POWERING THE WORLD’S NAVIES
SHIP POWER

Wärtsilä is the leading provider of ship power solutions including engines, generating sets, reduction gears, propulsion equipment (propellers, shafts, waterjets), automation and power distribution systems as well as sealing solutions for the marine industry.

POWERING THE WORLD'S NAVIES AND COAST GUARDS

Our experience in providing propulsion and powering solutions for Navy and Coast Guard vessels is a long standing one: more than 90 countries entrust Wärtsilä with the supply of equipment for their naval fleet.

Through innovative solutions and services, Wärtsilä sets out to be the most valued business partner with products that are capable of meeting the most stringent special naval requirements such as noise reduction and shock resistance.

SERVICES WORLDWIDE

Wärtsilä provides maintenance and through-life support services using the 160 offices of the Wärtsilä group based in 70 countries all over the world.

THE BENEFIT OF EXPERIENCE

In addition to providing integrated propulsion systems, dedicated specialised support is available:

- System integration capability
- Close cooperation with the major marine institutes to provide hydrodynamic studies
- Technical abilities to meet specific naval requirements
- Through-life cost studies
- Integrated Logistic support (ILS)
- Preventive and corrective maintenance

COMPLETE PROPULSION SOLUTIONS

Taking in account the vessel mission profile and its operational conditions, we propose a customised solution for each application. Our package approach offers real benefits in terms of manufacturer's support through the life of a vessel.
Wärtsilä engine designs are based on years of know-how and in life service which are combined with innovations in response to the customer needs.

- Reliability and low maintenance costs
- High thermal efficiency and low emissions
- Modular construction and reduced parts count
- Ergonomic interfaces
- Minimised consumables
- Cylinder liner with Anti-Polishing Ring
- Extended time between overhauls (up to 24,000 hours between top overhauls)
- Common Rail Technology
- Emission compliant with IMO Tier II requirements

**WÄRTSILÄ 20**

The Wärtsilä 20 medium-speed engine offers a combination of advanced technologies and high performance in a compact, space-saving package. With its virtually pipeless, operator-friendly design, the engine has started a new era in the development of medium-speed engines.

Where power-to-weight and power-to-space ratios are concerned, for its given speed range, the engine is unmatched in its power range. Operating reliably whilst burning the poorest quality heavy fuel, the Wärtsilä 20 also offers ultimate performance using light diesel oils.

Overhaul intervals up to 24,000 hours and maintenance-friendly design are some of the main valuable features that have earned the Wärtsilä 20 an installed base of more than 2000 engines since the launch in 1992.

**WÄRTSILÄ 26**

The Wärtsilä 26 represents the latest technical advances, combining fuel economy and low emission rates with high fuel versatility.

The Wärtsilä 26 (W26) family of medium speed engines is of modern concept and design and fully meets stringent Naval requirements. It has been developed to meet today’s and future requirements in respect of overall cost of ownership, emissions, shock and noise. Important features of the W26 engine are not only the high reliability based on the low number of components, low through-life costs and compactness with hardly any pipes and all the pipe connections being placed on one end of the engine, but also a high operational availability with MTBO of 12,000 Hrs.

**WÄRTSILÄ 32**

The Wärtsilä 32 was developed in response to a need in the market for a new engine in the 320 mm cylinder bore class and since 1998 more than 1200 of these engines have been sold worldwide.

Based on the latest achievements in combustion technology, it is designed for efficient and easy maintenance in combination with long maintenance-free operating periods.

The engine is fully equipped with all essential ancillaries and a thoroughly planned interface to external systems.

**WÄRTSILÄ 38**

The Wärtsilä 38 is a technologically advanced engine – a product that sets standards.

The intelligent design makes the Wärtsilä 38 the lightest and most compact heavy duty engine on the market.

The high level of technology incorporated in this engine, its design, and the power plant that is built around it, are all focused on achieving the lowest possible kWh production cost.

**WÄRTSILÄ 46**

The Wärtsilä 46 is a medium-speed engine for which reliability and total economy have been the guiding principles.

Extensive testing in our modern diesel laboratory backed up by several thousand running hours has made the Wärtsilä 46 a reliable diesel engine.

The extensive program reconfirmed the predicted calculations and simulations as well as performance mapping of factors such as heat balance, fuel and lube oil consumption, exhaust emission, noise and vibration level.

