

MAG 24.4 S 415A

60% CH4 40%CO2



Principle:	4-stroke Otto gas engine
Number of cylinders:	4 in series
Engine cooling:	without internal coolant pump Cooling by external pump and temperature control
Lubricating oil supply:	Pressure lubrication by gear-driven pump, replaceable lubricating oil filter The lubricating oil cooler is integrated in the main flow. Cooling by engine coolant circuit.
Spark plugs:	Special spark plugs for industrial gas engines.
Starter:	Magnetic starter 12 V - 2.3 kW

Important note: This engine may only be operated with biogas with a methane number greater than 130 in conjunction with knock control! be operated!

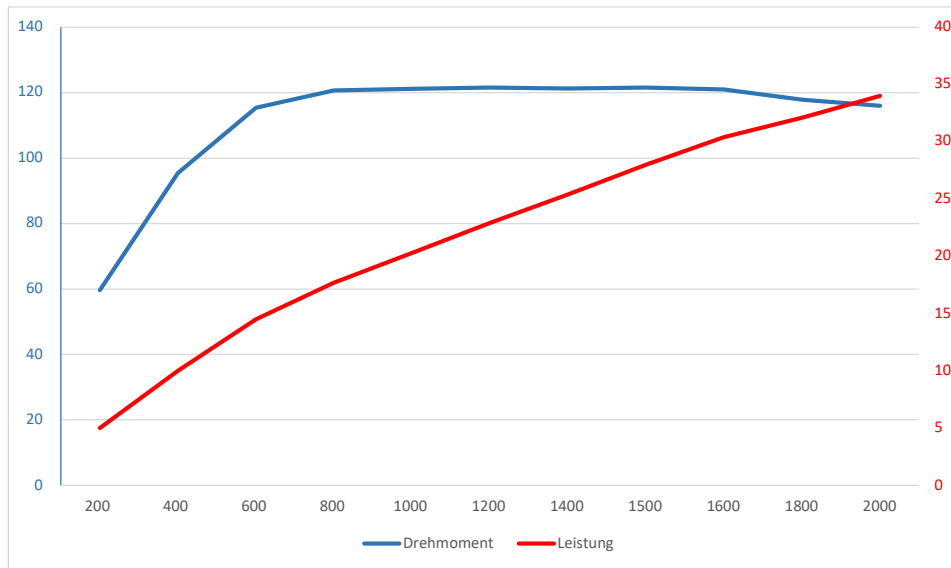
General data

Type		inline
Number of cylinders		4
Bore	mm	87
Stroke	mm	103
Displacement	l	2,45
Firing order		1-3-4-2
Direction of rotation with view of flywheel		counterclockwise
Flywheel housing		SAE 4
Number of teeth flywheel		98
Compression ratio ϵ		15:1
Lubricating oil consumption up to	g/kWh	0,3
Oil sump volume min./max.	l	9,5
Coolant filling quantity	l	10
min./max. operating pressure of coolant	bar	0,5/2,5
Minimum coolant temperature	°C	75
Maximum coolant temperature	°C	88
max. difference coolant inlet/outlet	K	6
Max. intake pressure before intake manifold	mbar	15
Max. exhaust back pressure	mbar	40
Engine width in mm		511
Engine length in mm		669
Engine height in mm		697
Engine weight, dry kg		192

Performance data mechanical at 1500 rpm

Rated speed	min-1	1500	1500	1500
Load rate	%	100	75	50
Lambda	λ	1	1	1
Ignition timing before top dead centre	grad	16	16	16
Average piston speed m/s	m/s	5	5	5
Max. Piston speed	m/s	8	8	8
Effective mean pressure	bar	6,53	4,90	3,27
Mechanical power	kW _{mech}	20	15	10

All-speed performance



Performance data thermal at 1500 rpm

Thermal output of the engine cooling water	kW	20,8	19,7	17,5
Heat output of the exhaust gas 100 °C	kW	11,7	9,3	6,5
Exhaust gas temperature	°C	545	518	478
Heat output of the charge air cooler	kW	0	0	0

