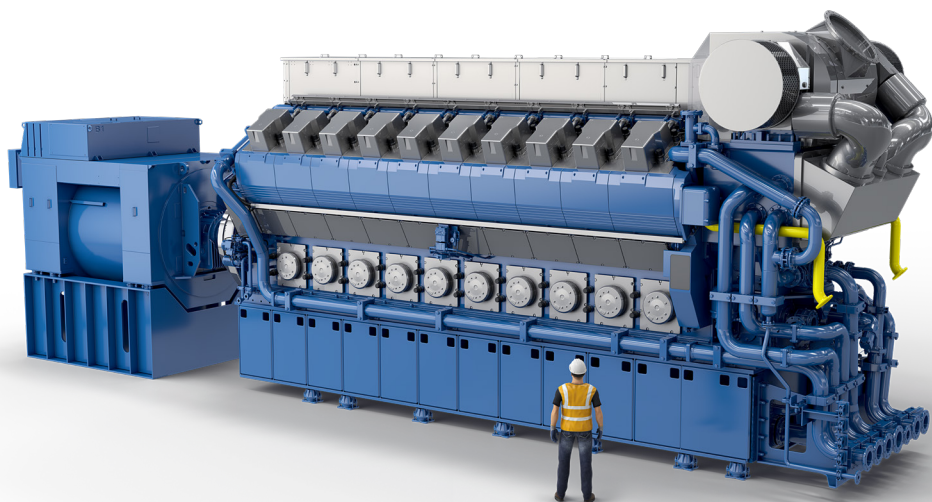




ON LAND. AT SEA.



Medium-speed generating sets

PORTFOLIO

Edition 1/22

RELIABLE AND FLEXIBLE POWER

Bergen Engines medium-speed liquid fuel and gas generating sets deliver reliable power with low operating costs. For over 75 years we have been innovating, designing and manufacturing engines that have become known for their world-leading performance both on land and at sea.

We pioneered the power generation market with our first lean-burn gas engine already in 1992. Today, we are a leading supplier of medium speed liquid fuel and gas engines, supporting your business with reliable, engine-based power generation solutions from 1.500 to 11.830 kW per engine, and complete power systems of 200 MWe and beyond.

We offer a wide and highly economical product range with world class electrical efficiency of up to 50% in open cycle. Our power solutions are ideal for baseload, grid support, peaking and for hybrid power systems with batteries and renewable energy sources. Lead time is short, and no extensive on-site construction is required.

The fast reacting medium speed engines can ramp up from zero to full load in 3 minutes, and maintenance intervals are not affected by the number of starts and stops. This makes them a perfect match for variable renewable power that needs balancing back-up power.

As the concept is modular, additional generator sets can quickly be added if the total power demand should stabilise at a higher level. In a combined heat and power configuration the total efficiency can reach more than 95 percent. And by installing a heat recovery system and steam turbine, power production can be increased by up to eight percent with no additional fuel consumption.

We also support you with a diverse range of flexible service solutions throughout the entire product lifecycle. Our digital solutions make equipment monitoring easier.

Real-time data gathering and analysis ensures that many technical problems can be either predicted and prevented, or solved swiftly by our technical support team. Remote troubleshooting by technical support is an excellent way to reduce operational costs and maintain maximum availability.



Broad scope and capability

- Fuel efficient and flexible gas and diesel engines
- Integrated power plant solutions based on modular systems
- Multi-unit power plant concept that maximises plant availability
- Power plant design and project management
- Partnering for turnkey installation
- Long term service agreements and plant operations experience
- Export finance

WHY CHOOSE MEDIUM-SPEED FOR POWER GENERATION?