**GENERATING SETS**

Wärtsilä provides generating sets complete with alternators mounted on a common bed-frame which meet our customers requirements for shock, noise and vibration levels. By utilising double mounting arrangements and acoustic enclosures, naval standards can be met and exceeded.

Wärtsilä generating sets are in operation with many of the world navies providing electric power for diesel-electric propulsion and onboard ship services.
INTEGRATED ELECTRIC PROPULSION

Engines from Wärtsilä’s 20, 26, 32 and 38 range are driving IEP on the seven seas. Our customers include the Royal Navy with the Queen Elizabeth Class aircraft carriers.

Wärtsilä’s reputation of excellence and leadership in this field is long established with the delivery of more than 50 large generating sets used for the IEP of naval applications.

AUXILIARY AND EMERGENCY GENERATING SETS

A wide range of generating sets is available for the supply of electric power for the vessel hotel load.

Additionally, the reliability and efficiency of Wärtsilä products have convinced our customers to fit our generating sets within their scope of equipment for the electrical power source in emergency situations.

ENGINEERING EXPERTISE

- Installation of the engine, generator and auxiliaries on a common base frame. A static and dynamic analysis of the base frame design (stiffness of the seatings below engine and generator fittings, natural frequencies and mode shapes) is generally done through a Finite Element Model.

- Selection of the number of resilient mount stages; at least one stage of resilient mounts between the common base frame and the machinery foundation on the ship hull plating. If needed, in addition to the previous stage, a second resilient mounts stage is fitted between the engine and the base frame (and for some applications, between the generator and the base frame).

- Selection of the type of resilient mounts (natural frequencies generally in the range of 3 to 10 Hz, displacements capability from 10 mm up to 70 mm for some Navy applications with shock requirements).

- Design of the auxiliaries fitting and pipe clamping which may have a significant influence on the resilient mounting efficiency.

- An acoustic enclosure can be needed when the noise level in the engine room has to be below the standard engine airborne noise or when the vibrations have been reduced at a very low level and then the underwater radiated noise may be influenced by the airborne noise of the diesel generating set.
CONTROLLABLE PITCH PROPELLERS

The increasing demand in stealth and shock resistance capabilities for fighting vessels leads to a definite necessity of enhancement on the already reliable technology used for commercial vessels.

Navy applications often need tailor made solutions based on standard equipments in order to meet the typically very severe requirements such as high shock resistance, low noise and vibration levels.

To fulfil such stringent and specific requirements, Wärtsilä, in cooperation with specialists in electronics or well known large water tank and cavitation tunnel facilities, has developed special features and designs.

PROPULSION TECHNOLOGIES

The technologies available include:

- Electronic Pitch Feedback (EFP): a more accurate feedback on real pitch achieved by CP propellers allowing a better control, efficiency and reactivity
- Special noiseless blade profiles allowing cavitation free (i.e. silent) propellers up to speeds of 22 knots. Such blade designs and profiles are tested in partnership with the leading large cavitation tunnel facilities to achieve the highest level of underwater radiated noise and cavitation prediction
- Finite element calculations giving high accuracy when designing the shock resistance capability and vibration modes of our installations
- 5CN Concept 2 Hub: a special barrel type hub design where the blade foot is integrated in the hub, creating as less perturbed flow around the hub as possible

SHAFTLINES

Custom-built shaftlines with standard or increased bore diameters can be provided to match any arrangement.

WATER LUBRICATED BEARINGS

Wärtsilä provides sea water lubricated bearings, either of the composite type or of the rubber type, for brackets and sterntubes. They can be delivered together with a bronze housing. We can also supply bearings which can be exchanged without dismounting the shaftline.

Oil lubricated bearings

Should the sterntube be oil lubricated, then Wärtsilä can supply suitable bearings, either of the white metal type or of the composite type, and even the complete sterntube equipped with bearings, aft and forward seals and the lubrication system.

Line shaft bearings

A variety of line shaft bearings from the simplest off-the-shelf bearing to the most sophisticated design can be supplied to meet the client’s specifications for shock, flooded compartment and low rotation speed requirements.

STERNTUBE SEALS

Two options can be provided, either oil lubricated seal assemblies or
water lubricated seals, depending on the specific requirements of the vessel. Both lip or face type seals are available.

**SEAL PROTECTION SYSTEM**
The rope and net cutter consists of one rotating blade and one stationary blade. This system instantly cuts the ropes and nets before they become entangled and damage the stern tube seal.

