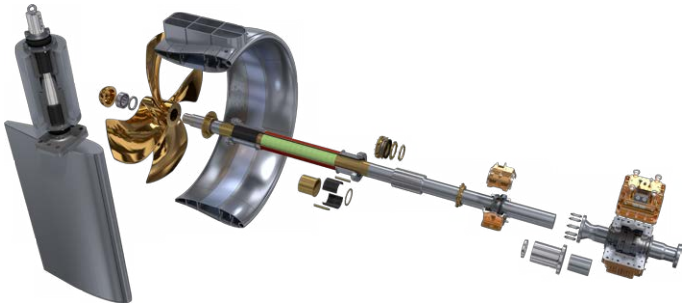
Tunnels, rudders & nozzles manufactured to customers' specifications.

Other Products

Complete stern tube packages

Wärtsilä Seals and Bearings products and services support you by maximising efficiency and minimising operational risks at the lowest lifecycle cost.

Wärtsilä has a long history and wide expertise of supplying complete stern tube packages with off-the shelf or tailored seals and bearings to suit your needs. Whether you have oil or water lubricated shaft lines, we have the products and services to match your requirements.



Ship Design Portfolio & Services

Wärtsilä Ship Design offers innovative designs with the emphasis on cost efficiency. Our designs are initiated from detailed discussions with the ship owner to attain a deep understanding of the company's business model, and from this basis we develop the specific type of vessel needed. In this attention to detail we differentiate from the majority of our competitors. All of our designs are optimized to achieve higher energy efficiency, lower operating costs, and enhanced environmental performance. They also ensure optimal construction at the shipyard.

Our unique expertise, knowledge, and global footprint allow us to turn our customers' vision into reality and maximize their profits and asset values. With more than 4000 vessels built to our designs, including the

most advanced LNG powered ships, the competitive edge we bring our customers is a well established fact.

We cover the full range of ship design disciplines, including naval architecture, hull optimization, stability calculations, hull and structural engineering, machinery- and piping engineering, and outfitting.

We offer a broad range of options, from basic designs including classification drawings, to detail designs and optimized 3D production drawings. We also offer a comprehensive range of marine consultancy services for shipyards, or owners undertaking newbuilding, conversion, and retrofit projects.

Ship Design

Merchant

Gas carriers

Tankers

Offshore

Platform supply vessels

AHTS vessels

Fishing Vessels

Purse seiners/trawlers

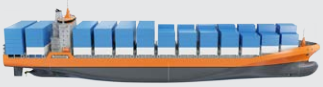
Freezer trawlers

Special Vessels

Ferries

Tugs

Container feeders



Construction vessels

Pipe-layers and cable-layers

Stern trawlers

Wind support

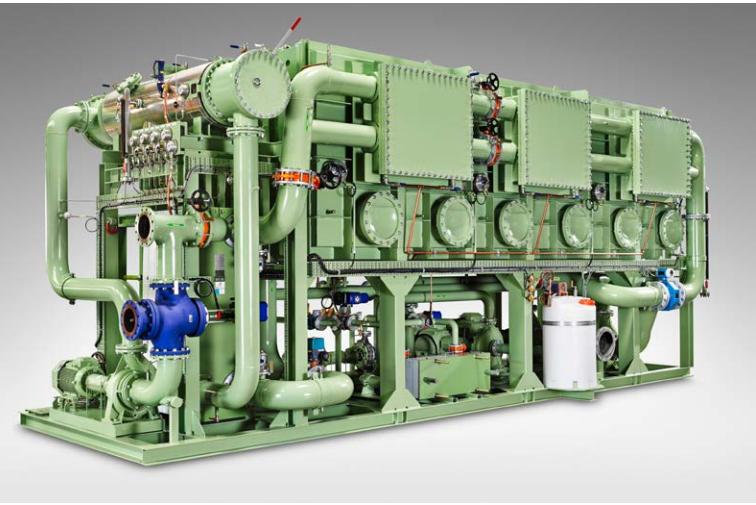
Accomodation/barge

Our people

The design process in Wärtsilä Ship Design is dedicated to delivering the very best solutions for each of our customers. We believe that a ship design is not merely a product – but a process. For this reason, we begin all our projects by asking our customers about their specific needs, and how best we can meet them. Through this we are able to ensure that the customer's precise challenges and objectives – both now and in the future – have been truly understood and will be met.

Today, Wärtsilä Ship Design has operations in 6 countries, with local project development and project delivery capabilities in Europe and Asia, and more than 200 dedicated and experienced designers and engineers. Their global ship design competence is the result of thousands of successfully completed projects.

Fresh Water Generation



Wärtsilä Serck Como Multi Stage Flash Evaporators

The Wärtsilä Serck Como multi-stage flash (MSF) evaporator is utilised for producing fresh water from seawater, well water or industrial water.

A special advantage of the multi-stage flash technology is that the specific heat consumption (or thermal efficiency) can be continuously adapted to the individual requirements of each application.

The produced distillate has a very low salt content which makes it suitable as technical water (e.g. boiler feed water). The distillate quality and quantity are independent from the seawater temperature which makes the MSF technology a reliable source for freshwater.

Characteristics

- Capacity up to 1500 t/d.
- Salt content of the distillate ≤ 4 ppm NaCl.
- Steady production of freshwater at seawater temperatures between 0–32°C
- Either steam, engine jacket water or a combination of these can be utilised for heating
- Corrosion resistant materials (e.g. copper- nickel) for components in contact with seawater

CLICK for more info

Fresh Water Generation

Key benefits

- Flexible dimensions
- Full-automatic operation
- High availability due to low maintenance requirements
- Technology with the lowest lifecycle costs
- Efficiency gained by the use of frequency converter for pumps
- Minimised risk of scaling because heat transfer and evaporation are taking place in different areas

Wärtsilä Serck Como Single Stage Desalination Systems

The Wärtsilä Serck Como Single Stage Desalination (SSD) fresh water generator uses the process of vacuum distillation to remove the salt and other impurities from seawater and convert it into high quality distillate.

The system uses a vacuum distillation process that enables the use of the waste heat from the main diesel engine or other alternative heat sources to evaporate the seawater.

The technology is simple and has a modular design. The automated operation and low maintenance requirements enable continuous and user friendly handling.

