



MEETING **TIER 4 FINAL** DEMANDS

KEEP IT SIMPLE!

ENGINES FOR **OFF-ROAD** APPLICATIONS

**VOLVO
PENTA**

VOLVO PENTA **INNOVATION**

The tradition of innovation runs deep at Volvo Penta.

Developing new, pioneering products and improving existing products is a source of pride for the entire Volvo Group. Although these products come to life in R&D departments and workshops, the sparks that ignite new ideas come from our customers and the end users of our products.

By having a strong relationship with our customers – and their customers – all over the world, we are able to focus on inventions and improvements that really matter. We know we are on the right path when our customers tell us that our product innovations have made a tangible difference to their business. We feel there is a special approach to product development that identifies where and when there is potential for improvement.

When it comes to legislation, often regarding emission levels, it's our ambition to stay well ahead of the curve in order to give our customers the time they need to plan and perfect their products.

This brochure exemplifies our attitude towards innovative thinking. It's not about innovation for its own sake, but for reliable, efficient and sustainable products – all in line with our customers' demands and expectations. Sometimes even to their delight.

PART OF THE VOLVO GROUP

The Volvo Group is one of the world's leading manufacturers of trucks, buses and construction equipment, drive systems for marine and industrial applications and aerospace components. The Volvo Group, which employs about 100,000 people, has production facilities in 19 countries and sales of products in more than 180 markets.

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QR readers are available in your smartphone's app store.



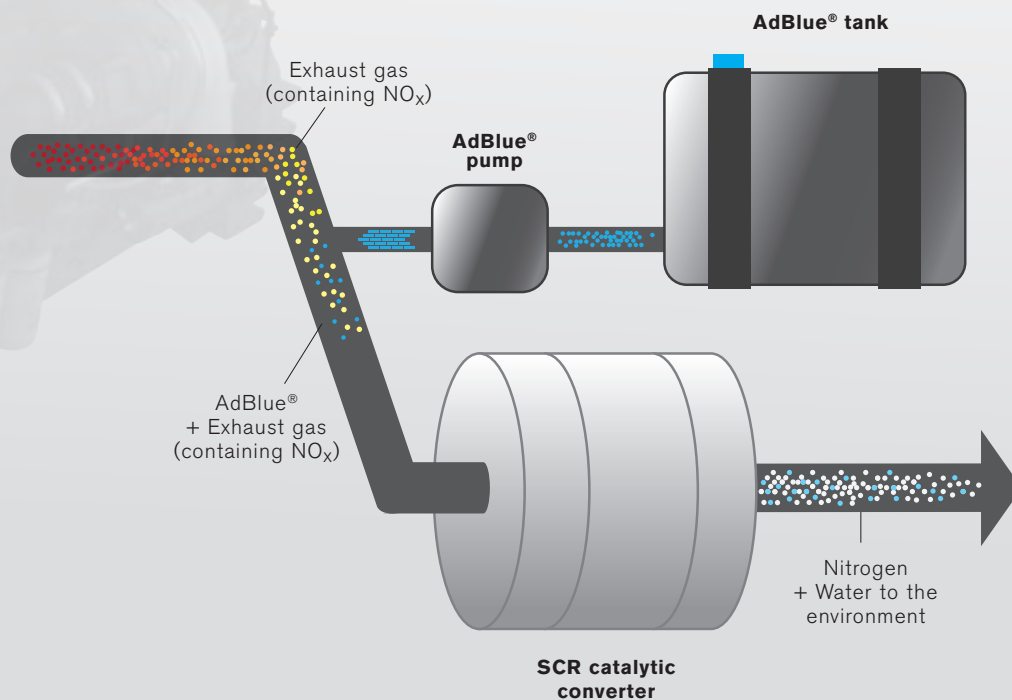
A SOLUTION FOR TOMORROW

In 2002, Volvo introduced EGR (Exhaust Gas Regeneration) technology. Then in 2005, Volvo released the Volvo SCR (Selective Catalytic Reduction) system. The technology proved so reliable that in 2010, Volvo Penta introduced the Volvo Penta SCR system optimised for off-road applications.

KEEP IT SIMPLE!

