

Maintenance Record

MAN Industrial Gas Engines

MAN Engines



Maintenance Record



MAN Industrial Gas Engines

Imprint

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Dear customer,

Congratulations on deciding to purchase an MAN gas engine! These engines are characterized by high levels of performance and operational reliability whilst requiring a minimum of outlay on maintenance. However, in order to guarantee trouble-free operation, it is necessary to perform regular check-ups and maintenance tasks.

This maintenance record provides an overview of all prescribed maintenance jobs.

The maintenance tasks must be carried out at an authorized workshop after a specific number of operating hours.

The following publications are available to help you work with your new engine:

- Operator's manual
- Service products for MAN gas engines
- Spare parts catalogue
- Maintenance record

We are glad to answer any specific questions you may have if there is anything not covered by this publication. Please remember to quote the **fourteen-digit engine number** with all enquiries. It can be found in the General Details form or on the engine model plate.

Yours faithfully,
MAN Truck & Bus AG
Werk Nürnberg

List of abbreviations

ETC	Exhaust gas turbocharger
OH	Operating hours
TV	Throttle valve
CL	Coolant
ZPR	Zero pressure regulator
LT	Low temperature
P	Pressure
-	-
T	Temperature
ΔP	Pressure differential
° bef. TDC	Degrees crank angle before top dead center

General details

The General Details form must be completed by the authorized workshop or the unit manufacturer as part of the start-up process.

Name and address of customer	Name and address of unit manufacturer
Details of engine	
Engine type:	Installed rated output in kW:
Plant no.:	Start-up date:
Engine number:	Rated speed [rpm]
Name of the MAN representative:	
Details of drive system	
Drive type (e.g. generator, pump, compressor):	
Construction no., year of manufacture	
Place and date of 20–50 hour service:	

Start-up

Initial start-up of the MAN gas engine must be carried out by an authorized MAN Truck & Bus AG workshop or by the unit manufacturer.

During the initial start-up, the engine must be configured so that adherence to the country-specific local environmental regulations can be guaranteed. In particular, this concerns compliance with the applicable statutory exhaust gas emission limits. Moreover, the engine operating parameters must comply with the respective applicable technical data sheets. The mixture and control system and if necessary the aftertreatment system are to be designed in line with the complete machine by the manufacturer. It is essential that the start-up log with measurement sheet and the General Details sheet be completed in full and returned to MAN Truck & Bus AG.

The applicable exhaust gas emission limits for NO_x and CO must be entered as setpoint values in the relevant maintenance records.

The inspection record from the unit manufacturer and the MAN gas engine start-up log will then be passed on to the authorized MAN Truck & Bus AG workshop.

The applicable exhaust gas emission limits for NO_x and CO must be entered as setpoint values in the relevant maintenance records.

The MAN warranty only becomes effective once these documents have been received and checked.

Exhaust emission measurements

Exhaust emission measurements may only be carried out by authorized and trained personnel.

Exhaust emission measurements must be carried out in accordance with the user manual of the manufacturer of the measurement instruments.

Exhaust emission measurements are performed at nominal speed, and at 100% and 50% of nominal power.

The engine must be brought to normal operating conditions before measurements are taken:

Inlet coolant temperature > 80°C

Outlet coolant temperature < 89°C

Oil temperature at least 85°C

Mixture temperature with charged engines and mixture-cooled engines: < 52°C

Check the following before measurement to ensure an optimum result:

Compression pressure

Valve clearance

Ignition time

Exhaust gas back pressure

Intake air restriction downstream of air filter


Intake air restriction downstream of gas mixer

Visual inspection of the intake and exhaust system for traces of oil and leakages

Testing of exhaust emissions must be carried out in accordance with the maintenance schedule and recorded in the maintenance records.

Measurement sheets

Start-up

				Start-up measurement sheet		Page 1 of 2	
Basic data							
Appendix	Type of system	System operating hours OH		System construction year	Electrical power rating KWh_{el}		
	Operating method	Reference variable / start requirements			Speed rpm		
Installation conditions	Installation height m	Air pressure mbar	Air humidity %	Outside temperature °C	Unit compartment temperature °C		
Engine	Engine type		Engine number	Plant number	Engine operating hours OH		
					No. engine starts		
Components	Gas mixer type		Alternator type		Air filter type		
	Ignition system type		Ignition coil type		Spark plug type		
	Catalytic converter type		Silencer type		Exhaust heat exchanger type		
Steel wire mesh hoses ¹⁾	Part number / Date of production		Part number / Date of production		Part number / Date of production		
	Part number / Date of production		Part number / Date of production		Part number / Date of production		
	Part number / Date of production		Part number / Date of production		Part number / Date of production		
Service products	Engine oil type		Engine oil change interval	Antifreeze / corrosion inhibitor type	Concentration %		
Fuel	Type of gas		Methane content CH ₄ %	Sulphur / hydrogen sulfide ppm	Lower calorific value, Hu kWh/Nm³		
Place:		Date:		Customer's signature		Maintenance personnel signature	

¹⁾ all steel wire mesh hoses have to be replaced at the latest of 6 years after the day of production



Start-up measurement sheet

Operating data of engine at 100% rated power

Emissions	NOx emissions mg/Nm³	CO emissions mg/Nm³	O2 content of exhaust gas %	Lambda value
Gas train	Gas pressure upstream of ZPR mbar	Gas pressure downstream of ZPR mbar	Gas moisture %	Gas temperature °C
Intake system	T: intake air °C	P: intake vacuum mbar	Δ P: gas mixer mbar	Throttle valve position %
Turbocharging	Δ P: mixture cooler mbar	P: charge air upstream of TV mbar	T: mixture downstream of cooler °C	T: exhaust gas upstream of ETC bank A/B °C
Exhaust system	T: exhaust gas upstream of ETC bank A/B °C	P: exhaust gas back pressure, bank A/B mbar	T: exhaust gas up/downstream of catalytic converter °C	T: exhaust gas up/downstream of exhaust heat exchanger °C
Lubrication	Measuring point, engine oil T	T: engine oil °C	P: engine oil bar	P: crank chamber mbar
Cooling circuit	T: CL engine inlet °C	T: CL engine outlet °C	P: CL engine operating temperature bar	CL circulation quantity, engine l/min
	T: CL inflow LT mixture cooler °C	T: CL outflow LT mixture cooler °C	P: CL LT mixture cooler operating temperature bar	CL circulation quantity, LT mixture cooler l/min
Ignition system	Ignition time control ° bef. TDC	Ignition time measurement ° bef. TDC	Ignition energy V	Spark plug electrode distance m

Operating data of engine at 50% rated power

Emissions	NOx emissions mg/Nm³	CO emissions mg/Nm³	O2 content of exhaust gas %	Lambda value
Gas train	Gas pressure upstream of ZPR mbar	Gas pressure downstream of ZPR mbar	Gas moisture %	Gas temperature °C
Intake system	T: intake air °C	P: intake vacuum mbar	Δ P: gas mixer mbar	Throttle valve position %
Turbocharging	Δ P: mixture cooler mbar	P: charge air upstream of TV mbar	T: mixture downstream of cooler °C	T: exhaust gas upstream of ETC bank A/B °C
Exhaust system	T: exhaust gas upstream of ETC bank A/B °C	P: exhaust gas back pressure, bank A/B mbar	T: exhaust gas up/downstream of catalytic converter °C	T: exhaust gas up/downstream of exhaust heat exchanger °C
Lubrication	Measuring point, engine oil T	T: engine oil °C	P: engine oil bar	P: crank chamber mbar
Cooling circuit	T: CL engine inlet °C	T: CL engine outlet °C	P: CL engine operating temperature bar	CL circulation quantity, engine l/min
	T: CL inflow LT mixture cooler °C	T: CL outflow LT mixture cooler °C	P: CL LT mixture cooler operating temperature bar	CL circulation quantity, LT mixture cooler l/min


Place:

Date:

Customer's signature

Maintenance personnel signature

Return to service after Revision R2

	<p>Return to service after Revision R2</p>	<p>Page 1 of 2</p>
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Basic data					
Appendix	Type of system	System operating hours <div style="text-align: right;">OH</div>		System construction year	Electrical power rating <div style="text-align: right;">KWh_{el}</div>
	Operating method	Reference variable / start requirements			Speed <div style="text-align: right;">rpm</div>
Installation conditions	Installation height <div style="text-align: right;">m</div>	Air pressure <div style="text-align: right;">mbar</div>	Air humidity <div style="text-align: right;">%</div>	Outside temperature <div style="text-align: right;">°C</div>	Unit compartment temperature <div style="text-align: right;">°C</div>

Engine	Engine type	Engine number	Plant number	Engine operating hours <div style="text-align: right;">OH</div>
				No. engine starts

Components	Gas mixer type	Alternator type	Air filter type
	Ignition system type	Ignition coil type	Spark plug type
	Catalytic converter type	Silencer type	Exhaust heat exchanger type

Steel wire mesh hoses ¹⁾	Part number / Date of production	Part number / Date of production	Part number / Date of production
	Part number / Date of production	Part number / Date of production	Part number / Date of production
	Part number / Date of production	Part number / Date of production	Part number / Date of production

Service products	Engine oil type	Engine oil change interval	Antifreeze / corrosion inhibitor type	Concentration <div style="text-align: right;">%</div>
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Fuel	Type of gas	Methane content CH ₄ <div style="text-align: right;">%</div>	Sulphur / hydrogen sulfide <div style="text-align: right;">ppm</div>	Lower calorific value, Hu <div style="text-align: right;">kWh/Nm³</div>
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Place:	Date:	Customer's signature	Maintenance personnel signature
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¹⁾ all steel wire mesh hoses have to be replaced at the latest of 6 years after the day of production



**Return to service
after Revision R2**

Operating data of engine at 100% rated power

Emissions	NOx emissions mg/Nm³	CO emissions mg/Nm³	O2 content of exhaust gas %	Lambda value
Gas train	Gas pressure upstream of ZPR mbar	Gas pressure downstream of ZPR mbar	Gas moisture %	Gas temperature °C
Intake system	T: intake air °C	P: intake vacuum mbar	Δ P: gas mixer mbar	Throttle valve position %
Turbocharging	Δ P: mixture cooler mbar	P: charge air upstream of TV mbar	T: mixture downstream of cooler °C	T: exhaust gas upstream of ETC bank A/B °C
Exhaust system	T: exhaust gas upstream of ETC bank A/B °C	P: exhaust gas back pressure, bank A/B mbar	T: exhaust gas up/downstream of catalytic converter °C	T: exhaust gas up/downstream of exhaust heat exchanger °C
Lubrication	Measuring point, engine oil T	T: engine oil °C	P: engine oil bar	P: crank chamber mbar
Cooling circuit	T: CL engine inlet °C	T: CL engine outlet °C	P: CL engine operating temperature bar	CL circulation quantity, engine l/min
	T: CL inflow LT mixture cooler °C	T: CL outflow LT mixture cooler °C	P: CL LT mixture cooler operating temperature bar	CL circulation quantity, LT mixture cooler l/min
Ignition system	Ignition time control ° bef. TDC	Ignition time measurement ° bef. TDC	Ignition energy V	Spark plug electrode distance m

Operating data of engine at 50% rated power

Emissions	NOx emissions mg/Nm³	CO emissions mg/Nm³	O2 content of exhaust gas %	Lambda value
Gas train	Gas pressure upstream of ZPR mbar	Gas pressure downstream of ZPR mbar	Gas moisture %	Gas temperature °C
Intake system	T: intake air °C	P: intake vacuum mbar	Δ P: gas mixer mbar	Throttle valve position %
Turbocharging	Δ P: mixture cooler mbar	P: charge air upstream of TV mbar	T: mixture downstream of cooler °C	T: exhaust gas upstream of ETC bank A/B °C
Exhaust system	T: exhaust gas upstream of ETC bank A/B °C	P: exhaust gas back pressure, bank A/B mbar	T: exhaust gas up/downstream of catalytic converter °C	T: exhaust gas up/downstream of exhaust heat exchanger °C
Lubrication	Measuring point, engine oil T	T: engine oil °C	P: engine oil bar	P: crank chamber mbar
Cooling circuit	T: CL engine inlet °C	T: CL engine outlet °C	P: CL engine operating temperature bar	CL circulation quantity, engine l/min
	T: CL inflow LT mixture cooler °C	T: CL outflow LT mixture cooler °C	P: CL LT mixture cooler operating temperature bar	CL circulation quantity, LT mixture cooler l/min


Place:

Date:

Customer's signature

Maintenance personnel
signature

Return to service after Revision R3

					Return to service after Revision R3					Page 1 of 2				
Basic data														
Appendix		Type of system			System operating hours OH			System construction year		Electrical power rating KWh_{el}				
		Operating method		Reference variable / start requirements						Speed rpm				
Installation conditions		Installation height m		Air pressure mbar		Air humidity %		Outside temperature °C		Unit compartment temperature °C				
Engine		Engine type			Engine number			Plant number		Engine operating hours OH				
										No. engine starts				
Components		Gas mixer type			Alternator type			Air filter type						
		Ignition system type			Ignition coil type			Spark plug type						
		Catalytic converter type			Silencer type			Exhaust heat exchanger type						
Steel wire mesh hoses ¹⁾		Part number / Date of production			Part number / Date of production			Part number / Date of production						
		Part number / Date of production			Part number / Date of production			Part number / Date of production						
		Part number / Date of production			Part number / Date of production			Part number / Date of production						
Service products		Engine oil type			Engine oil change interval		Antifreeze / corrosion inhibitor type		Concentration %					
Fuel		Type of gas		Methane content CH ₄ %		Sulphur / hydrogen sulfide ppm		Lower calorific value, H _u kWh/Nm³						
Place:				Date:				Customer's signature			Maintenance personnel signature			

¹⁾ all steel wire mesh hoses have to be replaced at the latest of 6 years after the day of production



**Return to service
after Revision R3**

Operating data of engine at 100% rated power

Emissions	NOx emissions mg/Nm³	CO emissions mg/Nm³	O2 content of exhaust gas %	Lambda value
Gas train	Gas pressure upstream of ZPR mbar	Gas pressure downstream of ZPR mbar	Gas moisture %	Gas temperature °C
Intake system	T: intake air °C	P: intake vacuum mbar	Δ P: gas mixer mbar	Throttle valve position %
Turbocharging	Δ P: mixture cooler mbar	P: charge air upstream of TV mbar	T: mixture downstream of cooler °C	T: exhaust gas upstream of ETC bank A/B °C
Exhaust system	T: exhaust gas upstream of ETC bank A/B °C	P: exhaust gas back pressure, bank A/B mbar	T: exhaust gas up/downstream of catalytic converter °C	T: exhaust gas up/downstream of exhaust heat exchanger °C
Lubrication	Measuring point, engine oil T	T: engine oil °C	P: engine oil bar	P: crank chamber mbar
Cooling circuit	T: CL engine inlet °C	T: CL engine outlet °C	P: CL engine operating temperature bar	CL circulation quantity, engine l/min
	T: CL inflow LT mixture cooler °C	T: CL outflow LT mixture cooler °C	P: CL LT mixture cooler operating temperature bar	CL circulation quantity, LT mixture cooler l/min
Ignition system	Ignition time control ° bef. TDC	Ignition time measurement ° bef. TDC	Ignition energy V	Spark plug electrode distance m

Operating data of engine at 50% rated power

Emissions	NOx emissions mg/Nm³	CO emissions mg/Nm³	O2 content of exhaust gas %	Lambda value
Gas train	Gas pressure upstream of ZPR mbar	Gas pressure downstream of ZPR mbar	Gas moisture %	Gas temperature °C
Intake system	T: intake air °C	P: intake vacuum mbar	Δ P: gas mixer mbar	Throttle valve position %
Turbocharging	Δ P: mixture cooler mbar	P: charge air upstream of TV mbar	T: mixture downstream of cooler °C	T: exhaust gas upstream of ETC bank A/B °C
Exhaust system	T: exhaust gas upstream of ETC bank A/B °C	P: exhaust gas back pressure, bank A/B mbar	T: exhaust gas up/downstream of catalytic converter °C	T: exhaust gas up/downstream of exhaust heat exchanger °C
Lubrication	Measuring point, engine oil T	T: engine oil °C	P: engine oil bar	P: crank chamber mbar
Cooling circuit	T: CL engine inlet °C	T: CL engine outlet °C	P: CL engine operating temperature bar	CL circulation quantity, engine l/min
	T: CL inflow LT mixture cooler °C	T: CL outflow LT mixture cooler °C	P: CL LT mixture cooler operating temperature bar	CL circulation quantity, LT mixture cooler l/min


Place:

Date:

Customer's signature

Maintenance personnel signature

Return to service after temporary withdrawal

 <b style="font-size: 1.2em;">Return to service after temporary withdrawal					Page 1 of 2
Basic data					
Appendix	Type of system	System operating hours <div style="text-align: right;">OH</div>		System construction year	Electrical power rating <div style="text-align: right;">KWh_{el}</div>
	Operating method	Reference variable / start requirements			Speed <div style="text-align: right;">rpm</div>
Installation conditions	Installation height <div style="text-align: right;">m</div>	Air pressure <div style="text-align: right;">mbar</div>	Air humidity <div style="text-align: right;">%</div>	Outside temperature <div style="text-align: right;">°C</div>	Unit compartment temperature <div style="text-align: right;">°C</div>
Engine	Engine type	Engine number	Plant number	Engine operating hours <div style="text-align: right;">OH</div>	
				No. engine starts	
Components	Gas mixer type		Alternator type	Air filter type	
	Ignition system type		Ignition coil type	Spark plug type	
	Catalytic converter type		Silencer type	Exhaust heat exchanger type	
Steel wire mesh hoses ¹⁾	Part number / Date of production		Part number / Date of production	Part number / Date of production	
	Part number / Date of production		Part number / Date of production	Part number / Date of production	
	Part number / Date of production		Part number / Date of production	Part number / Date of production	
Service products	Engine oil type	Engine oil change interval	Antifreeze / corrosion inhibitor type	Concentration <div style="text-align: right;">%</div>	
Fuel	Type of gas	Methane content CH ₄ <div style="text-align: right;">%</div>	Sulphur / hydrogen sulfide <div style="text-align: right;">ppm</div>	Lower calorific value, H _u <div style="text-align: right;">kWh/Nm³</div>	
Place:		Date:	Customer's signature	Maintenance personnel signature	

¹⁾ all steel wire mesh hoses have to be replaced at the latest of 6 years after the day of production



Return to service after temporary withdrawal

Operating data of engine at 100% rated power

Emissions	NOx emissions mg/Nm³	CO emissions mg/Nm³	O2 content of exhaust gas %	Lambda value
Gas train	Gas pressure upstream of ZPR mbar	Gas pressure downstream of ZPR mbar	Gas moisture %	Gas temperature °C
Intake system	T: intake air °C	P: intake vacuum mbar	Δ P: gas mixer mbar	Throttle valve position %
Turbocharging	Δ P: mixture cooler mbar	P: charge air upstream of TV mbar	T: mixture downstream of cooler °C	T: exhaust gas upstream of ETC bank A/B °C
Exhaust system	T: exhaust gas upstream of ETC bank A/B °C	P: exhaust gas back pressure, bank A/B mbar	T: exhaust gas up/downstream of catalytic converter °C	T: exhaust gas up/downstream of exhaust heat exchanger °C
Lubrication	Measuring point, engine oil T	T: engine oil °C	P: engine oil bar	P: crank chamber mbar
Cooling circuit	T: CL engine inlet °C	T: CL engine outlet °C	P: CL engine operating temperature bar	CL circulation quantity, engine l/min
	T: CL inflow LT mixture cooler °C	T: CL outflow LT mixture cooler °C	P: CL LT mixture cooler operating temperature bar	CL circulation quantity, LT mixture cooler l/min
Ignition system	Ignition time control ° bef. TDC	Ignition time measurement ° bef. TDC	Ignition energy V	Spark plug electrode distance m

Operating data of engine at 50% rated power

Emissions	NOx emissions mg/Nm³	CO emissions mg/Nm³	O2 content of exhaust gas %	Lambda value
Gas train	Gas pressure upstream of ZPR mbar	Gas pressure downstream of ZPR mbar	Gas moisture %	Gas temperature °C
Intake system	T: intake air °C	P: intake vacuum mbar	Δ P: gas mixer mbar	Throttle valve position %
Turbocharging	Δ P: mixture cooler mbar	P: charge air upstream of TV mbar	T: mixture downstream of cooler °C	T: exhaust gas upstream of ETC bank A/B °C
Exhaust system	T: exhaust gas upstream of ETC bank A/B °C	P: exhaust gas back pressure, bank A/B mbar	T: exhaust gas up/downstream of catalytic converter °C	T: exhaust gas up/downstream of exhaust heat exchanger °C
Lubrication	Measuring point, engine oil T	T: engine oil °C	P: engine oil bar	P: crank chamber mbar
Cooling circuit	T: CL engine inlet °C	T: CL engine outlet °C	P: CL engine operating temperature bar	CL circulation quantity, engine l/min
	T: CL inflow LT mixture cooler °C	T: CL outflow LT mixture cooler °C	P: CL LT mixture cooler operating temperature bar	CL circulation quantity, LT mixture cooler l/min


Place:

Date:

Customer's signature

Maintenance personnel signature

Return to service after change of customer/location

 Return to service after change of customer/location					Page 1 of 2
Basic data					
Appendix	Type of system	System operating hours OH		System construction year	Electrical power rating KWh_{el}
	Operating method	Reference variable / start requirements			Speed rpm
Installation conditions	Installation height m	Air pressure mbar	Air humidity %	Outside temperature °C	Unit compartment temperature °C
Components	Gas mixer type		Alternator type		Air filter type
	Ignition system type		Ignition coil type		Spark plug type
	Catalytic converter type		Silencer type		Exhaust heat exchanger type
Steel wire mesh hoses ¹⁾	Part number / Date of production		Part number / Date of production		Part number / Date of production
	Part number / Date of production		Part number / Date of production		Part number / Date of production
	Part number / Date of production		Part number / Date of production		Part number / Date of production
Engine	Engine type		Engine number	Plant number	Engine operating hours OH
					No. engine starts
Service products	Engine oil type	Engine oil change interval	Antifreeze / corrosion inhibitor type	Concentration %	
Fuel	Type of gas	Methane content CH ₄ %	Sulphur / hydrogen sulfide ppm	Lower calorific value, Hu kWh/Nm³	
Place:		Date:	Customer's signature		Maintenance personnel signature

