The Power You Need.
The Cat® and MaK™ brands of Caterpillar Marine offer premier high- and medium-speed propulsion, auxiliary, and generator set solutions, as well as optional dualfuel, diesel-electric, and hybrid-system configurations. With the launch of Caterpillar Propulsion our comprehensive and evolving product line gives customers one source for the most extensive engine power range available, as well as for complete propulsion systems, controllable pitch propellers, transmission and azimuth thrusters, and controls. Cat and MaK products and technologies prove proven reliability and are built to last in all marine applications, demonstrating superior productivity and the lowest lifecycle cost.

The Cat Global Dealer Network, more than 2,200 global service locations strong, ensures that you will have local expertise, highly-trained technicians, rapid parts delivery, and the proper equipment and services to keep you working — anytime, anywhere.

Construction, term, or repower financing through Cat Financial will help you make Cat and MaK power a reality. With our knowledge of customer needs, local markets, and legal and regulatory requirements, we have been providing tailored financing solutions and exceeding expectations since 1986.

For more information or to find your local dealer, visit our website: www.cat.com/marine

Visit Cat Financial at: www.CatPowerFinance.com
Why Insist on Genuine MaK Parts?

You Get What You Pay For
Quick access to quality parts is critical for your business — often deciding the difference in uptime and profits available. Genuine MaK components are designed to function reliably as a complete system. Our manufacturing techniques are improved continually to ensure that using original MaK parts ensures engine performance and lowers emissions while increasing reliability. Genuine MaK parts may ore often lead to lower lifetime costs, reducing overall owning and operating costs — benefits you may not get from non-original competitors. As you would expect, all genuine original genuine MaK parts conform to IMO requirements (as applicable), ensuring that your engine remains compliant with the relevant MARPOL Annex VI regulations and EIAPP certification (if applicable). Equally important, all of our MaK spare parts are backed by the Caterpillar Motors warranty.

Our high quality materials and final machining processes produce injector nozzle elements that are guaranteed to offer long service life with minimal risk of failure. Genuine MaK nozzle elements are designed to work with all other parts of the fuel system. The resulting fuel injector spray pattern is a major contributor to optimal combustion processes in the cylinder.

A proprietary MaK after-treatment process, developed by Caterpillar fuel systems engineers, reduces the thermal load of parts in the combustion chamber and lowers fuel consumption and NOx emissions. By doing this, the increased fuel pump delivery pressure is reduced, lowering fuel flow rates. As a consequence, injector nozzles also result in up to 25% longer service life for injectors as well as potential damage to other engine components. Installing such non-original injector nozzles will lead to a shorter service life with risk of component failure and the potential of consequential damage to other engine components.

What’s the Risk?
Non-original nozzle elements are fluid machined and therefore fit the nozzle holes almost exactly. Using non-original injector nozzle delivery ports, where operating stress is reduced due to the smooth, rounded edges. Insufficient and incorrect fuel injector nozzle elements from a non-original manufacturer invoke a lower level of quality, materials and manufacturing resulting in major deviations from the MaK specifications and original dimensions. These defects, in turn, will cause significant stress in the area of the nozzle holes which are designed to function reliably as a complete system. A deviation from droplet size, injection angle, and spray pattern produced by an after-treatment process means shorter life for injectors as well as potential damage to other components.

Especially the MaK after treatment process ensures an optimized nozzle geometry and therefore reliable and targeted engine performance data. From our experience, using original and genuine MaK nozzle elements results in lower cylinder liner temperatures up to 14°C, less piston crown surface temperatures up to 20°C, and reduces exhaust valve temperatures by up to 35°C.

What’s the Difference?
A deviation in droplet size of 12% and 3° wider injection angle results in increased emissions, lower fuel consumption and also impacts the plateaus from fuel engagement on the crown and liner surfaces. The optimized droplet size reduces the temperature of components in the combustion chamber, thus providing longer life for injector, liners, piston rings and valve seats. By means of intensive tests the designed manufacturing process techniques were adjusted in a way to meet the best compromise of engine performance data (fuel consumption, smoke and NOx emissions) and the thermal load of parts in the combustion chamber to obtain a balanced, better and longer service life.

Using genuine nozzle elements can increase operating temperature of critical engine components with shorter life for injectors as well as potential damage to exhaust valves, seats, piston rings and valvesprings.

Installation of non-original nozzle delivery ports without risk of component failure and the potential of consequential damage to other engine components.

Further underestimated, these non-original injector nozzles also result in up to 50% lower fuel flow rates. As a consequence of this, increased fuel pump delivery pressure will lead to higher mechanical loads on rails and increased wear on camshafts.