**Hydraulic sleeve couplings**
The hydraulically fitted sleeve coupling is designed to make a simple connection between cylindrical shaft ends. This coupling is easy to mount and dismount and provides a high torque capability through a powerful friction joint. Outboard couplings can be made either of stainless steel or of standard steel, protected by a special glass fibre reinforced coating.

**Hydraulic loose flange couplings**
This coupling is usually used between a cylindrical or conical shaft segment and a forged flange. The fitting is based on the same principles as the sleeve coupling.

**OTHER ACCESSORIES**
We can also include in our scope of supply other shaft accessories such as bulkhead glands, hydraulic disc brakes and mechanical shaft locking devices, torque meters, earthing devices, thrust bearings etc.
THE LEADING SYSTEM INTEGRATOR

Wärtsilä has set forward a new approach to the lifecycle of the vessel by getting involved at all stages, from ship design to new buildings or repowering of the complete propulsion system and finally for the services of the ship.

The global question behind the design of a vessel is the efficiency of the propulsion system.

According to Wärtsilä, everything starts from the interaction between the hull and the propulsors.

Then significant total savings can be found by optimizing the propeller design and matching it with the prime movers.

Engine selection is another key element to improve the overall efficiency. Wärtsilä offers the configuration which provides the ability to match and run the engines close to optimum efficiency.

The propulsion packages are developed according to the mission profile of the vessel as defined by the end-user.

ONE SUPPLIER: WÄRTSILÄ

The benefits of having a single supplier throughout the entire life cycle of the vessel, from conceptual design to construction and operation provide value:

- Opportunity for shipyards to focus on their core competence (e.g. project management, hull production)
- One supplier – One responsibility – One single point of contact = Wärtsilä
- Reduced risk from unforeseen incompatibilities
- Less co-ordination work between parties, one interface
- Classification for complete systems
- Time-savings in design and engineering
- Time-savings in purchasing process
- Integrated system documentation
- Production schedule discipline
- Improved environment and work safety
- Outfitting work from ship to shops
- Warranty handling

Wärtsilä aims to deliver the optimum total solution and performance tailored to the specific operating profile of the vessel.

GEARBOXES

Wärtsilä gearbox design and production facility is based upon proven technology and experience.

Our gears covers a power range of 1 to 25 MW for single input gearboxes with vertical or horizontal offset (with more than 350 gear configurations available), and 2 to 35 MW for twin input-single output type of gearboxes (with more than 100 gear configurations available).

MAIN CHARACTERISTICS AND FEATURES

- Modular and flexible design
- Compact and reliable
- Plain bearings
- Rigid housing structure:
  - Small deformation
  - Low stress levels
  - Cast iron or welded
  - Low noise and vibrating levels
- Precision ground gearwheels with profile correction:
  - Good load distribution over the gear tooth
  - Low noise
• Optional PTO/PTI solutions
• Optional built-in multiple plate type of clutch
• Combined oil system for gear and propeller (for sizes 50 to 95)

NAVY APPLICATIONS
Wärtsilä offers custom designs developed from previously tested modules. We can meet specific requirements including shock resistance, low noise and vibration levels, and survivability in a flooded compartment.

We use 3D CAD with integrated FEM design to study and develop the housings (cast or welded, according to the configuration and level of specification) to achieve the necessary enhanced characteristics. The gearbox range is designed and developed with package solutions in mind and optimized for installation with Wärtsilä engines and propulsion equipment.

PROPULSION CONTROL SYSTEMS
Whichever Wärtsilä power and propulsion systems you choose, we provide a single control system.

The new generation of Lipstronic 7000 provides more effective load control and secures optimal performance of the engine and propulsor.

It is a unique combination of knowhow and experience from a supplier of propulsion systems, engines and control systems.

With its fully adjustable and easy-to-use set of parameters, Lipstronic 7000 is a single solution for all propulsion systems:
• Controllable pitch propellers
• Waterjets
• Steerable thrusters
• Transverse thrusters
• Engine safety system
• Rudder control system
• Joystick system

STEERABLE THRUSTERS
Wärtsilä steerable thrusters are delivered in modular, retractable, underwater mountable and containerized designs in fixed pitch and controllable pitch executions.

They are designed, manufactured and delivered in close cooperation with the customer.

