EOUK STROKE MARINE ENGINES

HIGH PERFORMANCE PRODUCT RANGE

Engineering the Future – since 1758. **MAN Diesel & Turbo**



POWERING THE WORLD --RESPONSIBLY



MAN Diesel & Turbo is the world's leading provider of large-bore diesel engines and turbomachinery. Our portfolio includes fourstroke and two-stroke engines for marine and stationary applications, turbochargers and propellers, gas and steam turbines, compressors and chemical reactors.

Our four-stroke engines offer propulsion and auxiliary power for all types of applications. We also provide dual fuel engines and complete propulsion packages. Around 50 percent of all global ocean-going trade is today powered by MAN engines.

We are committed to minimizing fuel consumption while meeting the most advanced emission regulations. The MAN PrimeServ brand supports our customers all around the world with a comprehensive range of after-sales services.





MAN VP185 Pages 12-15

















PRIME MOVERS IN THE HISTORY OF SHIPPING

History made by pioneers

When the M/S Selandia was launched in 1912 it was the first ocean-going ship with a diesel engine, built on a tradition of innovative engineering that went back to 1758. In the 1890s, MAN engineers helped Rudolf Diesel build the world's first diesel engine. In just a few decades it would completely change the way ships were powered. **Progress is change and change needs movement** MAN engineers continued improving the diesel engine into the 21st century. We will continue to build on our tradition of innovation: responding to megatrends such as globalization, population growth, urbanization, and climate change while providing solutions for the needs of ship owners, ship builders, operators, crews and passengers.

MAN 175D

The compact high speed engine

The MAN 175D diesel engine is a 12 cylinder V type with 175 mm bore for mechanical or electric propulsion and onboard power generation. Running from 1,500 to 1,900 rpm it features ratings from 1,440 to 2,220 kW. With its advanced Common Rail fuel injection system the engine combines upmost fuel efficiency with the lowest possible emissions, making it a perfect investment for the future. The MAN 175D high-performance engine is IMO Tier III compliant when fitted with MAN SCR (Selective Catalytic Reduction).

Characterized by clear-cut design, the MAN 175D is easy to commission, easy to operate, and easy to service. Inheriting its genes from our successful four-stroke engine tradition, the MAN 175D is robust and reliable by nature.



HIGHSPEED MARINE POWER PACKAGE



Four-Stroke Marine Engines Page 10 | 11





Advanced efficiency for business or pleasure

The MAN 175D is ideal for economical operation in ferries, offshore service and supply vessels, workboats, tugs, yachts and governmental ships. It combines dynamic partload operation with economical endurance. Designed from the outset considering high-level emission standards, the MAN 175D is one of the most versatile marine engines able to meet all the challenges of many different applications.

Benefits

- Advanced and robust Cutting-edge technology and proven reliability
- Powerful and reliable

Peak performance built on experience

- Modular design for easy adaptation to different applications With four auxiliary Power Take-Offs (PTO)
- Environmentally friendly
 Full IMO Tier III compliance in combination with MAN SCR

Applications



MAN VP185

High speed performer

The MAN VP185 diesel propulsion engine is a V type available with 12 or 18 cylinders with 185 mm bore. It runs on marine gas oil and has an output of 2,000 to 4,000 kW. Its class-beating power to weight ratio is 2.69 – 2.88 kg/kW. It is IMO Tier III compliant when fitted with MAN SCR (Selective Catalytic Reduction).

This compact, high speed engine is easy to install. Its water-cooled exhaust system helps to maintain a low engine room temperature whilst the two-stage turbocharging arrangement provides a wide torque curve.



MAXIMUM POWER -MINIMUM VOLUME





Proven power and reliability

The MAN VP185 has proven itself in many applications, from fast patrol boats to luxury yachts. In terms of performance, it has one of the highest power densities on the market. At the same time, its operation is simple and reliable which is essential in boats with small crews.

The MAN VP185 is an ideal propulsion choice for high speed coastal and offshore patrol vessels. For naval vessels it provides a high technical readiness level, outstanding reliability with low acoustic and thermal signatures.