In 2014, the EU Tier 4 Final emission regulations for diesel engines in off-road applications will come into effect. Volvo Penta's strategy to meet these new emission demands is to keep it simple – for the manufacturers. By using the proven SCR technology, installation challenges for the manufacturers will be very limited, no regeneration is needed and operating costs are low.

Here, Volvo Penta proudly presents a completely new range of diesel engines that will comply with the upcoming emission standards.



Before the exhaust gases pass through the catalytic converter, up to 5% AdBlue® is added. The NO_x is then converted into harmless nitrogen gas and water vapour, and released into the environment.

The Volvo SCR system uses high-efficiency combustion, which results in lower fuel consumption and extremely low levels of particulate matter (PM), but high levels of nitrogen oxides (NO_x).

Volvo Penta is committed to SCR as the environmental technology to best comply with current and future emission demands. This technology is the optimal solution for low consumption of fuel and urea, operational efficiency, and reliability.

® = Registered trademark of the Verband der Automobilindustrie e.V. (VDA).

COMPLIANCE IN PRACTICE

The main benefit of the engines in the new range is that they are fully compliant with the stringent EU Tier 4 Final emission regulations for 2014. This means reducing NO_x emissions from 2.0 g/kWh to 0.4 g/kWh – a massive 80%. The same installation interface and performance is also available for other emission levels.

Thanks to several years' experience from the SCR system, Volvo Penta can offer off-road application manufacturers a sustainable engine plan for meeting current and new environmental standards. However, the emission compliance is only the first of many manufacturer and end user benefits.

The strategy for evolving the Volvo Penta engines from Tier 4 Interim to Tier 4 Final compliance was obvious. The SCR system had more than proven its efficiency, so we kept it simple. Together with a light EGR system, our new generation of engines now stands ready to meet the new emission standards with a well-proven technology.

The main technical changes in the new engine range are:

- Optimised SCR system
- Updated airless urea injection
- Added light EGR
- Simple installation: redesigned tank now includes pump and control unit

EASIER INSTALLATIONS

An engine with the Volvo SCR system has the same – or lower – cooling demand than one without SCR. Lower cooling demands translates to lower noise levels and minimised costs for the radiator package. This enables manufacturers to house the cooling system in installations where space is limited.

MAXIMISED POWER OUTPUT

The Volvo Advanced Combustion Technology and the SCR system turn more fuel energy into mechanical power – which leads to less heat rejection – meaning that the power output can be maximised for any given engine displacement. The result is smaller engine sizes, reduced costs, and simplified installations.

REDUCED OVERALL COSTS

For the end users, the principal benefits of the SCR engines start with unsurpassed fuel efficiency that cuts operating costs. With the SCR system, where the catalytic converter is designed to last the life of the engine, costs for maintenance and downtime are also reduced.

KEEP IT SIMPLE! The Volvo solution contains only the base engine, the SCR catalyst and the urea tank.

VOLVO PENTA D11 – TIER 4 FINAL EQUIPPED

UREA INJECTOR

Integrated in the SCR catalyst. Ensures that urea is injected directly into the catalyst, which reduces the risk of crystallisation.

HUMIDITY SENSOR

The humidity sensor combined with ambient temperature sensing optimises the usage of AdBlue®.

TEMPERATURE CONTROL SYSTEM

Heat management with a unique throttle arrangement reduces excess air flow and increases the exhaust gas temperature in low load conditions. This improves emission performance in the SCR catalyst with maintained fuel economy.

ADBLUE® TANK WITH INTEGRATED PUMP AND CONTROL MODULE

The urea pump is powered by electricity – no need for compressor, air tanks or regulator.

CATALYST AND SILENCER IN ONE

No regeneration needed.



LIGHT EGR

No increased heat rejection.

LIVING UP TO YOUR CUSTOMERS' DEMANDS

UPTIME



In most off-road operations, uptime is crucial. For Volvo Penta, knowledge about end users' operations and an on-going dialogue with our customers, allows us to make engines that are adapted to the demands and

challenges of its respective application. The supreme quality of the Volvo engines, the proven technology with no regeneration, and the same or longer service intervals, are also primary benefits. Furthermore, our preventive maintenance programmes help keep the engines running optimally, thereby maximising their uptime.