Wärtsilä has developed an efficient and cost-effective technology for seawater desalination, with a capacity up to 50 t/d, for marine and offshore applications.

Key benefits

- High distillate quality
- Easy maintenance
- Easy operation
- Compact

Options

- Booster heater
- Steam injector
- Rehardening filter
- Hot water loop

Oily Water Systems

Wärtsilä Oily Water Separators

The Wärtsilä Oily Water Separator (OWS) manages bilge water with minimum impact for operating personnel, with results that surpasses current and proposed legislative requirements.

The technology behind the Wärtsilä OWS is a combination of optimised traditional methods and innovative new solutions. The separator consists of a four-stage, emulsion-breaking unit, where each stage handles one key component of the sludge and bilge mix. It can handle input fl ows with an oil content of between 0 and 100%, making it the most versatile separator on the market.

The Wärtsilä OWS units are IMO and US Coast Guard approved and gives the operator eff ective control over all bilge media as well as over any discharges made into the sea. The amount of oil in water after treatment is less than 5 ppm.

Wärtsilä Bilge Water Guard

Wärtsilä Bilge Water Guard is a fully automated bilge discharge monitoring system which continually monitors the oil content for all bilge discharges overboard.

Should the oil content rise above the set limit, the flow will be rerouted back to the bilge tank. The system logs the discharge quantity and oil content as well as time and location of the ship. All data is stored in memory for later retrieval.

Oily Water Systems

The system is enclosed in a locked, tamper-proof cabinet, with all accesses being logged to internal memory. For both crew members and ship management, the Wärtsilä Bilge Water Guard provides a vital safety net, with the availability to make evident the compliance with applicable regulations.

Wärtsilä Slop Water Treatment System

The Wärtsilä slop water treatment system is designed to clean water (deck washing water or rain) – contaminated with oil or drilling mud produced by off shore operational activity – enabling it to be discharged without further treatment.

The system consists of two units – a MWD (Mud Water Decanter) and SWC (Slop Water Cleaning) unit. In the first stage the MWD separates the mud and oil from the water emulsion, in the second the SWC treats and discharges the emulsified water.

Slop water/mud is a waste stream, produced when an oil/synthetic/diesel drilling fluid becomes contaminated with water. It is amongst the most significant of waste streams from exploration and exploitation activities.

The system will significantly reduce drill slop sent onshore by as much as 80–90%.

Waste Water Processing

Wärtsilä Hamworthy Sewage Treatment Plants

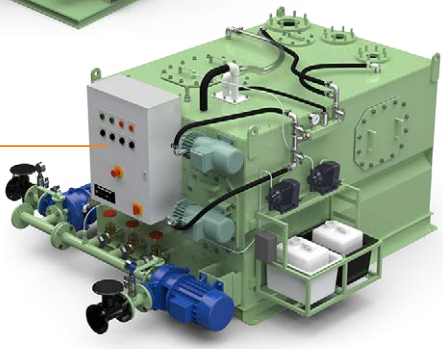
The Wärtsilä Hamworthy Super Trident sewage treatment plant is the cost-effective and safe answer to disposing of wastewater at sea, maintaining the quality of the world's oceans.

Our sewage treatment plants are certified to meet IMO MEPC 227(64) guidelines, which came into effect 1 January 2016.

Optimised for the treatment of black and grey wastewater flows, and suitable for conventional gravity and vacuum fed collection systems, all plants are controlled automatically. This allows unattended operation, with reduced maintenance requirements and lower long-term operating costs.

The systems are compact and modular in design, suitable for between-deck installations, and are adaptable to customer new build specifications.

Large STC-14 sewage treatment plant



Small STC-13 sewage treatment plant

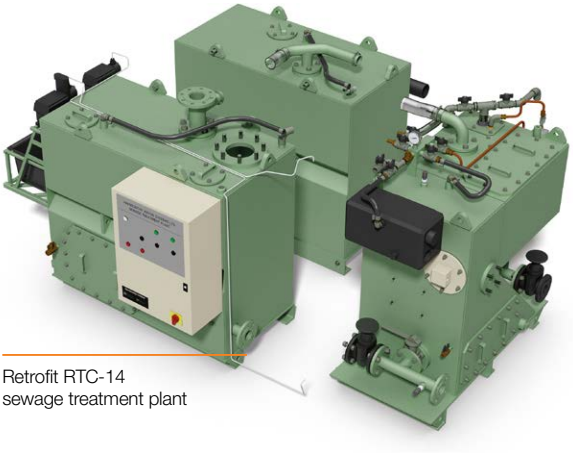
Waste Water Processing

Wärtsilä Hamworthy Retrofit RTC-14 Sewage Treatment Plants

The Wärtsilä Hamworthy retrofit RTC-14 range has been specifically designed to reduce the cost of installing sewage treatment equipment into existing vessels. Each size in the retrofit range is built up from three separate water tight tanks connected by external piping, aiding installation. The dimensions of each component has been arranged to permit its transportation through standard vessel access ways.

The dimensions below indicate the size of aperture through which unit will pass with tanks separated when the control panel, transfer tubes & studs, dosing skid, vent tubes, flow meter and covers are also removed.

Model No.	Width (mm)	Length (mm)
RTC20-14	655	1220
RTC40-14	730	1670
RTC60-14	830	1770
RTC80-14	880	1870



Retrofit RTC-14
sewage treatment plant

Waste Water Processing

Wärtsilä Hamworthy Membrane BioReactor (MBR) Systems

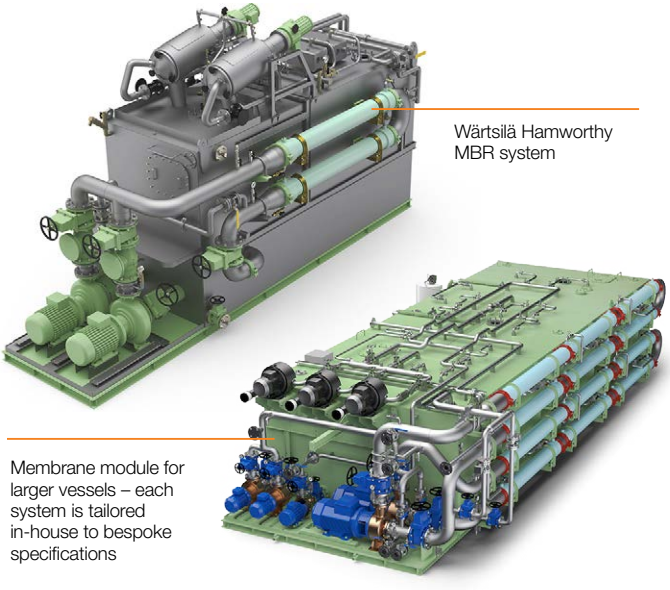
Wärtsilä Hamworthy MBR technology is based on biological degradation and membrane separation and allows for the treatment of grey and black water to satisfy the most stringent standards.