Benefits

- Compact size
 Excellent power to weight ratio
- Minimized detectability
 Low acoustic and thermal signature
- IMO Tier III compliant When fitted with MAN SCR (Selective Catalytic Reduction)

Applications NAVAL DEFENSE

© Courtesy of Cantieri Navali Codecasa Due S.p.A

MAN 21/31

Reliable propulsion power

The MAN L21/31 is an inline diesel engine for propulsion or power generation. It is available with five to nine cylinders with 210 mm bore. It runs on MGO, MDO and HFO, and has an output of 1,000 to 1,980 kW. When fitted with MAN SCR (Selective Catalytic Reduction), it complies with IMO Tier III regulations.

This engine features a jet assist device that supports the rapid acceleration in partial load operation of the main marine engines. This improves the maneuvering characteristics by increasing the charge air pressure of the turbocharger. With its outstanding load pick up capabilities and extremely long time between overhauls (TBO), the MAN L21/31 is ideal for many different applications.



RELIABLE AND USER-FRIENDLY OPERATION

ACIFIC ORCA



Superior load change application and long TBOs

Many years of experience with the propulsion concept, together with customers' requirements for reliability, economy and technical advancement has resulted in this attractive 1000-rpm engine with a cylinder output of 220 kW (GenSet).

The MAN L21/31 engine is the ideal power source for small to medium sized tankers, cargo vessels, ferries, RoRo vessels, large fishing vessels, tugs, workboats and supply vessels.

Benefits

- Convenient Power Take-Off (PTO) 100 % PTO is possible from either end of the engine. A small 40 kW PTO is optional on the front-end
- Clean engine design

The front-end box incorporates cooling water pumps, thermostatic valves, oil pump, cooler and filter

 Very short installation length Stand-by pump connection is at the side of the engine

Applications

Courtesy of Swire Blue Ocea



MAN 23/30DF

Economical power generation

The MAN 23/30DF is an inline dual fuel engine for power generation or propulsion available with five to eight cylinders with a bore of 225 mm and a stroke of 300 mm; the crankshaft speed is 720, 750 or 900 rpm. It runs on marine gas oil (MGO) and liquefied natural gas (LNG) and has an output of 625 to 1,200 kW.

Based on the popular MAN 23/30 conventional diesel GenSet, the MAN 23/30DF is ideal for many applications requiring economical power, reliability and full compliance with IMO Tier III regulations.



LOWER ENISSIONS AT LOWER COST



MAN 23/30DF

A practical solution available as retrofit

With over 14,000 MAN 23/30 GenSets in service around the world it makes perfect sense to offer the MAN 23/30DF as an economical retrofit solution. The MAN 23/30DF continues the GenSet's tradition of easy maintenance and long time between overhauls.

The MAN 23/30DF's robust monoblock engine is made of cast iron. The engine frame and underslung crankshaft restrict combustion and inertia forces to within the same component, enhancing reliability, durability and availability.

Benefits

- Classic engine design and easy engine operation The MAN 23/30DF is based on well-proven MAN 23/30 Genset
- High availability of spare parts and service
 Worldwide PrimeServ network
- Long time between overhaul
 20,000 operational hours

Applications





SELECTIVE CATALYTIC REDUCTION

The solution for less NO_x

Selective Catalytic Reduction (SCR) is the most tested and approved system for achieving NO_x reduction rates up of to 90%. By inducing chemical reactions in the engine's exhaust gases, harmful substances are transformed into ecologically benign constituents.

Our MAN SCR system can be used with our entire portfolio of four-stroke medium and high speed engines. Efficient and reliable, it serves as a standard solution to meet the IMO Tier III emission limits.

Benefits

- IMO Tier III compliance For operation in emission control areas (ECA)
- One source, one point of contact
 Standardized portfolio for minimum cost, maximum flexibility and fast order management
- Proven catalyst know-how

Thanks to long-term experience from the automotive industry

LNG DUAL FUEL SOLUTIONS

Low-emission ship propulsion and onboard power

We are committed to reducing emissions while increasing fuel efficiency and power density. Our dual fuel engines do this while keeping operation economical. And thanks to the recent acquisition of MAN Cryo we also offer one-stop solutions for comprehensive engine and fuel gas supply systems (FGSS).

Dual-fuel engines using clean-burning liquefied natural gas (LNG) are an excellent option. Not only do they satisfy all emission requirements when running on gas, they also offer low operational and maintenance costs.