Wärtsilä steerable thrusters generate considerable savings in cost due to their reliable and durable components, efficient propeller and maintenance-friendly design.

TRANSVERSE THRUSTERS
Wärtsilä transverse thrusters can be equipped with fixed pitch or controllable pitch propellers.

Their design and layout have been directed towards easy inspection and maintenance, which in turn leads to minimum maintenance costs.
Wärtsilä produces high quality Fixed Pitch Propellers (FPP) and Built-Up Propellers (BUP) for a wide range of naval applications.

These propellers are manufactured, controlled and tested in Wärtsilä factories in The Netherlands, in Norway or in Spain, where skilled and trained grinders can achieve the highest manufacturing and finishing tolerances necessary for such high efficiency propellers.

SILENT PROPELLERS

Until now, the radiated noise of a propeller cannot be predicted with sufficient accuracy in order to directly select the geometrical characteristics which will control and reduce this radiated noise. As the cavitation is an important source of noise, the wet parts of the ship, especially the propeller, should be free of any type of cavitation at the sailing speed of 11 knots, which means that the Cavitation Inception Speed (CIS) should be higher than 11 knots to ensure radiated noise levels as low as possible. An indirect strategy for noise reduction has been developed to delay the inception of cavitation.

Wärtsilä has developed its expertise for FPP and BUP designs with the cooperation of the major institutions and model basins in this field of research. Some of the most well-known research vessels are equipped with Wärtsilä propellers including CEFAS Endeavour, IFREMER Pourquoi Pas, IMR G.O. SARS., MARINE INSTITUTE Celtic Explorer, NERC James Cook or SKIPSTEPNISK Cabo de Hornos.

These vessels have reached silent operation levels never achieved before, significantly below the ICES 209 curve, by avoiding the noise normally created by cavitation or pressure pulses. These operational achievements offer huge benefits to our customers in trying to achieve the even more accurate measurements demanded by the scientific community.

This expertise is also applicable to naval applications. Navies have an increasing need for discrete vessels radiating as little underwater noise as possible. Our experience ensures the stealth capability of strategic vessels.

MARINE SEALS

Wärtsilä is the world’s leading supplier of marine engineering sealing systems.

Moreover, we are the only supplier in the world to offer a full range of both radial and axial seal types for any naval vessel type or size.

KEY POINTS

- Since 1971 we have specialized in supplying naval sealing solutions and to date have supplied to more than 75 of the world’s navies.
- Extensive shock qualification throughout the range
- Widest range of seal sizes and applications
- Patented technologies and design philosophies for superior naval sealing solutions.

The main propulsion sealing system is ManeSeal, an innovative concept with wrapped bellows and a split design.
Tried and tested throughout the world’s navies, ManeSeal can be changed without having to remove the propeller and tail shaft. The range also includes an inflatable maintenance seal and an optional auxiliary packing.

**OTHER PRODUCTS AVAILABLE**

- Rudder stock seals
- Stabilizer seals
- Waterjet seals
- Pump seals for all on-board applications
- ManeSafe ND shaft bulkhead seal
- ManeBar water or oil lubricated
- sterntube seals
- ManeDive, a high-pressure water lubricated sterntube seal.

**INTERNATIONAL COUNCIL FOR THE EXPLORATION OF THE SEA (ICES)**


The main objective of these recommendations is to define a spectrum of acceptable underwater radiated noise levels to avoid “any disturbance of the natural distribution of the fish” but also to “ensure that the fish target distributions and echo-integrator results are free of bias due to high-frequency noise”.

The noise levels should be measured for a ship sailing at 11 knots.

**PROPELLERS FOR RESEARCH SHIPS**

All the parts of a vessel contribute to the underwater radiated noise, the active inner parts (such as machinery) as well as the passive outer parts (the hull and its appendages) due to turbulence in the flow on these surfaces.

The propellers become one of the essential sources of noise with the increasing vessel speed because of the occurrence and the extension of the cavitation phenomenon which increases dramatically the noise levels at all frequencies.

The graphic shows the underwater radiated noise curves of different vessels equipped with Wärtsilä propellers, versus the ICES 209 curve, at 11 knots.