Low emissions and quick ramp up and ramp down times to support grid fluctuations and variable renewables generation



Small footprint, with possibility to locate the power plant in remote places to support incomplete grids or in high demand areas such as big cities



Minimal derating due to variations in temperature, altitude and part load operation



Low capital investment that can be done gradually as power demand rises, with short payback time



Cost efficient and predictable maintenance that ensures low operational costs



Quick delivery and installation

GENERAL CONDITIONS

Definition of engine power and performance data is in accordance with ISO 3046-1, ISO 8528-1 and ISO 15550. Engine and generator performance may be adjusted in accordance with application, site conditions, load profile and fuel type.

Natural gas operation

Reference fuel for gas engines has a lower heating value (LHV) of 36MJ/Nm³ and methane number of >80.

Liquid fuel operation

Specific fuel oil consumption is based on diesel oil (MDO) with a net heating value of 42.7 MJ/kg and two engine driven pumps.

Heavy fuel oil operation

The engines are designed for operations on heavy fuel oil with viscosity up to 700 cSt at 50 °C within ISO 8217.

Emissions

Engine exhaust emission levels are below the limits for engine driven power plants, as stated in the World Bank Group's Pollution prevention and abatement handbook.

Heat recovery

Data for arranging heat recovery is available upon request.

Dimensions

All dimensions are in mm.

Dimensions and weights are given for guidance purposes only and are based on a typical specification. For detailed information please contact Bergen Engines.

Note

The information herein is subject to change without notice and the given data does not carry any contractual value. Rolls-Royce assumes no responsibility for any errors that may appear.



NATURAL GAS GENERATING SETS

B36:45V AG

50 Hz



Cylinder diameter 360 mm, piston stroke 450 mm

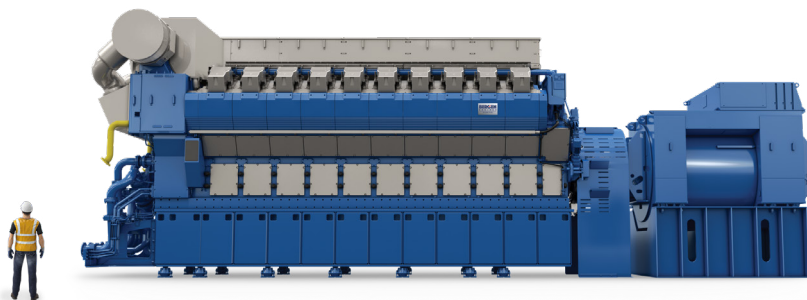
Weight and dimentions	Weight kg	Length	Width	Height
B36:45V12 AG	100000	11716	3280	4980
B36:45V16 AG	150000	12996	3783	4980
B36:45V20 AG	170000	14276	3783	4980
Technical data	Unit	B36:45V12AG	B36:45V16AG	B36:45V20AG
Number of cylinders		12	16	20
Engine speed	r/min	750	750	750
Electrical output	kW	7090	9470	11830
Charge air cooler HT	kW	1600	2140	2715
Charge air cooler LT	kW	350	470	625
Lube oil cooler	kW	840	1120	1135
Jacket water cooler	kW	1000	1320	1260
Exhaust mass	kg/h	38500	51400	62400
Exhaust gas	°C	375	375	375
Nom. el. efficiency	%	49	49.5	50

- Depending on type of generator the weight, dimensions and performance may change
- All technical data is valid at 100% load, with no engine driven pumps
- Engine power definition and fuel gas consumption are according to ISO 3046-1 (ICFN)
- Generator standard IEC 60034-1, power factor 1
- Reference fuel is natural gas with a lower heating value of 36MJ/nm3, methane number >80
- Minimum fuel gas pressure to the gas regulating module: 5,3 barg
- Due to continuous development some data may change