Benefits

- Low emissions Gas burns cleanly and with low \mbox{NO}_{x} and low \mbox{SO}_{x} emissions
- Low running costs
 Gas is attractively priced
- Fuel flexibility

Easy switch to diesel if gas is not available or is more expensive than diesel

ECOMAP

Intelligent optimization of engine load profiles

ECOMAP is a software feature for our electronically controlled engines that allows the engine to be programmed to run along different SFOC / power characteristics, each of them having its efficiency optimum at different load points.

The combination of Common Rail technology and the **SaCoS**_{one} electronic management system enables the realization of different engine maps with software changes only. There is no need to modify anything in the engine's hardware.

Benefits

Low CO₂ emissions Gas burns cleanly and with low emissions
Fuel savings By optimizing engine and load profile maps
Easy to apply

No engine hardware modifications

MAN ALPHA KAPPEL PROPELLERS

A greener profile with the lowest possible EEDI

New fuel-saving and energy-efficient propulsion opportunities are available with the full integration of the Kappel tip fin propeller blade designs in the MAN Alpha propeller program.

Optimized propeller and propulsion efficiencies contribute to lowering the EEDI (Energy Efficiency Design Index) of ships, as every gram of fuel saved by means of higher propulsive efficiency results in more energy-efficient transport.

Benefits

- Lower emissions
- Thanks to increased propulsion efficiency
- Fuel savings
- Up to 6 % compared to conventional designs
- Increased passenger/crew comfort Reduced noise and vibration levels



Respecting the environment

In 2016, the International Maritime Organization IMO Tier III standard came into force for ships operating in the ports and coastal waters of North America and US Caribbean, imposing substantially more stringent limits for nitrogen oxide (NO_x). There are also sulfur oxide (SO_x) restrictions since 2015 in the Emissions Control Areas (ECA) in the Baltic Sea, the North Sea, designated coastal areas off the United States and Canada, and the United States Caribbean Sea. We offer customers an IMO Tier III compliant marine engine portfolio based on a diverse and extensive range of technologies. We are the first company to successfully make all its four-stroke marine engines IMO Tier III compliant.

MAN 27/38

Compact, reliable and economical

The MAN 27/38 is an inline diesel engine available with five to nine cylinders with 270 mm bore. It runs on MGO, MDO and HFO, and has an output of 1,500 to 3,285 kW and can be used for propulsion or as auxiliary GenSet. It features a jet assist device that supports the rapid acceleration in partial load operation of the main marine engines. This improves the maneuvering characteristics by increasing the charge air pressure of the turbocharger.

Superior load change application and long TBOs make the MAN 27/38 engine an ideal power source for many different types of vessels. It offers full IMO Tier III compliance with the addition of MAN SCR (Selective Catalytic Reduction).







Reliability and economy in operation

The proven reliability of this engine ensures long periods between overhauls and no unscheduled maintenance and repair work. Additional economic benefits derive from its low fuel and lube oil consumption – while fulfilling legal emission limits.

The compact engine is easy to install in ferries, RoRo vessels, container feeder vessels, cargo ships, tugs, offshore supply and fishing vessels.

Benefits

Clean engine design

The front-end box incorporates cooling water pumps, thermostatic valves, oil pump, cooler and filter

Very short installation length

Thanks to pump connection at the side of the engine

Reliability in operation

Long periods between overhauls and no unscheduled maintenance

 Convenient Power Take-Off (PTO) 100 % PTO from either end of the engine plus optional 50 kW PTO

Applications



MAN 28/32DF

Environmentally friendly propulsion

The MAN L28/32DF is an inline dual fuel engine available with five to nine cylinders with a bore of 280 mm and a stroke of 320 mm. It runs on MG0, HF0 and LNG and has an output of 950 to 1,800 kW.

The MAN L28/32DF complies with IMO Tier III regulations (when fitted with MAN SCR) while offering the economic benefits of full fuel flexibility and high efficiency regardless of fluctuations in the fuel market.



DUAL FUEL FOR A FLEXIBLE FUTURE



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MAN 28/32DF

Exploiting the possibilities of clean burning gas

The MAN L28/32DF engine is based on the proven MAN 28/32H workhorse, recognized worldwide as an ultra-reliable and robust engine with long TBOs. The reliability of the MAN 28/32H engine design is proven by the 14,000 engines in service worldwide.