Non-original nozzle do not conform to IMO MARPOL Annex VI, although the IMO marking may be printed on the nozzle. Installing non-original nozzle delivery ports, engine emissions, NOx, particulates, CO2 and fuel consumption can all increase. The customer may lose their IMO certification for injectors as well as potential damage to other engine components. Using non-original nozzle delivery ports will lead to a shorter service life with risk of component failure and the potential of consequential damage to other engine components.

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Longer Life and Longer TBO. Lower Operating Cost.
MaK customers receive additional value for the price they pay. MaK works to provide our customers with the highest combination of reliability, emission conformance, longer life, and lower owning and operating costs available in the industry. Customers will benefit from fewer replacement nozzle elements and labor and lower repair costs, and limited risk of engine failure.

MaK spare parts originate from the Caterpillar factory in Kirchzarten. We are delivered through our distribution center located near the major international port of Hamburg. With its close proximity to both the international airport and the port infrastructure in Hamburg, the logistics center makes parts available quickly. The result is a parts delivery that is immediately available to dealers. In addition, you’ll benefit from the lowest total owning and operating costs available in the world. The result is a more cost effective, dependable engine.

MaK specifications and technical data are available on the parts catalog as well as on our website. You can also contact our customer service department regarding MAK parts and technology.

Genuine MaK Parts

Shape of spray hole inlet-ports. Comparison between MaK original nozzle element:

The non original nozzle elements had a round shape with a smooth transition of the nozzle to the combustion chamber. The rounded nozzle element has a smooth and rounded geometry.

A proprietary after treatment process, developed by Caterpillar fuel systems engineers, reduces the thermal load of parts in the combustion chamber to obtain a balanced, better and longer service life.

Non-original nozzle do not conform to IMO MARPOL Annex VI, although the IMO marking may be printed on the nozzle. Installing non-original nozzle delivery ports, engine emissions, NOx, particulates, CO2 and fuel consumption can all increase. The customer may lose their IMO certification for injectors as well as potential damage to other engine components.
Why Insist on Genuine MaK Parts?

Genuine MaK Parts


Our high quality materials and final machining process produce injector nozzle elements that are guaranteed to offer longer service life with minimal risk of failures.

Genuine MaK nozzle elements are designed to work with all other parts of the fuel system. The resulting fuel injector spring pattern is a major contributor to optimal combustion processes in the cylinder.

A proprietary MaK after treatment process, developed by Caterpillar fuel system engineers, ensures the genuine MaK nozzle element produces an ideal spray pattern over its entire design lifetime.

Genuine MaK nozzle elements are designed specifically for reliable fuel injector operation with all recommended fuels and all approved engine models of MaK engines.

What’s the Difference?

An original MaK nozzle produces a fuel spray pattern that reduces emissions, lowers fuel consumption and also protects the pistons from fuel ingestion on the crown and liner surfaces. The optimized fuel release reduces the temperature of components in the combustion chamber, thus prolonging life for valves, liners, piston rings and valve seats.

By means of intensive tests the designated manufacturing procedures/techniques were adjusted in a way to maintain the best compromise of engine performance data (fuel consumption, smoke behavior) and the thermal load of parts in the combustion chamber (valves, piston and liner temperatures). By doing this, the genuine nozzle elements provide:

- A more uniform and consistent atomization of the fuel over a longer period.
- A smaller droplet size and optimized fuel spray penetration angle production.

A complete combustion process is reinforced, with lower smoke and lower emissions.

The different nozzle parameters like the nozzle exit holes diameter and length, nozzle exit inner/outer longitudinal hole shape and others have a huge impact on the spray pattern which in turn influence engine performance data and the thermal stress level in the combustion chamber.

Enginer measurements with nozzles whose parameters were modified due to a changed after treatment process revealed the following:

- A deviation in droplet size of ±12% and ±20% injector spray of the fuel, measured with non-original injector nozzle, results in significant differences in heat releases and thermal stress.
- Increased opening temperature of critical engine components means shorter life for the injectors as well as potential damage to other components.

Especially the MaK after treatment process ensure an optimized nozzle geometry and therefore reliable and targeted engine performance data.

From our experience, using original and genuine MaK nozzle elements can lower cylinder liner temperatures up to 45°C, lower piston crown surface temperatures by 20°C, and reduce exhaust valve temperatures by up to 30°C.

What’s the Risk?

MaK nozzle elements are fastened with a proprietary Caterpillar after treatment process of the fuel delivery ports, where opening stress is reduced due to the smooth, rounded edges.

Improper and incorrect fuel injector operation from a non-manufacturer produce a lower quality of fuel atomization and manufacturing resulting in major deviations from the MaK specifications and original dimensions. The oil will therefore stress the area of the nozzle holes which at high operating temperatures can cause complete breakdowns of the nozzle, resulting in corrosive damage to the cylinder head and exhaust valves.

