

THE WÄRTSILÄ 32 METHANOL ENGINE

Methanol



Methanol is gaining momentum

As shipping looks to cut emissions, methanol is emerging as a prime fuel candidate. Wärtsilä has more than half a decade's experience with methanol, converting the first of four engines on the ferry *Stena Germanica* in 2015. Now this expertise is being deployed on one of Wärtsilä's most well-established engine platforms.

The Wärtsilä 32 methanol engine can run on methanol and/or fuel oils. Available for newbuild or retrofitting, it refines the proven fuel handling, injection and combustion technologies of *Germanica's* converted Wärtsilä Z40 engines and combines them with cutting-edge engine automation, control and other state-of-the-art features of the Wärtsilä 32 platform.

Methanol as a fuel

Methanol has been transported as an industrial chemical for decades. It has

roughly similar storage density to LNG but does not require cryogenic cooling, making it easier to handle onboard. There is widely established port supply infrastructure and an existing regulatory framework under IMO's IGF Code.

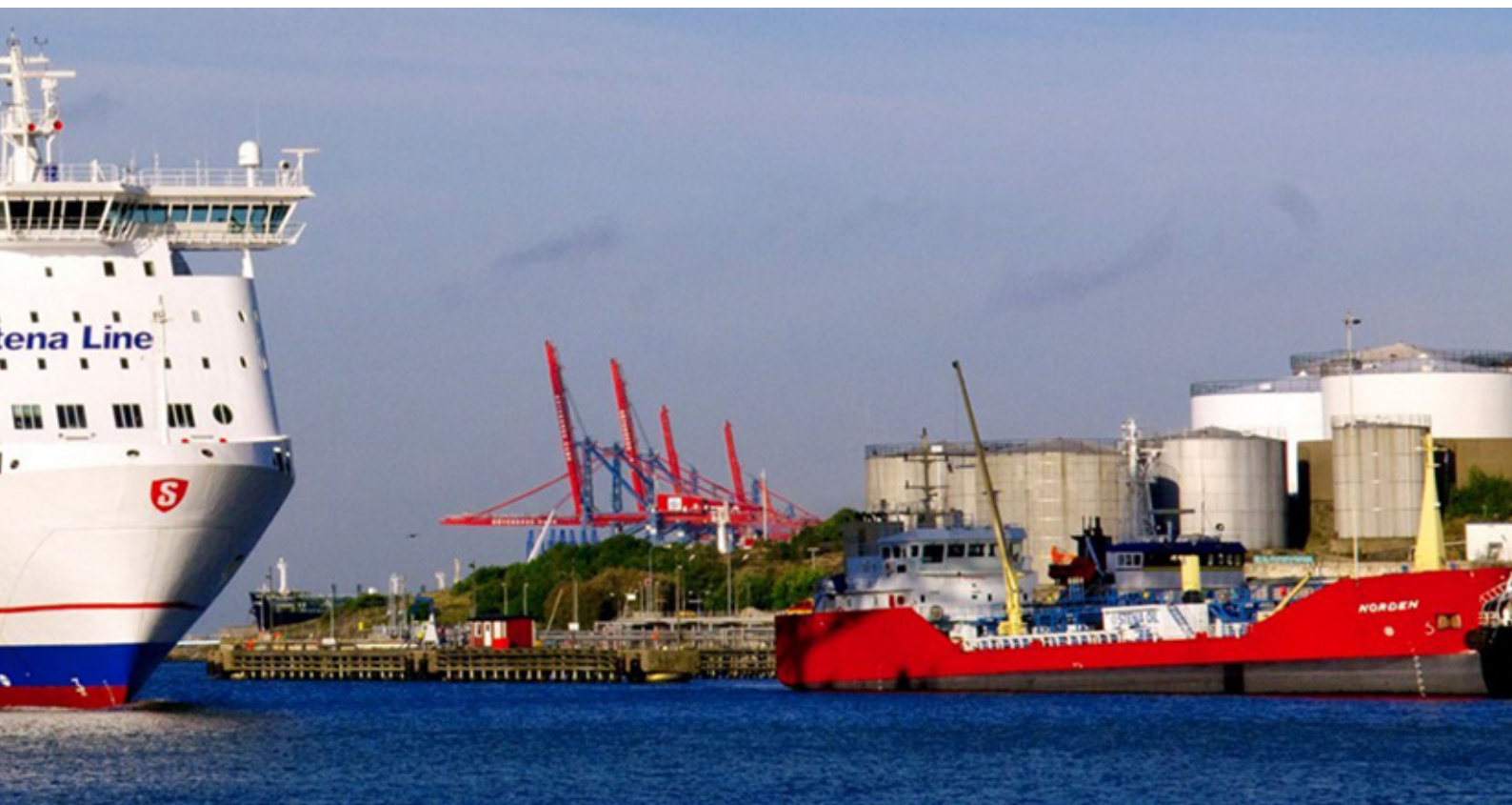
As methanol has the least carbon and highest hydrogen content of any liquid fuel, it has better combustion characteristics than other alternative fuels.