The process produces the highest quality discharge without requiring any addition or generation of chemicals that are hazardous to the environment or ship operation.

Effluent quality tests conducted by the US National Sanitary Foundation on Wärtsilä Hamworthy MBR produced results exceeding the most stringent future legislative pollutant standards envisaged. The technology also achieved outstanding performance in Alaska under the scrutiny of the local authority, USCG and USEPA studies over the past seasons.

We also supply smaller, more compact versions of our MBR systems. Wärtsilä Hamworthy miniMBR's are ideal for use on smaller cruise and naval vessels, plus ferries with up to a 200 complement, as well as FPSOs and accommodation platforms.

Waste Water Processing



Wärtsilä Hamworthy MBR system

Membrane module for larger vessels – each system is tailored in-house to bespoke specifications

Vacuum Systems

Wärtsilä Vacuum Collection Systems

The Wärtsilä vacuum collection system uses differential air pressure to transport sewage from the toilet bowls, and other sanitary fittings, to the Sewage Treatment Plant (STP) or independent collection tank.

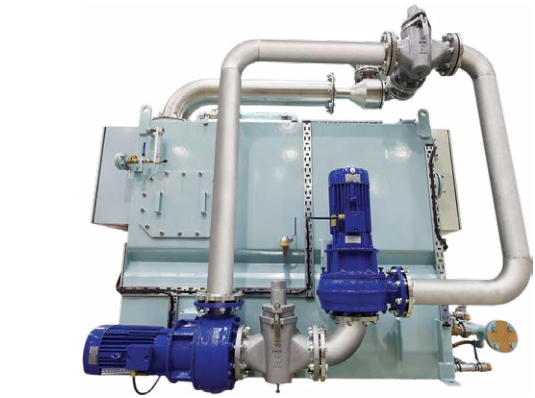
Ejectors can be mounted direct to the STP for modular construction without the need for a separate collection tank, and only a small amount of flush water is needed compared to conventional gravity systems.

Features

- Ejectors can be mounted direct to the STP for modular construction without the need for a separate collection tank
- Only a small amount of flush water is needed compared to conventional gravity systems
- Vertical Lift capability
- Smaller diameter piping, independent of slope
- Reduced peak loadings allow use of smaller sewage treatment plant than for gravity systems
- Ejector performance optimised using Computational Fluid Dynamics (CFD)

Additional optional features

- Grey water vacuum collection to separate grey water collection tank(s)
- Retrofit to existing tanks
- Foam suppressant
- PLC interface with data logger
- Overboard discharge from vacuum circulation pump
- Controlled feed/transfer equipment



Vacuum Systems

Wärtsilä Vacuum Toilets

The Wärtsilä vacuum flush toilet has been designed to be mechanically simple, operationally reliable, and stylish in appearance.

Wärtsilä vacuum toilets use air to drive waste from the toilet to the treatment tank or intermediate collection tank. This contemporarily styled toilet has a built-in vacuum breaker and flush memory, is simple to install, and is supplied ready to connect. The control mechanism can be accessed without removing the bowl. By using only approximately 1 litre of water, the amount of wastewater is dramatically reduced.

Wärtsilä also offers a Vacuum Interface Valve, which provides an interface between the sewage collection system and conventional grey water drains and urinals. The valve enables an easy connection to gravity-based appliances, enabling cost savings and effective integration with the vacuum system piping. The valve is reliable, easy to maintain, and has been installed in USN/USCG ships and merchant marine vessels throughout the world.

Features

- Contemporary styling
- Minimum space requirements
- Low water consumption
- Simple to install – supplied complete, ready to connect
- Quiet operation
- Maintenance in-situ

Headquarters

Wärtsilä Corporation
John Stenbergin ranta 2, P.O. Box 196,
FI-00531 Helsinki, Finland
Tel. .....+358 10 709 0000
Fax .....+358 10 709 5700

Worldwide Network

ARGENTINA

Wärtsilä Argentina S.A.
Services Office Buenos Aires,
Tronador 963, C1427CRS Buenos Aires,
Argentina
Tel. .....+54 11 4555 1331

AUSTRALIA

Wärtsilä Australia Pty Ltd.
Marine Solutions & Services Office Perth
8a Sparks Road,
WA 6166 Henderson, Australia
Tel. .....+61 8 9410 1300
Marine Solutions & Services Office Huntingwood
48 Huntingwood Drive, NSW 2148
Huntingwood, Australia
Tel. .....+61 2 9672 8200
Fax .....+61 2 9672 8585

AZERBAIJAN

Wärtsilä Azerbaijan LLC
22 Salyan Highway, AZ1083,
Baku, Azerbaijan
Tel. .....+994 12 545 9141
Fax .....+994 12 545 9145

BRAZIL

Wärtsilä Brasil Ltda.
Rua da Alfândega, 33 - 9o andar
Centro 20070-000 Rio de Janeiro, RJ
Brasil
Tel. .....+55 21 2206 2500
E-mail: ..... Lucas.correa@wartsila.com

Wärtsilä Brasil Ltda.
Av. Joao Cabral de Mello Neto,
No. 400 - sala 601 / Barra da Tijuca
22775-056 Rio de Janeiro, Brazil
Tel. .....+55-21-3489-3315
E-mail.....Lucas.Correa@l-3com.com

CANADA

Wärtsilä Canada Inc.
Marine Solutions & Services Office
7575 Transcanadienne, Suite 640
St. Laurent, Quebec H4T 1V6 Canada
Tel. .....+1 514 335 3150
Fax .....+1 514 332 4173
Services Office
Vancouver British Columbia
1771 Savage Road
Richmond, BC V6V 1R1Canada
Tel. .....+1 604 244 8181
Fax .....+1 604 244 1181