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**Underwater radiated noise curves of different vessels equipped with a Wärtsilä propeller, versus the ICES 209 curve, at 11 knots.**

**CHILEAN NAVY, MEDUSA PROJECT RESEARCH VESSEL**

- 3 x 8L20 generating sets
- main switchboard 690 V
- IAS (Integrated Automation System)
- fixed pitch propeller
- 2 x electric motors transformers

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**US NAVY, LEWIS AND CLARK T-AKE CLASS, USNS LEWIS AND CLARK, T-AKE1**

- fixed pitch propeller
- shuttline
- thrust bearing
- set of seals & bearings
- turning gear
WATERJETS

Wärtsilä is the leading supplier of AXIAL flow stainless steel waterjets for high-end applications: design and engineering of these waterjets combine advanced technology, reliability and ease of maintenance. Wärtsilä proposes also non-axial waterjets, successfully delivered worldwide since the 1970s.

WÄRTSILÄ AXIAL WATERJETS

Wärtsilä axial flow waterjets are a line of single stage compact high performance waterjets combining mixed flow properties with an axial build. The result is reduced transom occupation with highly increased cavitation margins.

AVERAGE 25% REDUCED TRANSOM OCCUPATION Jet sizes are indicated by the front side diameter of the impeller seat ring. Non-axial designs expand in a radial direction downstream directing the flow through the jet over an less efficient path. This results in a large transom flange diameter and often difficulties with fitting the jet in the available space either in width or height. The Wärtsilä axial waterjet series takes away all disadvantages by minimizing transom occupation and by offering an average 25% smaller diameter of the transom mounting flange.

UP TO 10% LOWER WEIGHT The reduced transom size not only results in reduced dimensions, but also gives a substantial lower weight of the installation. If this is combined with our welded jet construction allowing further weight optimizations, savings can be as high as 15% compared to non-axial build jet designs.

AVERAGE 10% HIGHER ROTATIONAL SPEED = 10% LESS TORQUE Compared with non-axial design the rotational speed of the impeller is on average 10% higher while the impeller tip speed is still lower. The lower torque can give both weight and cost savings for couplings, shafts and gearboxes.

LARGER MARGINS FOR OPERATING FLEXIBILITY AND MANOEUVRING The cavitation margins of the pump are shifted backwards with at least 35%. Due to this increase in cavitation margin and the lower impeller tip speed, more power can be allowed during manoeuvring resulting in a 15% higher manoeuvring thrust. Furthermore with the additional cavitation margin, operation with a reduced number of shaft lines is possible at a higher load of the remaining engines resulting in better operating flexibility.

INCREASE IN POWER ABSORPTION AT MANOEUVRING During manoeuvring engines operate in a critical zone and waterjets tend to absorb increased power at a lower rotational speed of the impeller. The result is a high load for the engine resulting in smoke and an increased thermal load. The increase in power absorption of the Wärtsilä axial jet series is up to 70% lower than of competing designs.

DESIGN LAYOUTS All jet designs are available in a steering/reversing (SR), reversing only (R) and booster execution (B). On request, Wärtsilä can supply designs for special applications for instance giving thrust in all directions 360 degree or offering shock compliant installations. The key benefits of the axial technology are valid for all executions.

WÄRTSILÄ NON-AXIAL WATERJETS

The non-axial E-type waterjet is still available in the Wärtsilä product portfolio for those applications requiring extreme speeds. Four large steering and reversing Wärtsilä 2 X LJ160E and 2 X LJ150E waterjets are
used in the propulsion system of the USS Independence (LCS-2). The ship, with an overall length of 127 m and full load displacement of 2,637 tons, is an innovative combatant designed to operate in shallow water environments to counter challenging threats in coastal regions, specifically mines, submarines and fast surface craft. LCS-2 is capable of speeds in excess of 40 knots and can operate in water less than 20 feet deep.

HYBRID OR WARP SYSTEMS
Unique to Wärtsilä is the delivery of various hybrid or Waterjet And Refined Propeller (WARP) systems. These systems combine controllable pitch propellers with a waterjet. The benefit is that the largest parts of the total installed vessel power can be absorbed by the waterjet. Despite the high amount of power the dimensions of the jet remain relatively small due to the high allowed power density compared to a propeller. With the jet taking most of the total vessel power, the propellers can remain small in diameter as well limiting the draft of the vessel. The result is a very attractive operational profile. The propellers are fully optimized for lower cruising speeds delivering optimum efficiency with low noise and vibrations.