Engine coolant resistance curve

Power consumption

Combustion power	kW	58	49	38
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Efficiency

ETA mechanical based on DIN ISO 3046-1 *	%	34,5	30,6	26,3
ETA thermal related to DIN ISO 3046-1 *	%	56,1	59,2	63,2
ETA total referred to DIN ISO 3046-1 *		90,6	89,8	89,5

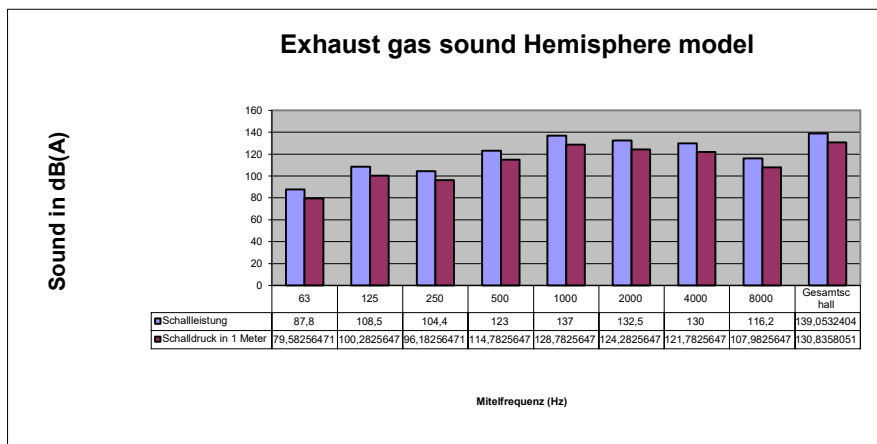
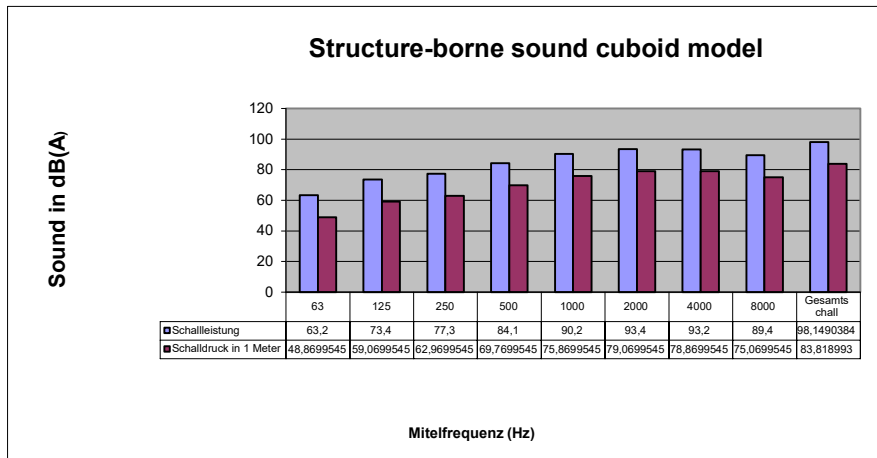
Mass flows

Air mass flow	kg/h	73,0	61,7	47,8
Gas mass flow	kg/h	11,7	9,9	7,7
Exhaust gas mass flow (wet)	kg/h	84,7	71,6	55,5

Exhaust emissions

NOX	mg/Nm ³	<6500	at 5 % residual oxygen	
CO	mg/Nm ³	<5000	at 5 % residual oxygen	
NMHC	mg/Nm ³	<150		

Noise emissions



* DIN ISO 3046-1: The tolerance for specific fuel consumption is + 5 % at nominal power. The tolerance for the usable heat is 7 % at nominal power.
The technical data are based on standard conditions according to DIN ISO 3046-1.
All data in the data sheet are calculated values. These may deviate from the actual values.

Standard conditions:

Absolute air pressure: 1013 mBar

Air temperature: 25 °C

Relative humidity: 30 %

Performance data for gas mixture with a calorific value of : 6 kWh N/m³ MZ > 130

Performance adjustment in accordance with ambient conditions DIN ISO 3046-1

Cooling water data based on 40 % antifreeze content