¹⁾ all steel wire mesh hoses have to be replaced at the latest of 6 years after the day of production



Return to service after change of customer/location

Operating data of engine at 100% rated power

Emissions	NOx emissions mg/Nm³	CO emissions mg/Nm³	O2 content of exhaust gas %	Lambda value
Gas train	Gas pressure upstream of ZPR mbar	Gas pressure downstream of ZPR mbar	Gas moisture %	Gas temperature °C
Intake system	T: intake air °C	P: intake vacuum mbar	Δ P: gas mixer mbar	Throttle valve position %
Turbocharging	Δ P: mixture cooler mbar	P: charge air upstream of TV mbar	T: mixture downstream of cooler °C	T: exhaust gas upstream of ETC bank A/B °C
Exhaust system	T: exhaust gas upstream of ETC bank A/B °C	P: exhaust gas back pressure, bank A/B mbar	T: exhaust gas up/downstream of catalytic converter °C	T: exhaust gas up/downstream of exhaust heat exchanger °C
Lubrication	Measuring point, engine oil T	T: engine oil °C	P: engine oil bar	P: crank chamber mbar
Cooling circuit	T: CL engine inlet °C	T: CL engine outlet °C	P: CL engine operating temperature bar	CL circulation quantity, engine l/min
	T: CL inflow LT mixture cooler °C	T: CL outflow LT mixture cooler °C	P: CL LT mixture cooler operating temperature bar	CL circulation quantity, LT mixture cooler l/min
Ignition system	Ignition time control ° bef. TDC	Ignition time measurement ° bef. TDC	Ignition energy V	Spark plug electrode distance m

Operating data of engine at 50% rated power

Emissions	NOx emissions mg/Nm³	CO emissions mg/Nm³	O2 content of exhaust gas %	Lambda value
Gas train	Gas pressure upstream of ZPR mbar	Gas pressure downstream of ZPR mbar	Gas moisture %	Gas temperature °C
Intake system	T: intake air °C	P: intake vacuum mbar	Δ P: gas mixer mbar	Throttle valve position %
Turbocharging	Δ P: mixture cooler mbar	P: charge air upstream of TV mbar	T: mixture downstream of cooler °C	T: exhaust gas upstream of ETC bank A/B °C
Exhaust system	T: exhaust gas upstream of ETC bank A/B °C	P: exhaust gas back pressure, bank A/B mbar	T: exhaust gas up/downstream of catalytic converter °C	T: exhaust gas up/downstream of exhaust heat exchanger °C
Lubrication	Measuring point, engine oil T	T: engine oil °C	P: engine oil bar	P: crank chamber mbar
Cooling circuit	T: CL engine inlet °C	T: CL engine outlet °C	P: CL engine operating temperature bar	CL circulation quantity, engine l/min
	T: CL inflow LT mixture cooler °C	T: CL outflow LT mixture cooler °C	P: CL LT mixture cooler operating temperature bar	CL circulation quantity, LT mixture cooler l/min

Place:

Date:

Customer's signature

Maintenance personnel signature

Completion of maintenance tasks

General information

Please note that the maintenance tasks may only be carried out by authorized MAN workshops. The workshop will stamp a checklist to confirm that the tasks have been completed correctly at each service.

It is important to ensure that all entries are duly made in full and are clearly legible.

A test run must be carried out after every service.

Notes about tasks that appear necessary or work/repairs carried out may also be kept.

Start-up

The Start-up form must be completed by the authorized workshop or the unit manufacturer and forwarded to MAN Truck & Bus AG as part of the start-up process.

Service at 20–50 operating hours

This first service is essential.

The General Details form must be completed by the authorized workshop or the unit manufacturer and forwarded to MAN Truck & Bus AG as part of the start-up process.

Steel wire mesh hoses

All steel wire mesh hoses have to be replaced at the latest of 6 years after the day of production. The date of production is stamped on the fittings, directly on the hoses, see picture (yy/mm).



The date of production of the steel wire mesh hoses has to be documented during the commissioning. For engines which are already in operation, the date of production must be checked and documented within the next regular service operation.

An extension of the period of use is only possible, if the specified inspection criteria according to the BG Directive-Fact-Sheet No. 15 (Table 1-8) are examined and evaluated at regular intervals.

NOTE

In the case of complaints within the warranty period, maintenance records E2/E3 must also be presented.

Important instructions concerning technical safety and the safety of personnel are specifically highlighted, as indicated below.

Danger

Refers to working and operating procedures which must be followed in order to avoid exposing people to risk.

Caution

Refers to working and operating procedures which must be followed in order to avoid material damage or destruction.

NOTE

An explanatory note which is useful for understanding the working or operating procedure to be performed.

Assembling pipes

Danger

Do not bend pipes of any kind.

Mounting gaskets

Gaskets are often fitted with adhesives or sealing compounds as an aid to installation or to improve the seal. This can result in the seal slipping during operation due to the so-called sewing-machine effect, causing leaks to occur. This is especially likely where parts with different rates of thermal expansion are connected (e.g. aluminum and cast iron).

Example:

If an adhesive or sealing compound is used on the cover of the front crankshaft oil seal, the gasket will gradually slip inside over time due to the varying thermal expansion rates. Oil leaks will occur which might be wrongly attributed to the shaft seal.

Correct installation of gaskets can only be achieved if the following principles are observed:

- Only use genuine MAN seals and gaskets.
- Make sure that the areas to be sealed are undamaged and clean.
- Do not use adhesive agents or sealing agents. To facilitate installation, a little grease can be used to stick the seal to the part to be mounted.
- Tighten the bolts evenly to the specified tightening torque.

Mounting O-rings

- Only use genuine MAN O-rings.
- Make sure that the areas to be sealed are undamaged and clean.
- As a rule, moisten the seals with engine oil when fitting.

Warranty conditions

Scope of the warranty

MAN Truck & Bus AG guarantees that any components of engine series E08, E26, E28 and E32 acknowledged to be faulty will be either replaced or repaired, as decided by MAN Truck & Bus AG. The following warranty conditions (as contained in the terms of delivery) are applicable here:

Repairs

In order for work to be carried out as required, the customer must

- Grant the necessary time and opportunity
- Furnish, at his expense, the necessary assistants, equipment and facilities and carry out ancillary work
- Perform, at his expense, all work above and beyond the original scope of the order

Once per case of damage, MAN Truck & Bus AG will undertake appropriate travel expenses as required by authorized service technicians, and appropriate shipping costs for replacement and reconditioned parts. Additional special travel and transport costs will be borne by the customer. Repairs will be carried out during normal, regular working hours. The extra cost of any work carried out outside regular working hours will be borne by the customer.

The warranty does not cover:

- The replacement of wearing parts, e.g. filters, V-belts, operating fluids (oil, anti-freeze and anti-corrosion agents)
- The costs of normal, routine prescribed inspections
- Damage caused by the use of unsuitable service products or by improper handling/operation
- Any costs indirectly incurred in connection with warranty cases, for downtimes, loss of time, expenses for sustenance, accommodation, freight costs, fuel costs, etc. or any other follow-on costs
- Damage caused by failure to follow the guidelines prescribed in the installation manual for industrial gas engines

Maintenance schedules and maintenance records

Service intervals for E0834 LE302, E0836 LE202/302 "Natural gas"

	After start-up and R1-R2	all	all	all	up to	up to	up to
Interval after operating hours at 1500 rpm	20-50	n.s.	1.000	2.000	10.000	30.000	60.000
Interval after operating hours at 1800 rpm	20-50	n.s.	600	1,200	10.000	20.000	40.000
Service interval	E1	O1*)	E2	E3	R1****)	R2****)	R3****)
Check steel wire mesh hoses	X			X	X	X	X
Carry out a leak test	X		X				
Check bolt connections	X		X				
Change engine oil; oil analysis*)	X	X					
Change engine oil filter*)	X	X					
Record operating data****)	X		X				
Check start procedure	X		X				
Adjust/check throttle valve	X			X			
Clean/check gas filter	X			X			
Clean/check air filter	X			X			
Clean/check pickups	X			X			
Check coolant concentration	X			X			
Check ignition time	X			X			
Check coolant circuit / system pressure	X			X			
Measure crankcase pressure	X			X			
Measure exhaust back pressure including catalytic converter	X			X			
Check emissions and Lambda	X			X			
Check exhaust system for air leaks / external soiling	X						
Check intake vacuum			X				
Check spark plugs, replace if necessary			X				
Check valve clearance and adjust if necessary				X			
Replace spark plugs				X			
Check compression pressure				X			
Check/replace oil separator				X			
Check/clean mixture cooler	X			X			
Check/calibrate sensors				X			
Check exhaust system bolt connections				X			
Replace coolant					X		
Measure crankshaft axial play					X		
Replace turbo charger					X		
Replace cylinder liner						X	
Check/replace connecting rods						X	
Replace piston rings						X	
Check/replace pistons						X	
Replace cylinder heads						X	
Complete engine overhaul							X

Service intervals for E0834 LE302/322, E0836 LE202/LE302 "Special gas"

	After start-up and R1-R2	all	all	all	up to	up to	up to
Interval after operating hours at 1500 rpm	20-50	n.s	1.000	2.000	10.000	30.000	60.000
Interval after operating hours at 1800 rpm	20-50	n.s	900	1.200	10.000	20.000	40.000
Service interval	E1	O1*)	E2	E3	R1***)	R2***)	R3***)
Check steel wire mesh hoses	X			X	X	X	X
Carry out a leak test	X		X				
Check bolt connections	X		X				
Change engine oil; oil analysis*)	X	X					
Change engine oil filter*)	X	X					
Record operating data****)	X		X				
Check start procedure	X		X				
Adjust/check throttle valve	X			X			
Clean/check gas filter	X			X			
Clean/check air filter	X			X			
Clean/check pickups	X			X			
Check coolant concentration	X			X			
Check ignition time	X			X			
Check coolant circuit / system pressure	X			X			
Measure crankcase pressure	X			X			
Measure exhaust back pressure including catalytic converter	X			X			
Check emissions and Lambda	X			X			
Check exhaust system for air leaks / external soiling	X						
Check intake vacuum			X				
Check spark plugs, replace if necessary			X				
Check valve clearance and adjust if necessary				X			
Replace spark plugs				X			
Check compression pressure				X			
Check/replace oil separator				X			
Check/clean mixture cooler	X			X			
Check/calibrate sensors				X			
Check exhaust system bolt connections				X			
Replace coolant					X		
Measure crankshaft axial play					X		
Replace turbo charger					X		
Replace cylinder liner						X	
Check/replace connecting rods						X	
Replace piston rings						X	
Check/replace pistons						X	
Replace cylinder heads						X	
Complete engine overhaul							X

Service intervals for E0834 E302/312, E0836 E302/312 "Natural gas"

	After start-up and R1-R2	all	all	all	up to	up to	up to
Interval after operating hours at 1500 rpm	20-50	n.s	1.500	3.000	15.000	30.000	60.000
Interval after operating hours at 1800 rpm	20-50	n.s	900	1.800	12.000	20.000	40.000
Service interval	E1	O1*)	E2	E3	R1***)	R2***)	R3***)
Check steel wire mesh hoses	X			X	X	X	X
Carry out a leak test	X		X				
Check bolt connections	X		X				
Change engine oil; oil analysis*)	X	X					
Change engine oil filter*)	X	X					
Record operating data****)	X		X				
Check start procedure	X		X				
Adjust/check throttle valve	X			X			
Clean/check gas filter	X			X			
Clean/check air filter	X			X			
Clean/check pickups	X			X			
Check coolant concentration	X			X			
Check ignition time	X			X			
Check coolant circuit / system pressure	X			X			
Measure crankcase pressure	X			X			
Measure exhaust back pressure including catalytic converter	X			X			
Check emissions and Lambda	X			X			
Check exhaust system for air leaks / external soiling	X						
Check intake vacuum			X				
Check spark plugs, replace if necessary			X				
Check valve clearance and adjust if necessary			X				
Replace spark plugs	X			X			
Check compression pressure			X				
Check/replace oil separator				X			
Check/calibrate sensors				X			
Check exhaust system bolt connections				X			
Replace coolant					X		
Measure crankshaft axial play					X		
Replace cylinder liner						X	
Check/replace connecting rods						X	
Replace piston rings						X	
Check/replace pistons						X	
Replace cylinder heads						X	
Complete engine overhaul							X

Service intervals for E2876 E312, E2842 E312, "Natural gas"

	After start-up and R1-R2	all	all	all	up to	up to	up to
Interval after operating hours at 1500 rpm	20-50	n.s	1.800 **)	3.600	15.000	25.000	50.000
Interval after operating hours at 1800 rpm	20-50	n.s	900 **)	1.800	12.000	20.000	40.000
Service interval	E1	O1*)	E2	E3	R1***)	R2***)	R3***)
Check steel wire mesh hoses	X			X	X	X	X
Carry out a leak test	X		X				
Check bolt connections	X		X				
Change engine oil; oil analysis*)	X	X					
Change engine oil filter*)	X	X					
Record operating data****)	X		X				
Check start procedure	X		X				
Adjust/check throttle valve	X			X			
Clean/check gas filter	X			X			
Clean/check air filter	X			X			
Clean/check pickups	X			X			
Check coolant concentration	X			X			
Check ignition time	X			X			
Check coolant circuit / system pressure	X			X			
Measure crankcase pressure	X			X			
Measure exhaust back pressure including catalytic converter	X			X			
Check emissions and Lambda	X			X			
Check exhaust system for air leaks / external soiling	X						
Check intake vacuum			X				
Check spark plugs, replace if necessary			X				
Check valve clearance and adjust if necessary				X			
Replace spark plugs				X			
Check compression pressure				X			
Check/replace oil separator				X			
Check/clean mixture cooler	X			X			
Check/calibrate sensors				X			
Check exhaust system bolt connections				X			
Replace coolant					X		
Measure crankshaft axial play					X		
Replace cylinder liner						X	
Check/replace connecting rods						X	
Replace piston rings						X	
Check/replace pistons						X	
Replace cylinder heads						X	
Complete engine overhaul							X

Service intervals for E2676 E302, "Natural gas"

	After start-up and R1-R2	all	all	all	up to	up to	up to
Interval after operating hours at 1500 rpm	20-50	n.s	1.800	3.600	15.000	25.000	50.000
Interval after operating hours at 1800 rpm	20-50	n.s	900	1.800	12.000	20.000	40.000
Service interval	E1	O1*)	E2	E3	R1***)	R2***)	R3***)
Check steel wire mesh hoses	X			X	X	X	X
Carry out a leak test	X		X				
Check bolt connections	X		X				
Change engine oil; oil analysis*)	X	X					
Change engine oil filter*)	X	X					
Record operating data****)	X		X				
Check start procedure	X		X				
Adjust/check throttle valve	X			X			
Clean/check gas filter	X			X			
Clean/check air filter	X			X			
Clean/check pickups	X			X			
Check coolant concentration	X			X			
Check ignition time	X			X			
Check coolant circuit / system pressure	X			X			
Measure crankcase pressure	X			X			
Measure exhaust back pressure including catalytic converter	X			X			
Check emissions and Lambda	X			X			
Check exhaust system for air leaks / external soiling	X						
Check intake vacuum			X				
Check spark plugs, replace if necessary			X				
Endoscopy of the combustion chambers ¹⁾				X			
Check valve clearance and adjust if necessary			X				
Replace spark plugs	X			X			
Check compression pressure			X				
Check/replace oil separator				X			
Check/calibrate sensors				X			
Check exhaust system bolt connections				X			
Replace membrane Foil separator					10.000 h		
Replace coolant					X		
Measure crankshaft axial play					X		
Replace cylinder liner						X	
Check/replace connecting rods						X	
Replace piston rings						X	
Check/replace pistons						X	
Replace cylinder heads						X	
Complete engine overhaul							X

¹⁾ from 6,000 operating hours

Service intervals for E3232 E302, "Natural gas", with spark plugs M14

	After start-up and R1-R2	all	all	all	up to	up to	up to
Interval after operating hours at 1500 rpm	20-50	n.s	1.800	3.600	15.000	25.000	50.000
Interval after operating hours at 1800 rpm	20-50	n.s	900	1.800	12.000	20.000	40.000
Service interval	E1	O1*)	E2	E3	R1***)	R2***)	R3***)
Check steel wire mesh hoses	X			X	X	X	X
Carry out a leak test	X		X				
Check bolt connections	X		X				
Change engine oil; oil analysis*)	X	X					
Change engine oil filter*)	X	X					
Record operating data****)	X		X				
Check start procedure	X		X				
Adjust/check throttle valve	X			X			
Clean/check gas filter	X			X			
Clean/check air filter	X			X			
Clean/check pickups	X			X			
Check coolant concentration	X			X			
Check ignition time	X			X			
Check coolant circuit / system pressure	X			X			
Measure crankcase pressure	X			X			
Measure exhaust back pressure including catalytic converter	X			X			
Check emissions and Lambda	X			X			
Check exhaust system for air leaks / external soiling	X						
Check intake vacuum			X				
Check spark plugs M14, replace if necessary			X				
Endoscopy of the combustion chambers ¹⁾				X			
Check valve clearance and adjust if necessary			X				
Replace spark plugs M14	X			X			
Check compression pressure			X				
Check/replace oil separator				X			
Check/calibrate sensors				X			
Check exhaust system bolt connections				X			
Replace coolant					X		
Measure crankshaft axial play					X		
Replace cylinder liner						X	
Check/replace connecting rods						X	
Replace piston rings						X	
Check/replace pistons						X	
Replace cylinder heads						X	
Complete engine overhaul							X

¹⁾ from 6,000 operating hours

Service intervals for E3232 E302, "Natural gas", with spark plugs M18

	After start-up and R1-R2	all	all	all	up to	up to	up to
Interval after operating hours at 1500 rpm	20-50	n.s	2.000	4.000	15.000	25.000	50.000
Interval after operating hours at 1800 rpm	20-50	n.s	1.000	2.000	12.000	20.000	40.000
Service interval	E1	O1*)	E2	E3	R1***)	R2***)	R3***)
Check steel wire mesh hoses	X			X	X	X	X
Carry out a leak test	X		X				
Check bolt connections	X		X				
Change engine oil; oil analysis*)	X	X					
Change engine oil filter*)	X	X					
Record operating data****)	X		X				
Check start procedure	X		X				
Adjust/check throttle valve	X			X			
Clean/check gas filter	X			X			
Clean/check air filter	X			X			
Clean/check pickups	X			X			
Check coolant concentration	X			X			
Check ignition time	X			X			
Check coolant circuit / system pressure	X			X			
Measure crankcase pressure	X			X			
Measure exhaust back pressure including catalytic converter	X			X			
Check emissions and Lambda	X			X			
Check exhaust system for air leaks / external soiling	X						
Check intake vacuum			X				
Check spark plugs M18, replace if necessary			X				
Endoscopy of the combustion chambers ¹⁾				X			
Check valve clearance and adjust if necessary			X				
Replace spark plugs M18	X			X			
Check compression pressure			X				
Check/replace oil separator				X			
Check/calibrate sensors				X			
Check exhaust system bolt connections				X			
Replace coolant					X		
Measure crankshaft axial play					X		
Replace cylinder liner						X	
Check/replace connecting rods						X	
Replace piston rings						X	
Check/replace pistons						X	
Replace cylinder heads						X	
Complete engine overhaul							X

¹⁾ from 6,000 operating hours

Service intervals for E2876 TE302 "Special gas"

	After start-up and R1-R2	all	all	all	up to	up to	up to
Interval after operating hours at 1500 rpm	20-50	n.s.	1000 **)	2.000	15.000	30.000	60.000
Interval after operating hours at 1800 rpm	20-50	n.s..	600 **)	1.200	12.000	20.000	40.000
Service interval	E1	O1*)	E2	E3	R1***)	R2***)	R3***)
Check steel wire mesh hoses	X			X	X	X	X
Carry out a leak test	X		X				
Check bolt connections	X		X				
Change engine oil; oil analysis*)	X	X					
Change engine oil filter*)	X	X					
Record operating data	X		X				
Check start procedure	X		X				
Adjust/check throttle valve	X			X			
Clean/check gas filter	X			X			
Clean/check air filter	X			X			
Clean/replace pickups	X			X			
Check coolant concentration	X			X			
Check ignition time	X			X			
Check coolant circuit / system pressure	X			X			
Measure crankcase pressure	X			X			
Measure exhaust back pressure including catalytic converter	X			X			
Check emissions and Lambda	X			X			
Check exhaust system for air leaks / external soiling	X						
Check intake vacuum			X				
Check spark plugs, replace if necessary			X				
Check valve clearance and adjust if necessary				X			
Replace spark plugs	X			X			
Check compression pressure				X			
Check/replace oil separator				X			
Check/clean mixture cooler	X			X			
Check/calibrate sensors				X			
Check exhaust system bolt connections				X			
Replace coolant					X		
Measure crankshaft axial play					X		
Replace turbo charger					X		
Replace cylinder liner						X	
Check/replace connecting rods						X	
Replace piston rings						X	
Check/replace pistons						X	
Replace cylinder heads						X	
Complete engine overhaul							X

Service intervals for E2876 LE302/LE212 "Natural gas"