However, despite all precautions, downtime does occur. During these rare occurrences, users of vehicles, machines, and equipment with Volvo Penta engines can rely on rapid support from Volvo Penta service dealers and equally rapid access to spare parts. Being proactive and responsive is important to us, because to the end users, time really is money.

COST OF OWNERSHIP



When investing in new off-road machinery, the buyer's ambition should be to achieve maximum value for the money. Costs should be balanced against product qualities. Volvo Penta's strategy for offering end

users superior cost of ownership is based on a comprehensive approach where all engine components are optimised in relation to each other.

In a Volvo Penta engine, end user concerns like fuel efficiency, serviceability, durability, purchase cost, service costs, etc. are taken into account. However, we also consider the manufacturers' needs and strive for installation simplicity and application optimisation. It should be obvious, because when it comes to cost of ownership, quality pays.

GLOBAL SERVICE AND SUPPORT



For Volvo Penta, all service and support depends on local presence. Volvo Penta Industrial has a constantly growing number of dedicated and qualified service dealers in more than 100 countries who offer comprehensive service and support. They are, in turn, backed up by 40 Volvo Group warehouses that feed parts and accessories to 15,000 distribution points all over the world.

A typical example of our commitment to service is the Volvo Penta Action Service – a unique telephone service that is available to all owners of Volvo Penta engines in Europe and the US, round the clock, 365 days a year. At Volvo Penta, we don't see effective service and support just as an added value to the engine, but as an integral part of it.

INNOVATION FOR SUSTAINABLE PROFITABILITY



All users of off-road machines equipped with Volvo Penta engines benefit from the innovations and experience of the Volvo Group. With more than a century's experience in product development, the Volvo Group today is one of the world's largest diesel engine manufacturers.

By working with manufacturers and users of off-road machinery and equipment across the world, Volvo Penta has developed a broad range of engine applications, optimised for off-road use and tailored to specific end-user requests.

Our roadmap for future technological innovation is based on consistency. By offering total solutions and lifecycle commitment, we can create a basis for sustainable profitability for our end users.

A BROAD RANGE OF **APPLICATIONS**

CONSTRUCTION

Construction sites often mean extremely rough working environments. This puts extra pressure on the engines powering the machines and equipment – which are expected to just keep on going. In these circumstances, the Volvo Penta engines show their true colours.

The lightweight and compact Volvo Penta engines are easy to integrate, whatever your specific applications may be. In cranes, crushers, screeners, concrete and high-pre pumps, air compressors, equipment for piling and drilling, and other types of construction machines, they will match your needs perfectly.

Today, end users in construction sites all over the world rely on their machines and equipment – and ultimately their Volvo Penta engines.

RAW MATERIAL EXPLORATION

Heavy vibrations, smoke and dust, hefty loads, long stretches, extreme temperatures, and repeated beatings – the working conditions for mining machines and equipment are, to say the least, rough. Nevertheless, the Volvo Penta engines powering them have proved tough enough.

Volvo Penta engines are perfectly adapted to suit various mining applications. They are lightweight, compact, and easy to build into machines and equipment where space is scarce. In underground load and haul equipment, mobile and stationary crushing and screening equipment, and drill rigs, these engines perform with least possible environmental impact thanks to minimal emission levels. Through the years, Volvo Penta engines have proved their mining abilities in every way.



MATERIALS HANDLING

In harbours and freight terminals, the machines and equipment working with materials handling are exposed to increasing demands from the shipping industry. When containers and goods are loaded and unloaded, time is extremely valuable. It's vital that the engines in these machines are durable as well as available.

In this demanding work environment, Volvo Penta is recognised as an industry leader with engines that perform according to plan. In cranes, forklift trucks, reach stackers, AGVs, straddle carriers, terminal tractors, and other equipment, our engines are appreciated for their low-end torque, low fuel consumption, and their ability to provide high handling capacity to machines and equipment at all times.

SPECIAL AND OTHER APPLICATIONS

In close collaboration with our customers, we develop, test, and manufacture special solutions for special needs and applications. In this field, two factors have proved particularly important: the versatility of the Volvo Penta engines and our deep application knowledge.

In the wide range of Volvo Penta special applications, you'll find everything from emergency vehicles for fire-fighting operations and lifting platforms for heavy loads, to snow grooming equipment and sugar beet harvesters. These applications all benefit from the compact dimensions, high performance, and environmental qualities of Volvo Penta engines.