Emissions performance

With no sulphur content, emissions of SOx are negligible and dependent mainly on pilot fuel. Methanol also reduces filter smoke number – representing visible smoke and particle emissions – by 50% compared to fuel oil.

Methanol combustion produces 50% less NOx than fuel oil, making the Wärtsilä 32 methanol engine compliant

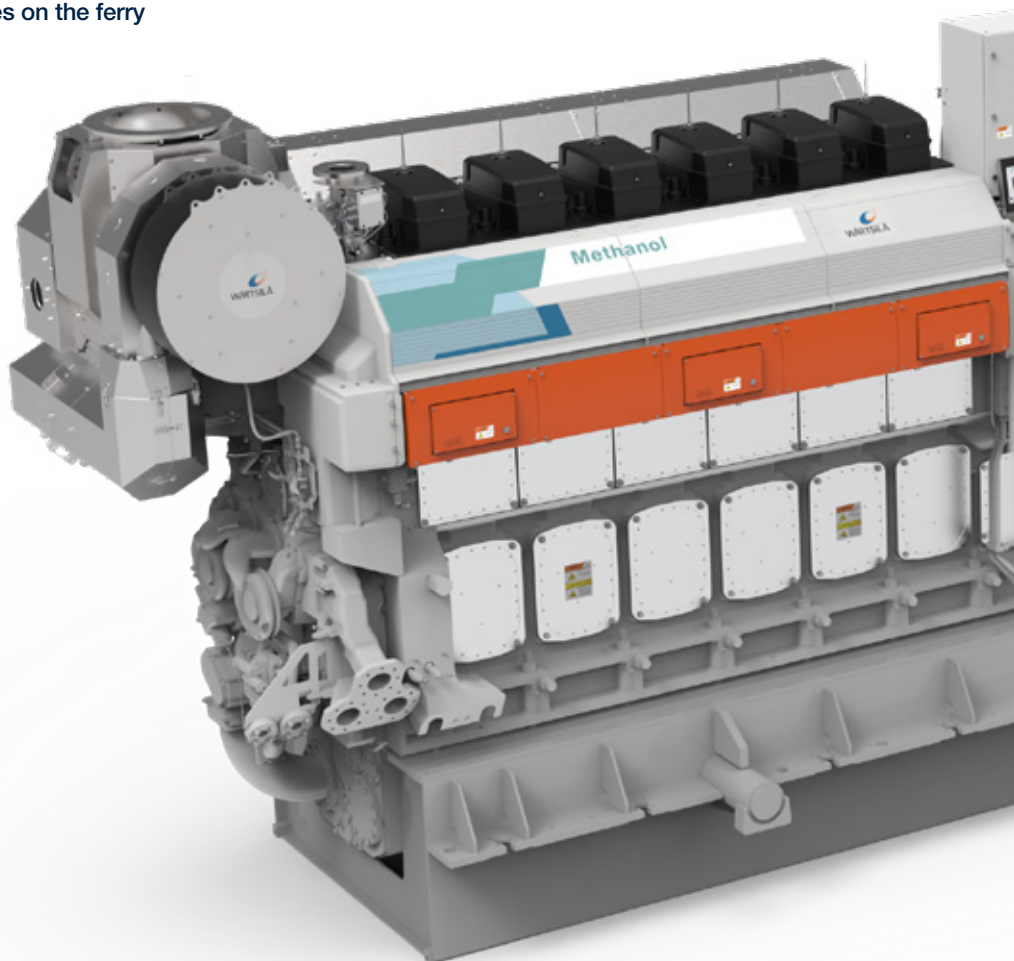
Enabling sustainable fuel use with one of Wärtsilä's most widely deployed engines