	After start-up and R1-R2	all	all	all	up to	up to	up to
Interval after operating hours at 1500 rpm	20-50	n.s.	1000 **)	2.000	15.000	25.000	50.000
Interval after operating hours at 1800 rpm	20-50	n.s.	600 **)	1.200	12.000	20.000	40.000
Service interval	E1	O1*)	E2	E3	R1***)	R2***)	R3***)
Check steel wire mesh hoses	X			X	X	X	X
Carry out a leak test	X		X				
Check bolt connections	X		X				
Change engine oil; oil analysis*)	X	X					
Change engine oil filter*)	X	X					
Record operating data****)	X		X				
Check start procedure	X		X				
Adjust/check throttle valve	X			X			
Clean/check gas filter	X			X			
Clean/check air filter	X			X			
Clean/replace pickups	X			X			
Check coolant concentration	X			X			
Check ignition time	X			X			
Check coolant circuit / system pressure	X			X			
Measure crankcase pressure	X			X			
Measure exhaust back pressure including catalytic converter	X			X			
Check emissions and Lambda	X			X			
Check exhaust system for air leaks / external soiling	X						
Check intake vacuum			X				
Check valve clearance and adjust if necessary				X			
Replace spark plugs	X		X				
Check compression pressure				X			
Check/replace oil separator				X			
Check/clean mixture cooler				X			
Check/calibrate sensors				X			
Check exhaust system bolt connections				X			
Replace coolant					X		
Measure crankshaft axial play					X		
Replace turbo charger					X		
Replace cylinder liner						X	
Check/replace connecting rods						X	
Replace piston rings						X	
Check/replace pistons						X	
Replace cylinder heads						X	
Complete engine overhaul							X

Service intervals for E2876 LE302 "Special gas"

	After start-up and R1-R2	all	all	all	up to	up to	up to
Interval after operating hours at 1500 rpm	20-50	n.s.	1000 **)	2.000	15.000	30.000	50.000
Interval after operating hours at 1800 rpm	20-50	n.s.	600 **)	1.200	12.000	20.000	40.000
Service interval	E1	O1*)	E2	E3	R1***)	R2***)	R3***)
Check steel wire mesh hoses	X			X	X	X	X
Carry out a leak test	X		X				
Check bolt connections	X		X				
Change engine oil; oil analysis*)	X	X					
Change engine oil filter*)	X	X					
Record operating data****)	X		X				
Check start procedure	X		X				
Adjust/check throttle valve	X			X			
Clean/check gas filter	X			X			
Clean/check air filter	X			X			
Clean/replace pickups	X			X			
Check coolant concentration	X			X			
Check ignition time	X			X			
Check coolant circuit / system pressure	X			X			
Measure crankcase pressure	X			X			
Measure exhaust back pressure including catalytic converter	X			X			
Check emissions and Lambda	X			X			
Check exhaust system for air leaks / external soiling	X						
Check intake vacuum			X				
Check spark plugs, replace if necessary			X				
Check valve clearance and adjust if necessary				X			
Replace spark plugs	X			X			
Check compression pressure				X			
Check/replace oil separator				X			
Check/clean mixture cooler				X			
Check/calibrate sensors				X			
Check exhaust system bolt connections				X			
Replace coolant					X		
Measure crankshaft axial play					X		
Replace turbo charger					X		
Replace cylinder liner						X	
Check/replace connecting rods						X	
Replace piston rings						X	
Check/replace pistons						X	
Replace cylinder heads						X	
Complete engine overhaul							X

Service intervals for E2876 LE202 "Special gas"

	After start-up and R1-R2	all	all	all	up to	up to	up to
Interval after operating hours at 1500 rpm	20-50	n.s.	750 **)	1.500	15.000	25.000	50.000
Service interval	E1	O1*)	E2	E3	R1***)	R2***)	R3***)
Check steel wire mesh hoses	X			X	X	X	X
Carry out a leak test	X		X				
Check bolt connections	X		X				
Change engine oil; oil analysis*)	X	X					
Change engine oil filter*)	X	X					
Record operating data****)	X		X				
Check start procedure	X		X				
Adjust/check throttle valve	X			X			
Clean/check gas filter	X			X			
Clean/check air filter	X			X			
Clean/replace pickups	X			X			
Check coolant concentration	X			X			
Check ignition time	X			X			
Check coolant circuit / system pressure	X			X			
Measure crankcase pressure	X			X			
Measure exhaust back pressure including catalytic converter	X			X			
Check emissions and Lambda	X			X			
Check exhaust system for air leaks / external soiling	X						
Check intake vacuum			X				
Check spark plugs, replace if necessary			X				
Check valve clearance and adjust if necessary				X			
Replace spark plugs	X			X			
Check compression pressure				X			
Check/replace oil separator				X			
Check/clean mixture cooler				X			
Check/calibrate sensors				X			
Check exhaust system bolt connections				X			
Replace coolant					X		
Measure crankshaft axial play					X		
Replace turbo charger					X		
Replace cylinder liner						X	
Check/replace connecting rods						X	
Replace piston rings						X	
Check/replace pistons						X	
Replace cylinder heads						X	
Complete engine overhaul							X

Service intervals for E2848 LE322 "Natural gas"

	After start-up and R1-R2	all	all	all	up to	up to	up to
Interval after operating hours at 1500 rpm	20-50	n.s.	1000 **)	2.000	15.000	25.000	50.000
Interval after operating hours at 1800 rpm	20-50	n.s..	600 **)	1.200	12.000	20.000	40.000
Service interval	E1	O1*)	E2	E3	R1***)	R2***)	R3***)
Check steel wire mesh hoses	X			X	X	X	X
Carry out a leak test	X		X				
Check bolt connections	X		X				
Change engine oil; oil analysis*)	X	X					
Change engine oil filter*)	X	X					
Record operating data	X		X				
Check start procedure	X		X				
Adjust/check throttle valve	X			X			
Clean/check gas filter	X			X			
Clean/check air filter	X			X			
Clean/replace pickups	X			X			
Check coolant concentration	X			X			
Check ignition time	X			X			
Check coolant circuit / system pressure	X			X			
Measure crankcase pressure	X			X			
Measure exhaust back pressure including catalytic converter	X			X			
Check emissions and Lambda	X			X			
Check exhaust system for air leaks / external soiling	X						
Check intake vacuum			X				
Check spark plugs, replace if necessary			X				
Check valve clearance and adjust if necessary				X			
Replace spark plugs	X			X			
Check compression pressure				X			
Check/replace oil separator				X			
Check/clean mixture cooler	X			X			
Check/calibrate sensors				X			
Check exhaust system bolt connections				X			
Replace coolant					X		
Measure crankshaft axial play					X		
Replace turbo charger					X		
Replace cylinder liner						X	
Check/replace connecting rods						X	
Replace piston rings						X	
Check/replace pistons						X	
Replace cylinder heads						X	
Complete engine overhaul							X

Service intervals for E2848 LE322 "Special gas"

	After start-up and R1-R2	all	all	all	up to	up to	up to
Interval after operating hours at 1500 rpm	20-50	n.s.	1000 **)	2.000	15.000	30.000	50.000
Interval after operating hours at 1800 rpm	20-50	n.s.	600 **)	1.200	12.000	20.000	40.000
Service interval	E1	O1*)	E2	E3	R1***)	R2***)	R3***)
Check steel wire mesh hoses	X			X	X	X	X
Carry out a leak test	X		X				
Check bolt connections	X		X				
Change engine oil; oil analysis*)	X	X					
Change engine oil filter*)	X	X					
Record operating data****)	X		X				
Check start procedure	X		X				
Adjust/check throttle valve	X			X			
Clean/check gas filter	X			X			
Clean/check air filter	X			X			
Clean/replace pickups	X			X			
Check coolant concentration	X			X			
Check ignition time	X			X			
Check coolant circuit / system pressure	X			X			
Measure crankcase pressure	X			X			
Measure exhaust back pressure including catalytic converter	X			X			
Check emissions and Lambda	X			X			
Check exhaust system for air leaks / external soiling	X						
Check intake vacuum			X				
Check spark plugs, replace if necessary			X				
Check valve clearance and adjust if necessary				X			
Replace spark plugs	X			X			
Check compression pressure				X			
Check/replace oil separator				X			
Check/clean mixture cooler				X			
Check/calibrate sensors				X			
Check exhaust system bolt connections				X			
Replace coolant					X		
Measure crankshaft axial play					X		
Replace turbo charger					X		
Replace cylinder liner						X	
Check/replace connecting rods						X	
Replace piston rings						X	
Check/replace pistons						X	
Replace cylinder heads						X	
Complete engine overhaul							X

Service intervals for E2842 LE322/LE332 "Natural gas"

	After start-up and R1-R2	all	all	all	up to	up to	up to
Interval after operating hours at 1500 rpm	20-50	n.s.	1000 **)	2.000	15.000	25.000	50.000
Interval after operating hours at 1800 rpm	20-50	n.s..	600 **)	1.200	12.000	20.000	40.000
Service interval	E1	O1*)	E2	E3	R1***)	R2***)	R3***)
Check steel wire mesh hoses	X			X	X	X	X
Carry out a leak test	X		X				
Check bolt connections	X		X				
Change engine oil; oil analysis*)	X	X					
Change engine oil filter*)	X	X					
Record operating data	X		X				
Check start procedure	X		X				
Adjust/check throttle valve	X			X			
Clean/check gas filter	X			X			
Clean/check air filter	X			X			
Clean/replace pickups	X			X			
Check coolant concentration	X			X			
Check ignition time	X			X			
Check coolant circuit / system pressure	X			X			
Measure crankcase pressure	X			X			
Measure exhaust back pressure including catalytic converter	X			X			
Check emissions and Lambda	X			X			
Check exhaust system for air leaks / external soiling	X						
Check intake vacuum			X				
Check spark plugs, replace if necessary			X				
Check valve clearance and adjust if necessary				X			
Replace spark plugs	X			X			
Check compression pressure				X			
Check/replace oil separator				X			
Check/clean mixture cooler	X			X			
Check/calibrate sensors				X			
Check exhaust system bolt connections				X			
Replace coolant					X		
Measure crankshaft axial play					X		
Replace turbo charger					X		
Replace cylinder liner						X	
Check/replace connecting rods						X	
Replace piston rings						X	
Check/replace pistons						X	
Replace cylinder heads						X	
Complete engine overhaul							X

Service intervals for E2842 LE322/LE202 "Special gas"

	After start-up and R1-R2	all	all	all	up to	up to	up to
Interval after operating hours at 1500 rpm	20-50	n.s.	1000 **)	2.000	15.000	30.000	50.000
Interval after operating hours at 1800 rpm	20-50	n.s.	600 **)	1.200	12.000	20.000	40.000
Service interval	E1	O1*)	E2	E3	R1***)	R2***)	R3***)
Check steel wire mesh hoses	X			X	X	X	X
Carry out a leak test	X		X				
Check bolt connections	X		X				
Change engine oil; oil analysis*)	X	X					
Change engine oil filter*)	X	X					
Record operating data****)	X		X				
Check start procedure	X		X				
Adjust/check throttle valve	X			X			
Clean/check gas filter	X			X			
Clean/check air filter	X			X			
Clean/replace pickups	X			X			
Check coolant concentration	X			X			
Check ignition time	X			X			
Check coolant circuit / system pressure	X			X			
Measure crankcase pressure	X			X			
Measure exhaust back pressure including catalytic converter	X			X			
Check emissions and Lambda	X			X			
Check exhaust system for air leaks / external soiling	X						
Check intake vacuum			X				
Check spark plugs, replace if necessary			X				
Check valve clearance and adjust if necessary				X			
Replace spark plugs	X			X			
Check compression pressure				X			
Check/replace oil separator				X			
Check/clean mixture cooler	X			X			
Check/calibrate sensors				X			
Check exhaust system bolt connections				X			
Replace coolant					X		
Measure crankshaft axial play					X		
Replace turbo charger					X		
Replace exhaust pipe multi-piece rings					X		
Replace cylinder liner						X	
Check/replace connecting rods						X	
Replace piston rings						X	
Check/replace pistons						X	
Replace cylinder heads						X	
Complete engine overhaul							X

Service intervals for E2676 LE202 "Natural gas"

	After start-up and R1-R2	all	all	all	up to	up to	up to
Interval after operating hours at 1500 rpm	20-50	n.s.	800	1.600	15.000	25.000	50.000
Interval after operating hours at 1800 rpm	20-50	n.s.	600	1.200	12.000	20.000	40.000
Service interval	E1	O1*)	E2	E3	R1***)	R2***)	R3***)
Check steel wire mesh hoses	X			X	X	X	X
Carry out a leak test	X		X				
Check bolt connections	X		X				
Change engine oil; oil analysis*)	X	X					
Change engine oil filter*)	X	X					
Record operating data****)	X		X				
Check start procedure	X		X				
Adjust/check throttle valve	X			X			
Clean/check gas filter	X			X			
Clean/check air filter	X			X			
Clean/replace pickups	X			X			
Check coolant concentration	X			X			
Check ignition time	X			X			
Check coolant circuit / system pressure	X			X			
Measure crankcase pressure	X			X			
Measure exhaust back pressure including catalytic converter	X			X			
Check emissions and Lambda	X			X			
Check exhaust system for air leaks / external soiling	X						
Check intake vacuum			X				
Check spark plugs, replace if necessary			X				
Endoscopy of the combustion chambers ¹⁾				X			
Check valve clearance and adjust if necessary				X			
Replace spark plugs	X			X			
Check compression pressure				X			
Check/replace oil separator				X			
Check/clean mixture cooler	X			X			
Check/calibrate sensors				X			
Check exhaust system bolt connections				X			
Replace membrane oil separator					10.000 h		
Replace coolant					X		
Measure crankshaft axial play					X		
Replace charge-mixture hose					X		
Replace turbo charger					X		
Replace cylinder liner						X	
Check/replace connecting rods						X	
Replace piston rings						X	
Check/replace pistons						X	
Replace cylinder heads						X	
Complete engine overhaul							X

¹⁾ from 6,000 operating hours

Service intervals for E2676 LE202/LE212 "Special gas"

	After start-up and R1-R2	all	all	all	up to	up to	up to
Interval after operating hours at 1500 rpm	20-50	n.s.	800	1.600	15.000	25.000	50.000
Interval after operating hours at 1800 rpm	20-50	n.s.	600	1.200	12.000	20.000	40.000
Service interval	E1	O1*)	E2	E3	R1***)	R2***)	R3***)
Check steel wire mesh hoses	X			X	X	X	X
Carry out a leak test	X		X				
Check bolt connections	X		X				
Change engine oil; oil analysis*)	X	X					
Change engine oil filter*)	X	X					
Record operating data****)	X		X				
Check start procedure	X		X				
Adjust/check throttle valve	X			X			
Clean/check gas filter	X			X			
Clean/check air filter	X			X			
Clean/replace pickups	X			X			
Check coolant concentration	X			X			
Check ignition time	X			X			
Check coolant circuit / system pressure	X			X			
Measure crankcase pressure	X			X			
Measure exhaust back pressure including catalytic converter	X			X			
Check emissions and Lambda	X			X			
Check exhaust system for air leaks / external soiling	X						
Check intake vacuum			X				
Check spark plugs, replace if necessary			X				
Endoscopy of the combustion chambers ¹⁾				X			
Check valve clearance and adjust if necessary				X			
Replace spark plugs	X			X			
Check compression pressure				X			
Check/replace oil separator				X			
Check/clean mixture cooler				X			
Check/calibrate sensors				X			
Check exhaust system bolt connections				X			
Replace membrane oil separator					10.000 h		
Replace coolant					X		
Measure crankshaft axial play					X		
Replace charge-mixture hose					X		
Replace turbo charger					X		
Replace cylinder liner						X	
Check/replace connecting rods						X	
Replace piston rings						X	
Check/replace pistons						X	
Replace cylinder heads						X	
Complete engine overhaul							X

¹⁾ from 6,000 operating hours

Service intervals for E3268 LE212, E3262 LE201/202/232 "Natural gas" with spark plugs M14

	After start-up and R1-R2	all	all	all	up to	up to	up to
Interval after operating hours at 1500 rpm	20-50	n.s.	800	1.600	15.000	25.000	50.000
Interval after operating hours at 1800 rpm	20-50	n.s.	600	1.200	12.000	20.000	40.000
Service interval	E1	O1*)	E2	E3	R1***)	R2***)	R3***)
Check steel wire mesh hoses	X			X	X	X	X
Carry out a leak test	X		X				
Check bolt connections	X		X				
Change engine oil; oil analysis*)	X	X					
Change engine oil filter*)	X	X					
Record operating data****)	X		X				
Check start procedure	X		X				
Adjust/check throttle valve	X			X			
Clean/check gas filter	X			X			
Clean/check air filter	X			X			
Clean/replace pickups	X			X			
Check coolant concentration	X			X			
Check ignition time	X			X			
Check coolant circuit / system pressure	X			X			
Measure crankcase pressure	X			X			
Measure exhaust back pressure including catalytic converter	X			X			
Check emissions and Lambda	X			X			
Check exhaust system for air leaks / external soiling	X			X			
Check intake vacuum			X				
Endoscopy of the combustion chambers ¹⁾				X			
Check valve clearance and adjust if necessary				X			
Check spark plugs M14, replace if necessary			X				
Replace spark plugs M14	X			X			
Check compression pressure				X			
Check/replace oil separator				X			
Check/clean mixture cooler	X			X			
Check/calibrate sensors				X			
Check exhaust system bolt connections				X			
Replace coolant					X		
Measure crankshaft axial play					X		
Replace charge-mixture hoses					X		
Replace turbo charger					X		
Replace cylinder liner						X	
Check/replace connecting rods						X	
Replace piston rings						X	
Check/replace pistons						X	
Replace cylinder heads						X	
Complete engine overhaul							X

¹⁾ from 6,000 operating hours

Service intervals for E3268 LE212, E3262 LE201/202/232 "Natural gas" with spark plugs M18

	After start-up and R1-R2	all	all	all	up to	up to	up to
Interval after operating hours at 1500 rpm	20-50	n.s.	1000	2.000	15.000	25.000	50.000
Interval after operating hours at 1800 rpm	20-50	n.s.	800	1.600	12.000	20.000	40.000
Service interval	E1	O1*)	E2	E3	R1***)	R2***)	R3***)
Check steel wire mesh hoses	X			X	X	X	X
Carry out a leak test	X		X				
Check bolt connections	X		X				
Change engine oil; oil analysis*)	X	X					
Change engine oil filter*)	X	X					
Record operating data****)	X		X				
Check start procedure	X		X				
Adjust/check throttle valve	X			X			
Clean/check gas filter	X			X			
Clean/check air filter	X			X			
Clean/replace pickups	X			X			
Check coolant concentration	X			X			
Check ignition time	X			X			
Check coolant circuit / system pressure	X			X			
Measure crankcase pressure	X			X			
Measure exhaust back pressure including catalytic converter	X			X			
Check emissions and Lambda	X			X			
Check exhaust system for air leaks / external soiling	X			X			
Check intake vacuum			X				
Endoscopy of the combustion chambers ¹⁾				X			
Check valve clearance and adjust if necessary				X			
Check spark plugs M14, replace if necessary			X				
Replace spark plugs M14	X			X			
Check compression pressure				X			
Check/replace oil separator				X			
Check/clean mixture cooler	X			X			
Check/calibrate sensors				X			
Check exhaust system bolt connections				X			
Replace coolant					X		
Measure crankshaft axial play					X		
Replace charge-mixture hoses					X		
Replace turbo charger					X		
Replace cylinder liner						X	
Check/replace connecting rods						X	
Replace piston rings						X	
Check/replace pistons						X	
Replace cylinder heads						X	
Complete engine overhaul							X

¹⁾ from 6,000 operating hours

Service intervals for E3268 LE222/LE232, E3262 LE202/LE242 "Special gas" with spark plugs M14

	After start-up and R1-R2	all	all	all	up to	up to	up to
Interval after operating hours at 1500 rpm	20-50	n.s.	800	1.600	15.000	25.000	50.000
Interval after operating hours at 1800 rpm	20-50	n.s.	600	1.200	12.000	20.000	40.000
Service interval	E1	O1*)	E2	E3	R1***)	R2***)	R3***)
Check steel wire mesh hoses	X			X	X	X	X
Carry out a leak test	X		X				
Check bolt connections	X		X				
Change engine oil; oil analysis*)	X	X					
Change engine oil filter*)	X	X					
Record operating data****)	X		X				
Check start procedure	X		X				
Adjust/check throttle valve	X			X			
Clean/check gas filter	X			X			
Clean/check air filter	X			X			
Clean/replace pickups	X			X			
Check coolant concentration	X			X			
Check ignition time	X			X			
Check coolant circuit / system pressure	X			X			
Measure crankcase pressure	X			X			
Measure exhaust back pressure including catalytic converter	X			X			
Check emissions and Lambda	X			X			
Check exhaust system for air leaks / external soiling	X						
Check intake vacuum			X				
Endoscopy of the combustion chambers ¹⁾				X			
Check valve clearance and adjust if necessary				X			
Check spark plugs M14, replace if necessary			X				
Replace spark plugs M14	X			X			
Check compression pressure				X			
Check/replace oil separator				X			
Check/clean mixture cooler				X			
Check/calibrate sensors				X			
Check exhaust system bolt connections				X			
Replace coolant					X		
Measure crankshaft axial play					X		
Replace charge-mixture hoses					X		
Replace turbo charger					X		
Replace exhaust pipe multi-piece rings					X		
Replace cylinder liner						X	
Check/replace connecting rods						X	
Replace piston rings						X	
Check/replace pistons						X	
Replace cylinder heads						X	
Complete engine overhaul							X

¹⁾ from 6,000 operating hours

Service intervals for E3268 LE222/LE232, E3262 LE202/212/LE242 "Special gas" with spark plugs M18

	After start-up and R1-R2	all	all	all	up to	up to	up to
Interval after operating hours at 1500 rpm	20-50	n.s.	1000	2.000	15.000	25.000	50.000
Interval after operating hours at 1800 rpm	20-50	n.s.	800	1.200	12.000	20.000	40.000
Service interval	E1	O1*)	E2	E3	R1***)	R2***)	R3***)
Check steel wire mesh hoses	X			X	X	X	X
Carry out a leak test	X		X				
Check bolt connections	X		X				
Change engine oil; oil analysis*)	X	X					
Change engine oil filter*)	X	X					
Record operating data****)	X		X				
Check start procedure	X		X				
Adjust/check throttle valve	X			X			
Clean/check gas filter	X			X			
Clean/check air filter	X			X			
Clean/replace pickups	X			X			
Check coolant concentration	X			X			
Check ignition time	X			X			
Check coolant circuit / system pressure	X			X			
Measure crankcase pressure	X			X			
Measure exhaust back pressure including catalytic converter	X			X			
Check emissions and Lambda	X			X			
Check exhaust system for air leaks / external soiling	X						
Check intake vacuum			X				
Endoscopy of the combustion chambers ¹⁾				X			
Check valve clearance and adjust if necessary				X			
Check spark plugs M18, replace if necessary			X				
Replace spark plugs M18	X			X			
Check compression pressure				X			
Check/replace oil separator				X			
Check/clean mixture cooler				X			
Check/calibrate sensors				X			
Check exhaust system bolt connections				X			
Replace coolant					X		
Measure crankshaft axial play					X		
Replace charge-mixture hoses					X		
Replace turbo charger					X		
Replace exhaust pipe multi-piece rings					X		
Replace cylinder liner						X	
Check/replace connecting rods						X	
Replace piston rings						X	
Check/replace pistons						X	
Replace cylinder heads						X	
Complete engine overhaul							X

¹⁾ from 6,000 operating hours

Information on service intervals

The maintenance tasks shown above must be carried out by a MAN Truck & Bus AG authorized workshop or the unit manufacturer when the relevant number of operating hours has been reached.