CARIBBEAN

Wärtsilä Caribbean Inc.
Services Office, Carolina
Road 887 Km 0.6, Street A Lot 5
Industrial Park Julio N. Matos
PR 00987 Carolina
P.O. Box 7039, PR 00986-7039 Carolina
Puerto Rico
Tel. .....+1 787 701 2288
Fax .....+1 787 701 2211

CHILE

Wärtsilä Chile Ltd.
Marine Solutions & Services Office Valparaíso
Avenida Brasil 2060, Valparaíso, Chile
Tel. .....+56 32 2570 600
Fax .....+56 32 2570 601

CHINA

Wärtsilä China Ltd.
Dalian
Office 606 Building B. Dalian International
Ocean Building, No.11 Yu Guang Street,
Zhongshan District, Dalian,
Liaoning Province 116001 P.R. China
Tel. .....+86 411 8230 9819
Fax .....+86 411 8230 9829
Shanghai
Building 11, No.170 Jin Feng Road, Pudong
New District, Shanghai 201201, P.R.China
Tel. .....+86 21 5858 5500
Fax .....+86 21 5858 9331
Hongkong
TYTL 108RP Sai Tso Wan Road,
Tsing Yi Island, New Territories,
Hong Kong, P.R. China
Tel. .....+852 2528 6605
Fax .....+852 2529 6672

Wärtsilä Hamworthy
Dalian
Office 606 Building B. Dalian International Ocean Building, No.11 Yu Guang Street, Zhongshan District, Dalian, Liaoning Province 116001 P.R. China
Tel. .....+86 411 8230 9819
Fax .....+86 411 8230 9829

Guangzhou
Room 910, Fuying Building, No. 166 Changgand Rd, Haizhu district, 510250 Guangzhou, P.R. China
Tel. .....+86 20 8435 1719
Fax .....+86 20 8435 1695
E-mail..... li.ma@wartsila.com

Shanghai
4th Floor, Building 13, 170 Jin Feng Road, Pudong New District, Shanghai 201201, P.R.China
Tel. .....+86 21 5858 5500
Fax .....+86 21 5858 7992

Suzhou
No. 77 Hongxi Road, New District, Suzhou, 215151, P. R. China
Tel. .....+86 512 6824 3108
Fax .....+86 512 6824 2709

Shipham Valves
Tangzhen 4th floor, Building 13
No.170 Jinfeng RD, Pudong New District
Shanghai, P. R. China
Tel. .....+86 21 5858 5500
Fax .....+86 21 5858 7992

Wärtsilä Services (Shanghai) Co., Ltd. (Guangzhou Nansha Branch)
No.1-11A, Section B of Nansha Auto Park, Xin Guang 3rd Road,
Pearl River Management District,
Nansha Development Zone, Guangzhou, Guangdong Province 511462, P.R. China
Tel. .....+86 20 3905 6288
Fax .....+86 20 3905 6299

Wärtsilä Ship Design (Shanghai) Ltd.
2nd Floor, Building 11No.170 Jin Feng Road, Pudong New District, Shanghai 201201, P.R.China
Tel. .....+86 21 5858 5500
Fax .....+86 21 5858 2620

Wärtsilä CME Zhenjiang Propeller Co., Ltd.
8 JingSan Road, Ding Mao New District, Zhenjiang Jiangsu Province, 212009 P.R.China
Tel. .....+86 511 8451 1719
Fax .....+86 511 8451 2907

Wärtsilä Propulsion (Wuxi) Co., Ltd.
No.53 Xi Qin Road, Wuxi National High & New Tech Development Area, Wuxi,Jiangsu Province 214028 P.R.China
Tel. .....+86 510 6886 0218
Fax .....+86 510 6886 0219

Wärtsilä Qiyao Diesel Company Ltd.
No.2988, Jiangshan Rd , Lingang, Nanhui, Shanghai 201306 P.R. China
Tel. .....+86 21 6828 4688
Fax .....+86 21 6828 4149

Wärtsilä Yuchai Engine Co., Ltd
No.3 Qixing Road, Fushan Industrial Park, Doumen, Zhuhai, 519175, P.R. China
Tel. .....+86 756 5598 222
Fax .....+86 756 5888 205

Wärtsilä SAM Electronics (Taizhou) Co., Ltd.
3F YueDa Huangpu Riverside Mansion, 356 Xinzha Road, Shanghai 200003, China
Tel. .....+86 21 6267 5666 # 219
E-Mail.....info.sam.cn@wartsila.com

Wärtsilä SAM Electronics (Taizhou) Co., Ltd.
No. 6 TaiHe Road, Hailing Industrial Park, Taizhou City, Jiangsu Province, 225300, P. R. China
Tel. ..... +86-523-86 998 520
E-mail.....info.sam.cn@wartsila.com

CSSC Wärtsilä Engine (Shanghai) Co., Ltd.
Factory address: No. 383 Hongyin Road, Lingang, Shanghai
Project office address: 2F, Building 11, 170 JinFeng Road, Pudong New District, Shanghai, 201201, P.R.China
Tel. .....+86 21 5858 5500
Fax .....+86 21 5858 8322
E-mail..... sales@cwec.net.cn

COLOMBIA

Wärtsilä Colombia S.A.
Services Office Bogotá
Cra 19B # 83-63 Piso 5o, Bogotá, Colombia
Tel. .....+57 1 635 8168
Tel. .....+57 1 635 9382
Mobile .....+57 318 716 4395

CYPRUS

Wärtsilä Cyprus
Services Office Limassol,
9 Synergatismou Street,
CY-3010 Tsiflikoudia, Limassol, Cyprus
Tel. .....+357 25 313 761
Fax .....+357 25 812 195
E-mail..... cyprus@wartsila.com

DENMARK

Wärtsilä Danmark A/S
Marine Solutions & Services Office Copenhagen
H.C. Andersens Boulevard 11, 3. sal,
DK-1553 Copenhagen V, Denmark
Tel. .....+45 99 56 99 56

Wärtsilä Svanehøj A/S
Fabriksparken 6,
DK- 9230 Svenstrup J, Denmark
Tel. .....+45 96 37 22 00
24 Hours Service..... +45 40 26 39 74
E-mail:
Spares ..... svanehoj.spareparts@wartsila.com
Service support .. svanehojservice@wartsila.com