Developed for maximum uptime and cost efficiency, these applications also have an explicit business objective.





VERSATILITY FOR WORLD-LEADING APPLICATIONS

Ship-to-shore and container handling solutions are used in ports and terminals around the world.

Volvo Penta has more than a century of experience working with equipment manufacturers, supplying end users with off-road machinery and equipment. This has resulted in unique application expertise and a broad range of practical applications.

Volvo Penta diesel engines are built to be versatile. They are characterised by high performance, reliability, fuel efficiency, and low emission levels. The engines are developed to satisfy the equipment builders' demands. Low weight, compact designs, and easy installation make them perfect for numerous machine and equipment applications in several different industries.

Mobile and stationary machines for handling concrete, mortar, and high-density solids.

Today you will find Volvo Penta engines in forestry machines like harvesters, forwarders, and log loaders and in farming equipment such as harvesters, cultivators, bale wrappers, and other equipment. In agriculture, stationary engine installations such as pumps also rely on Volvo Penta engines.

Crushers, screeners, concrete and high-pre pumps, air compressors, equipment for piling and drilling.

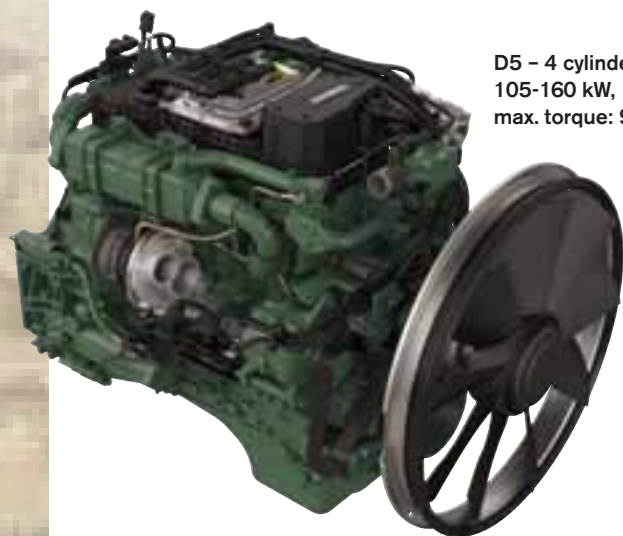
Last, but not least, we pride ourselves on the many stationary power generation installations with Volvo Penta engines. By reliably supplying hospitals, airports, various sports arenas, and other operations all over the world with electricity, Volvo Penta engines contribute to ensuring on-going daily operations.

CUSTOMERS' VIEWS

Applications primarily based on an unconditional demand for high power and torque and a partner who understands and meets their needs are top priorities for our customer. Low fuel consumption, which contributes to a lower total cost of ownership, low emissions, as well as the premium quality and the global service network are top selling points of the Volvo Penta engines.

FROM **105 TO 565 KW**

The new and evolved Volvo Penta engine range for off-road applications consists of five basic engines, where two are completely new designs, all manufactured by Volvo, for Volvo. The engines share a common design concept – meaning that the different parts of the engines are identically located on the engine body. This is particularly valuable to manufacturers who include several engine sizes in their product applications.



**D5 – 4 cylinders,
105-160 kW,
max. torque: 900 Nm.**

5 LITRES The D5 is a completely new engine, equipped with common rail, VGT turbo, light EGR and a compact SCR unit. One of the most powerful four-cylinder engines available, the VGT turbo provides performance on par with larger 6-cylinder engines and offers greatly increased torque in low rpms compared with Tier 4 Interim. Used in vehicles where high power density is demanded, this engine is an attractive alternative to 6-cylinder engines in forklift trucks, drill rigs, and screeners.



**D8 – 6 cylinders,
160-235 kW,
max. torque: 1,300 Nm.**

8 LITRES This is, just like the D5, a completely new engine in our total range. It is developed, manufactured, and supported by Volvo. The D8 – which has a design similar to the D11, D13, and D16 – offers a wide power range. It offers very rapid response and massive low-rpm torque thanks to the VGT turbo. Perfect for applications like forklift trucks, drill rigs – above and below ground – high-pressure pumps, and more.