- *) The engine oil lifetimes are to be determined using regular oil analyses based on operating conditions and engine oil used in accordance with MAN works standard M3271-2 for natural gas and M3271-4 for special gas as per the tables below.
 - ***) Tighten cylinder head bolts at 400 operating hours
 - ****) For Revisions R1, R2, R3, the intervals are predictions and are non-binding, but take into account the minimum gas quality requirements for MAN industrial engines and the operation of engines within the Technical Instructions governing exhaust gas emission limits.
 - *****) MAN data memory; read and store data (if present).
- If there are fluctuations in gas composition, regular oil analysis must be carried out
 - When operating charged engines within the 1/2 TA Luft (technical instructions for preserving clean air) emissions limits (250 mg/Nm³ NO_x), the intervals for E2 and E3 must always be halved and the set values are to be determined only in accordance with the applicable technical data sheet of the relevant engines.

Oil analysis tables

Oil analysis table: natural gas

Natural gas		
Engine operating hours		
Mineral oil	Part/fully synthetic oil	
50 operating hours	50 operating hours	1. Oil change
400 operating hours	800 operating hours	2. Oil change with oil analysis as check
An incremental increase in oil lifetimes based on oil analyses is possible up to a max. maintenance interval of E3. *)		

Oil analysis table: special gas

Special gases (biogas / landfill gas / sewage gas)		
Engine operating hours	Oil operating hours	
50 operating hours	50 operating hours	Oil change
Max. 300 operating hours	Max. 300 operating hours	Oil change with oil analysis as check
An incremental increase in oil lifetimes based on oil analyses is possible up to a max. maintenance interval of E3. *)		

*) Depending on the outcome of the 2nd oil analysis and only after consultation with MAN Truck & Bus AG, customer service department in the Nuremberg factory.

Maintenance record

Important information on the maintenance records:

NOTE

The following maintenance records are stored (E2 x15; E3 x10) and are to be kept in this maintenance book once completed.

NOTE

In the case of complaints within the warranty period, the data records recorded and stored from engines with MAN data memory must be presented as well.
Completed maintenance records should also be returned to MAN Truck & Bus AG in the case of goodwill requests.

Maintenance records E2 and E3 should be stored with the relevant engine/unit documents.

In the case of complaints within the warranty period, completed maintenance records should be returned to MAN Truck & Bus AG.

Address:

MAN Truck & Bus AG

Werk Nürnberg Abt. SEP

Vogelweiherstr. 33

90411 Nuremberg

Engines.components@de.man-mn.com

Tel: 0911 420 – 0

Fax: 0911 420 – 1932

Maintenance record E2

	Maintenance record	E2 Page 1 of 2
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Basic data					
Appendix	Type of system	System operating hours OH		System construction year	Electrical power rating KWh_{el}
	Operating method	Reference variable / start requirements			Speed rpm
Installation conditions	Installation height m	Air pressure mbar	Air humidity %	Outside temperature °C	Unit compartment temperature °C

Engine	Engine type	Engine number	Plant number	Engine operating hours OH
				No. engine starts

The Components section should only be completed in the case of engine modifications

Components	Gas mixer type	Alternator type	Air filter type
	Ignition system type	Ignition coil type	Spark plug type
	Catalytic converter type	Silencer type	Exhaust heat exchanger type

Service products	Engine oil type	Engine oil change interval	Antifreeze / corrosion inhibitor type	Concentration %
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Fuel	Type of gas	Methane content CH4 %	Sulphur / hydrogen sulfide ppm	Lower calorific value, Hu kWh/Nm³
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Comment:

Place:	Date:	Customer's signature	Maintenance personnel signature
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Maintenance record

E2
 Page 2 of 2

Operating data of engine at 100% rated power

Emissions	NOx emissions mg/Nm³	CO emissions mg/Nm³	O2 content of exhaust gas %	Lambda value
Gas train	Gas pressure upstream of ZPR mbar	Gas pressure downstream of ZPR mbar	Gas moisture %	Gas temperature °C
Intake system	T: intake air °C	P: intake vacuum mbar	Δ P: gas mixer mbar	Throttle valve position %
Turbocharging	Δ P: mixture cooler mbar	P: charge air upstream of TV mbar	T: mixture downstream of cooler °C	T: exhaust gas upstream of ETC bank A/B °C
Exhaust system	T: exhaust gas upstream of ETC bank A/B °C	P: exhaust gas back pressure, bank A/B mbar	T: exhaust gas up/downstream of catalytic converter °C	T: exhaust gas up/downstream of exhaust heat exchanger °C
Lubrication	Measuring point, engine oil T	T: engine oil °C	P: engine oil bar	P: crank chamber mbar
Cooling circuit	T: CL engine inlet °C	T: CL engine outlet °C	P: CL engine operating temperature bar	CL circulation quantity, engine l/min
	T: CL inflow LT mixture cooler °C	T: CL outflow LT mixture cooler °C	P: CL LT mixture cooler operating temperature bar	CL circulation quantity, LT mixture cooler l/min
Ignition system	Ignition time control ° bef. TDC	Ignition time measurement ° bef. TDC	Ignition energy V	Spark plug electrode distance m

Operating data of engine at 50% rated power


Emissions	NOx emissions mg/Nm³	CO emissions mg/Nm³	O2 content of exhaust gas %	Lambda value
Gas train	Gas pressure upstream of ZPR mbar	Gas pressure downstream of ZPR mbar	Gas moisture %	Gas temperature °C
Intake system	T: intake air °C	P: intake vacuum mbar	Δ P: gas mixer mbar	Throttle valve position %
Turbocharging	Δ P: mixture cooler mbar	P: charge air upstream of TV mbar	T: mixture downstream of cooler °C	T: exhaust gas upstream of ETC bank A/B °C
Exhaust system	T: exhaust gas upstream of ETC bank A/B °C	P: exhaust gas back pressure, bank A/B mbar	T: exhaust gas up/downstream of catalytic converter °C	T: exhaust gas up/downstream of exhaust heat exchanger °C
Lubrication	Measuring point, engine oil T	T: engine oil °C	P: engine oil bar	P: crank chamber mbar
Cooling circuit	T: CL engine inlet °C	T: CL engine outlet °C	P: CL engine operating temperature bar	CL circulation quantity, engine l/min
	T: CL inflow LT mixture cooler °C	T: CL outflow LT mixture cooler °C	P: CL LT mixture cooler operating temperature bar	CL circulation quantity, LT mixture cooler l/min

Place:

Date:

Customer's signature

Maintenance personnel
signature

 Maintenance record					E2 Page 1 of 2
Basic data					
Appendix	Type of system	System operating hours OH		System construction year	Electrical power rating KWh_{el}
	Operating method	Reference variable / start requirements			Speed rpm
Installation conditions	Installation height m	Air pressure mbar	Air humidity %	Outside temperature °C	Unit compartment temperature °C
Engine	Engine type		Engine number	Plant number	Engine operating hours OH
					No. engine starts
The Components section should only be completed in the case of engine modifications					
Components	Gas mixer type		Alternator type		Air filter type
	Ignition system type		Ignition coil type		Spark plug type
	Catalytic converter type		Silencer type		Exhaust heat exchanger type
Service products	Engine oil type	Engine oil change interval	Antifreeze / corrosion inhibitor type		Concentration %
Fuel	Type of gas	Methane content CH4 %	Sulphur / hydrogen sulfide ppm		Lower calorific value, Hu kWh/Nm³
Comment:					
Place:		Date:	Customer's signature		Maintenance personnel signature



Maintenance record

E2
 Page 2 of 2

Operating data of engine at 100% rated power

Emissions	NOx emissions mg/Nm³	CO emissions mg/Nm³	O2 content of exhaust gas %	Lambda value
Gas train	Gas pressure upstream of ZPR mbar	Gas pressure downstream of ZPR mbar	Gas moisture %	Gas temperature °C
Intake system	T: intake air °C	P: intake vacuum mbar	Δ P: gas mixer mbar	Throttle valve position %
Turbocharging	Δ P: mixture cooler mbar	P: charge air upstream of TV mbar	T: mixture downstream of cooler °C	T: exhaust gas upstream of ETC bank A/B °C
Exhaust system	T: exhaust gas upstream of ETC bank A/B °C	P: exhaust gas back pressure, bank A/B mbar	T: exhaust gas up/downstream of catalytic converter °C	T: exhaust gas up/downstream of exhaust heat exchanger °C
Lubrication	Measuring point, engine oil T	T: engine oil °C	P: engine oil bar	P: crank chamber mbar
Cooling circuit	T: CL engine inlet °C	T: CL engine outlet °C	P: CL engine operating temperature bar	CL circulation quantity, engine l/min
	T: CL inflow LT mixture cooler °C	T: CL outflow LT mixture cooler °C	P: CL LT mixture cooler operating temperature bar	CL circulation quantity, LT mixture cooler l/min
Ignition system	Ignition time control ° bef. TDC	Ignition time measurement ° bef. TDC	Ignition energy V	Spark plug electrode distance m

Operating data of engine at 50% rated power

Emissions	NOx emissions mg/Nm³	CO emissions mg/Nm³	O2 content of exhaust gas %	Lambda value
Gas train	Gas pressure upstream of ZPR mbar	Gas pressure downstream of ZPR mbar	Gas moisture %	Gas temperature °C
Intake system	T: intake air °C	P: intake vacuum mbar	Δ P: gas mixer mbar	Throttle valve position %
Turbocharging	Δ P: mixture cooler mbar	P: charge air upstream of TV mbar	T: mixture downstream of cooler °C	T: exhaust gas upstream of ETC bank A/B °C
Exhaust system	T: exhaust gas upstream of ETC bank A/B °C	P: exhaust gas back pressure, bank A/B mbar	T: exhaust gas up/downstream of catalytic converter °C	T: exhaust gas up/downstream of exhaust heat exchanger °C
Lubrication	Measuring point, engine oil T	T: engine oil °C	P: engine oil bar	P: crank chamber mbar
Cooling circuit	T: CL engine inlet °C	T: CL engine outlet °C	P: CL engine operating temperature bar	CL circulation quantity, engine l/min
	T: CL inflow LT mixture cooler °C	T: CL outflow LT mixture cooler °C	P: CL LT mixture cooler operating temperature bar	CL circulation quantity, LT mixture cooler l/min

Place:

Date:

Customer's signature

Maintenance personnel
signature

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Basic data					
Appendix	Type of system	System operating hours <div style="text-align: right;">OH</div>	System construction year	Electrical power rating <div style="text-align: right;">KWh_{el}</div>	
	Operating method	Reference variable / start requirements		Speed <div style="text-align: right;">rpm</div>	
Installation conditions	Installation height <div style="text-align: right;">m</div>	Air pressure <div style="text-align: right;">mbar</div>	Air humidity <div style="text-align: right;">%</div>	Outside temperature <div style="text-align: right;">°C</div>	Unit compartment temperature <div style="text-align: right;">°C</div>

Engine	Engine type	Engine number	Plant number	Engine operating hours <div style="text-align: right;">OH</div>
				No. engine starts

The Components section should only be completed in the case of engine modifications

Components	Gas mixer type	Alternator type	Air filter type
	Ignition system type	Ignition coil type	Spark plug type
	Catalytic converter type	Silencer type	Exhaust heat exchanger type

Service products	Engine oil type	Engine oil change interval	Antifreeze / corrosion inhibitor type	Concentration <div style="text-align: right;">%</div>
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Fuel	Type of gas	Methane content CH4 <div style="text-align: right;">%</div>	Sulphur / hydrogen sulfide <div style="text-align: right;">ppm</div>	Lower calorific value, Hu <div style="text-align: right;">kWh/Nm³</div>
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Operating data of engine at 100% rated power

Emissions	NOx emissions mg/Nm³	CO emissions mg/Nm³	O2 content of exhaust gas %	Lambda value
Gas train	Gas pressure upstream of ZPR mbar	Gas pressure downstream of ZPR mbar	Gas moisture %	Gas temperature °C
Intake system	T: intake air °C	P: intake vacuum mbar	Δ P: gas mixer mbar	Throttle valve position %
Turbocharging	Δ P: mixture cooler mbar	P: charge air upstream of TV mbar	T: mixture downstream of cooler °C	T: exhaust gas upstream of ETC bank A/B °C
Exhaust system	T: exhaust gas upstream of ETC bank A/B °C	P: exhaust gas back pressure, bank A/B mbar	T: exhaust gas up/downstream of catalytic converter °C	T: exhaust gas up/downstream of exhaust heat exchanger °C
Lubrication	Measuring point, engine oil T	T: engine oil °C	P: engine oil bar	P: crank chamber mbar
Cooling circuit	T: CL engine inlet °C	T: CL engine outlet °C	P: CL engine operating temperature bar	CL circulation quantity, engine l/min
	T: CL inflow LT mixture cooler °C	T: CL outflow LT mixture cooler °C	P: CL LT mixture cooler operating temperature bar	CL circulation quantity, LT mixture cooler l/min
Ignition system	Ignition time control ° bef. TDC	Ignition time measurement ° bef. TDC	Ignition energy V	Spark plug electrode distance m

Operating data of engine at 50% rated power

Emissions	NOx emissions mg/Nm³	CO emissions mg/Nm³	O2 content of exhaust gas %	Lambda value
Gas train	Gas pressure upstream of ZPR mbar	Gas pressure downstream of ZPR mbar	Gas moisture %	Gas temperature °C
Intake system	T: intake air °C	P: intake vacuum mbar	Δ P: gas mixer mbar	Throttle valve position %
Turbocharging	Δ P: mixture cooler mbar	P: charge air upstream of TV mbar	T: mixture downstream of cooler °C	T: exhaust gas upstream of ETC bank A/B °C
Exhaust system	T: exhaust gas upstream of ETC bank A/B °C	P: exhaust gas back pressure, bank A/B mbar	T: exhaust gas up/downstream of catalytic converter °C	T: exhaust gas up/downstream of exhaust heat exchanger °C
Lubrication	Measuring point, engine oil T	T: engine oil °C	P: engine oil bar	P: crank chamber mbar
Cooling circuit	T: CL engine inlet °C	T: CL engine outlet °C	P: CL engine operating temperature bar	CL circulation quantity, engine l/min
	T: CL inflow LT mixture cooler °C	T: CL outflow LT mixture cooler °C	P: CL LT mixture cooler operating temperature bar	CL circulation quantity, LT mixture cooler l/min

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Basic data					
Appendix	Type of system	System operating hours <div style="text-align: right;">OH</div>	System construction year	Electrical power rating <div style="text-align: right;">KWh_{el}</div>	
	Operating method	Reference variable / start requirements		Speed <div style="text-align: right;">rpm</div>	
Installation conditions	Installation height <div style="text-align: right;">m</div>	Air pressure <div style="text-align: right;">mbar</div>	Air humidity <div style="text-align: right;">%</div>	Outside temperature <div style="text-align: right;">°C</div>	Unit compartment temperature <div style="text-align: right;">°C</div>

Engine	Engine type	Engine number	Plant number	Engine operating hours <div style="text-align: right;">OH</div>
				No. engine starts

The Components section should only be completed in the case of engine modifications

Components	Gas mixer type	Alternator type	Air filter type
	Ignition system type	Ignition coil type	Spark plug type
	Catalytic converter type	Silencer type	Exhaust heat exchanger type

Service products	Engine oil type	Engine oil change interval	Antifreeze / corrosion inhibitor type	Concentration <div style="text-align: right;">%</div>
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Fuel	Type of gas	Methane content CH ₄ <div style="text-align: right;">%</div>	Sulphur / hydrogen sulfide <div style="text-align: right;">ppm</div>	Lower calorific value, Hu <div style="text-align: right;">kWh/Nm³</div>
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Operating data of engine at 100% rated power				
Emissions	NOx emissions mg/Nm³	CO emissions mg/Nm³	O2 content of exhaust gas %	Lambda value
Gas train	Gas pressure upstream of ZPR mbar	Gas pressure downstream of ZPR mbar	Gas moisture %	Gas temperature °C
Intake system	T: intake air °C	P: intake vacuum mbar	Δ P: gas mixer mbar	Throttle valve position %
Turbocharging	Δ P: mixture cooler mbar	P: charge air upstream of TV mbar	T: mixture downstream of cooler °C	T: exhaust gas upstream of ETC bank A/B °C
Exhaust system	T: exhaust gas upstream of ETC bank A/B °C	P: exhaust gas back pressure, bank A/B mbar	T: exhaust gas up/downstream of catalytic converter °C	T: exhaust gas up/downstream of exhaust heat exchanger °C
Lubrication	Measuring point, engine oil T	T: engine oil °C	P: engine oil bar	P: crank chamber mbar
Cooling circuit	T: CL engine inlet °C	T: CL engine outlet °C	P: CL engine operating temperature bar	CL circulation quantity, engine l/min
	T: CL inflow LT mixture cooler °C	T: CL outflow LT mixture cooler °C	P: CL LT mixture cooler operating temperature bar	CL circulation quantity, LT mixture cooler l/min
Ignition system	Ignition time control ° bef. TDC	Ignition time measurement ° bef. TDC	Ignition energy V	Spark plug electrode distance m

Operating data of engine at 50% rated power				
Emissions	NOx emissions mg/Nm³	CO emissions mg/Nm³	O2 content of exhaust gas %	Lambda value
Gas train	Gas pressure upstream of ZPR mbar	Gas pressure downstream of ZPR mbar	Gas moisture %	Gas temperature °C
Intake system	T: intake air °C	P: intake vacuum mbar	Δ P: gas mixer mbar	Throttle valve position %
Turbocharging	Δ P: mixture cooler mbar	P: charge air upstream of TV mbar	T: mixture downstream of cooler °C	T: exhaust gas upstream of ETC bank A/B °C
Exhaust system	T: exhaust gas upstream of ETC bank A/B °C	P: exhaust gas back pressure, bank A/B mbar	T: exhaust gas up/downstream of catalytic converter °C	T: exhaust gas up/downstream of exhaust heat exchanger °C
Lubrication	Measuring point, engine oil T	T: engine oil °C	P: engine oil bar	P: crank chamber mbar
Cooling circuit	T: CL engine inlet °C	T: CL engine outlet °C	P: CL engine operating temperature bar	CL circulation quantity, engine l/min
	T: CL inflow LT mixture cooler °C	T: CL outflow LT mixture cooler °C	P: CL LT mixture cooler operating temperature bar	CL circulation quantity, LT mixture cooler l/min

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Basic data					
Appendix	Type of system	System operating hours OH		System construction year	Electrical power rating KWh_{el}
	Operating method	Reference variable / start requirements			Speed rpm
Installation conditions	Installation height m	Air pressure mbar	Air humidity %	Outside temperature °C	Unit compartment temperature °C
Engine	Engine type		Engine number	Plant number	Engine operating hours OH
					No. engine starts
The Components section should only be completed in the case of engine modifications					
Components	Gas mixer type		Alternator type		Air filter type
	Ignition system type		Ignition coil type		Spark plug type
	Catalytic converter type		Silencer type		Exhaust heat exchanger type
Service products	Engine oil type	Engine oil change interval	Antifreeze / corrosion inhibitor type		Concentration %
Fuel	Type of gas	Methane content CH4 %	Sulphur / hydrogen sulfide ppm		Lower calorific value, Hu kWh/Nm³
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Operating data of engine at 100% rated power

Emissions	NOx emissions mg/Nm³	CO emissions mg/Nm³	O2 content of exhaust gas %	Lambda value
Gas train	Gas pressure upstream of ZPR mbar	Gas pressure downstream of ZPR mbar	Gas moisture %	Gas temperature °C
Intake system	T: intake air °C	P: intake vacuum mbar	Δ P: gas mixer mbar	Throttle valve position %
Turbocharging	Δ P: mixture cooler mbar	P: charge air upstream of TV mbar	T: mixture downstream of cooler °C	T: exhaust gas upstream of ETC bank A/B °C
Exhaust system	T: exhaust gas upstream of ETC bank A/B °C	P: exhaust gas back pressure, bank A/B mbar	T: exhaust gas up/downstream of catalytic converter °C	T: exhaust gas up/downstream of exhaust heat exchanger °C
Lubrication	Measuring point, engine oil T	T: engine oil °C	P: engine oil bar	P: crank chamber mbar
Cooling circuit	T: CL engine inlet °C	T: CL engine outlet °C	P: CL engine operating temperature bar	CL circulation quantity, engine l/min
	T: CL inflow LT mixture cooler °C	T: CL outflow LT mixture cooler °C	P: CL LT mixture cooler operating temperature bar	CL circulation quantity, LT mixture cooler l/min
Ignition system	Ignition time control ° bef. TDC	Ignition time measurement ° bef. TDC	Ignition energy V	Spark plug electrode distance m