The engine is available in two versions: new build or retrofit. Designed to complement the four-stroke MAN 51/60DF or a two-stroke dual-fuel ME-GI engine as part of a complete power package, the engine's ability to run on gas offers unprecedented possibilities.

Benefits

Classic engine design and easy engine operation

MAN L28/32DF is based on well proven conventional MAN 28/32H diesel GenSet

- Long time between overhaul 20,000 operational hours
- Full compliance with IMO Tier III regulation When operating in gas mode

Applications

LNG SHIPPING FERRY

MAN PA6B

A proven success story

The MAN PA6B Offshore GenSet (OG) is a V-type diesel GenSet available with 12, 16, 18 or 20 cylinders with 280 mm bore. It runs on MG0 and MD0 and has an output of 4,200 - 7,400 kW. The original MAN PA6B has proven itself over uncountable running hours, as well as in starting and loading sequences. More than 1,000 engines of the PA class are in service around the world.

The new MAN PA6B OG is IMO Tier II compliant and surpasses IMO Tier III regulations with a Selective Catalytic Reduction (SCR). It uses the latest engine-safety-and-control system and the turbochargers have been optimized to meet the load requirements and operational profile for offshore generator sets on semi-submersible drilling rigs.



LIGHTWEIGHT POWERHOUSE



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Compact, lightweight, and durable GenSet

The MAN PA6B is an ideal solution for diesel-electric propulsion and power generation in the offshore segment. The engine is highly resistant to shock and can deal with tilts of up to 25°. It also copes well with load increases and long-term, low-load operation. The MAN PA6B's impressive profile is rounded off by long maintenance intervals, thanks to its proven design and the use of high-class OEM components.

Benefits

- Great power-to-weight ratio
 High power density, low-weight engine
- Compact design to reduce size of engine room
 Improves variable deck loading capability
- Black start capability
 Engine start with load acceptance in < 10 seconds
- Higher deck load capacity on semi-submersible / self-elevating vessels Thanks to compact design and great power-to-weight ratio

Applications

OFFSHORE EXPLORATION OFFSHORE PRODUCTION

MAN 28/33D STC



Efficient, reliable and economical

The MAN 28/33D STC is a V-type diesel engine available with 12, 16 or 20 cylinders with 280 mm bore. It runs on MGO and has an output of 5,460 to 10,000 kW and the best power to weight ratio in the medium speed engine class. Its advanced STC (sequential turbocharging) system provides high torque at low rpm. The MAN 28/33D STC complies with IMO Tier II and IMO Tier III (with optional Selective Catalytic Reduction).

MAN 28/33D STC engines are ideal for naval applications as they offer an optimum combination of high power and rapid engine response as well as long endurance, and economical, low signature operation during extended cruising and patrolling missions.





MAN 28/33D STC

Versatile performance

The masterful performance of this engine is not just down to advanced technology like sequential turbocharging, it also makes a clear statement with low fuel consumption and full environmental compliance at low costs.

Its low acoustic and thermal signature characteristics make it especially suitable for naval applications. It is capable of extended operation at low loads without white smoke or maintenance impact. With its outstanding efficiency and reliability the MAN 28/33D STC is also perfectly suitable for fast ferries.

Benefits

Best power to weight ratio in its class

5.3 kg/kW, unequaled by any other medium speed engine

High reliability and low maintenance efforts

All maintenance in situ, no removal from vessel necessary, no change of crankshaft

Simple efficiency

Sequential turbocharging (STC) provides optimum matching over all loads with only two turbochargers

Applications

NAVAL DEFENSE FAST FERRY YACHT



Engineering the future

Our aim is to meet the needs of our customers in a world marked by challenges in the areas of health, resource scarcity, urbanization, and climate change. We do this by continuously looking for different ways of improving the efficiency of our products.

Research and development focus

- Reducing fuel consumption and emissions
- Alternative drive concepts
- Alternative fuels
- Systems and instruments

Ensuring your future performance

Because most of our products have a very long service life – and are used intensively – we implement a future-oriented product development process to minimize environmental impacts as far as possible. Long service life is also why our service brand MAN PrimeServ is so important. We have a strong local presence with over 100 PrimeServ locations worldwide.