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with IMO Tier II limits. Combined with selective catalytic reduction such as Wärtsilä's NOR (nitrogen oxide reducer), the engine meets IMO Tier III.

When methanol is produced with renewable electricity and captured carbon (such as biomass), it is carbon-neutral. The use of such 'green' methanol can reduce well-to-wake greenhouse gas emissions by around 80%, taking into account emissions across the supply chain and the use of pilot fuel.



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The Wärtsilä 32 platform

The Wärtsilä 32 engine has been the preferred choice of yards, operators and owners since the 1980s, with more than 5,300 engines delivered to the marine market and more installations on land. With proven reliability and low fuel consumption, the Wärtsilä 32 represents the most efficient solution throughout the entire lifecycle of the vessel.

Typical applications

The Wärtsilä 32 has a proven track record in a wide range of vessel applications. It is used for main engine applications, both direct mechanical drive as well as diesel electric, and as an auxiliary engine. It can be optimized for either constant speed or along a combinatory curve.

In the merchant fleet, typical applications include use as the main

engine on different types of tankers and container vessels. In the offshore sector, the reliability of the Wärtsilä 32 has made it the most popular medium speed engine for OSVs and drilling vessels. Similarly, in the cruise and ferry sector, the Wärtsilä 32 has proven to be the most favoured engine of its size. In auxiliary electric production, the Wärtsilä 32 is suitable in all vessel categories where high auxiliary load is needed.

With its exceptional pedigree, the Wärtsilä 32 methanol engine is the natural choice for bringing the advantages of methanol fuel to these applications.