Operating data of engine at 50% rated power


Emissions	NOx emissions mg/Nm³	CO emissions mg/Nm³	O2 content of exhaust gas %	Lambda value
Gas train	Gas pressure upstream of ZPR mbar	Gas pressure downstream of ZPR mbar	Gas moisture %	Gas temperature °C
Intake system	T: intake air °C	P: intake vacuum mbar	Δ P: gas mixer mbar	Throttle valve position %
Turbocharging	Δ P: mixture cooler mbar	P: charge air upstream of TV mbar	T: mixture downstream of cooler °C	T: exhaust gas upstream of ETC bank A/B °C
Exhaust system	T: exhaust gas upstream of ETC bank A/B °C	P: exhaust gas back pressure, bank A/B mbar	T: exhaust gas up/downstream of catalytic converter °C	T: exhaust gas up/downstream of exhaust heat exchanger °C
Lubrication	Measuring point, engine oil T	T: engine oil °C	P: engine oil bar	P: crank chamber mbar
Cooling circuit	T: CL engine inlet °C	T: CL engine outlet °C	P: CL engine operating temperature bar	CL circulation quantity, engine l/min
	T: CL inflow LT mixture cooler °C	T: CL outflow LT mixture cooler °C	P: CL LT mixture cooler operating temperature bar	CL circulation quantity, LT mixture cooler l/min

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Basic data					
Appendix	Type of system	System operating hours OH		System construction year	Electrical power rating KWh_{el}
	Operating method	Reference variable / start requirements			Speed rpm
Installation conditions	Installation height m	Air pressure mbar	Air humidity %	Outside temperature °C	Unit compartment temperature °C
Engine	Engine type	Engine number	Plant number	Engine operating hours OH	
				No. engine starts	
The Components section should only be completed in the case of engine modifications					
Components	Gas mixer type		Alternator type	Air filter type	
	Ignition system type		Ignition coil type	Spark plug type	
	Catalytic converter type		Silencer type	Exhaust heat exchanger type	
Service products	Engine oil type	Engine oil change interval	Antifreeze / corrosion inhibitor type	Concentration %	
Fuel	Type of gas	Methane content CH ₄ %	Sulphur / hydrogen sulfide ppm	Lower calorific value, H _u kWh/Nm³	
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Operating data of engine at 100% rated power

Emissions	NOx emissions mg/Nm³	CO emissions mg/Nm³	O2 content of exhaust gas %	Lambda value
Gas train	Gas pressure upstream of ZPR mbar	Gas pressure downstream of ZPR mbar	Gas moisture %	Gas temperature °C
Intake system	T: intake air °C	P: intake vacuum mbar	Δ P: gas mixer mbar	Throttle valve position %
Turbocharging	Δ P: mixture cooler mbar	P: charge air upstream of TV mbar	T: mixture downstream of cooler °C	T: exhaust gas upstream of ETC bank A/B °C
Exhaust system	T: exhaust gas upstream of ETC bank A/B °C	P: exhaust gas back pressure, bank A/B mbar	T: exhaust gas up/downstream of catalytic converter °C	T: exhaust gas up/downstream of exhaust heat exchanger °C
Lubrication	Measuring point, engine oil T	T: engine oil °C	P: engine oil bar	P: crank chamber mbar
Cooling circuit	T: CL engine inlet °C	T: CL engine outlet °C	P: CL engine operating temperature bar	CL circulation quantity, engine l/min
	T: CL inflow LT mixture cooler °C	T: CL outflow LT mixture cooler °C	P: CL LT mixture cooler operating temperature bar	CL circulation quantity, LT mixture cooler l/min
Ignition system	Ignition time control ° bef. TDC	Ignition time measurement ° bef. TDC	Ignition energy V	Spark plug electrode distance m

Operating data of engine at 50% rated power

Emissions	NOx emissions mg/Nm³	CO emissions mg/Nm³	O2 content of exhaust gas %	Lambda value
Gas train	Gas pressure upstream of ZPR mbar	Gas pressure downstream of ZPR mbar	Gas moisture %	Gas temperature °C
Intake system	T: intake air °C	P: intake vacuum mbar	Δ P: gas mixer mbar	Throttle valve position %
Turbocharging	Δ P: mixture cooler mbar	P: charge air upstream of TV mbar	T: mixture downstream of cooler °C	T: exhaust gas upstream of ETC bank A/B °C
Exhaust system	T: exhaust gas upstream of ETC bank A/B °C	P: exhaust gas back pressure, bank A/B mbar	T: exhaust gas up/downstream of catalytic converter °C	T: exhaust gas up/downstream of exhaust heat exchanger °C
Lubrication	Measuring point, engine oil T	T: engine oil °C	P: engine oil bar	P: crank chamber mbar
Cooling circuit	T: CL engine inlet °C	T: CL engine outlet °C	P: CL engine operating temperature bar	CL circulation quantity, engine l/min
	T: CL inflow LT mixture cooler °C	T: CL outflow LT mixture cooler °C	P: CL LT mixture cooler operating temperature bar	CL circulation quantity, LT mixture cooler l/min

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Basic data					
Appendix	Type of system	System operating hours <div style="text-align: right;">OH</div>	System construction year	Electrical power rating <div style="text-align: right;">KWh_{el}</div>	
	Operating method	Reference variable / start requirements		Speed <div style="text-align: right;">rpm</div>	
Installation conditions	Installation height <div style="text-align: right;">m</div>	Air pressure <div style="text-align: right;">mbar</div>	Air humidity <div style="text-align: right;">%</div>	Outside temperature <div style="text-align: right;">°C</div>	Unit compartment temperature <div style="text-align: right;">°C</div>

Engine	Engine type	Engine number	Plant number	Engine operating hours <div style="text-align: right;">OH</div>
				No. engine starts

The Components section should only be completed in the case of engine modifications

Components	Gas mixer type	Alternator type	Air filter type
	Ignition system type	Ignition coil type	Spark plug type
	Catalytic converter type	Silencer type	Exhaust heat exchanger type

Service products	Engine oil type	Engine oil change interval	Antifreeze / corrosion inhibitor type	Concentration <div style="text-align: right;">%</div>
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Fuel	Type of gas	Methane content CH ₄ <div style="text-align: right;">%</div>	Sulphur / hydrogen sulfide <div style="text-align: right;">ppm</div>	Lower calorific value, H _u <div style="text-align: right;">kWh/Nm³</div>
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Operating data of engine at 100% rated power

Emissions	NOx emissions mg/Nm³	CO emissions mg/Nm³	O2 content of exhaust gas %	Lambda value
Gas train	Gas pressure upstream of ZPR mbar	Gas pressure downstream of ZPR mbar	Gas moisture %	Gas temperature °C
Intake system	T: intake air °C	P: intake vacuum mbar	Δ P: gas mixer mbar	Throttle valve position %
Turbocharging	Δ P: mixture cooler mbar	P: charge air upstream of TV mbar	T: mixture downstream of cooler °C	T: exhaust gas upstream of ETC bank A/B °C
Exhaust system	T: exhaust gas upstream of ETC bank A/B °C	P: exhaust gas back pressure, bank A/B mbar	T: exhaust gas up/downstream of catalytic converter °C	T: exhaust gas up/downstream of exhaust heat exchanger °C
Lubrication	Measuring point, engine oil T	T: engine oil °C	P: engine oil bar	P: crank chamber mbar
Cooling circuit	T: CL engine inlet °C	T: CL engine outlet °C	P: CL engine operating temperature bar	CL circulation quantity, engine l/min
	T: CL inflow LT mixture cooler °C	T: CL outflow LT mixture cooler °C	P: CL LT mixture cooler operating temperature bar	CL circulation quantity, LT mixture cooler l/min
Ignition system	Ignition time control ° bef. TDC	Ignition time measurement ° bef. TDC	Ignition energy V	Spark plug electrode distance m

Operating data of engine at 50% rated power


Emissions	NOx emissions mg/Nm³	CO emissions mg/Nm³	O2 content of exhaust gas %	Lambda value
Gas train	Gas pressure upstream of ZPR mbar	Gas pressure downstream of ZPR mbar	Gas moisture %	Gas temperature °C
Intake system	T: intake air °C	P: intake vacuum mbar	Δ P: gas mixer mbar	Throttle valve position %
Turbocharging	Δ P: mixture cooler mbar	P: charge air upstream of TV mbar	T: mixture downstream of cooler °C	T: exhaust gas upstream of ETC bank A/B °C
Exhaust system	T: exhaust gas upstream of ETC bank A/B °C	P: exhaust gas back pressure, bank A/B mbar	T: exhaust gas up/downstream of catalytic converter °C	T: exhaust gas up/downstream of exhaust heat exchanger °C
Lubrication	Measuring point, engine oil T	T: engine oil °C	P: engine oil bar	P: crank chamber mbar
Cooling circuit	T: CL engine inlet °C	T: CL engine outlet °C	P: CL engine operating temperature bar	CL circulation quantity, engine l/min
	T: CL inflow LT mixture cooler °C	T: CL outflow LT mixture cooler °C	P: CL LT mixture cooler operating temperature bar	CL circulation quantity, LT mixture cooler l/min

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Basic data					
Appendix	Type of system	System operating hours OH		System construction year	Electrical power rating KWh_{el}
	Operating method	Reference variable / start requirements			Speed rpm
Installation conditions	Installation height m	Air pressure mbar	Air humidity %	Outside temperature °C	Unit compartment temperature °C
Engine	Engine type	Engine number	Plant number	Engine operating hours OH	
				No. engine starts	
The Components section should only be completed in the case of engine modifications					
Components	Gas mixer type		Alternator type	Air filter type	
	Ignition system type		Ignition coil type	Spark plug type	
	Catalytic converter type		Silencer type	Exhaust heat exchanger type	
Service products	Engine oil type	Engine oil change interval	Antifreeze / corrosion inhibitor type	Concentration %	
Fuel	Type of gas	Methane content CH ₄ %	Sulphur / hydrogen sulfide ppm	Lower calorific value, H _u kWh/Nm³	
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Operating data of engine at 100% rated power				
Emissions	NOx emissions mg/Nm³	CO emissions mg/Nm³	O2 content of exhaust gas %	Lambda value
Gas train	Gas pressure upstream of ZPR mbar	Gas pressure downstream of ZPR mbar	Gas moisture %	Gas temperature °C
Intake system	T: intake air °C	P: intake vacuum mbar	Δ P: gas mixer mbar	Throttle valve position %
Turbocharging	Δ P: mixture cooler mbar	P: charge air upstream of TV mbar	T: mixture downstream of cooler °C	T: exhaust gas upstream of ETC bank A/B °C
Exhaust system	T: exhaust gas upstream of ETC bank A/B °C	P: exhaust gas back pressure, bank A/B mbar	T: exhaust gas up/downstream of catalytic converter °C	T: exhaust gas up/downstream of exhaust heat exchanger °C
Lubrication	Measuring point, engine oil T	T: engine oil °C	P: engine oil bar	P: crank chamber mbar
Cooling circuit	T: CL engine inlet °C	T: CL engine outlet °C	P: CL engine operating temperature bar	CL circulation quantity, engine l/min
	T: CL inflow LT mixture cooler °C	T: CL outflow LT mixture cooler °C	P: CL LT mixture cooler operating temperature bar	CL circulation quantity, LT mixture cooler l/min
Ignition system	Ignition time control ° bef. TDC	Ignition time measurement ° bef. TDC	Ignition energy V	Spark plug electrode distance m

Operating data of engine at 50% rated power				
Emissions	NOx emissions mg/Nm³	CO emissions mg/Nm³	O2 content of exhaust gas %	Lambda value
Gas train	Gas pressure upstream of ZPR mbar	Gas pressure downstream of ZPR mbar	Gas moisture %	Gas temperature °C
Intake system	T: intake air °C	P: intake vacuum mbar	Δ P: gas mixer mbar	Throttle valve position %
Turbocharging	Δ P: mixture cooler mbar	P: charge air upstream of TV mbar	T: mixture downstream of cooler °C	T: exhaust gas upstream of ETC bank A/B °C
Exhaust system	T: exhaust gas upstream of ETC bank A/B °C	P: exhaust gas back pressure, bank A/B mbar	T: exhaust gas up/downstream of catalytic converter °C	T: exhaust gas up/downstream of exhaust heat exchanger °C
Lubrication	Measuring point, engine oil T	T: engine oil °C	P: engine oil bar	P: crank chamber mbar
Cooling circuit	T: CL engine inlet °C	T: CL engine outlet °C	P: CL engine operating temperature bar	CL circulation quantity, engine l/min
	T: CL inflow LT mixture cooler °C	T: CL outflow LT mixture cooler °C	P: CL LT mixture cooler operating temperature bar	CL circulation quantity, LT mixture cooler l/min

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Basic data					
Appendix	Type of system	System operating hours OH		System construction year	Electrical power rating KWh_{el}
	Operating method	Reference variable / start requirements			Speed rpm
Installation conditions	Installation height m	Air pressure mbar	Air humidity %	Outside temperature °C	Unit compartment temperature °C
Engine	Engine type	Engine number	Plant number	Engine operating hours OH	
				No. engine starts	
The Components section should only be completed in the case of engine modifications					
Components	Gas mixer type		Alternator type	Air filter type	
	Ignition system type		Ignition coil type	Spark plug type	
	Catalytic converter type		Silencer type	Exhaust heat exchanger type	
Service products	Engine oil type	Engine oil change interval	Antifreeze / corrosion inhibitor type	Concentration %	
Fuel	Type of gas	Methane content CH ₄ %	Sulphur / hydrogen sulfide ppm	Lower calorific value, H _u kWh/Nm³	
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Operating data of engine at 100% rated power

Emissions	NOx emissions mg/Nm³	CO emissions mg/Nm³	O2 content of exhaust gas %	Lambda value
Gas train	Gas pressure upstream of ZPR mbar	Gas pressure downstream of ZPR mbar	Gas moisture %	Gas temperature °C
Intake system	T: intake air °C	P: intake vacuum mbar	Δ P: gas mixer mbar	Throttle valve position %
Turbocharging	Δ P: mixture cooler mbar	P: charge air upstream of TV mbar	T: mixture downstream of cooler °C	T: exhaust gas upstream of ETC bank A/B °C
Exhaust system	T: exhaust gas upstream of ETC bank A/B °C	P: exhaust gas back pressure, bank A/B mbar	T: exhaust gas up/downstream of catalytic converter °C	T: exhaust gas up/downstream of exhaust heat exchanger °C
Lubrication	Measuring point, engine oil T	T: engine oil °C	P: engine oil bar	P: crank chamber mbar
Cooling circuit	T: CL engine inlet °C	T: CL engine outlet °C	P: CL engine operating temperature bar	CL circulation quantity, engine l/min
	T: CL inflow LT mixture cooler °C	T: CL outflow LT mixture cooler °C	P: CL LT mixture cooler operating temperature bar	CL circulation quantity, LT mixture cooler l/min
Ignition system	Ignition time control ° bef. TDC	Ignition time measurement ° bef. TDC	Ignition energy V	Spark plug electrode distance m

Operating data of engine at 50% rated power


Emissions	NOx emissions mg/Nm³	CO emissions mg/Nm³	O2 content of exhaust gas %	Lambda value
Gas train	Gas pressure upstream of ZPR mbar	Gas pressure downstream of ZPR mbar	Gas moisture %	Gas temperature °C
Intake system	T: intake air °C	P: intake vacuum mbar	Δ P: gas mixer mbar	Throttle valve position %
Turbocharging	Δ P: mixture cooler mbar	P: charge air upstream of TV mbar	T: mixture downstream of cooler °C	T: exhaust gas upstream of ETC bank A/B °C
Exhaust system	T: exhaust gas upstream of ETC bank A/B °C	P: exhaust gas back pressure, bank A/B mbar	T: exhaust gas up/downstream of catalytic converter °C	T: exhaust gas up/downstream of exhaust heat exchanger °C
Lubrication	Measuring point, engine oil T	T: engine oil °C	P: engine oil bar	P: crank chamber mbar
Cooling circuit	T: CL engine inlet °C	T: CL engine outlet °C	P: CL engine operating temperature bar	CL circulation quantity, engine l/min
	T: CL inflow LT mixture cooler °C	T: CL outflow LT mixture cooler °C	P: CL LT mixture cooler operating temperature bar	CL circulation quantity, LT mixture cooler l/min

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Basic data					
Appendix	Type of system	System operating hours <div style="text-align: right;">OH</div>		System construction year	Electrical power rating <div style="text-align: right;">kWh_{el}</div>
	Operating method	Reference variable / start requirements			Speed <div style="text-align: right;">rpm</div>
Installation conditions	Installation height <div style="text-align: right;">m</div>	Air pressure <div style="text-align: right;">mbar</div>	Air humidity <div style="text-align: right;">%</div>	Outside temperature <div style="text-align: right;">°C</div>	Unit compartment temperature <div style="text-align: right;">°C</div>

Engine	Engine type	Engine number	Plant number	Engine operating hours <div style="text-align: right;">OH</div>
				No. engine starts

The Components section should only be completed in the case of engine modifications

Components	Gas mixer type	Alternator type	Air filter type
	Ignition system type	Ignition coil type	Spark plug type
	Catalytic converter type	Silencer type	Exhaust heat exchanger type

Service products	Engine oil type	Engine oil change interval	Antifreeze / corrosion inhibitor type	Concentration <div style="text-align: right;">%</div>
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Fuel	Type of gas	Methane content CH ₄ <div style="text-align: right;">%</div>	Sulphur / hydrogen sulfide <div style="text-align: right;">ppm</div>	Lower calorific value, Hu <div style="text-align: right;">kWh/Nm³</div>
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Maintenance record

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Operating data of engine at 100% rated power

Emissions	NOx emissions mg/Nm³	CO emissions mg/Nm³	O2 content of exhaust gas %	Lambda value
Gas train	Gas pressure upstream of ZPR mbar	Gas pressure downstream of ZPR mbar	Gas moisture %	Gas temperature °C
Intake system	T: intake air °C	P: intake vacuum mbar	Δ P: gas mixer mbar	Throttle valve position %
Turbocharging	Δ P: mixture cooler mbar	P: charge air upstream of TV mbar	T: mixture downstream of cooler °C	T: exhaust gas upstream of ETC bank A/B °C
Exhaust system	T: exhaust gas upstream of ETC bank A/B °C	P: exhaust gas back pressure, bank A/B mbar	T: exhaust gas up/downstream of catalytic converter °C	T: exhaust gas up/downstream of exhaust heat exchanger °C
Lubrication	Measuring point, engine oil T	T: engine oil °C	P: engine oil bar	P: crank chamber mbar
Cooling circuit	T: CL engine inlet °C	T: CL engine outlet °C	P: CL engine operating temperature bar	CL circulation quantity, engine l/min
	T: CL inflow LT mixture cooler °C	T: CL outflow LT mixture cooler °C	P: CL LT mixture cooler operating temperature bar	CL circulation quantity, LT mixture cooler l/min
Ignition system	Ignition time control ° bef. TDC	Ignition time measurement ° bef. TDC	Ignition energy V	Spark plug electrode distance m

Operating data of engine at 50% rated power

Emissions	NOx emissions mg/Nm³	CO emissions mg/Nm³	O2 content of exhaust gas %	Lambda value
Gas train	Gas pressure upstream of ZPR mbar	Gas pressure downstream of ZPR mbar	Gas moisture %	Gas temperature °C
Intake system	T: intake air °C	P: intake vacuum mbar	Δ P: gas mixer mbar	Throttle valve position %
Turbocharging	Δ P: mixture cooler mbar	P: charge air upstream of TV mbar	T: mixture downstream of cooler °C	T: exhaust gas upstream of ETC bank A/B °C
Exhaust system	T: exhaust gas upstream of ETC bank A/B °C	P: exhaust gas back pressure, bank A/B mbar	T: exhaust gas up/downstream of catalytic converter °C	T: exhaust gas up/downstream of exhaust heat exchanger °C
Lubrication	Measuring point, engine oil T	T: engine oil °C	P: engine oil bar	P: crank chamber mbar
Cooling circuit	T: CL engine inlet °C	T: CL engine outlet °C	P: CL engine operating temperature bar	CL circulation quantity, engine l/min
	T: CL inflow LT mixture cooler °C	T: CL outflow LT mixture cooler °C	P: CL LT mixture cooler operating temperature bar	CL circulation quantity, LT mixture cooler l/min

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Basic data					
Appendix	Type of system	System operating hours <div style="text-align: right;">OH</div>	System construction year	Electrical power rating <div style="text-align: right;">KWh_{el}</div>	
	Operating method	Reference variable / start requirements		Speed <div style="text-align: right;">rpm</div>	
Installation conditions	Installation height <div style="text-align: right;">m</div>	Air pressure <div style="text-align: right;">mbar</div>	Air humidity <div style="text-align: right;">%</div>	Outside temperature <div style="text-align: right;">°C</div>	Unit compartment temperature <div style="text-align: right;">°C</div>

Engine	Engine type	Engine number	Plant number	Engine operating hours <div style="text-align: right;">OH</div>
				No. engine starts

The Components section should only be completed in the case of engine modifications

Components	Gas mixer type	Alternator type	Air filter type
	Ignition system type	Ignition coil type	Spark plug type
	Catalytic converter type	Silencer type	Exhaust heat exchanger type