Gas generating sets

B36:45V AG

60 Hz



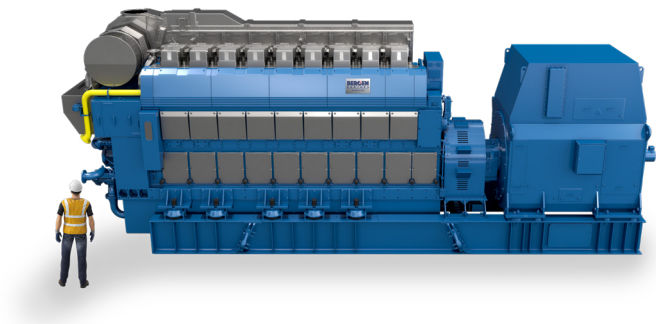
Cylinder diameter 360 mm, piston stroke 450 mm

Weight and dimensions	Weight kg	Length	Width	Height
B36:45V12 AG	100000	11716	3280	4980
B36:45V16 AG	150000	12996	3783	4980
B36:45V20 AG	170000	14276	3783	4980
Technical data	Unit	B36:45V12AG	B36:45V16AG	B36:45V20AG
Number of cylinders		12	16	20
Engine speed	r/min	720	720	720
Electrical output	kW	6800	9070	11340
Charge air cooler HT	kW	1540	2050	2620
Charge air cooler LT	kW	340	450	500
Lube oil cooler	kW	810	1070	1330
Jacket water cooler	kW	950	1260	1580
Exhaust mass	kg/h	36900	49200	61500
Exhaust gas	°C	375	375	375
Nom. el. efficiency	%	48.9	49.4	49.9

- Depending on type of generator the weight, dimensions and performance may change
- All technical data is valid at 100% load, with no engine driven pumps
- Engine power definition and fuel gas consumption are according to ISO 3046-1 (ICFN)
- Generator standard IEC 60034-1, power factor 1
- Reference fuel is natural gas with a lower heating value of 36MJ/nm³, methane number >80
- Minimum fuel gas pressure to the gas regulating module: 5.3 barg
- Due to continuous development some data may change

B36:45L AG

50 Hz



Cylinder diameter 360 mm, piston stroke 450 mm

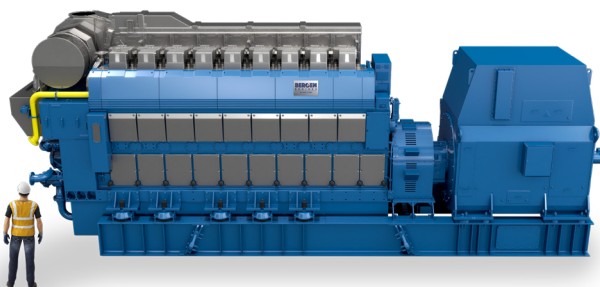
Weight and dimentions	Weight kg	Length	Width	Height
B36:45L6 AG	67000	9800	2800	3890
B36:45L8 AG	87500	10240	3000	4170
B36:45L9 AG	88000	11250	3400	4170
Technical data	Unit	B36:45L6AG	B36:45L9AG	
Number of cylinders		6	8	9
Engine speed	r/min	750	750	750
Electrical output	kW	3520	4700	5290
Charge air cooler HT	kW	810	1080	1085
Charge air cooler LT	kW	225	300	400
Lube oil cooler	kW	360	475	625
Jacket water cooler	kW	455	605	790
Exhaust mass	kg/h	18800	25100	28200
Exhaust gas	°C	375	375	375
Nom. el. efficiency	%	48.5	48.7	48.9

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- All technical data is valid at 100% load, with no engine driven pumps
- Engine power definition and fuel gas consumption are according to ISO 3046-1 (ICFN)
- Generator standard IEC 60034-1, power factor 1
- Reference fuel is natural gas with a lower heating value of 36MJ/nm3, methane number >80
- Minimum fuel gas pressure to the gas regulating module: 5.3 barg
- Due to continuous development some data may change