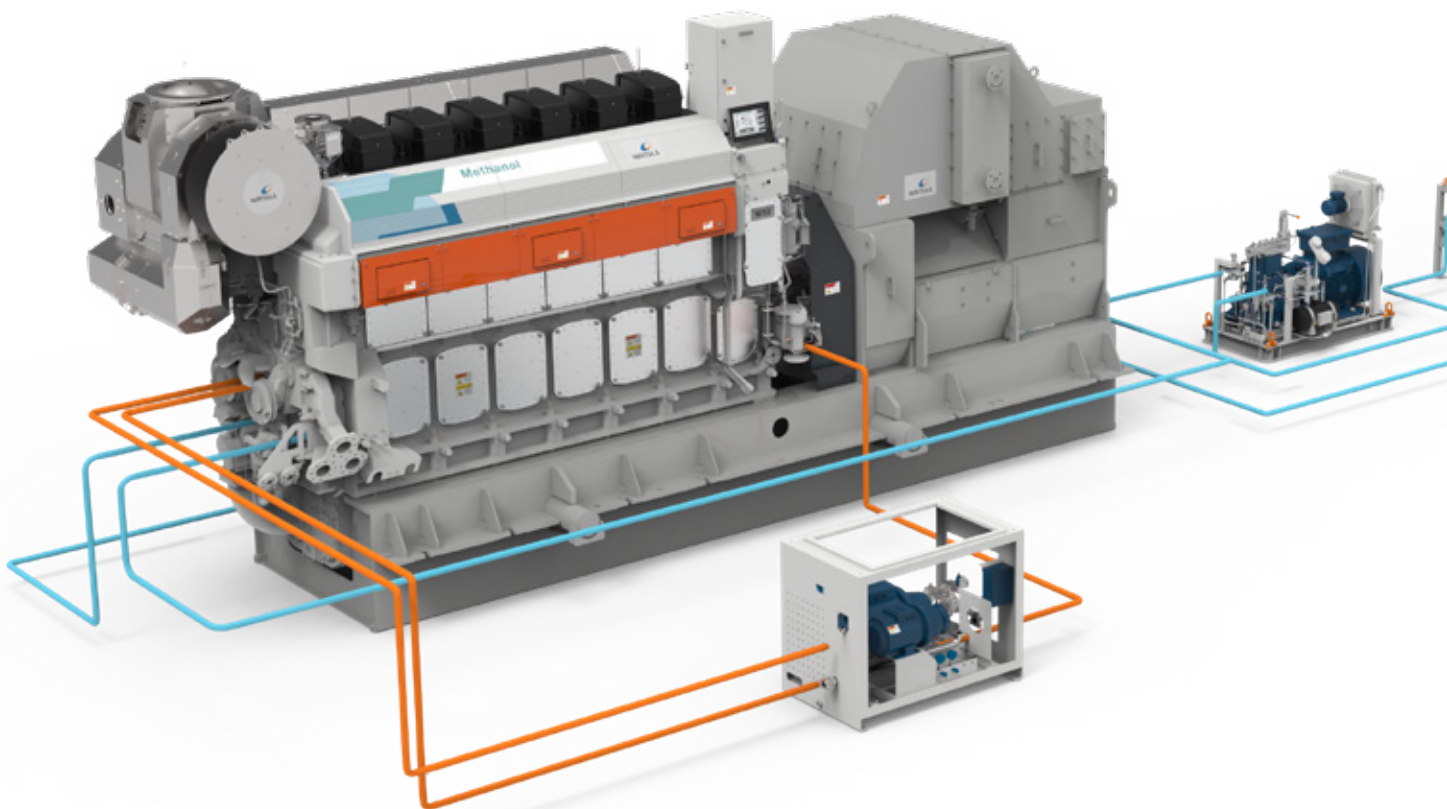
Operational features

Its excellent fuel flexibility allows the Wärtsilä 32 methanol engine to operate on methanol, HFO, MDO

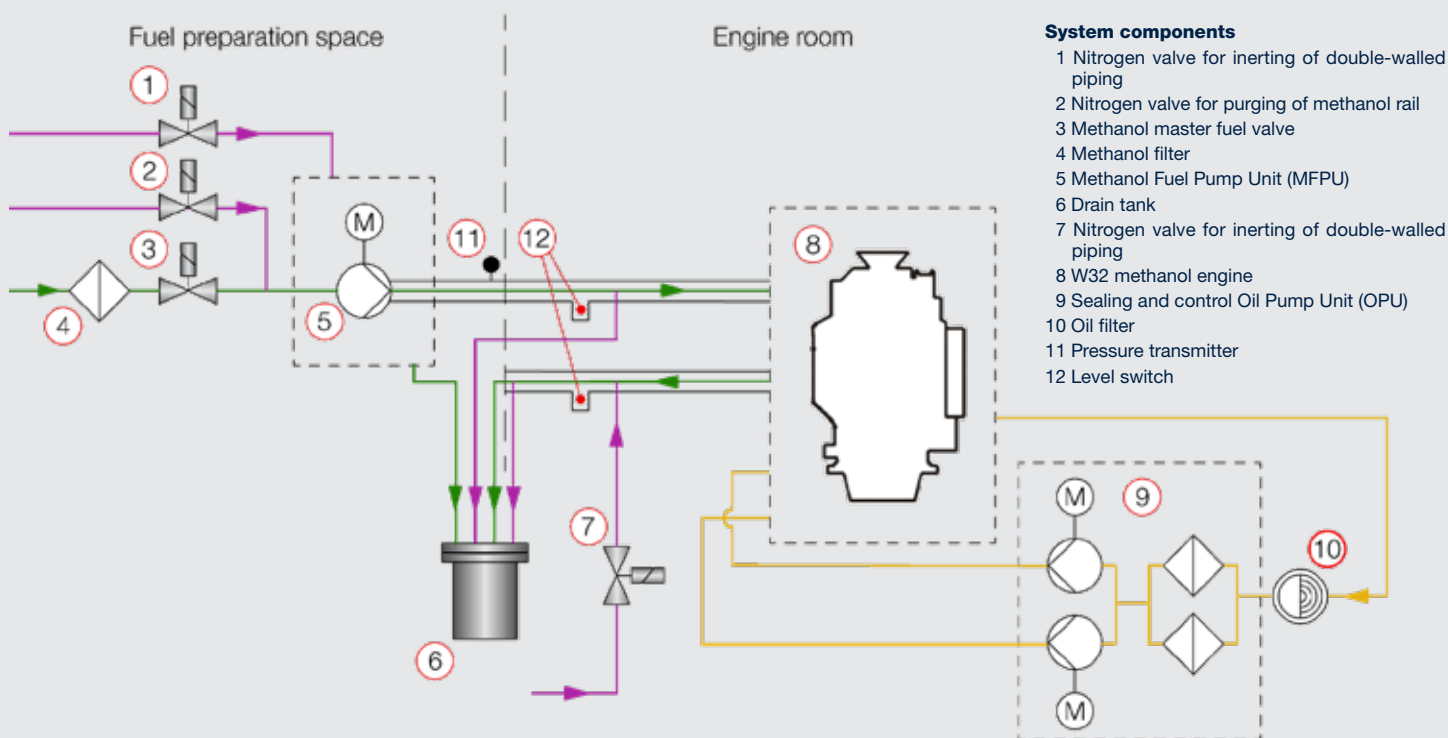
- **High reliability**
- **High power density**
- **Low fuel consumption over a wide load range**
- **Operates on methanol, HFO, MDO and liquid biofuels**
- **Supported by Wärtsilä's global service network**