Service products	Engine oil type	Engine oil change interval	Antifreeze / corrosion inhibitor type	Concentration <div style="text-align: right;">%</div>
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Fuel	Type of gas	Methane content CH4 <div style="text-align: right;">%</div>	Sulphur / hydrogen sulfide <div style="text-align: right;">ppm</div>	Lower calorific value, Hu <div style="text-align: right;">kWh/Nm³</div>
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Operating data of engine at 100% rated power				
Emissions	NOx emissions <div style="text-align: right;">mg/Nm³</div>	CO emissions <div style="text-align: right;">mg/Nm³</div>	O2 content of exhaust gas <div style="text-align: right;">%</div>	Lambda value
Gas train	Gas pressure upstream of ZPR <div style="text-align: right;">mbar</div>	Gas pressure downstream of ZPR <div style="text-align: right;">mbar</div>	Gas moisture <div style="text-align: right;">%</div>	Gas temperature <div style="text-align: right;">°C</div>
Intake system	T: intake air <div style="text-align: right;">°C</div>	P: intake vacuum <div style="text-align: right;">mbar</div>	Δ P: gas mixer <div style="text-align: right;">mbar</div>	Throttle valve position <div style="text-align: right;">%</div>
Turbocharging	Δ P: mixture cooler <div style="text-align: right;">mbar</div>	P: charge air upstream of TV <div style="text-align: right;">mbar</div>	T: mixture downstream of cooler <div style="text-align: right;">°C</div>	T: exhaust gas upstream of ETC bank A/B <div style="text-align: right;">°C</div>
Exhaust system	T: exhaust gas upstream of ETC bank A/B <div style="text-align: right;">°C</div>	P: exhaust gas back pressure, bank A/B <div style="text-align: right;">mbar</div>	T: exhaust gas up/downstream of catalytic converter <div style="text-align: right;">°C</div>	T: exhaust gas up/downstream of exhaust heat exchanger <div style="text-align: right;">°C</div>
Lubrication	Measuring point, engine oil T	T: engine oil <div style="text-align: right;">°C</div>	P: engine oil <div style="text-align: right;">bar</div>	P: crank chamber <div style="text-align: right;">mbar</div>
Cooling circuit	T: CL engine inlet <div style="text-align: right;">°C</div>	T: CL engine outlet <div style="text-align: right;">°C</div>	P: CL engine operating temperature <div style="text-align: right;">bar</div>	CL circulation quantity, engine <div style="text-align: right;">l/min</div>
	T: CL inflow LT mixture cooler <div style="text-align: right;">°C</div>	T: CL outflow LT mixture cooler <div style="text-align: right;">°C</div>	P: CL LT mixture cooler operating temperature <div style="text-align: right;">bar</div>	CL circulation quantity, LT mixture cooler <div style="text-align: right;">l/min</div>
Ignition system	Ignition time control <div style="text-align: right;">° bef. TDC</div>	Ignition time measurement <div style="text-align: right;">° bef. TDC</div>	Ignition energy <div style="text-align: right;">V</div>	Spark plug electrode distance <div style="text-align: right;">m</div>

Operating data of engine at 50% rated power				
Emissions	NOx emissions <div style="text-align: right;">mg/Nm³</div>	CO emissions <div style="text-align: right;">mg/Nm³</div>	O2 content of exhaust gas <div style="text-align: right;">%</div>	Lambda value
Gas train	Gas pressure upstream of ZPR <div style="text-align: right;">mbar</div>	Gas pressure downstream of ZPR <div style="text-align: right;">mbar</div>	Gas moisture <div style="text-align: right;">%</div>	Gas temperature <div style="text-align: right;">°C</div>
Intake system	T: intake air <div style="text-align: right;">°C</div>	P: intake vacuum <div style="text-align: right;">mbar</div>	Δ P: gas mixer <div style="text-align: right;">mbar</div>	Throttle valve position <div style="text-align: right;">%</div>
Turbocharging	Δ P: mixture cooler <div style="text-align: right;">mbar</div>	P: charge air upstream of TV <div style="text-align: right;">mbar</div>	T: mixture downstream of cooler <div style="text-align: right;">°C</div>	T: exhaust gas upstream of ETC bank A/B <div style="text-align: right;">°C</div>
Exhaust system	T: exhaust gas upstream of ETC bank A/B <div style="text-align: right;">°C</div>	P: exhaust gas back pressure, bank A/B <div style="text-align: right;">mbar</div>	T: exhaust gas up/downstream of catalytic converter <div style="text-align: right;">°C</div>	T: exhaust gas up/downstream of exhaust heat exchanger <div style="text-align: right;">°C</div>
Lubrication	Measuring point, engine oil T	T: engine oil <div style="text-align: right;">°C</div>	P: engine oil <div style="text-align: right;">bar</div>	P: crank chamber <div style="text-align: right;">mbar</div>
Cooling circuit	T: CL engine inlet <div style="text-align: right;">°C</div>	T: CL engine outlet <div style="text-align: right;">°C</div>	P: CL engine operating temperature <div style="text-align: right;">bar</div>	CL circulation quantity, engine <div style="text-align: right;">l/min</div>
	T: CL inflow LT mixture cooler <div style="text-align: right;">°C</div>	T: CL outflow LT mixture cooler <div style="text-align: right;">°C</div>	P: CL LT mixture cooler operating temperature <div style="text-align: right;">bar</div>	CL circulation quantity, LT mixture cooler <div style="text-align: right;">l/min</div>

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Basic data					
Appendix	Type of system	System operating hours <div style="text-align: right;">OH</div>	System construction year	Electrical power rating <div style="text-align: right;">KWh_{el}</div>	
	Operating method	Reference variable / start requirements		Speed <div style="text-align: right;">rpm</div>	
Installation conditions	Installation height <div style="text-align: right;">m</div>	Air pressure <div style="text-align: right;">mbar</div>	Air humidity <div style="text-align: right;">%</div>	Outside temperature <div style="text-align: right;">°C</div>	Unit compartment temperature <div style="text-align: right;">°C</div>

Engine	Engine type	Engine number	Plant number	Engine operating hours <div style="text-align: right;">OH</div>
				No. engine starts

The Components section should only be completed in the case of engine modifications

Components	Gas mixer type	Alternator type	Air filter type
	Ignition system type	Ignition coil type	Spark plug type
	Catalytic converter type	Silencer type	Exhaust heat exchanger type

Service products	Engine oil type	Engine oil change interval	Antifreeze / corrosion inhibitor type	Concentration <div style="text-align: right;">%</div>
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Fuel	Type of gas	Methane content CH ₄ <div style="text-align: right;">%</div>	Sulphur / hydrogen sulfide <div style="text-align: right;">ppm</div>	Lower calorific value, H _u <div style="text-align: right;">kWh/Nm³</div>
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Operating data of engine at 100% rated power

Emissions	NOx emissions mg/Nm³	CO emissions mg/Nm³	O2 content of exhaust gas %	Lambda value
Gas train	Gas pressure upstream of ZPR mbar	Gas pressure downstream of ZPR mbar	Gas moisture %	Gas temperature °C
Intake system	T: intake air °C	P: intake vacuum mbar	Δ P: gas mixer mbar	Throttle valve position %
Turbocharging	Δ P: mixture cooler mbar	P: charge air upstream of TV mbar	T: mixture downstream of cooler °C	T: exhaust gas upstream of ETC bank A/B °C
Exhaust system	T: exhaust gas upstream of ETC bank A/B °C	P: exhaust gas back pressure, bank A/B mbar	T: exhaust gas up/downstream of catalytic converter °C	T: exhaust gas up/downstream of exhaust heat exchanger °C
Lubrication	Measuring point, engine oil T	T: engine oil °C	P: engine oil bar	P: crank chamber mbar
Cooling circuit	T: CL engine inlet °C	T: CL engine outlet °C	P: CL engine operating temperature bar	CL circulation quantity, engine l/min
	T: CL inflow LT mixture cooler °C	T: CL outflow LT mixture cooler °C	P: CL LT mixture cooler operating temperature bar	CL circulation quantity, LT mixture cooler l/min
Ignition system	Ignition time control ° bef. TDC	Ignition time measurement ° bef. TDC	Ignition energy V	Spark plug electrode distance m

Operating data of engine at 50% rated power

Emissions	NOx emissions mg/Nm³	CO emissions mg/Nm³	O2 content of exhaust gas %	Lambda value
Gas train	Gas pressure upstream of ZPR mbar	Gas pressure downstream of ZPR mbar	Gas moisture %	Gas temperature °C
Intake system	T: intake air °C	P: intake vacuum mbar	Δ P: gas mixer mbar	Throttle valve position %
Turbocharging	Δ P: mixture cooler mbar	P: charge air upstream of TV mbar	T: mixture downstream of cooler °C	T: exhaust gas upstream of ETC bank A/B °C
Exhaust system	T: exhaust gas upstream of ETC bank A/B °C	P: exhaust gas back pressure, bank A/B mbar	T: exhaust gas up/downstream of catalytic converter °C	T: exhaust gas up/downstream of exhaust heat exchanger °C
Lubrication	Measuring point, engine oil T	T: engine oil °C	P: engine oil bar	P: crank chamber mbar
Cooling circuit	T: CL engine inlet °C	T: CL engine outlet °C	P: CL engine operating temperature bar	CL circulation quantity, engine l/min
	T: CL inflow LT mixture cooler °C	T: CL outflow LT mixture cooler °C	P: CL LT mixture cooler operating temperature bar	CL circulation quantity, LT mixture cooler l/min

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Basic data					
Appendix	Type of system	System operating hours <div style="text-align: right;">OH</div>	System construction year	Electrical power rating <div style="text-align: right;">KWh_{el}</div>	
	Operating method	Reference variable / start requirements		Speed <div style="text-align: right;">rpm</div>	
Installation conditions	Installation height <div style="text-align: right;">m</div>	Air pressure <div style="text-align: right;">mbar</div>	Air humidity <div style="text-align: right;">%</div>	Outside temperature <div style="text-align: right;">°C</div>	Unit compartment temperature <div style="text-align: right;">°C</div>

Engine	Engine type	Engine number	Plant number	Engine operating hours <div style="text-align: right;">OH</div>
				No. engine starts

The Components section should only be completed in the case of engine modifications

Components	Gas mixer type	Alternator type	Air filter type
	Ignition system type	Ignition coil type	Spark plug type
	Catalytic converter type	Silencer type	Exhaust heat exchanger type

Service products	Engine oil type	Engine oil change interval	Antifreeze / corrosion inhibitor type	Concentration <div style="text-align: right;">%</div>
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Fuel	Type of gas	Methane content CH4 <div style="text-align: right;">%</div>	Sulphur / hydrogen sulfide <div style="text-align: right;">ppm</div>	Lower calorific value, Hu <div style="text-align: right;">kWh/Nm³</div>
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Operating data of engine at 100% rated power

Emissions	NOx emissions mg/Nm³	CO emissions mg/Nm³	O2 content of exhaust gas %	Lambda value
Gas train	Gas pressure upstream of ZPR mbar	Gas pressure downstream of ZPR mbar	Gas moisture %	Gas temperature °C
Intake system	T: intake air °C	P: intake vacuum mbar	Δ P: gas mixer mbar	Throttle valve position %
Turbocharging	Δ P: mixture cooler mbar	P: charge air upstream of TV mbar	T: mixture downstream of cooler °C	T: exhaust gas upstream of ETC bank A/B °C
Exhaust system	T: exhaust gas upstream of ETC bank A/B °C	P: exhaust gas back pressure, bank A/B mbar	T: exhaust gas up/downstream of catalytic converter °C	T: exhaust gas up/downstream of exhaust heat exchanger °C
Lubrication	Measuring point, engine oil T	T: engine oil °C	P: engine oil bar	P: crank chamber mbar
Cooling circuit	T: CL engine inlet °C	T: CL engine outlet °C	P: CL engine operating temperature bar	CL circulation quantity, engine l/min
	T: CL inflow LT mixture cooler °C	T: CL outflow LT mixture cooler °C	P: CL LT mixture cooler operating temperature bar	CL circulation quantity, LT mixture cooler l/min
Ignition system	Ignition time control ° bef. TDC	Ignition time measurement ° bef. TDC	Ignition energy V	Spark plug electrode distance m

Operating data of engine at 50% rated power

Emissions	NOx emissions mg/Nm³	CO emissions mg/Nm³	O2 content of exhaust gas %	Lambda value
Gas train	Gas pressure upstream of ZPR mbar	Gas pressure downstream of ZPR mbar	Gas moisture %	Gas temperature °C
Intake system	T: intake air °C	P: intake vacuum mbar	Δ P: gas mixer mbar	Throttle valve position %
Turbocharging	Δ P: mixture cooler mbar	P: charge air upstream of TV mbar	T: mixture downstream of cooler °C	T: exhaust gas upstream of ETC bank A/B °C
Exhaust system	T: exhaust gas upstream of ETC bank A/B °C	P: exhaust gas back pressure, bank A/B mbar	T: exhaust gas up/downstream of catalytic converter °C	T: exhaust gas up/downstream of exhaust heat exchanger °C
Lubrication	Measuring point, engine oil T	T: engine oil °C	P: engine oil bar	P: crank chamber mbar
Cooling circuit	T: CL engine inlet °C	T: CL engine outlet °C	P: CL engine operating temperature bar	CL circulation quantity, engine l/min
	T: CL inflow LT mixture cooler °C	T: CL outflow LT mixture cooler °C	P: CL LT mixture cooler operating temperature bar	CL circulation quantity, LT mixture cooler l/min

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Basic data					
Appendix	Type of system	System operating hours <div style="text-align: right;">OH</div>	System construction year	Electrical power rating <div style="text-align: right;">KWh_{el}</div>	
	Operating method	Reference variable / start requirements		Speed <div style="text-align: right;">rpm</div>	
Installation conditions	Installation height <div style="text-align: right;">m</div>	Air pressure <div style="text-align: right;">mbar</div>	Air humidity <div style="text-align: right;">%</div>	Outside temperature <div style="text-align: right;">°C</div>	Unit compartment temperature <div style="text-align: right;">°C</div>

Engine	Engine type	Engine number	Plant number	Engine operating hours <div style="text-align: right;">OH</div>
				No. engine starts

The Components section should only be completed in the case of engine modifications

Components	Gas mixer type	Alternator type	Air filter type
	Ignition system type	Ignition coil type	Spark plug type
	Catalytic converter type	Silencer type	Exhaust heat exchanger type

Service products	Engine oil type	Engine oil change interval	Antifreeze / corrosion inhibitor type	Concentration <div style="text-align: right;">%</div>
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Fuel	Type of gas	Methane content CH4 <div style="text-align: right;">%</div>	Sulphur / hydrogen sulfide <div style="text-align: right;">ppm</div>	Lower calorific value, Hu <div style="text-align: right;">kWh/Nm³</div>
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Operating data of engine at 100% rated power

Emissions	NOx emissions mg/Nm³	CO emissions mg/Nm³	O2 content of exhaust gas %	Lambda value
Gas train	Gas pressure upstream of ZPR mbar	Gas pressure downstream of ZPR mbar	Gas moisture %	Gas temperature °C
Intake system	T: intake air °C	P: intake vacuum mbar	Δ P: gas mixer mbar	Throttle valve position %
Turbocharging	Δ P: mixture cooler mbar	P: charge air upstream of TV mbar	T: mixture downstream of cooler °C	T: exhaust gas upstream of ETC bank A/B °C
Exhaust system	T: exhaust gas upstream of ETC bank A/B °C	P: exhaust gas back pressure, bank A/B mbar	T: exhaust gas up/downstream of catalytic converter °C	T: exhaust gas up/downstream of exhaust heat exchanger °C
Lubrication	Measuring point, engine oil T	T: engine oil °C	P: engine oil bar	P: crank chamber mbar
Cooling circuit	T: CL engine inlet °C	T: CL engine outlet °C	P: CL engine operating temperature bar	CL circulation quantity, engine l/min
	T: CL inflow LT mixture cooler °C	T: CL outflow LT mixture cooler °C	P: CL LT mixture cooler operating temperature bar	CL circulation quantity, LT mixture cooler l/min
Ignition system	Ignition time control ° bef. TDC	Ignition time measurement ° bef. TDC	Ignition energy V	Spark plug electrode distance m

Operating data of engine at 50% rated power

Emissions	NOx emissions mg/Nm³	CO emissions mg/Nm³	O2 content of exhaust gas %	Lambda value
Gas train	Gas pressure upstream of ZPR mbar	Gas pressure downstream of ZPR mbar	Gas moisture %	Gas temperature °C
Intake system	T: intake air °C	P: intake vacuum mbar	Δ P: gas mixer mbar	Throttle valve position %
Turbocharging	Δ P: mixture cooler mbar	P: charge air upstream of TV mbar	T: mixture downstream of cooler °C	T: exhaust gas upstream of ETC bank A/B °C
Exhaust system	T: exhaust gas upstream of ETC bank A/B °C	P: exhaust gas back pressure, bank A/B mbar	T: exhaust gas up/downstream of catalytic converter °C	T: exhaust gas up/downstream of exhaust heat exchanger °C
Lubrication	Measuring point, engine oil T	T: engine oil °C	P: engine oil bar	P: crank chamber mbar
Cooling circuit	T: CL engine inlet °C	T: CL engine outlet °C	P: CL engine operating temperature bar	CL circulation quantity, engine l/min
	T: CL inflow LT mixture cooler °C	T: CL outflow LT mixture cooler °C	P: CL LT mixture cooler operating temperature bar	CL circulation quantity, LT mixture cooler l/min

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Basic data					
Appendix	Type of system	System operating hours <div style="text-align: right;">OH</div>	System construction year	Electrical power rating <div style="text-align: right;">KWh_{el}</div>	
	Operating method	Reference variable / start requirements		Speed <div style="text-align: right;">rpm</div>	
Installation conditions	Installation height <div style="text-align: right;">m</div>	Air pressure <div style="text-align: right;">mbar</div>	Air humidity <div style="text-align: right;">%</div>	Outside temperature <div style="text-align: right;">°C</div>	Unit compartment temperature <div style="text-align: right;">°C</div>

Engine	Engine type	Engine number	Plant number	Engine operating hours <div style="text-align: right;">OH</div>
				No. engine starts

The Components section should only be completed in the case of engine modifications

Components	Gas mixer type	Alternator type	Air filter type
	Ignition system type	Ignition coil type	Spark plug type
	Catalytic converter type	Silencer type	Exhaust heat exchanger type

Service products	Engine oil type	Engine oil change interval	Antifreeze / corrosion inhibitor type	Concentration <div style="text-align: right;">%</div>
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Fuel	Type of gas	Methane content CH4 <div style="text-align: right;">%</div>	Sulphur / hydrogen sulfide <div style="text-align: right;">ppm</div>	Lower calorific value, Hu <div style="text-align: right;">kWh/Nm³</div>
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Operating data of engine at 100% rated power

Emissions	NOx emissions mg/Nm³	CO emissions mg/Nm³	O2 content of exhaust gas %	Lambda value
Gas train	Gas pressure upstream of ZPR mbar	Gas pressure downstream of ZPR mbar	Gas moisture %	Gas temperature °C
Intake system	T: intake air °C	P: intake vacuum mbar	Δ P: gas mixer mbar	Throttle valve position %
Turbocharging	Δ P: mixture cooler mbar	P: charge air upstream of TV mbar	T: mixture downstream of cooler °C	T: exhaust gas upstream of ETC bank A/B °C
Exhaust system	T: exhaust gas upstream of ETC bank A/B °C	P: exhaust gas back pressure, bank A/B mbar	T: exhaust gas up/downstream of catalytic converter °C	T: exhaust gas up/downstream of exhaust heat exchanger °C
Lubrication	Measuring point, engine oil T	T: engine oil °C	P: engine oil bar	P: crank chamber mbar
Cooling circuit	T: CL engine inlet °C	T: CL engine outlet °C	P: CL engine operating temperature bar	CL circulation quantity, engine l/min
	T: CL inflow LT mixture cooler °C	T: CL outflow LT mixture cooler °C	P: CL LT mixture cooler operating temperature bar	CL circulation quantity, LT mixture cooler l/min
Ignition system	Ignition time control ° bef. TDC	Ignition time measurement ° bef. TDC	Ignition energy V	Spark plug electrode distance m

Operating data of engine at 50% rated power

Emissions	NOx emissions mg/Nm³	CO emissions mg/Nm³	O2 content of exhaust gas %	Lambda value
Gas train	Gas pressure upstream of ZPR mbar	Gas pressure downstream of ZPR mbar	Gas moisture %	Gas temperature °C
Intake system	T: intake air °C	P: intake vacuum mbar	Δ P: gas mixer mbar	Throttle valve position %
Turbocharging	Δ P: mixture cooler mbar	P: charge air upstream of TV mbar	T: mixture downstream of cooler °C	T: exhaust gas upstream of ETC bank A/B °C
Exhaust system	T: exhaust gas upstream of ETC bank A/B °C	P: exhaust gas back pressure, bank A/B mbar	T: exhaust gas up/downstream of catalytic converter °C	T: exhaust gas up/downstream of exhaust heat exchanger °C
Lubrication	Measuring point, engine oil T	T: engine oil °C	P: engine oil bar	P: crank chamber mbar
Cooling circuit	T: CL engine inlet °C	T: CL engine outlet °C	P: CL engine operating temperature bar	CL circulation quantity, engine l/min
	T: CL inflow LT mixture cooler °C	T: CL outflow LT mixture cooler °C	P: CL LT mixture cooler operating temperature bar	CL circulation quantity, LT mixture cooler l/min

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Basic data					
Appendix	Type of system	System operating hours OH		System construction year	Electrical power rating KWh_{el}
	Operating method	Reference variable / start requirements			Speed rpm
Installation conditions	Installation height m	Air pressure mbar	Air humidity %	Outside temperature °C	Unit compartment temperature °C

Engine	Engine type	Engine number	Plant number	Engine operating hours OH
				No. engine starts

The Components section should only be completed in the case of engine modifications

Components	Gas mixer type	Alternator type	Air filter type
	Ignition system type	Ignition coil type	Spark plug type
	Catalytic converter type	Silencer type	Exhaust heat exchanger type

Service products	Engine oil type	Engine oil change interval	Antifreeze / corrosion inhibitor type	Concentration %
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Fuel	Type of gas	Methane content CH ₄ %	Sulphur / hydrogen sulfide ppm	Lower calorific value, Hu kWh/Nm³
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Comment:

Place:	Date:	Customer's signature	Maintenance personnel signature
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Maintenance record

E3
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Operating data of engine at 100% rated power

Emissions	NOx emissions mg/Nm³	CO emissions mg/Nm³	O2 content of exhaust gas %	Lambda value
Gas train	Gas pressure upstream of ZPR mbar	Gas pressure downstream of ZPR mbar	Gas moisture %	Gas temperature °C
Intake system	T: intake air °C	P: intake vacuum mbar	Δ P: gas mixer mbar	Throttle valve position %
Turbocharging	Δ P: mixture cooler mbar	P: charge air upstream of TV mbar	T: mixture downstream of cooler °C	T: exhaust gas upstream of ETC bank A/B °C
Exhaust system	T: exhaust gas upstream of ETC bank A/B °C	P: exhaust gas back pressure, bank A/B mbar	T: exhaust gas up/downstream of catalytic converter °C	T: exhaust gas up/downstream of exhaust heat exchanger °C
Lubrication	Measuring point, engine oil T	T: engine oil °C	P: engine oil bar	P: crank chamber mbar
Cooling circuit	T: CL engine inlet °C	T: CL engine outlet °C	P: CL engine operating temperature bar	CL circulation quantity, engine l/min
	T: CL inflow LT mixture cooler °C	T: CL outflow LT mixture cooler °C	P: CL LT mixture cooler operating temperature bar	CL circulation quantity, LT mixture cooler l/min
Ignition system	Ignition time control ° bef. TDC	Ignition time measurement ° bef. TDC	Ignition energy V	Spark plug electrode distance m

Operating data of engine at 50% rated power

Emissions	NOx emissions mg/Nm³	CO emissions mg/Nm³	O2 content of exhaust gas %	Lambda value
Gas train	Gas pressure upstream of ZPR mbar	Gas pressure downstream of ZPR mbar	Gas moisture %	Gas temperature °C
Intake system	T: intake air °C	P: intake vacuum mbar	Δ P: gas mixer mbar	Throttle valve position %
Turbocharging	Δ P: mixture cooler mbar	P: charge air upstream of TV mbar	T: mixture downstream of cooler °C	T: exhaust gas upstream of ETC bank A/B °C
Exhaust system	T: exhaust gas upstream of ETC bank A/B °C	P: exhaust gas back pressure, bank A/B mbar	T: exhaust gas up/downstream of catalytic converter °C	T: exhaust gas up/downstream of exhaust heat exchanger °C
Lubrication	Measuring point, engine oil T	T: engine oil °C	P: engine oil bar	P: crank chamber mbar
Cooling circuit	T: CL engine inlet °C	T: CL engine outlet °C	P: CL engine operating temperature bar	CL circulation quantity, engine l/min
	T: CL inflow LT mixture cooler °C	T: CL outflow LT mixture cooler °C	P: CL LT mixture cooler operating temperature bar	CL circulation quantity, LT mixture cooler l/min

Place:

Date:

Customer's signature

Maintenance personnel
signature

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Type of system	System operating hours	Engine operating hours	Operating hours since last check
Engine type	Engine number	Plant number	Valve clearance Compression pressure

Valve clearance on "cold" engine (engine temp. <50 °C)												
cylinder	1	2	3	4	5	6	7	8	9	10	11	12
Inlet actual measurement												
Outlet actual measurement												
cylinder	1	2	3	4	5	6	7	8	9	10	11	12
Inlet adjusted value												
Outlet adjusted value												

Compression pressures		
Measurement conditions	Target	Actual
Engine temperature	>50 °C	
Starter speed	>140 rpm	

Throttle valve must be open when measuring compression pressure Check air filter and exhaust system before measuring

cylinder	1	2	3	4	5	6	7	8	9	10	11	12
Compression pressure before inspection												
Compression pressure after inspection												

Comment:

Place:	Date:	Customer's signature	Maintenance personnel signature
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	Maintenance record	E3 Page 1 of 3
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Basic data					
Appendix	Type of system	System operating hours <div style="text-align: right;">OH</div>		System construction year	Electrical power rating <div style="text-align: right;">KWh_{el}</div>
	Operating method	Reference variable / start requirements			Speed <div style="text-align: right;">rpm</div>
Installation conditions	Installation height <div style="text-align: right;">m</div>	Air pressure <div style="text-align: right;">mbar</div>	Air humidity <div style="text-align: right;">%</div>	Outside temperature <div style="text-align: right;">°C</div>	Unit compartment temperature <div style="text-align: right;">°C</div>

Engine	Engine type	Engine number	Plant number	Engine operating hours <div style="text-align: right;">OH</div>
				No. engine starts

The Components section should only be completed in the case of engine modifications

Components	Gas mixer type	Alternator type	Air filter type
	Ignition system type	Ignition coil type	Spark plug type
	Catalytic converter type	Silencer type	Exhaust heat exchanger type

Service products	Engine oil type	Engine oil change interval	Antifreeze / corrosion inhibitor type	Concentration <div style="text-align: right;">%</div>
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Fuel	Type of gas	Methane content CH4 <div style="text-align: right;">%</div>	Sulphur / hydrogen sulfide <div style="text-align: right;">ppm</div>	Lower calorific value, Hu <div style="text-align: right;">kWh/Nm³</div>
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Comment:

Place:	Date:	Customer's signature	Maintenance personnel signature
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Maintenance record

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Operating data of engine at 100% rated power

Emissions	NOx emissions mg/Nm ³	CO emissions mg/Nm ³	O2 content of exhaust gas %	Lambda value
Gas train	Gas pressure upstream of ZPR mbar	Gas pressure downstream of ZPR mbar	Gas moisture %	Gas temperature °C
Intake system	T: intake air °C	P: intake vacuum mbar	Δ P: gas mixer mbar	Throttle valve position %
Turbocharging	Δ P: mixture cooler mbar	P: charge air upstream of TV mbar	T: mixture downstream of cooler °C	T: exhaust gas upstream of ETC bank A/B °C
Exhaust system	T: exhaust gas upstream of ETC bank A/B °C	P: exhaust gas back pressure, bank A/B mbar	T: exhaust gas up/downstream of catalytic converter °C	T: exhaust gas up/downstream of exhaust heat exchanger °C
Lubrication	Measuring point, engine oil T	T: engine oil °C	P: engine oil bar	P: crank chamber mbar
Cooling circuit	T: CL engine inlet °C	T: CL engine outlet °C	P: CL engine operating temperature bar	CL circulation quantity, engine l/min
	T: CL inflow LT mixture cooler °C	T: CL outflow LT mixture cooler °C	P: CL LT mixture cooler operating temperature bar	CL circulation quantity, LT mixture cooler l/min
Ignition system	Ignition time control ° bef. TDC	Ignition time measurement ° bef. TDC	Ignition energy V	Spark plug electrode distance m

Operating data of engine at 50% rated power

Emissions	NOx emissions mg/Nm ³	CO emissions mg/Nm ³	O2 content of exhaust gas %	Lambda value
Gas train	Gas pressure upstream of ZPR mbar	Gas pressure downstream of ZPR mbar	Gas moisture %	Gas temperature °C
Intake system	T: intake air °C	P: intake vacuum mbar	Δ P: gas mixer mbar	Throttle valve position %
Turbocharging	Δ P: mixture cooler mbar	P: charge air upstream of TV mbar	T: mixture downstream of cooler °C	T: exhaust gas upstream of ETC bank A/B °C
Exhaust system	T: exhaust gas upstream of ETC bank A/B °C	P: exhaust gas back pressure, bank A/B mbar	T: exhaust gas up/downstream of catalytic converter °C	T: exhaust gas up/downstream of exhaust heat exchanger °C
Lubrication	Measuring point, engine oil T	T: engine oil °C	P: engine oil bar	P: crank chamber mbar
Cooling circuit	T: CL engine inlet °C	T: CL engine outlet °C	P: CL engine operating temperature bar	CL circulation quantity, engine l/min
	T: CL inflow LT mixture cooler °C	T: CL outflow LT mixture cooler °C	P: CL LT mixture cooler operating temperature bar	CL circulation quantity, LT mixture cooler l/min

Place:	Date:	Customer's signature	Maintenance personnel signature
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Maintenance Record E3

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Type of system	System operating hours	Engine operating hours	Operating hours since last check
Engine type	Engine number	Plant number	Valve clearance Compression pressure

Valve clearance on "cold" engine (engine temp. <50 °C)												
cylinder	1	2	3	4	5	6	7	8	9	10	11	12
Inlet actual measurement												
Outlet actual measurement												
cylinder	1	2	3	4	5	6	7	8	9	10	11	12
Inlet adjusted value												
Outlet adjusted value												

Compression pressures		
Measurement conditions	Target	Actual
Engine temperature	>50 °C	
Starter speed	>140 rpm	

Throttle valve must be open when measuring compression pressure Check air filter and exhaust system before measuring

cylinder	1	2	3	4	5	6	7	8	9	10	11	12
Compression pressure before inspection												
Compression pressure after inspection												

Comment:

Place:	Date:	Customer's signature	Maintenance personnel signature
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Maintenance Record E3

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Basic data					
Appendix	Type of system	System operating hours <div style="text-align: right;">OH</div>		System construction year	Electrical power rating <div style="text-align: right;">KWh_{el}</div>
	Operating method	Reference variable / start requirements			Speed <div style="text-align: right;">rpm</div>
Installation conditions	Installation height <div style="text-align: right;">m</div>	Air pressure <div style="text-align: right;">mbar</div>	Air humidity <div style="text-align: right;">%</div>	Outside temperature <div style="text-align: right;">°C</div>	Unit compartment temperature <div style="text-align: right;">°C</div>

Engine	Engine type	Engine number	Plant number	Engine operating hours <div style="text-align: right;">OH</div>
				No. engine starts

The Components section should only be completed in the case of engine modifications

Components	Gas mixer type	Alternator type	Air filter type
	Ignition system type	Ignition coil type	Spark plug type
	Catalytic converter type	Silencer type	Exhaust heat exchanger type

Service products	Engine oil type	Engine oil change interval	Antifreeze / corrosion inhibitor type	Concentration <div style="text-align: right;">%</div>
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Fuel	Type of gas	Methane content CH4 <div style="text-align: right;">%</div>	Sulphur / hydrogen sulfide <div style="text-align: right;">ppm</div>	Lower calorific value, Hu <div style="text-align: right;">kWh/Nm³</div>
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Comment:

Place:	Date:	Customer's signature	Maintenance personnel signature
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Maintenance record

E3
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Operating data of engine at 100% rated power

Emissions	NOx emissions mg/Nm ³	CO emissions mg/Nm ³	O2 content of exhaust gas %	Lambda value
Gas train	Gas pressure upstream of ZPR mbar	Gas pressure downstream of ZPR mbar	Gas moisture %	Gas temperature °C
Intake system	T: intake air °C	P: intake vacuum mbar	Δ P: gas mixer mbar	Throttle valve position %
Turbocharging	Δ P: mixture cooler mbar	P: charge air upstream of TV mbar	T: mixture downstream of cooler °C	T: exhaust gas upstream of ETC bank A/B °C
Exhaust system	T: exhaust gas upstream of ETC bank A/B °C	P: exhaust gas back pressure, bank A/B mbar	T: exhaust gas up/downstream of catalytic converter °C	T: exhaust gas up/downstream of exhaust heat exchanger °C
Lubrication	Measuring point, engine oil T	T: engine oil °C	P: engine oil bar	P: crank chamber mbar
Cooling circuit	T: CL engine inlet °C	T: CL engine outlet °C	P: CL engine operating temperature bar	CL circulation quantity, engine l/min
	T: CL inflow LT mixture cooler °C	T: CL outflow LT mixture cooler °C	P: CL LT mixture cooler operating temperature bar	CL circulation quantity, LT mixture cooler l/min
Ignition system	Ignition time control ° bef. TDC	Ignition time measurement ° bef. TDC	Ignition energy V	Spark plug electrode distance m

Operating data of engine at 50% rated power

Emissions	NOx emissions mg/Nm ³	CO emissions mg/Nm ³	O2 content of exhaust gas %	Lambda value
Gas train	Gas pressure upstream of ZPR mbar	Gas pressure downstream of ZPR mbar	Gas moisture %	Gas temperature °C
Intake system	T: intake air °C	P: intake vacuum mbar	Δ P: gas mixer mbar	Throttle valve position %
Turbocharging	Δ P: mixture cooler mbar	P: charge air upstream of TV mbar	T: mixture downstream of cooler °C	T: exhaust gas upstream of ETC bank A/B °C
Exhaust system	T: exhaust gas upstream of ETC bank A/B °C	P: exhaust gas back pressure, bank A/B mbar	T: exhaust gas up/downstream of catalytic converter °C	T: exhaust gas up/downstream of exhaust heat exchanger °C
Lubrication	Measuring point, engine oil T	T: engine oil °C	P: engine oil bar	P: crank chamber mbar
Cooling circuit	T: CL engine inlet °C	T: CL engine outlet °C	P: CL engine operating temperature bar	CL circulation quantity, engine l/min
	T: CL inflow LT mixture cooler °C	T: CL outflow LT mixture cooler °C	P: CL LT mixture cooler operating temperature bar	CL circulation quantity, LT mixture cooler l/min

Place:

Date:

Customer's signature

Maintenance personnel
signature

	<h2 style="margin: 0;">Maintenance record</h2>	<h2 style="margin: 0;">E3</h2> <p style="margin: 0;">Page 3 of 3</p>
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Type of system	System operating hours	Engine operating hours	Operating hours since last check
Engine type	Engine number	Plant number	Valve clearance Compression pressure

Valve clearance on "cold" engine (engine temp. <50 °C)												
cylinder	1	2	3	4	5	6	7	8	9	10	11	12
Inlet actual measurement												
Outlet actual measurement												
cylinder	1	2	3	4	5	6	7	8	9	10	11	12
Inlet adjusted value												
Outlet adjusted value												

Compression pressures		
Measurement conditions	Target	Actual
Engine temperature	>50 °C	
Starter speed	>140 rpm	

Throttle valve must be open when measuring compression pressure Check air filter and exhaust system before measuring

cylinder	1	2	3	4	5	6	7	8	9	10	11	12
Compression pressure before inspection												
Compression pressure after inspection												

Comment:

Place:	Date:	Customer's signature	Maintenance personnel signature
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Notes on Maintenance Record E3

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	Maintenance record	E3 Page 1 of 3
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Basic data					
Appendix	Type of system	System operating hours <div style="text-align: right;">OH</div>		System construction year	Electrical power rating <div style="text-align: right;">KWh_{el}</div>
	Operating method	Reference variable / start requirements			Speed <div style="text-align: right;">rpm</div>
Installation conditions	Installation height <div style="text-align: right;">m</div>	Air pressure <div style="text-align: right;">mbar</div>	Air humidity <div style="text-align: right;">%</div>	Outside temperature <div style="text-align: right;">°C</div>	Unit compartment temperature <div style="text-align: right;">°C</div>

Engine	Engine type	Engine number	Plant number	Engine operating hours <div style="text-align: right;">OH</div>
				No. engine starts

The Components section should only be completed in the case of engine modifications

Components	Gas mixer type	Alternator type	Air filter type
	Ignition system type	Ignition coil type	Spark plug type
	Catalytic converter type	Silencer type	Exhaust heat exchanger type

Service products	Engine oil type	Engine oil change interval	Antifreeze / corrosion inhibitor type	Concentration <div style="text-align: right;">%</div>
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Fuel	Type of gas	Methane content CH4 <div style="text-align: right;">%</div>	Sulphur / hydrogen sulfide <div style="text-align: right;">ppm</div>	Lower calorific value, Hu <div style="text-align: right;">kWh/Nm³</div>
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Comment:

Place:	Date:	Customer's signature	Maintenance personnel signature
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Maintenance record

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Operating data of engine at 100% rated power

Emissions	NOx emissions mg/Nm ³	CO emissions mg/Nm ³	O2 content of exhaust gas %	Lambda value
Gas train	Gas pressure upstream of ZPR mbar	Gas pressure downstream of ZPR mbar	Gas moisture %	Gas temperature °C
Intake system	T: intake air °C	P: intake vacuum mbar	Δ P: gas mixer mbar	Throttle valve position %
Turbocharging	Δ P: mixture cooler mbar	P: charge air upstream of TV mbar	T: mixture downstream of cooler °C	T: exhaust gas upstream of ETC bank A/B °C
Exhaust system	T: exhaust gas upstream of ETC bank A/B °C	P: exhaust gas back pressure, bank A/B mbar	T: exhaust gas up/downstream of catalytic converter °C	T: exhaust gas up/downstream of exhaust heat exchanger °C
Lubrication	Measuring point, engine oil T	T: engine oil °C	P: engine oil bar	P: crank chamber mbar
Cooling circuit	T: CL engine inlet °C	T: CL engine outlet °C	P: CL engine operating temperature bar	CL circulation quantity, engine l/min
	T: CL inflow LT mixture cooler °C	T: CL outflow LT mixture cooler °C	P: CL LT mixture cooler operating temperature bar	CL circulation quantity, LT mixture cooler l/min
Ignition system	Ignition time control ° bef. TDC	Ignition time measurement ° bef. TDC	Ignition energy V	Spark plug electrode distance m

Operating data of engine at 50% rated power

Emissions	NOx emissions mg/Nm ³	CO emissions mg/Nm ³	O2 content of exhaust gas %	Lambda value
Gas train	Gas pressure upstream of ZPR mbar	Gas pressure downstream of ZPR mbar	Gas moisture %	Gas temperature °C
Intake system	T: intake air °C	P: intake vacuum mbar	Δ P: gas mixer mbar	Throttle valve position %
Turbocharging	Δ P: mixture cooler mbar	P: charge air upstream of TV mbar	T: mixture downstream of cooler °C	T: exhaust gas upstream of ETC bank A/B °C
Exhaust system	T: exhaust gas upstream of ETC bank A/B °C	P: exhaust gas back pressure, bank A/B mbar	T: exhaust gas up/downstream of catalytic converter °C	T: exhaust gas up/downstream of exhaust heat exchanger °C
Lubrication	Measuring point, engine oil T	T: engine oil °C	P: engine oil bar	P: crank chamber mbar
Cooling circuit	T: CL engine inlet °C	T: CL engine outlet °C	P: CL engine operating temperature bar	CL circulation quantity, engine l/min
	T: CL inflow LT mixture cooler °C	T: CL outflow LT mixture cooler °C	P: CL LT mixture cooler operating temperature bar	CL circulation quantity, LT mixture cooler l/min

Place:	Date:	Customer's signature	Maintenance personnel signature
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Type of system	System operating hours	Engine operating hours	Operating hours since last check
Engine type	Engine number	Plant number	Valve clearance Compression pressure

Valve clearance on "cold" engine (engine temp. <50 °C)												
cylinder	1	2	3	4	5	6	7	8	9	10	11	12
Inlet actual measurement												
Outlet actual measurement												
cylinder	1	2	3	4	5	6	7	8	9	10	11	12
Inlet adjusted value												
Outlet adjusted value												

Compression pressures		
Measurement conditions	Target	Actual
Engine temperature	>50 °C	
Starter speed	>140 rpm	

Throttle valve must be open when measuring compression pressure Check air filter and exhaust system before measuring

cylinder	1	2	3	4	5	6	7	8	9	10	11	12
Compression pressure before inspection												
Compression pressure after inspection												

Comment:

Place:	Date:	Customer's signature	Maintenance personnel signature
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Notes on Maintenance Record E3

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Maintenance Record E3

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Basic data					
Appendix	Type of system	System operating hours <div style="text-align: right; margin-top: 5px;">OH</div>		System construction year	Electrical power rating <div style="text-align: right; margin-top: 5px;">KWh_{el}</div>
	Operating method	Reference variable / start requirements			Speed <div style="text-align: right; margin-top: 5px;">rpm</div>
Installation conditions	Installation height <div style="text-align: right; margin-top: 5px;">m</div>	Air pressure <div style="text-align: right; margin-top: 5px;">mbar</div>	Air humidity <div style="text-align: right; margin-top: 5px;">%</div>	Outside temperature <div style="text-align: right; margin-top: 5px;">°C</div>	Unit compartment temperature <div style="text-align: right; margin-top: 5px;">°C</div>

Engine	Engine type	Engine number	Plant number	Engine operating hours <div style="text-align: right; margin-top: 5px;">OH</div>
				No. engine starts

The Components section should only be completed in the case of engine modifications

Components	Gas mixer type	Alternator type	Air filter type
	Ignition system type	Ignition coil type	Spark plug type
	Catalytic converter type	Silencer type	Exhaust heat exchanger type

Service products	Engine oil type	Engine oil change interval	Antifreeze / corrosion inhibitor type	Concentration <div style="text-align: right; margin-top: 5px;">%</div>
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Fuel	Type of gas	Methane content CH4 <div style="text-align: right; margin-top: 5px;">%</div>	Sulphur / hydrogen sulfide <div style="text-align: right; margin-top: 5px;">ppm</div>	Lower calorific value, Hu <div style="text-align: right; margin-top: 5px;">kWh/Nm³</div>
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Comment:

Place:	Date:	Customer's signature	Maintenance personnel signature
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Maintenance record

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Operating data of engine at 100% rated power

Emissions	NOx emissions mg/Nm ³	CO emissions mg/Nm ³	O2 content of exhaust gas %	Lambda value
Gas train	Gas pressure upstream of ZPR mbar	Gas pressure downstream of ZPR mbar	Gas moisture %	Gas temperature °C
Intake system	T: intake air °C	P: intake vacuum mbar	Δ P: gas mixer mbar	Throttle valve position %
Turbocharging	Δ P: mixture cooler mbar	P: charge air upstream of TV mbar	T: mixture downstream of cooler °C	T: exhaust gas upstream of ETC bank A/B °C
Exhaust system	T: exhaust gas upstream of ETC bank A/B °C	P: exhaust gas back pressure, bank A/B mbar	T: exhaust gas up/downstream of catalytic converter °C	T: exhaust gas up/downstream of exhaust heat exchanger °C
Lubrication	Measuring point, engine oil T	T: engine oil °C	P: engine oil bar	P: crank chamber mbar
Cooling circuit	T: CL engine inlet °C	T: CL engine outlet °C	P: CL engine operating temperature bar	CL circulation quantity, engine l/min
	T: CL inflow LT mixture cooler °C	T: CL outflow LT mixture cooler °C	P: CL LT mixture cooler operating temperature bar	CL circulation quantity, LT mixture cooler l/min
Ignition system	Ignition time control ° bef. TDC	Ignition time measurement ° bef. TDC	Ignition energy V	Spark plug electrode distance m