Using non-original nozzle elements can increase operating temperatures of critical engine components with shorter life for injectors as well as potential damage to exhaust valves, seats, piston rings and valve seats.

Installing such non-original nozzle elements would lead to a shorter service life and risk of component failure and thermal stress.

Non-original nozzle do not conform to ISO MAREPS Annex VI, although the IMO markings may be printed on the nozzle.

What’s the Potential Cost of Non-Genuine Parts?

- Damage to the nozzle element with after treatment process, leading to consequential damage to the injector nozzle fuel delivery ports.
- Consequential damage to other engine components.

From our experience, using original and genuine MaK nozzle elements can lower cylinder liner temperatures up to 45°C, lower piston crown surface temperatures by 20°C, and reduce exhaust valve temperatures by up to 30°C.

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A more constant pressure and increased operating temperature
Non-original nozzle

A deviation in droplet size of 12% and spray angle of 3° wider injection angle of the fuel, measured with non-original injector nozzles, and in significant differences in heat release and thermal stress.

Increased operating temperature of critical engine components means shorter life for the injectors as well as potential damage to other components.

Especially the MaK after treatment technology ensures an optimized nozzle geometry and therefore reliable and targeted engine performance data.

From our experience, using original and genuine MaK nozzle elements can lower cylinder liner temperatures up to 45°C, lower piston crown surface temperatures by 20°C, and reduce exhaust valve temperatures by 30°C.

What’s the Risk?

MaK nozzle elements are fluid machined to a proprietary Caterpillar fuel atomizer holes and fuel strainers. Inadequate and manufacturing resulting in major deviations from the MaK specifications and original dimensions. There will be higher stress in the area of the nozzle hole, at the interfaces where the spray cone is targeted. The use of non-original injector nozzles can increase operating temperatures of critical engine components with shorter life for injectors as well as potential damage to exhaust valves, piston rings and turbochargers. Installing such non-original injector nozzles will lead to a shorter service life with risk of compromised future and the potential of consequential damage to other engine components.

Often underestimated, these non-original injector nozzles also result in up to 25% lower fuel flow rates. As a consequence, this increased fuel pump delivery pressure will lead to higher mechanical stress levels in the cylinder head and exhaust valves.

Non-original nozzle do not conform to IMO MARPOL Annex VI, although the IMO marking may be printed on the nozzle.

Using non-original injector nozzles can increase operating temperatures of critical engine components with shorter life for injectors as well as potential damage to exhaust valves, piston rings and turbochargers. Installing such non-original injector nozzles will lead to a shorter service life with risk of compromised future and the potential of consequential damage to other engine components. Often underestimated, these non-original injector nozzles also result in up to 25% lower fuel flow rates. As a consequence, this increased fuel pump delivery pressure will lead to higher mechanical stress levels in the cylinder head and exhaust valves.

Larger Life and Longer TDO. Lower Operating Cost.

MaK customers receive additional value for the price they pay. MaK aims to provide our customers with the best combination of reliability, emission conformity, longer life, and lower operating costs available in the industry. Customers will benefit from: lower replacement nozzle and labor, and, equally important, will experience increased downtime, lower fuel costs, and limited risk of engine failure.

Tanner Less Expensive. Damage-Free Parts.

Any MaK part, purchased directly through your MaK dealer, is backed by a world-class partnership between the Caterpillar factory in Kiel, Germany and the port infrastructure in Hamburg, the logistic center makes parts available quickly. In the event a part is not immediately available to dealer inventory, it will be dispatched from the Caterpillar avoidance center within 24-hours.

Optimized packaging of parts ensures protection from damage. We maintain close contact with logistics partners worldwide with specific regard to air, sea, and ground transport, so that each shipment is collected and dispatched as efficiently as possible.
Injector Nozzle Elements

Genuine MaK Parts

More Profit
Greater reliability and longer lifetime maximizes your uptime and reduces Total Cost of Operation.

Lower Operating Cost
With longer life and longer Time Between Overhauls, MaK engines cost less to operate with genuine MaK parts.

Greater Safety
MaK engines operated with genuine MaK parts perform longer with fewer unplanned maintenance events or risk of failure.

Availability
All parts can be dispatched within 24 hours through our strategically located distribution centres and delivered globally by our authorized distributors.

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Injector Nozzle

Elements

Genuine Makk Parts

The Power You Need.

Greater reliability and longer lifetime maximize your uptime and reduces Total Cost of Operation.

Lower Operating Cost

With longer and longer Time Between Overhauls, Makk engines cost less to operate with genuine Makk parts.

Greater Safety

Makk engines powered with genuine Makk parts perform longer with fewer unplanned maintenance events or risk of failure.

Availability

All parts can be dispatched within 24 hours through our strategically located distribution centers and delivered globally by our authorized distributors.

Subject to change without notice.

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