**D11 – 6 cylinders,
235-285 kW,
max. torque: 1,935 Nm.**



11 LITRES This is a new engine in the Volvo Penta range with impressive low-speed torque. The D11 is equipped with a compact and reliable SCR system. This basic engine concept provides not only safe operation and high levels of uptime, but also a long operational lifetime. It is also a compact design that works without particle filter, oxidation catalyst, and compressed air. Ideal for around-the-clock running materials handling applications and demanding applications like crushers.

**D13 – 6 cylinders,
285-405 kW,
max. torque: 2,590 Nm.**



13 LITRES Of all the world's 13-litre engines, this is probably the one produced in the largest number of units. With very few changes from its Tier 4 Interim version, this popular engine makes an uncomplicated transition to the new emission stage. The 13-litre is still very fuel-efficient and offers extended or maintained service intervals. This very versatile product is used in mobile cranes, crushers and demanding underground applications.

FROM **105 TO 565 kW**

D16 – 6 cylinders,
405-565 kW,
max. torque: 3,287 Nm.

16 LITRES The D16 is the most powerful engine in the new range, bringing up to 768 hp in Tier 4 Final. A number of favourable qualities, such as long lifetime and impressive torque, make it a truly efficient and powerful engine. A newly developed electronic system and an after treatment system without regeneration are added benefits. The high degree of commonality within the engine range makes spare parts easy to obtain. The engine is used in heavier vehicles in construction and in RTG cranes, to mention a few.

Power range (kW)

D5



105-160 kW

D8



160-235 kW

D11



235-285 kW

D13



285-405 kW

D16



405-565 kW

ENGINE DATA

TIER 4 FINAL* ENGINES

Engine	Maximum power			Peak torque		Dimensions mm Length/Width/Height
	kW	hp	rpm	Nm	rpm	
TAD570VE	105	143	2200	700	1000	772 / 859 / 995
TAD571VE	129	175	2200	800	1100	
TAD572VE	160	218	2200	900	1200	
TAD870VE	160	218	2200	1050	1000	1020 / 840 / 1063
TAD871VE	185	252	2200	1150	1100	
TAD872VE	210	286	2200	1250	1100	
TAD873VE	235	320	2200	1300	1200	
TAD1170VE	235	320	2000	1550	900	1148 / 918 / 1148
TAD1171VE	265	360	2000	1750	950	
TAD1172VE	285	388	2000	1935	950	
TAD1371VE	285	388	1900	1925	945	1427 / 868 / 1148
TAD1372VE	315	428	1900	2130	970	
TAD1373VE	345	469	1900	2330	1000	
TAD1374VE	375	510	1900	2540	1100	
TAD1375VE	405	551	1900	2590	1150	
TAD1670VE	405	551	1900	2700	950	1582 / 893 / 1320
TAD1671VE	450	612	1900	2900	960	
TAD1672VE	515	700	1900	3150	1000	
TAD1643VE	565	768	1900	3287	1200	1582 / 868 / 1320

* All engine data is preliminary. Tier 4 Final engines will be available no earlier than at the end of 2013.

This document is not contractual. In a constant effort to improve the quality of its products, Volvo Penta reserves the right to modify any of the characteristics stated in this form without notice. For specific information on a certain engine model, please ask your dealer or visit our website www.volvopenta.com. Not all models are available on all markets. The engines in the pictures may be fitted with extra optional equipment.

ENVIRONMENTAL LEADERSHIP



For us, high engine performance and reduced environmental impact go hand in hand. Therefore, every new Volvo Penta engine must be competitive in both aspects. By making the most of the fuel at hand and, at the same time, reducing the environmental impact to a minimum, we have made fuel-efficiency our hallmark.

Reducing engine emissions is a long standing tradition at Volvo Penta, not only due to legislation, but because environmental care is vital both to our customers and us.

Through the years, we have set an example with a number of products and solutions with an explicit environmental focus. As industry leaders, we have taken another step forward with the new Tier 4 Final engine range for 2014.

We are continuously looking into future products and solutions. What challenges can we anticipate beyond 2014? We know one thing for sure: thanks to you, as our partner/customer, we will be at the forefront of development for a long time to come.

PREFERRED PARTNER – POWERING YOUR BUSINESS **WWW.VOLVOPENTA.COM**

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