Wärtsilä Lyngsø Marine A/S
Lyngsø Allé 2, DK – 2970 Hørsholm
Tel. .....+45 45 16 62 00
E-mail..... sales.lyngsoe.dk@wartsila.com

DOMINICAN REPUBLIC

Wärtsilä Dominicana, SRL
Services Office Santo Domingo
C/El Recodo #4, Bella Vista, Santo Domingo,
Dominican Republic
Tel. .....+1 809 564 4440
Fax .....+1 809 560 6777

Workshop
Km 13 ½ Aut. Duarte, Alameda
Santo Domingo Oeste
Dominican Republic
Tel. .....+ 1 809 561 2022
Fax .....+ 1 809 372 7968

ECUADOR

Wärtsilä Ecuador
La Mancha Business Centre,
Autopista E35 km 24 ½
Tababela, Quito, Ecuador
Tel. 593 2 3931560

FINLAND

Wärtsilä Finland Oy
Marine Solutions & Services Office Helsinki
John Stenbergin ranta 2
P.O. Box 196, FI-00531 Helsinki, Finland
Tel. .....+358 10 709 0000
Fax ..... +358 10 709 5700 (Marine Solutions)
Fax ..... +358 10 709 5700 (Services)

Marine Solutions & Services Office Turku
Stålarminkatu 45, P.O. Box 50, FI-20811
Turku, Finland
Tel. .....+358 10 709 0000
Fax ..... +358 2 250 6002 (Marine Solutions)
Fax ..... +358 2 234 2419 (Services)

Marine Solutions & Services Office Vaasa
Tarhaajantie 2, P.O. Box 252,
FI-65101 Vaasa, Finland
Tel. .....+358 10 709 0000
Fax ..... +358 6 356 7188 (Marine Solutions)
Fax ..... +358 6 356 7374 (Services)

FRANCE

Wärtsilä France SAS
Marine Solutions
3 boulevard de la Loire, P.O. Box 97511,
FR-44275 Nantes cedex 2, France
Tel. .....+33 240 41 16 02
Fax .....+33 240 41 16 00

Marine Solutions & Services Office Surgères
La Combe, P.O. Box 113,
FR-17700 Surgeres cedex, France
Tel. .....+33 546 30 31 32
Fax .....+33 546 30 31 53

Services Office Marseille
Enceinte portuaire, Porte 4,
Chemin du Cap Janet CS 80263
FR-13344 Marseille cedex 15, France
Tel. .....+33 491 03 99 20
Fax .....+33 491 03 99 21

Marine Solutions, Tank Control Systems
119 rue de Bitche, FR-62100 Calais, France
Tel. .....+33 321 96 49 93
Fax .....+33 321 34 36 12

GERMANY

Wärtsilä Deutschland GmbH
Marine Solutions & Services Office Hamburg
Schlenzigstrasse 6, D-21107 Hamburg, Germany
Tel. ..... +49 40 75190-0
Fax ..... +49 40 75190-245 (Marine Solutions)
Fax ..... +49 40 75190-194 (Services)
E-mail .... MarineSolutionsHamburg@wartsila.com
E-mail ..... hamburg@wartsila.com (Services)

Wärtsilä Serck Como GmbH
Pankower Str. 16-18, 21502 Geesthacht, Germany
Tel. ..... +49 4152 805-0
Fax ..... +49 4152 805-105
E-mail ..... wsc.sales@wartsila.com
E-mail ..... wsc.aftersales@wartsila.com

Wärtsilä ELAC Nautik GmbH
Neufeldtstrasse 10, 24118 Kiel, Germany
Tel. ..... +49 431 883 0
E-mail ..... info@elac-wartsila.de

Wärtsilä FUNA International GmbH
Stedinger Str. 11, 26723 Emden, Germany
Tel. ..... +49 4921/967 0
E-mail ..... funa.de@wartsila.com

Wärtsilä JOVYATLAS EUROATLAS GmbH
Zum Panrepel 2, 28307 Bremen, Germany
Tel. ..... +49 421 48 69 30
E-mail ..... sales@euroatlas-wartsila.de

Wärtsilä JOVYATLAS EUROATLAS GmbH
Fennenweg 4, 26844 Jemgum, Germany
Tel. ..... +49 4958 9394 0
E-mail ..... sales.jovyatlas@wartsila.com

Wärtsilä SAM Electronics GmbH
Behringstrasse 120,
22763 Hamburg, Germany
Tel. ..... +49 40 88 25 0
Fax ..... +49 40 88 25 40 00
E-mail ..... info.sam.de@wartsila.com

GREECE

Wärtsilä Greece S.A.
Marine Solutions & Services Office Piraeus
25 Akti Miaouli, P.O. Box 860 12, GR-18503 Piraeus, Greece
Tel. ..... +30 210 413 5450
Fax ..... +30 210 411 7902

ICELAND

Vélar og Skip ehf.
Marine Solutions & Services Office Reykjavik
Hólmaslóð 4, IS-101 Reykjavik, Iceland
Tel. ..... +354 562 0095
Fax ..... +354 562 1095

INDIA

Wärtsilä India Private Limited
Marine Solutions & Services Office
Kesar Solitaire, 21st Floor, Plot No. 5,
Sector No. 19, Palm Beach Road, Sanpada,
400 705 Navi Mumbai, India
Tel. ..... +91 22 2781 8300/8550
Fax Marine Solutions ..... +91 22 2781 4732

INDONESIA

P.T. Wärtsilä Indonesia
Marine Solutions & Services
Pergudangan Cardig Group
Airport Halim Perdanakusumah
Jakarta 13610
Tel. ..... +62 21 8088 9905
Fax ..... +62 21 8087 5781

ITALY

Wärtsilä Italia S.p.A.
Marine Solutions & Services Office Genova
Tel. ..... +39 010 599 5800
Fax, Sales ..... +39 010 247 2341
Fax, Field Services ..... +39 010 599 5830

Marine Solutions & Services Office Trieste
Bagnoli della Rosandra, 334, San Dorligo della Valle, IT-34018 Trieste, Italy
Tel. ..... +39 040 319 5000
Fax ..... +39 040 827 371

