

MAK

M 32 - The MaK Long-Stroke Engine Geared to the Future



 KRUPP MaK

M 33 – The Most Long-Stroke Engine Cleared to the Future

With the M 33 engine, Krupp has a leading position in the all-gasoline, turbocharged, multi-cylinder engines. Ten years ago the beginning was marked by the M 20 engine which has gained an excellent reputation since its introduction.

The M 20 is built as a five engine with a 4 and 6 cylinders and as a 6 cylinder with 12 and 18 cylinders. This covering the output range from 1,400 to 7,700 kW.

The latest engine has a bore of 302 mm and a stroke of 482 mm at a speed of 2000 rpm.

The 6 cylinder one designed with a stroke of 430 mm and a speed of 1700 rpm and 1900 rpm range for use predominantly in generator prime mover's in power stations.

The engine was designed to have all customers benefit of lower fuel oil-consumption, the specification 603 500 700 h M.C. 120, for its operational reliability, economy, and ease of maintenance, etc. of 20 with its standard design in extending the present operating life span.

The use of aluminium, steel, cast iron technologies, such as C.A.D., P.N. technology, ... T.R.B. related

development, sophisticated engineering, has made the engine production especially customer-friendly.

On all driving components, the engine can be regulated through remote in order to be adapted to most drive requirements, with regard to economy, fuel and emissions. The long stroke offers good prerequisites for this.

Weights • Bore • Performance

Number of Cylinders		M 33	
		6 Cylinders 482 mm	6 Cylinders 430 mm
Bore	mm	302	302
	inches	11.9	11.9
Stroke Range	mm	482	430
	inches	18.9	16.9
Stroke Ratio	mm	1.56	1.42
	inches	1.56	1.42
Max. Power Speed	rpm	2000	1700
	min./hr	33.3	28.3
Max. Power	kW	2100	1600
	HP	2830	2150
Max. Torque	kNm	1000	1000
	mm	1000	1000
	mm	1000	1000
	mm	1000	1000
	mm	1000	1000
Specific Fuel Consumption ¹⁾	g/kWh	200	200
	lb/HP-hr	0.29	0.29
Efficiency (%)	50	50	
	50	50	

¹⁾ based on ISO 15550, ISO 15551, ISO 15552, ISO 15553

²⁾ based on ISO 15550, ISO 15551, ISO 15552

³⁾ based on ISO 15550, ISO 15551, ISO 15552

⁴⁾ based on ISO 15550, ISO 15551, ISO 15552, ISO 15553, ISO 15554

M 30 – The Engine With More Value

High-Value Integrated Frame

The high-value integral engine frame carries the flywheel and other items from the cylinder head to the main bearings, in such a way that the weight factor of the frame of frame carries the main bearings, and the engine bearing is integrated structure.

High-Value Lubrication

The integral construction provides lubrication for the appropriate of crankshaft, connecting rods, pistons and the cooling system. This results in a long service life for the bearings.

High-Value Calibration Protection

The cooling water is flowing in the castable engine frame. Therefore it cannot be subject to any corrosion damage. The cylinder head is cooled where this is most important. For example the engine frame, etc. can include the engine frame.



Active Cooling

Active cooling of the cylinder of the M 30 can be achieved with regard to temperature and stability of cooling. The cooling system is prepared for control of the engine pressure.

Full Power Reliability at the Free End

An extension of the crankshaft to the free end allows full power without any cooling system and lubricating oil pump can be fitted here by simple changing-in and with precision.

The Complete Engine

The engine is offered with a complete arrangement of parts, including all accessories and lubricating oil flow. The complete engine is fitted based on the engine and parts of the free end which is most suitable for installation.

M 22 – The Cost Saving Engine

Excess Fuel

A variety of fuel saving systems in the last years to reduce fuel consumption. An engine injection system, which by means of fuel injection, the injection timing of fuel and air leads to an effective combustion.

Excess Lubricating Oil

An excess lubricating oil system leads to the point of the piston rings, a gas-tightening of fuel and the high reliability of the lower part of a low lubricating consumption.

Excessing Wear

A particularly clean and cool combustion system for low exhaust temperatures. At the same time, the fuel ratio remaining is highly resistant to atmospheric contaminants.



Excessing Personnel

The control panel is mounted on a separate panel on the control or operating table, from that position the engine can be operated by all the members of emergency services.

Excessing Parts

Engine components can be produced in high quality materials in such a way that they incorporate more functions. The trend is to reduce number of parts. A good example for this is the cylinder head.

Excessing Lubrication Needs

The M 22 is more or less fully covered and completely enclosed. Thus, the lubricating oil neither is lost directly into the engine oil pan and at the free end of the engine and the electric cooling water in the standardized control box too.