At the same time the combination of the waterjet and the propellers still gives access to higher speeds when required. Hybrid systems were delivered for various yachts with total vessel power up to 32 MW and for Navy vessels up to 28 MW.

INCREASED PERFORMANCE
In order to be able to respond to oncoming threats, Navy and Coastguard operators alike expect greater flexibility from their vessels. This being for fast acceleration where the waterjet needs to rapidly convert the engine power into thrust (particularly for planing hulls) as well as for low patrolling speeds where the waterjet needs to be able to operate for longer periods without restriction from cavitation. The Wärtsilä WLD range of waterjets permits prolonged continuous operation at low speeds without restriction.

"Increased cavitation margin at low speed" shows the cavitation limit line for the WLD axial flow design (orange) and the LJ mixed flow design (blue). The area in between the lines is thus the achieved gain in cavitation margin for the new design.
Considerable research and development investments have placed Wärtsilä as a market leader capable of offering innovative technologies to boost energy efficiency and environmentally sound operation at sea. Even though these measures may make a significant difference, now or sometime in the future, they are just the beginning.

In addition to engine tuning by using a combination of superior propulsion solutions along with first class products and inventions, Wärtsilä can offer more than 30 different ways of making your vessel operate more efficiently.

**ENVIRONMENTAL PERFORMANCE**

**MEDIUM-SPEED ENGINES**

Wärtsilä’s medium-speed engines are already emission compliant with IMO Tier II requirements. The Wärtsilä engines offer high efficiency, low exhaust gas emissions and safe operation.

**SO\textsubscript{2} EMISSIONS**

Since 2005 Wärtsilä offers guidelines for low sulphur fuel oil operation. The purpose of this document is to provide advice for design, modification and operation of new buildings and existing ships to comply with future legislation related to low sulphur content in the fuel.

**NO\textsubscript{X} EMISSIONS**

The annex VI of the MARPOL 73/78 convention entered into force on 19 May 2005, the exhaust emissions regulations are now referred to as IMO Tier I.

In October 2008, the Marine Environment Protection Committee (MEPC) of IMO adopted amendments to the MARPOL Annex VI regulations. These specify further NO\textsubscript{X} emission limits known as IMO Tier II and Tier III.

Under IMO Tier II, the NO\textsubscript{X} emission limits for engines installed in ships constructed on or after 1 January 2011 will be reduced, according to a speed-dependent function, about 20% from the presently valid IMO Tier I levels.
SERVICES

Several customers have recognized us as their preferred service supplier to ensure the availability and cost-efficient operation of their installations. They benefit from having their entire power system fully serviced by one global supplier. Wärtsilä Services provides full service throughout the product lifecycle for both marine and power plant customers, and is constantly developing its worldwide network.

Additionally, we are continually broadening our range of services by adding valuable products and specialist services to our portfolio. In this way, we also support equipment onboard your vessel or at your installation and in our numerous workshops around the globe and in key ports, regardless of your equipment make.

We offer lifecycle efficiency solutions in the following services product lines:

- Engine Services
- Propulsion Services
- Electrical & Automation Services
- Boiler Services
- Operations & Management Services
- Training Services
- Environmental Services

These services cover everything from basic support with parts, field service and technical support to service agreements and condition-based maintenance; from installation and commissioning, performance optimization, including upgrades and conversions, to environmental solutions, technical information and online support.

The choice available to you extends from parts and maintenance services to a variety of comprehensive, customized long-term service agreements, including performance and operations & management agreements. Our Services organization currently features more than 11,000 dedicated professionals in 70 countries.

Wärtsilä adds value to your business at every stage in the lifecycle of your installations. With us as your service partner, you receive many measurable benefits such as availability and performance, productivity gains and cost benefits. Above all, peace of mind in the knowledge that your installation is being serviced by the most experienced partner you could have — Wärtsilä.

Under IMO Tier III, the NOx emission limit for engines installed in ships constructed on or after 1 January 2016 will be reduced, according to a speed-dependent function, about 80% from the presently valid IMO Tier I levels when the ship is operating in a designated Emission Control Area. Outside the designated Emission Control Areas, Tier II limits will apply.
Wärtsilä is a global leader in complete lifecycle power solutions for the marine and energy markets. By emphasising technological innovation and total efficiency, Wärtsilä maximises the environmental and economic performance of the vessels and power plants of its customers. Wärtsilä is listed on the NASDAQ OMX Helsinki, Finland.