Gas generating sets

B36:45L AG

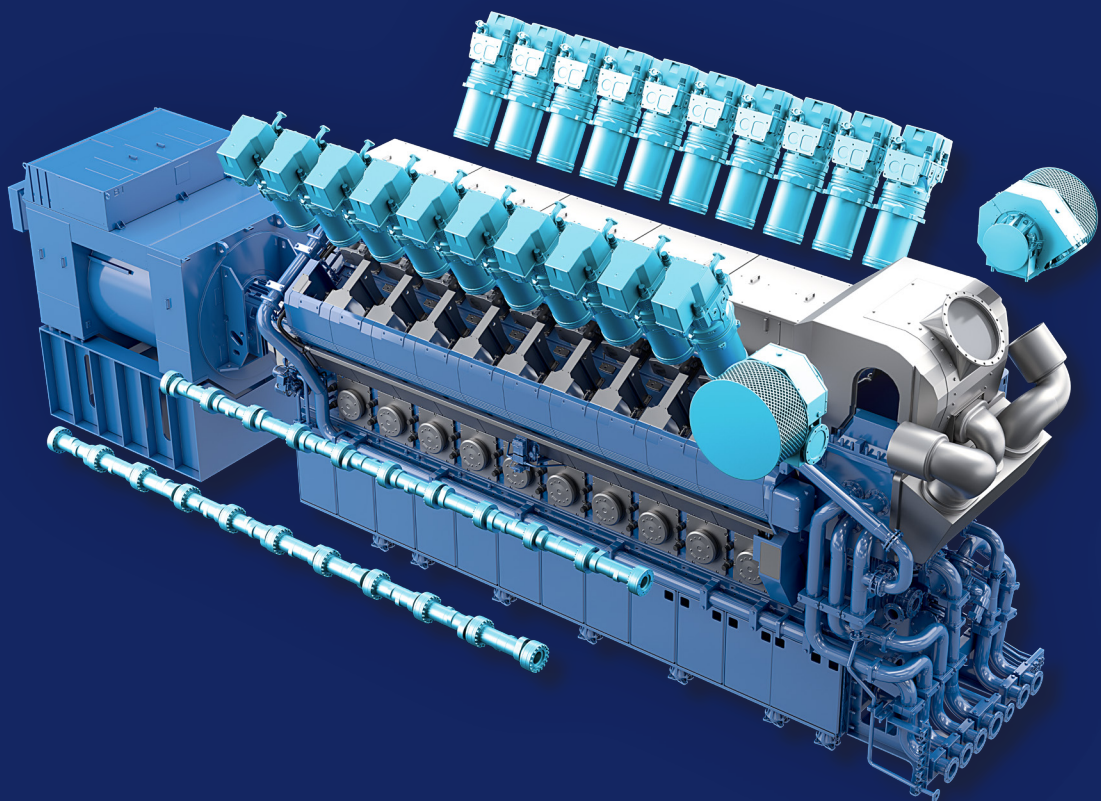
60 Hz



Cylinder diameter 360 mm, piston stroke 450 mm

Weight and dimentions	Weight kg	Length	Width	Height
B36:45L6 AG	67000	9800	2800	3890
B36:45L8 AG	87500	10240	3000	4170
B36:45L9 AG	88000	11250	3400	4170
Technical data	Unit	B36:45L6AG	B36:45L8AG	B36:45L9AG
Number of cylinders		6	8	9
Engine speed	r/min	720	720	720
Electrical output	kW	3370	4500	5070
Charge air cooler HT	kW	720	970	1080
Charge air cooler LT	kW	220	270	320
Lube oil cooler	kW	400	540	610
Jacket water cooler	kW	480	640	720
Exhaust mass	kg/h	18500	24600	27700
Exhaust gas	°C	375	375	375
Nom. el. efficiency	%	48.4	48.6	48.9