Wärtsilä APSS Srl
Via S. Sebastiano 16
12055 Diano d'Alba, Italy
Tel. ..... +39 0173 468 468
E-mail ..... sales.apss.it@wartsila.com

JAPAN

Wärtsilä Japan Ltd.
Marine Solutions
Yaesu MID Bldg 5F, 1-11-2 Kyobashi,
Chuo-ku, 104-0031 Tokyo, Japan
Tel. ..... +81 3 5159 8700
Fax ..... +81 3 5159 8710

Marine Solutions
6-7-2 Minatojima, Chuo-ku,
650-0045 Kobe, Japan
Tel. ..... +81 78 304 7511
Fax ..... +81 78 302 5143

Imabari Office
1-3-3 Kyouei-chou Imabari
794-0024 Ehime, Japan
Tel. .....+81 898 35 4822
Fax .....+81 898 35 4821

KOREA

Wärtsilä Korea Ltd.
Marine Solutions
15-36, Gangbyeon-daero 456 beon-gil,
Sasang-gu, Busan, 47033, Korea
Tel. .....+82 51 329 0500
Fax .....+82 51 324 4349

Wärtsilä Marine Systems Korea Co. Ltd.
8th Floor Saesam Building, 39 Sesil-ro,
Haeundae-gu, Busan, 48111, Korea
Tel. .....+82 51 704 9270
Fax .....+82 51 704 9276
E-mail..... sales.mskorea.kr@wartsila.com

MALAYSIA

Wärtsilä Malaysia Sdn Bhd
Services Sales Office
Suite C 10-05, Plaza Mont Kiara,
n° 2 Jalan - Kiara, 50480
Kuala Lumpur, Malaysia
Tel. ..... +603-62035072
Fax ..... +603-62035064
E-mail:
MYServicesSalesSupport@wartsila.com
SGMarine@wartsila.com

MEXICO

Wärtsilä Mexico S.A. de C.V.
Services Office Cd. Del Carmen
Services Office and Workshop
Av. Edzna #7 Int. 3,Col. Mundo Maya,
Cd. del Carmen, Campeche,
México C.P. 24150
Tel. .....+521 938 138 1500

MOROCCO

Société Salva
Marine Solutions & Services Sales Office
93 Boulevard de la Résistance ,
21700 Casablanca, Morocco
Tel. .....+212 5 2230 4038
Fax .....+212 5 2230 5717

NETHERLANDS

Wärtsilä Netherlands B.V.
Services Office Benelux Schiedam
Havenstraat 21, 3115 HD, Schiedam
Tel. ..... +31 (0) 88 980 2000

Wärtsilä Netherlands B.V.
Marine Solutions, Technology & Services Center and Wärtsilä Land & Sea Academy Drunen
Christiaan Huygensweg 23, 5151 DM Drunen
P.O. Box 6, 5150 BB Drunen
Tel. ..... +31 (0) 88 980 4000

Wärtsilä Netherlands B.V.
Marine Solutions & Services Zwolle
Hanzelaan 95, 8017 JE, Zwolle
Tel. ..... +31 (0) 88 980 3000

Wärtsilä Netherlands B.V.
QuantiParts BV - A Wärtsilä Company Zwolle
Hanzelaan 95, 8017 JE, Zwolle
Tel. ..... +31 (0) 88 980 2500
www.quantiparts.com

Wärtsilä Netherlands B.V.
Services office Harlingen
Nieuwe Vissershaven 17, 8861 NX, Harlingen
Tel. ..... +31 (0) 88 980 2900

Wärtsilä Netherlands B.V.
QuantiServ - A Wärtsilä Company Kruiningen
Stationsweg 6A, 4416 PJ, Kruiningen
Tel. ..... +31 (0) 88 980 2700
www.quantiserv.com

Wärtsilä SAM Electronics Nederland B.V.
Rotterdam
IJzerwerkerkade 36 (Harbour 1093)
3077 MC, Rotterdam
Tel. .....+31 10 479 54 44

Wärtsilä Global Logistics Services
Kampen
Genuakade 8, 8263 CG, Kampen
Tel. ..... +31 (0) 88 980 1200

NORWAY

Wärtsilä Norway AS
Marine Solutions
- Rubbestadneset,
  N-5420 Rubbestadneset, Norway
- Meatjonnsvegen 74
  N-5412 Stord, Norway
- Stiklestadveien 1,
  N-7041 Trondheim, Norway
- Dalhaugane 2,
  N-5489 Boenes, Norway
- Karmsundsgaten 77,
  N-5531 Haugesund, Norway

Tel. .....+47 53 42 25 00
Fax .....+47 53 42 25 01

Wärtsilä Moss AS
Vaerftsgata 13,
P.O. Box 1053, N-1510 Moss, Norway
Tel. .....+47 69 27 99 00
Fax .....+47 69 25 45 78
E-mail.....moss@wartsila.com

Wärtsilä Oil & Gas Systems AS
Solbraaveien 10, 1383 Asker, Norway
Tel. .....+47 815 48 500
E-mail:
Gas solutions..... gasinfo@wartsila.com
Service support .... support.wgs@wartsila.com
Spares.....spares.wgs@wartsila.com

Wärtsilä Ship Design Norway AS
Havnavegen 90, N-5419 Fitjar, Norway
Tel. .....+47 53 42 25 00
Fax .....+47 53 42 25 01
E-mail.....shipdesign@wartsila.com

Wärtsilä Valmarine AS
Ingeniør Rybergs gate 99, 3027 Drammen
P.O. Box 881, 3007 Drammen, Norway
Tel. .....+47 32 21 81 00
E-mail..... sales.valmarine.no@wartsila.com

PAKISTAN

Wärtsilä Pakistan (Pvt) Ltd.
Services Office, Lahore Pakistan
16 km Raiwind Road Lahore, Pakistan
Tel. .....+92 42 35905900
Fax .....+92 42 35905952

Services Office Karachi Pakistan
F-8 KDA Scheme 1, Tipu Sultan Road,
Karachi Pakistan
Tel. .....+92 21 34375830
Fax .....+92 21 34375822