Innovative alternatives

In our view, alternative engine technologies will take on new importance in the future. That's why it is essential for MAN to understand future customer needs; by flowing customer requirements into the development of our products and services, we create more customer value.

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MAN 32/44CR

High specific power output meets high availability

The MAN 32/44CR is an L- and V-type diesel engine available with 6, 7, 8, 9, 10, 12, 14, 16, 18 or 20 cylinders with 320 mm bore. It runs on MGO, MDO and HFO, and has an output of 3,600 to 12,000 kW. It is available for diesel-mechanic, diesel-electric and auxiliary application. The main components are all developed in-house. Compliance with IMO Tier III NO_x emission limits is ensured when combined with MAN SCR (Selective Catalytic Reduction).

With its high power output, low operating and maintenance costs and low exhaust emissions, MAN 32/44CR engines are multi-purpose "prime movers" for all marine applications, both commercial and governmental.



THE DRIVE FOR YOUR NEEDS





MAN 32/44CR

Engineered to set benchmarks

Our current MAN 32/44CR engine represents the newest technologies in the area of medium speed operated industrial sized diesel engines. The MAN 32/44CR is equipped with the newest generation of MAN Diesel & Turbo's engine management system. **SaCoS**_{one} combines all the functions of modern engine management in one complete system.

Benefits

- Low fuel oil consumption over the whole power range
 Due to highly flexible future ready Common Rail technology
- Excellent engine load acceptance
 Thanks to Common Rail with boost injection
- Reliable IMO Tier III compliance

With any fuel type and best fuel economy thanks to MAN's closed loop SCR system

Applications





MAN 35/44DF

Highest power output with lowest emissions

The MAN 35/44DF is an inline dual fuel propulsion and auxiliary engine available with six to ten cylinders with 350 mm bore. It is available for mechanical or electric propulsion and as auxiliary GenSet. It runs on MGO, MDO and HFO, and natural gas and has an output of 3,060 to 5,300 kW.

In the shipping industry, the choice of fuel for marine propulsion is becoming increasingly challenging. Highly flexible dual-fuel engines offer an eco-friendly yet cost-effective solution. The MAN L35/44DF offers high output, dual fuel flexibility, and is IMO Tier II and IMO Tier III compliant (in gas mode).





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MAN 35/44DF

Dual fuel flexibility

Engineering ingenuity enables ship owners to tap into component synergies and cut down their operating costs. The MAN L35/44DF engine's unique design centers on gas operation and offers full operational flexibility thanks to the seamless switching over from gas to liquid mode at any time, at loads between 15% and 100% – with no loss of engine power.

Benefits

- Unrivaled power output in class 530 kW/cyl
- Seamless fuel switching

From HFO to gas operation without the need for intermediate transfer to MDO

Reliable power with all fuels

Operation with gas qualities down to MN >= 70 without power reduction

 Future proof flexibility LNG ready solutions

Applications



MAN 48/60CR

The marine powerhouse

The MAN 48/60CR (Common Rail) is an L- and V-type diesel propulsion engine available with 6, 7, 8, 9, 12, 14, 16 or 18 cylinders with 480 mm bore. It has an output of 7,200 to 21,600 kW. The advanced Common Rail injection system of the MAN 48/60CR was designed for operation with heavy fuel oil (HFO) and it can also be operated with marine diesel oil (MDO) and marine gas oil (MGO).

The MAN 48/60CR was designed for all main marine applications and can be used in single- and multi-engine plants, for diesel-mechanic and diesel-electric drives. The optional MAN SCR (Selective Catalytic Reduction) ensures it complies fully with IMO Tier III emissions standards.



QUIETLY EFFICIENT AND CLEAN



MAN 48/60CR

Solving tomorrow's challenges today

The MAN 48/60CR is a striking combination of top performance, operational flexibility and reliability. High power output as well as low fuel consumption and exhaust emissions fit the market requirements of today – for every kind of marine application. Tailor-made engine seatings ensure the lowest level of vibrations and highest possible passenger comfort in cruise ships.

The economic and ecological performance of the engine is determined by the in-house development and production of the key components.