and liquid biofuel. The engine can operate efficiently and economically on methanol or low sulphur fuel oils (<0.1%) or liquid biofuels, giving a range of fuel options for operation in emission-controlled areas.

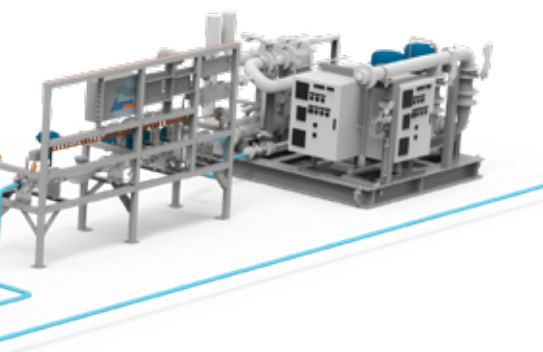
A variable inlet valve closure unit allows for early inlet valve closure at high load, enabling minimized NOx levels and



Methanol system overview



lower fuel consumption. Switching to late inlet valve closure ensures good part load and transient performance as well as improved load acceptance and smoke reduction.



A dedicated methanol fuel pump unit for each engine increases fuel delivery pressure to ensure efficient injection. This unit is controlled via variable frequency drives by the latest version of Wärtsilä's UNIC engine automation

system, which incorporates automatic monitoring and control for optimal operating efficiency.

An oil pump unit regulates the delivery of hydraulic oil used both to control injection and to provide an effective seal against methanol leakage during the injection process.

Lifecycle costs

The Wärtsilä 32 has been designed to operate reliably on a wide range

of fuels. The engine is designed for long periods of maintenance-free operation and has overhaul intervals of up to 24,000 hours. This and the maintenance-friendly design reduce downtime, promote scheduling, and cut operating costs. The overhaul interval time for the Wärtsilä 32 methanol engine can be further extended using condition-based maintenance and long-term service agreements, minimizing maintenance costs and maximizing vessel revenue-earning capability.

An easy-to-handle, proven solution offering compliance with all current and known future regulations



Full project support

Wärtsilä's project management teams have a proven track record of delivering smooth, successful projects across multiple fuels and can deliver the full project – from feasibility studies to execution planning and implementation – for both newbuild and retrofit. An adaptable approach results in the best solution for each individual customer.