PANAMA

Wärtsilä Panama, S.A.
Services Office Veracruz
Panama Pacifico Flex #2 - Local #3-
Brujas Ave., Business International Park.
Former Howard Air Force Base
Corregimiento de Veracruz
Distrito de Arraiján, Panama, Rep. of Panama
Tel. .....+507 304 7400
Fax .....+507 304 7494

PAPUA NEW GUINEA

Wärtsilä PNG Ltd
Services Office Papua New Guinea
Warehouse 5, Unit 9, Section 36
Allotment 5 Kitty Hawk Street
6 Mile, Port Moresby NCD 121
Papua New Guinea
Tel. .....+675 323 7375
Fax .....+675 323 7540
Postal address: P.O. Box 379,
Port Moresby NCD 121, Papua New Guinea

PERU

Wärtsilä Peru S.A.C.
Marine Solutions & Services Office Lima
Av. Ricardo Palma 341,
Centro Empresarial Platino, Piso 6,
Oficina 604, Miraflores, Lima 18, Peru
Tel. .....+51 1 241 7030
Fax .....+51 1 444 6867

PHILIPPINES

Wärtsilä Philippines Inc.
Marine Solutions & Services Office Laguna
No 6. Diode Street, Light Industry and
Science Park, Bo. Diezmo, Cabuyao, 4025
Laguna, Philippines
Tel. .....+63 2 843 7301
Fax .....+63 49 543 0381

POLAND

Wärtsilä Polska Sp. z o.o.
Marine Solutions
Ul. Twarda 12, 80-871 Gdansk, Poland
Tel. .....+48 58 347 85 00
Fax .....+48 58 347 85 20
E-mail..... contact.poland@wartsila.com

Wartsila Ship Design Poland Sp.z o.o.
Ul. Luzycka 2, 81-537 Gdynia, Poland
Tel. .....+48 58 622 63 13
E-mail..... shipdesign.poland@wartsila.com

Wärtsilä Baltic Design Centre Sp. z o.o.
Ul.Luzycka 3c, 81-537 Gdynia, Poland
Tel./Fax.....+48 58 718 61 50
E-mail.....wbdc@wartsila.com

PORTUGAL

Wärtsilä Portugal, Lda.
Services Office Maia
Zona Industrial da Maia I, Sector X,
Lote 363, P.O. Box 1415,
PT-4471-909 Maia, Portugal
Tel. .....+351 22 943 9720
Fax .....+351 22 943 9729
E-mail.....portugal@wartsila.com

ROMANIA

Wärtsilä Hungary Kft. Budaors Sucursala Constanta
Santierul Naval Constanta,
Cladirea Administrativa TA, Cam 2, ETJ 2,
Incinta Port Constanta 900900, Romania
Tel. .....+40 720 175 215
E-mail.....cristian.butoi@wartsila.com

RUSSIA

Wärtsilä Vostok LLC
Marine Solutions & Services Office St. Petersburg
Business centre Linkor 36 A
Petrogradskaya naberezhnaya,
197101 St. Petersburg, Russia
Tel. .....+7 812 448 3248
Fax .....+7 812 448 3241

Marine Solutions & Services Office Vladivostok
Utkinskaya St 9, 690091 Vladivostok, Russia
Tel. .....+7 4232 401600
Fax .....+7 4232 432004

SERBIA

Wärtsilä Ship Design Serbia d.o.o
Vrsacka 67, 21000 Novi Sad, Serbia
Tel. .....+381 21 500101

SINGAPORE

Wärtsilä Singapore Pte Ltd.
14 Benoi Crescent, 629977 Singapore,
Singapore
Tel. .....+65 6265 9122
Fax .....+65 6264 0802
E-mail.....Sgmarine@wartsila.com

Wärtsilä Ship Design Singapore Pte Ltd.
14 Benoi Crescent, 629977 Singapore,
Singapore
Tel. .....+65 6562 1138
Fax .....+65 6562 1238
E-mail.....shipdesign.singapore@wartsila.com

Wärtsilä Pumps Pte Ltd
15 Benoi Crescent, 629978 Singapore,
Singapore
Tel. .....+65 6261 6066
Fax .....+65 6261 6011
E-mail.....Wartsilainlinepumps@wartsila.com

SOUTH AFRICA

Wärtsilä South Africa (Pty) Ltd.
Marine Solutions
20 Dorsetshire Street, Paarden Eiland, Cape
Town, South Africa, 7405
P.O. Box 356, Paarden Eiland, Cape Town,
South Africa, 7420
Tel. .....+27 21 511 1230
Fax .....+27 21 511 1412

SPAIN

Wärtsilä Ibérica S.A.
Marine Solutions & Services Office Bermeo
Polígono Industrial Landabaso s/n,
ES-48370 Bermeo, Spain
Tel. .....+34 946 170 100
Fax ..... +34 946 170 105 (Marine Solutions)
Fax .....+34 946 170 104 (Services)

Industrial Operations - Propellers
Avda. Juan Carlos 1, No. 3,
ES-39600 Maliaño, Spain
Tel. .....+34 946 170 100
Fax .....+34 942 254 548
E-mail..... wartsilaib@wartsila.com

SRI LANKA

Wärtsilä Lanka (Pvt) Ltd
77 Negombo Road, Wattala, Sri Lanka
Tel. .....+94 11 2980907
Fax .....+94 11 4816422

SWEDEN

Wärtsilä Sweden AB
Services Office Gothenburg
Götaverksgatan 10, P.O. Box 8006,
402 77 Gothenburg, Sweden
Tel. .....+46 31 744 4600
Fax .....+46 31 744 4670

SWITZERLAND

Wärtsilä Services Switzerland Ltd.
Schützenstrasse 12, CH-8400 Winterthur
Tel. .....+41 52 262 49 00
Fax .....+41 52 212 4917

Diesel Technology Centre
Sulzer Allee 19, Building 650
CH-8404 Winterthur
Tel. .....+41 52 262 49 00
Fax .....+41 52 262 04 02

TAIWAN

Wärtsilä Taiwan Ltd.
Marine Solutions & Services Office Taipei
4F., No. 68, Sec. 2, Zhongshan N. Road,
Zhongshan District, Taipei City, Taiwan
Tel. .....+886 2 2522 2239
Fax .....+886 2 2522 2550