Benefits

Most powerful engine

1,200 kW per cylinder in the speed range of 500/514 rpm

- Intelligent fuel savings
 Optional ECOMAP function enables use of different engine performance
 characteristics
- Low maintenance costs

MAN quality and maintenance friendly engine design ensure long service intervals

Most economic and reliable

Compliance with IMO Tier III in combination with MAN SCR and intelligent SCR regeneration

Applications

Carnival Cruise Lin



MAN 51/60DF

High power and competitive fuel economy

The MAN 51/60DF is an L- and V-type dual fuel engine available with 6, 7, 8, 9, 12, 14, 16, or 18 cylinders with 510 mm bore. It is available for mechanical or electric propulsion and as power generation GenSet. It runs on MGO, MDO and HFO, and natural gas and has an output of 6,300 – 18,900 kW.

Fuel consumption in liquid fuel mode is best in class. The MAN 51/60DF engine satisfies IMO Tier III requirements in gas fuel operation and in liquid fuel operation (by means of MAN SCR). It is available as main engine propulsion and as power source for floating processing or power generation units. Its high configuration flexibility makes it ideal for multiple applications.



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MAN



MAN 51/60DF

Clean, clever, compact

With the MAN 51/60DF, MAN Diesel & Turbo has created a highly efficient dual-fuel engine that produces low emissions and can be conveniently switched from gas mode to liquid fuel mode without interruption. Combined with a state-of-the-art safety concept, this multi-fuel capability makes this option the ideal drive solution for LNG carriers. The fuel sharing operation mode offers the possibility of simultaneously fuelling the engine with liquid fuels and gas and contributes even further to an LNG carrier's operation flexibility.

Benefits

- Highest power output in its class
 Up to 1050 kW per cylinder with 10% overload margin in both, diesel and gas mode
- Full environmental compliance in gas and liquid fuel operation IMO Tier III in gas mode and with MAN SCR in liquid fuel mode Starting capability gas mode
- High operation flexibility

Top load acceptance in gas mode above 500 kW per second Transfer from diesel to gas and vice versa up to 100 % MCR

Applications

LNG SHIPPING CRUISE FERRY



WE ARE PEOPLE

The massive engines that carry the MAN name are designed, built and maintained by people for people. Our work is a continuous dialog between our customers' needs and the ingenuity of our designers, marine engineers, fitters, technicians, mechanics and service staff.

Reliable, innovative, dynamic and open

Every day we aim to make our products and services that little bit better. We do this all around the world, with sites in more than 120 countries.

Our Corporate Responsibility Strategy 2020+

We adapt to societal changes and meet global challenges with flexibility and innovation. Our commitment to transparency, sustainability, and corporate responsibility guides our steps and shapes our actions.

MAN PrimeServ

MAN PrimeServ is the dedicated MAN Diesel & Turbo service brand. Via a network of over 100 service centers worldwide, MAN PrimeServ provides 24/7 service across the globe. Our range of services includes technical support, consulting and OEM spares, as well as maintenance, repair and comprehensive individualized service plans.

MAN PrimeServ's aim is to provide:

- Prompt delivery of high-demand OEM spare parts within 24 hours
- Fast, reliable and competent customer support
- Individually tailored 0&M contracts
- Ongoing training and qualification of operators and maintenance staff
- Global service, 24 hours a day, 365 days a year
- Diagnosis and troubleshooting with our high-performance Online Service

SERVICE WITH PASSION



WORLD-WIDE SERVICE

MAN PrimeServ

We offer retrofitting and upgrade services to bring engines and turbochargers already in service up to the very latest standards of performance and efficiency. Using the latest digital technology, we enable you to maximize the performance and availability of your MAN equipment by accessing real-time data analysis, remote support and rapid solutions. We also offer an extensive range of training courses at MAN PrimeServ academies around the world.

For more information please visit: www.man.eu/primeserv

(MAN)

MAN PrimeServ



GET YOUR ENGINES STARTED...

🛛 An interactive experience 📹

Download our MAN Brochure Store app from the App Store. Use its exciting interactive features to explore our complete range of products and services. Suitable for iPhone or iPad.



MAN

🛛 Explore our latest news via an app 🗯 👘

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MAN Diesel & Turbo

86224 Augsburg, Germany Phone +49 821 322-0 Fax +49 821 322-3382 info@mandieselturbo.com www.marine.man.eu