For newbuild projects, Wärtsilä can help owners understand whether methanol is the right fuel choice for them. This includes assessing impact on ship design and operation as well as

financial and compliance implications before providing full project support.

Wärtsilä offers a holistic solution for converting vessels to use methanol as a fuel. Just like any other fuel conversion, there are several factors to consider in the planning and design stage. Whether the vessel can be converted to operate on methanol will depend mainly on space needed for tanks and additional equipment. Expert guidance at planning stage ensures that the final outcome meets the needs of the customer.

Retrofittable or newbuild solutions offering full flexibility for tailored decarbonisation pathways

Decarbonising shipping the Wärtsilä way

Methanol-fuelled engines are just one of several fuel and technology options that can help to decarbonise shipping. Wärtsilä's wide technological expertise offers customers the certainty that investments made today will help them reach their long-term decarbonisation objectives.

Cutting shipping's climate impact will take more than technology; this includes deep partnership with customers. Enabled by our experts, we help customers benchmark fleets and set targets in line with regulatory requirements and business objectives, and advise on selecting optimal and

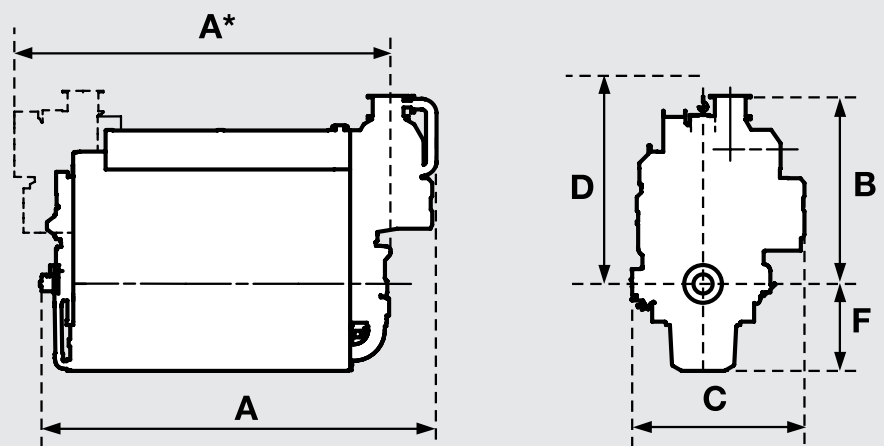


Wärtsilä 32

Main technical data		Rated power	
Cylinder bore	320 mm	Engine type	kW
Piston stroke	400 mm	6L32	3 480
Cylinder output	580 kW/cyl	7L32	4 060
Speed	750 rpm	8L32	4 640
Mean effective pressure	28.9 bar	9L32	5 220
IMO	Tier II or III		

Dimensions (mm) and weights (tonnes)								
Engine type	A* mm	A mm	B* mm	B mm	C mm	D mm	F mm	Weight tonnes
6L32	5 570	5 130	2 432	2 295	2 380	2 345	1 155	35
7L32	N/A	5 745	N/A	2 330	2 380	2 345	1 155	38
8L32	6 400	6 379	2 457	2 375	2 610	2 345	1 155	44
9L32	6 885	6 869	2 455	2 375	2 610	2 345	1 155	49

* Turbocharger at flywheel end



future-proof solutions. Success is assured via agreements based on expected outcomes, making Wärtsilä a lifetime partner for decarbonising shipping.

To learn how you can begin to decarbonise your fleet with methanol and the Wärtsilä 32 engine, please contact your local Wärtsilä Marine Sales Office

wartsila.com/marine/products#power
addresses.wartsila.com

WÄRTSILÄ MARINE POWER IN BRIEF

Wärtsilä Marine Power leads the industry in its journey towards a decarbonised and sustainable future. Our broad portfolio of engines, propulsion systems, hybrid technology, and integrated powertrain systems delivers the efficiency, reliability, safety, and environmental performance needed to support our customers. Our offering includes performance-based agreements, lifecycle solutions, and an unrivalled global network of maritime expertise.



wartsila.com/marine