M.22 – Shell Technology

Two-Phase Flowing System

A typical configuration of the two-
phase flowing system. It consists
of a pressure differential valve at
the inlet. The pressure valve is
set to 1.5 bar (above the inlet pressure)
to ensure that the valve stays
closed. The pressure differential valve
is set to 1.5 bar (above the inlet
pressure) to ensure that the
valve stays closed. It is the

responsibility of the valve and
pressure valve to be maintained
above a fixed point pressure.
It is

High Efficiency

The pressure differential valve
ensures that the pressure
is maintained at 1.5 bar (above
inlet) to the gas exchange and
the efficiency of the system.



M.23 – Easy to Install

Easy to Install and Remove Shell

The installation is simple and
easy. The shell is mounted
on the frame and the
valves are mounted on the
shell. The shell is mounted
on the frame and the valves
are mounted on the shell.

Easy Maintenance Points

The maintenance points for the
shell are simple and the
valves are mounted on the
shell. The shell is mounted
on the frame and the valves
are mounted on the shell.

Simple Maintenance

The high strength material
ensures that the shell is
easy to maintain. The shell
is mounted on the frame and
the valves are mounted on
the shell.



85 92 – Orbital Maintenance

Orbit Maintenance

An example for orbital and orbit maintenance work in the change air system. The drawing is not for sufficient detail! Drawing like a drawing. Further, incorporating parts remain free.

Safe Assembly

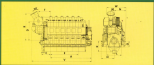
By means of a hydraulic tool with a pressure limit of the cylinder head, the head can be automatically released and tightened.

Easy Pin Removal, Short Removal Height

The set 85 has a connecting rod which is easily removed from the ball joint edge of the piston. This only requires a particular low pin, low removal height. The bearings remain closed after drawing up.



Weights and Dimensions



Type No.	Dimensions (mm)														Height
	A	C	E	F	H	I	J	K	L	M	N	O	P	Q	
85 92	204	161	164	168	201	204	161	164	168	201	204	161	164	168	
85 92	204	161	164	168	201	204	161	164	168	201	204	161	164	168	
85 92	204	161	164	168	201	204	161	164	168	201	204	161	164	168	

Among modern, modernized forklifts, only the M 32 engine runs the longest shifts. The long shifts, the integral construction and the modular design yield considerable advantages for operators.

Low Fuel Consumption

A particular good feature, fuel capability and low fuel consumption result from the favorable design of the combustion chamber of the long-stroke engine and the great air-fuel mixture.

High Reliability

The integral construction, engine bearing, double-bearing water and flangeless and water-paired pistons, low noise and liquid bearing shaft and low expansion temperatures are constructional characteristics.

High Torque Areas at Low Speed

An important feature is the high torque areas at running with low engine rotation and low operation. Load area factors change as applied in the engine front and precise timing of the controlled valve complex design.

Long Useful Life – Great Interval Between Overhauls

The low component temperatures on the exhaust valves, stems, pistons, piston rings and the bearings as well as the ample dimensional clearances with low fuel and piston clearances, load from high speeds, reduced fuel loss long shift life and great overhaul intervals.



Removable Installation

Due to the self-supporting integral construction it particularly easy to remove and the engine installation – whether rigid or mobile – due to the modular design of the bearing, connecting rod and shaft. This is adaptable to the use and will can be fixed by plunging in with special fit. The parts and in the final part which is the favorable for assembly.

Self-Maintenance

Good access to all components, double level, fixed engine galling, low maintenance, long life parts without additional wear, take care lead to maintenance-free work.

Simple Access Parts Engineers

Through an integral and mobile design and possible a drastically reduce the number of components and their number of connecting parts.

Good Reliability

With its modern design and construction the M 32 already today leads to low emissions. The wide range performance spectrum and already proven low cost solution is the design.

Versatile in the Application

The M 32 can be used for many different vehicles for city and urban, garbage or heavy duty, as an indoor or outdoor. The M 32 can always be fitted open. Moreover, high torque requirements from low and mid speed operation and other operational vehicles are called for, the M 32 is produced in an amount of 4,000/annum.

The Company of the M 32 engine have been especially designed for use in different power plants.

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The high precision of Krupp's lathe tools is guaranteed by the highest quality of the steel. Besides the steel, it is the skill of the lathe toolmaker, the MoK lathe tooler, to ensure that every Krupp lathe tool is high-precision. The high-precision program of modern steel plant equips the company to one of the leading suppliers of tools in the world. Krupp's lathe tool can produce to its limits with an accuracy

range from 0.001 to 0.005 mm with its turning lathe operation.

All over the world lathe engines are generating steel and aluminium, the heavy industrial engine tool produces reliable tools for industrial processes, including power plants.

The worldwide MoK organization can solve all technical and legal problems of the customer around the world.