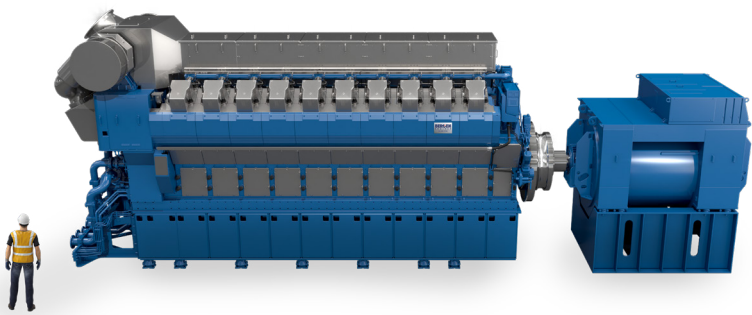
- Depending on type of generator the weight, dimensions and performance may change
- All technical data is valid at 100% load, with no engine driven pumps
- Engine power definition and fuel gas consumption are according to ISO 3046-1 (ICFN)
- Generator standard IEC 60034-1, power factor 1
- Reference fuel is natural gas with a lower heating value of 36MJ/nm³, methane number >80
- Minimum fuel gas pressure to the gas regulating module: 5.3 barg
- Due to continuous development some data may change



LIQUID FUEL GENERATING SETS

B33:45V A

50 Hz



Cylinder diameter 330 mm, piston stroke 450 mm

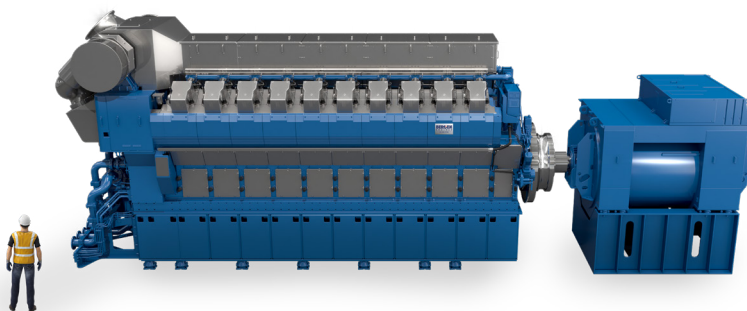
Weight and dimentions	Weight kg	Length	Width	Height
B33:45V12 A	100000	11716	3280	4980
B33:45V16 A	150000	12996	3783	4980
B33:45V20 A	170000	14276	3783	4980
Technical data	Unit	B33:45V12A	B33:45V16A	B33:45V20A
Number of cylinders		12	16	20
Engine speed	r/min	750	750	750
Electrical output	kW	6380	8520	10650
Charge air cooler HT	kW	1810	2410	3090
Charge air cooler LT	kW	400	530	590
Lube oil cooler	kW	780	1030	1290
Jacket water cooler	kW	920	1220	1520
Exhaust mass	kg/h	43400	57900	72400
Exhaust gas	°C	300	300	300
Nom. el. efficiency	%	48	48.3	48.3

- Depending on type of generator the weight, performance and dimensions may change
- All technical data is valid at 100% load, with no engine driven pumps
- Engine power definition is according to ISO 3046-1 (ICFN)
- Generator standard IEC 60034-1, power factor 1
- Specific fuel oil consumption is measured at test bed according to ISO 3046-1, using diesel oil with a net heating value of 42.7 MJ/kg
- Due to continuous development some data may change