TURKEY

Wärtsilä Enpa Dis Ticaret A.S.
Marine Solutions & Services Office Tuzla
Aydintepe Mah. D100 Karayolu Cad. No: 14/E
Bahar Is Merkezi ,
34947 Tuzla Istanbul, Turkey
Tel. .....+90 216 494 5050
Fax .....+90 216 494 5048

UNITED ARAB EMIRATES

Wärtsilä Gulf FZE
Marine Solutions
Plot 597-572, Dubai Investment Park 2,
P.O. Box 61494, Dubai, United Arab Emirates
Tel. .....+971 4 885 7222
Fax .....+971 4 885 7020

Wärtsilä Hamworthy Middle East FZE
P.O. Box 120691, W/H P6-86, SAIF Zone,
Sharjah, United Arab Emirates
Tel. .....+971 655 74806
Fax .....+971 655 74807

UNITED KINGDOM

Wärtsilä UK Ltd.
Marine Solutions & Seals and Bearings Product Company UK (PCUK)
4 Marples Way, Havant Hampshire
PO9 1NX, United Kingdom
Tel. .....+44 239 240 01 21
Fax .....+44 239 249 24 70

Marine Solutions & Services Office Aberdeen (Engine Services)
11a Peterseat Drive, Altens Industrial Estate,
Aberdeen Altens AB12 3HT, United Kingdom
Tel. .....+44 1224 871 166
Fax .....+44 1224 871 188

Marine Solutions, Tank Control Systems
No. 28 Northfield way, Aycliffe Industrial
Estate, Newton Aycliffe Durham DL5 6UF,
United Kingdom
Tel. .....+44 1325 327 299
Fax .....+44 1325 310 808
E-mail.....info@whessoe-europe.co.uk

Wärtsilä Water Systems Ltd
Fleets Corner, Poole Dorset BH17 0JT,
United Kingdom
Tel. .....+44 1202 662600
Fax .....+44 1202 668793
E-mail:
Ballast water
systems.....ballastwater@wartsila.com
Waste water
systems.....wastewater@wartsila.com
Pumps.....poolepumps@wartsila.com
Service .....poole.service@wartsila.com
Spares.....pse@wartsila.com

Wärtsilä Valves Ltd.
(Shipham Valves)
Hawthorn Avenue, Hull East Yorkshire
HU3 5JX, United Kingdom
Tel. .....+44 1482 323163
Fax .....+44 1482 224057
E-mail.....valvesales@wartsila.com

Wärtsilä Valves Ltd.
(John Mills Valves)
509 Shields Road, Walkergate, Newcastle
Upon Tyne NE6 4PX, United Kingdom
Tel. .....+44 191 2656550
Fax .....+44 191 2651002
E-mail.....valvesales@wartsila.com

U.S.A.

Wärtsilä North America, Inc.
Branch Office Annapolis
900 Bestgate Road, Suite 400, Annapolis
Maryland MD 21401, USA
Tel. .....+1 410 573 2100
Fax .....+1 410 573 2200

Branch Office Ft. Lauderdale
Wärtsilä FUNA International Inc
Wärtsilä G.A. International Inc.
2900 SW 42nd Street, FL 33312
Ft. Lauderdale, USA
Tel. .....+1 954 327 4700
Fax .....+1 954 327 4773

North America Headquarters
Wärtsilä Dynamic Positioning, Inc.
Wärtsilä G.A. International, Inc.
11710 N. Gessner Dr, Suite A
Houston, TX 77064
Tel. .....+1 281 233 6200
Fax .....+1 281 233 6233

Branch Office Long Beach
4007 Paramount Blvd., Suite 3
Lakewood, CA 90712
Tel. .....+1 281 233 6200

Branch Office New Orleans
1313 MacArthur Ave
Harvey, LA 70058 USA
Tel. .....+1 504 733 2500
Fax .....+1 504 734 7730

Branch Office Seattle
3257 17th Ave. West, Building 3
Seattle, WA 98119 USA
Tel. .....+1 425 640 8280
Fax .....+1 425 640 5162

Wärtsilä Defence Inc., Cheseapeake

Marine Solutions & Services Office
3617 Koppens Way,
Chesapeake Virginia 23323, USA
Tel. .....+1 757 485 5275
Fax .....+1 757 558 3627

Wärtsilä Defence Inc., Poulbo

Marine Solutions & Services Office
26264 Twelve Trees Lane, Poulsbo
Washington 98370-9435, USA
Tel. .....+1 360 779 1444
Fax .....+1 360 779 5927

Wärtsilä Defence Inc., San Diego

1313 Bay Marina Drive
National City, CA 91950 USA
Tel. .....+1 281 233 6200

Wärtsilä Dynamic Positioning Inc.

12131 Community Road, Suite A
Poway, California 92064, USA
Tel. .....+1 858 679 5500
E-mail..... customeremail.dp.us@wartsila.com

Branch Office Huntington Beach (WNA)
Wärtsilä G.A. International, Inc.
7402 Prodan Drive
Huntington Beach, CA 92648
Voice ..... (714) 375-7393 (24 hrs)
Fax .....(714) 375-7392
Service.California.GAI.us@wartsila.com

Branch Office Juneau (WNA)
Wärtsilä G.A. International, Inc.
1000 Harbor Way, Suite 204
Juneau, AK 99801
Voice .....(907) 586-2795
Fax .....(907) 586-4037
Service.Alaska.GAI.us@wartsila.com

Branch Office Newark (WNA)
Wärtsilä G.A. International, Inc.
90 Myrtle Street
Cranford, NJ 07016
Voice ..... (908) 276-9400 (24 hrs)
Fax .....(908) 276-3822
Service.NewJersey.GAI.us@wartsila.com

VIETNAM

Wärtsilä Vietnam Co., Ltd

Saigon Trade Center, Unit 1901, 19th Floor,
37 Ton Duc Thang Street, Ben Nghe Ward,
District 1, Ho Chi Minh City, Vietnam
Tel. .....+84 8 2220 0718
Fax .....+84 8 2220 0718
E-mail..... VNAllUsers@wartsila.com

Wärtsilä is a global leader in advanced technologies and complete lifecycle solutions for the marine and energy markets. By emphasising sustainable innovation and total efficiency, Wärtsilä maximises the environmental and economic performance of the vessels and power plants of its customers.

www.wartsila.com

www.wartsila.com/encyclopedia