Liquid fuel generating sets

B33:45V A

60 Hz

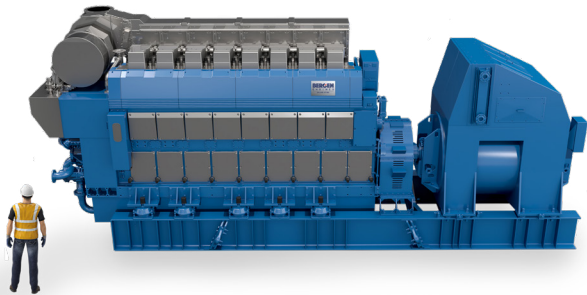


Cylinder diameter 330 mm, piston stroke 450 mm

Weight and dimensions	Weight kg	Length	Width	Height
B33:45V12 A	100000	11716	3280	4980
B33:45V16 A	150000	12996	3783	4980
B33:45V20 A	170000	14276	3783	4980
Technical data	Unit	B33:45V12A	B33:45V16A	B33:45V20A
Number of cylinders		12	16	20
Engine speed	r/min	720	720	720
Electrical output	kW	6380	8520	10650
Charge air cooler HT	kW	1810	2410	3090
Charge air cooler LT	kW	400	530	590
Lube oil cooler	kW	780	1030	1290
Jacket water cooler	kW	920	1220	1520
Exhaust mass	kg/h	43400	57900	72400
Exhaust gas	°C	300	300	300
Nom. el. efficiency	%	47.9	48.1	48.2

- Depending on type of generator the weight, performance and dimensions may change
- All technical data is valid at 100% load, with no engine driven pumps
- Engine power definition is according to ISO 3046-1 (ICFN)
- Generator standard IEC 60034-1, power factor 1
- Specific fuel oil consumption is measured at test bed according to ISO 3046-1, using diesel oil with a net heating value of 42.7 MJ/kg
- Due to continuous development some data may change

B33:45L A



Cylinder diameter 330 mm, piston stroke 450 mm

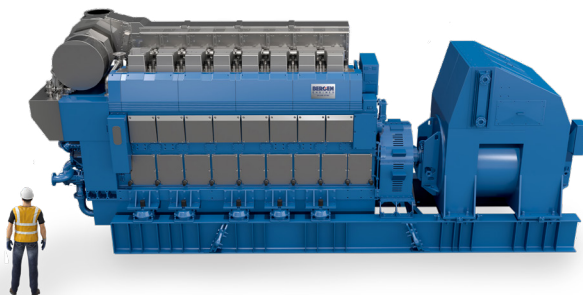
Weight and dimentions	Weight kg	Length	Width	Height
B33:45L6 A	66200	9280	2600	4110
B33:45L8 A	87500	10240	3000	4260
B33:45L9 A	92400	11250	3400	4170
Technical data	Unit	B33:45L6 A	B33:45L8 A	B33:45L9 A
Number of cylinders		6	8	9
Engine speed	r/min	750	750	750
Electrical output	kW	3170	4230	4760
Charge air cooler HT	kW	850	1150	1280
Charge air cooler LT	kW	250	320	400
Lube oil cooler	kW	390	520	580
Jacket water cooler	kW	460	610	690
Exhaust mass	kg/h	21700	28900	32600
Exhaust gas	°C	300	300	300
Nom. el. efficiency	%	47.7	47.7	47.7

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- All technical data is valid at 100% load, with no engine driven pumps
- Engine power definition is according to ISO 3046-1 (ICFN)
- Generator standard IEC 60034-1, power factor 1
- Specific fuel oil consumption is measured at test bed according to ISO 3046-1, using diesel oil with a net heating value of 42.7 MJ/kg
- Due to continuous development some data may change

Liquid fuel generating sets

B33:45L A

60 Hz



Cylinder diameter 330 mm, piston stroke 450 mm

Weight and dimensions	Weight kg	Length	Width	Height
B33:45L6 A	66200	9280	2600	4110
B33:45L8 A	87500	10240	3000	4260
B33:45L9 A	92400	11250	3400	4170
Technical data	Unit	B33:45L6 A	B33:45L8 A	B33:45L9 A
Number of cylinders		6	8	9
Engine speed	r/min	720	720	720
Electrical output	kW	3170	4220	4760
Charge air cooler HT	kW	850	1150	1280
Charge air cooler LT	kW	250	320	380
Lube oil cooler	kW	390	520	580
Jacket water cooler	kW	460	610	690
Exhaust mass	kg/h	21700	28900	32600
Exhaust gas	°C	300	300	300
Nom. el. efficiency	%	47.6	47.6	47.7

- Depending on type of generator the weight, performance and dimensions may change
- All technical data is valid at 100% load, with no engine driven pumps
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- Due to continuous development some data may change