Operating data of engine at 50% rated power

Emissions	NOx emissions mg/Nm ³	CO emissions mg/Nm ³	O2 content of exhaust gas %	Lambda value
Gas train	Gas pressure upstream of ZPR mbar	Gas pressure downstream of ZPR mbar	Gas moisture %	Gas temperature °C
Intake system	T: intake air °C	P: intake vacuum mbar	Δ P: gas mixer mbar	Throttle valve position %
Turbocharging	Δ P: mixture cooler mbar	P: charge air upstream of TV mbar	T: mixture downstream of cooler °C	T: exhaust gas upstream of ETC bank A/B °C
Exhaust system	T: exhaust gas upstream of ETC bank A/B °C	P: exhaust gas back pressure, bank A/B mbar	T: exhaust gas up/downstream of catalytic converter °C	T: exhaust gas up/downstream of exhaust heat exchanger °C
Lubrication	Measuring point, engine oil T	T: engine oil °C	P: engine oil bar	P: crank chamber mbar
Cooling circuit	T: CL engine inlet °C	T: CL engine outlet °C	P: CL engine operating temperature bar	CL circulation quantity, engine l/min
	T: CL inflow LT mixture cooler °C	T: CL outflow LT mixture cooler °C	P: CL LT mixture cooler operating temperature bar	CL circulation quantity, LT mixture cooler l/min

Place:

Date:

Customer's signature

Maintenance personnel
signature

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Type of system	System operating hours	Engine operating hours	Operating hours since last check
Engine type	Engine number	Plant number	Valve clearance Compression pressure

Valve clearance on "cold" engine (engine temp. <50 °C)												
cylinder	1	2	3	4	5	6	7	8	9	10	11	12
Inlet actual measurement												
Outlet actual measurement												
cylinder	1	2	3	4	5	6	7	8	9	10	11	12
Inlet adjusted value												
Outlet adjusted value												

Compression pressures		
Measurement conditions	Target	Actual
Engine temperature	>50 °C	
Starter speed	>140 rpm	

Throttle valve must be open when measuring compression pressure Check air filter and exhaust system before measuring

cylinder	1	2	3	4	5	6	7	8	9	10	11	12
Compression pressure before inspection												
Compression pressure after inspection												

Comment:

Place:	Date:	Customer's signature	Maintenance personnel signature
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Notes on Maintenance Record E3

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Basic data					
Appendix	Type of system	System operating hours <div style="text-align: right;">OH</div>		System construction year	Electrical power rating <div style="text-align: right;">KWh_{el}</div>
	Operating method	Reference variable / start requirements			Speed <div style="text-align: right;">rpm</div>
Installation conditions	Installation height <div style="text-align: right;">m</div>	Air pressure <div style="text-align: right;">mbar</div>	Air humidity <div style="text-align: right;">%</div>	Outside temperature <div style="text-align: right;">°C</div>	Unit compartment temperature <div style="text-align: right;">°C</div>

Engine	Engine type	Engine number	Plant number	Engine operating hours <div style="text-align: right;">OH</div>
				No. engine starts

The Components section should only be completed in the case of engine modifications

Components	Gas mixer type	Alternator type	Air filter type
	Ignition system type	Ignition coil type	Spark plug type
	Catalytic converter type	Silencer type	Exhaust heat exchanger type

Service products	Engine oil type	Engine oil change interval	Antifreeze / corrosion inhibitor type	Concentration <div style="text-align: right;">%</div>
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Fuel	Type of gas	Methane content CH4 <div style="text-align: right;">%</div>	Sulphur / hydrogen sulfide <div style="text-align: right;">ppm</div>	Lower calorific value, Hu <div style="text-align: right;">kWh/Nm³</div>
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Comment:

Place:	Date:	Customer's signature	Maintenance personnel signature
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Maintenance Record

E3
Page 2 of 3

Operating data of engine at 100% rated power

Emissions	NOx emissions mg/Nm ³	CO emissions mg/Nm ³	O2 content of exhaust gas %	Lambda value
Gas train	Gas pressure upstream of ZPR mbar	Gas pressure downstream of ZPR mbar	Gas moisture %	Gas temperature °C
Intake system	T: intake air °C	P: intake vacuum mbar	Δ P: gas mixer mbar	Throttle valve position %
Turbocharging	Δ P: mixture cooler mbar	P: charge air upstream of TV mbar	T: mixture downstream of cooler °C	T: exhaust gas upstream of ETC bank A/B °C
Exhaust system	T: exhaust gas upstream of ETC bank A/B °C	P: exhaust gas back pressure, bank A/B mbar	T: exhaust gas up/downstream of catalytic converter °C	T: exhaust gas up/downstream of exhaust heat exchanger °C
Lubrication	Measuring point, engine oil T	T: engine oil °C	P: engine oil bar	P: crank chamber mbar
Cooling circuit	T: CL engine inlet °C	T: CL engine outlet °C	P: CL engine operating temperature bar	CL circulation quantity, engine l/min
	T: CL inflow LT mixture cooler °C	T: CL outflow LT mixture cooler °C	P: CL LT mixture cooler operating temperature bar	CL circulation quantity, LT mixture cooler l/min
Ignition system	Ignition time control ° bef. TDC	Ignition time measurement ° bef. TDC	Ignition energy V	Spark plug electrode distance m

Operating data of engine at 50% rated power

Emissions	NOx emissions mg/Nm ³	CO emissions mg/Nm ³	O2 content of exhaust gas %	Lambda value
Gas train	Gas pressure upstream of ZPR mbar	Gas pressure downstream of ZPR mbar	Gas moisture %	Gas temperature °C
Intake system	T: intake air °C	P: intake vacuum mbar	Δ P: gas mixer mbar	Throttle valve position %
Turbocharging	Δ P: mixture cooler mbar	P: charge air upstream of TV mbar	T: mixture downstream of cooler °C	T: exhaust gas upstream of ETC bank A/B °C
Exhaust system	T: exhaust gas upstream of ETC bank A/B °C	P: exhaust gas back pressure, bank A/B mbar	T: exhaust gas up/downstream of catalytic converter °C	T: exhaust gas up/downstream of exhaust heat exchanger °C
Lubrication	Measuring point, engine oil T	T: engine oil °C	P: engine oil bar	P: crank chamber mbar
Cooling circuit	T: CL engine inlet °C	T: CL engine outlet °C	P: CL engine operating temperature bar	CL circulation quantity, engine l/min
	T: CL inflow LT mixture cooler °C	T: CL outflow LT mixture cooler °C	P: CL LT mixture cooler operating temperature bar	CL circulation quantity, LT mixture cooler l/min

Place:

Date:

Customer's signature

Maintenance personnel signature

	<h2 style="margin: 0;">Maintenance Record</h2>	<h2 style="margin: 0;">E3</h2> <p style="margin: 0;">Page 3 of 3</p>
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Type of system	System operating hours	Engine operating hours	Operating hours since last check
Engine type	Engine number	Plant number	Valve clearance Compression pressure

Valve clearance on "cold" engine (engine temp. <50 °C)												
cylinder	1	2	3	4	5	6	7	8	9	10	11	12
Inlet actual measurement												
Outlet actual measurement												
cylinder	1	2	3	4	5	6	7	8	9	10	11	12
Inlet adjusted value												
Outlet adjusted value												

Compression pressures		
Measurement conditions	Target	Actual
Engine temperature	>50 °C	
Starter speed	>140 rpm	

Throttle valve must be open when measuring compression pressure Check air filter and exhaust system before measuring

cylinder	1	2	3	4	5	6	7	8	9	10	11	12
Compression pressure before inspection												
Compression pressure after inspection												

Comment:

Place:	Date:	Customer's signature	Maintenance personnel signature
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Maintenance Record E3

	Maintenance Record	E3 Page 1 of 3
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Basic data					
Appendix	Type of system	System operating hours <div style="text-align: right;">OH</div>		System construction year	Electrical power rating <div style="text-align: right;">KWh_{el}</div>
	Operating method	Reference variable / start requirements			Speed <div style="text-align: right;">rpm</div>
Installation conditions	Installation height <div style="text-align: right;">m</div>	Air pressure <div style="text-align: right;">mbar</div>	Air humidity <div style="text-align: right;">%</div>	Outside temperature <div style="text-align: right;">°C</div>	Unit compartment temperature <div style="text-align: right;">°C</div>

Engine	Engine type	Engine number	Plant number	Engine operating hours <div style="text-align: right;">OH</div>
				No. engine starts

The Components section should only be completed in the case of engine modifications

Components	Gas mixer type	Alternator type	Air filter type
	Ignition system type	Ignition coil type	Spark plug type
	Catalytic converter type	Silencer type	Exhaust heat exchanger type

Service products	Engine oil type	Engine oil change interval	Antifreeze / corrosion inhibitor type	Concentration <div style="text-align: right;">%</div>
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Fuel	Type of gas	Methane content CH ₄ <div style="text-align: right;">%</div>	Sulphur / hydrogen sulfide <div style="text-align: right;">ppm</div>	Lower calorific value, Hu <div style="text-align: right;">kWh/Nm³</div>
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Comment:

Place:	Date:	Customer's signature	Maintenance personnel signature
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Maintenance Record

E3
 Page 2 of 3

Operating data of engine at 100% rated power

Emissions	NOx emissions mg/Nm ³	CO emissions mg/Nm ³	O2 content of exhaust gas %	Lambda value
Gas train	Gas pressure upstream of ZPR mbar	Gas pressure downstream of ZPR mbar	Gas moisture %	Gas temperature °C
Intake system	T: intake air °C	P: intake vacuum mbar	Δ P: gas mixer mbar	Throttle valve position %
Turbocharging	Δ P: mixture cooler mbar	P: charge air upstream of TV mbar	T: mixture downstream of cooler °C	T: exhaust gas upstream of ETC bank A/B °C
Exhaust system	T: exhaust gas upstream of ETC bank A/B °C	P: exhaust gas back pressure, bank A/B mbar	T: exhaust gas up/downstream of catalytic converter °C	T: exhaust gas up/downstream of exhaust heat exchanger °C
Lubrication	Measuring point, engine oil T	T: engine oil °C	P: engine oil bar	P: crank chamber mbar
Cooling circuit	T: CL engine inlet °C	T: CL engine outlet °C	P: CL engine operating temperature bar	CL circulation quantity, engine l/min
	T: CL inflow LT mixture cooler °C	T: CL outflow LT mixture cooler °C	P: CL LT mixture cooler operating temperature bar	CL circulation quantity, LT mixture cooler l/min
Ignition system	Ignition time control ° bef. TDC	Ignition time measurement ° bef. TDC	Ignition energy V	Spark plug electrode distance m

Operating data of engine at 50% rated power

Emissions	NOx emissions mg/Nm ³	CO emissions mg/Nm ³	O2 content of exhaust gas %	Lambda value
Gas train	Gas pressure upstream of ZPR mbar	Gas pressure downstream of ZPR mbar	Gas moisture %	Gas temperature °C
Intake system	T: intake air °C	P: intake vacuum mbar	Δ P: gas mixer mbar	Throttle valve position %
Turbocharging	Δ P: mixture cooler mbar	P: charge air upstream of TV mbar	T: mixture downstream of cooler °C	T: exhaust gas upstream of ETC bank A/B °C
Exhaust system	T: exhaust gas upstream of ETC bank A/B °C	P: exhaust gas back pressure, bank A/B mbar	T: exhaust gas up/downstream of catalytic converter °C	T: exhaust gas up/downstream of exhaust heat exchanger °C
Lubrication	Measuring point, engine oil T	T: engine oil °C	P: engine oil bar	P: crank chamber mbar
Cooling circuit	T: CL engine inlet °C	T: CL engine outlet °C	P: CL engine operating temperature bar	CL circulation quantity, engine l/min
	T: CL inflow LT mixture cooler °C	T: CL outflow LT mixture cooler °C	P: CL LT mixture cooler operating temperature bar	CL circulation quantity, LT mixture cooler l/min

Place: _____ Date: _____ Customer's signature _____ Maintenance personnel signature _____

	<h2 style="margin: 0;">Maintenance Record</h2>	<h2 style="margin: 0;">E3</h2> <p style="margin: 0;">Page 3 of 3</p>
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Type of system	System operating hours	Engine operating hours	Operating hours since last check
Engine type	Engine number	Plant number	Valve clearance Compression pressure

Valve clearance on "cold" engine (engine temp. <50 °C)												
cylinder	1	2	3	4	5	6	7	8	9	10	11	12
Inlet actual measurement												
Outlet actual measurement												
cylinder	1	2	3	4	5	6	7	8	9	10	11	12
Inlet adjusted value												
Outlet adjusted value												

Compression pressures		
Measurement conditions	Target	Actual
Engine temperature	>50 °C	
Starter speed	>140 rpm	

Throttle valve must be open when measuring compression pressure Check air filter and exhaust system before measuring

cylinder	1	2	3	4	5	6	7	8	9	10	11	12
Compression pressure before inspection												
Compression pressure after inspection												

Comment:

Place:	Date:	Customer's signature	Maintenance personnel signature
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Notes on Maintenance Record E3

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	<h2 style="margin: 0;">Maintenance Record</h2>	<h2 style="margin: 0;">E3</h2> <p style="margin: 0;">Page 1 of 3</p>
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Basic data					
Appendix	Type of system	System operating hours <div style="text-align: right;">OH</div>		System construction year	Electrical power rating <div style="text-align: right;">KWh_{el}</div>
	Operating method	Reference variable / start requirements			Speed <div style="text-align: right;">rpm</div>
Installation conditions	Installation height <div style="text-align: right;">m</div>	Air pressure <div style="text-align: right;">mbar</div>	Air humidity <div style="text-align: right;">%</div>	Outside temperature <div style="text-align: right;">°C</div>	Unit compartment temperature <div style="text-align: right;">°C</div>

Engine	Engine type	Engine number	Plant number	Engine operating hours <div style="text-align: right;">OH</div>
				No. engine starts

The Components section should only be completed in the case of engine modifications

Components	Gas mixer type	Alternator type	Air filter type
	Ignition system type	Ignition coil type	Spark plug type
	Catalytic converter type	Silencer type	Exhaust heat exchanger type

Service products	Engine oil type	Engine oil change interval	Antifreeze / corrosion inhibitor type	Concentration <div style="text-align: right;">%</div>
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Fuel	Type of gas	Methane content CH4 <div style="text-align: right;">%</div>	Sulphur / hydrogen sulfide <div style="text-align: right;">ppm</div>	Lower calorific value, Hu <div style="text-align: right;">kWh/Nm³</div>
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Comment:

Place:	Date:	Customer's signature	Maintenance personnel signature
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Maintenance Record

E3
 Page 2 of 3

Operating data of engine at 100% rated power

Emissions	NOx emissions mg/Nm ³	CO emissions mg/Nm ³	O2 content of exhaust gas %	Lambda value
Gas train	Gas pressure upstream of ZPR mbar	Gas pressure downstream of ZPR mbar	Gas moisture %	Gas temperature °C
Intake system	T: intake air °C	P: intake vacuum mbar	Δ P: gas mixer mbar	Throttle valve position %
Turbocharging	Δ P: mixture cooler mbar	P: charge air upstream of TV mbar	T: mixture downstream of cooler °C	T: exhaust gas upstream of ETC bank A/B °C
Exhaust system	T: exhaust gas upstream of ETC bank A/B °C	P: exhaust gas back pressure, bank A/B mbar	T: exhaust gas up/downstream of catalytic converter °C	T: exhaust gas up/downstream of exhaust heat exchanger °C
Lubrication	Measuring point, engine oil T	T: engine oil °C	P: engine oil bar	P: crank chamber mbar
Cooling circuit	T: CL engine inlet °C	T: CL engine outlet °C	P: CL engine operating temperature bar	CL circulation quantity, engine l/min
	T: CL inflow LT mixture cooler °C	T: CL outflow LT mixture cooler °C	P: CL LT mixture cooler operating temperature bar	CL circulation quantity, LT mixture cooler l/min
Ignition system	Ignition time control ° bef. TDC	Ignition time measurement ° bef. TDC	Ignition energy V	Spark plug electrode distance m

Operating data of engine at 50% rated power

Emissions	NOx emissions mg/Nm ³	CO emissions mg/Nm ³	O2 content of exhaust gas %	Lambda value
Gas train	Gas pressure upstream of ZPR mbar	Gas pressure downstream of ZPR mbar	Gas moisture %	Gas temperature °C
Intake system	T: intake air °C	P: intake vacuum mbar	Δ P: gas mixer mbar	Throttle valve position %
Turbocharging	Δ P: mixture cooler mbar	P: charge air upstream of TV mbar	T: mixture downstream of cooler °C	T: exhaust gas upstream of ETC bank A/B °C
Exhaust system	T: exhaust gas upstream of ETC bank A/B °C	P: exhaust gas back pressure, bank A/B mbar	T: exhaust gas up/downstream of catalytic converter °C	T: exhaust gas up/downstream of exhaust heat exchanger °C
Lubrication	Measuring point, engine oil T	T: engine oil °C	P: engine oil bar	P: crank chamber mbar
Cooling circuit	T: CL engine inlet °C	T: CL engine outlet °C	P: CL engine operating temperature bar	CL circulation quantity, engine l/min
	T: CL inflow LT mixture cooler °C	T: CL outflow LT mixture cooler °C	P: CL LT mixture cooler operating temperature bar	CL circulation quantity, LT mixture cooler l/min

Place:

Date:

Customer's signature

Maintenance personnel
signature

	<h2 style="margin: 0;">Maintenance Record</h2>	<h1 style="margin: 0;">E3</h1> <p style="margin: 0;">Page 3 of 3</p>
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Type of system	System operating hours	Engine operating hours	Operating hours since last check
Engine type	Engine number	Plant number	Valve clearance Compression pressure

Valve clearance on "cold" engine (engine temp. <50 °C)												
cylinder	1	2	3	4	5	6	7	8	9	10	11	12
Inlet actual measurement												
Outlet actual measurement												
cylinder	1	2	3	4	5	6	7	8	9	10	11	12
Inlet adjusted value												
Outlet adjusted value												

Compression pressures		
Measurement conditions	Target	Actual
Engine temperature	>50 °C	
Starter speed	>140 rpm	

Throttle valve must be open when measuring compression pressure Check air filter and exhaust system before measuring

cylinder	1	2	3	4	5	6	7	8	9	10	11	12
Compression pressure before inspection												
Compression pressure after inspection												

Comment:

Place:	Date:	Customer's signature	Maintenance personnel signature
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Notes on Maintenance Record E3

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	Maintenance Record	E3 Page 1 of 3
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Basic data					
Appendix	Type of system	System operating hours <div style="text-align: right; font-weight: bold;">OH</div>		System construction year	Electrical power rating <div style="text-align: right; font-weight: bold;">KWh_{el}</div>
	Operating method	Reference variable / start requirements			Speed <div style="text-align: right; font-weight: bold;">rpm</div>
Installation conditions	Installation height <div style="text-align: right; font-weight: bold;">m</div>	Air pressure <div style="text-align: right; font-weight: bold;">mbar</div>	Air humidity <div style="text-align: right; font-weight: bold;">%</div>	Outside temperature <div style="text-align: right; font-weight: bold;">°C</div>	Unit compartment temperature <div style="text-align: right; font-weight: bold;">°C</div>

Engine	Engine type	Engine number	Plant number	Engine operating hours <div style="text-align: right; font-weight: bold;">OH</div>
				No. engine starts

The Components section should only be completed in the case of engine modifications

Components	Gas mixer type	Alternator type	Air filter type
	Ignition system type	Ignition coil type	Spark plug type
	Catalytic converter type	Silencer type	Exhaust heat exchanger type

Service products	Engine oil type	Engine oil change interval	Antifreeze / corrosion inhibitor type	Concentration <div style="text-align: right; font-weight: bold;">%</div>
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Fuel	Type of gas	Methane content CH4 <div style="text-align: right; font-weight: bold;">%</div>	Sulphur / hydrogen sulfide <div style="text-align: right; font-weight: bold;">ppm</div>	Lower calorific value, Hu <div style="text-align: right; font-weight: bold;">kWh/Nm³</div>
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Comment:

Place:	Date:	Customer's signature	Maintenance personnel signature
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	<h2 style="margin: 0;">Maintenance record</h2>	<p style="margin: 0;">E3 Page 2 of 3</p>
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Operating data of engine at 100% rated power				
Emissions	NOx emissions mg/Nm³	CO emissions mg/Nm³	O2 content of exhaust gas %	Lambda value
Gas train	Gas pressure upstream of ZPR mbar	Gas pressure downstream of ZPR mbar	Gas moisture %	Gas temperature °C
Intake system	T: intake air °C	P: intake vacuum mbar	Δ P: gas mixer mbar	Throttle valve position %
Turbocharging	Δ P: mixture cooler mbar	P: charge air upstream of TV mbar	T: mixture downstream of cooler °C	T: exhaust gas upstream of ETC bank A/B °C
Exhaust system	T: exhaust gas upstream of ETC bank A/B °C	P: exhaust gas back pressure, bank A/B mbar	T: exhaust gas up/downstream of catalytic converter °C	T: exhaust gas up/downstream of exhaust heat exchanger °C
Lubrication	Measuring point, engine oil T	T: engine oil °C	P: engine oil bar	P: crank chamber mbar
Cooling circuit	T: CL engine inlet °C	T: CL engine outlet °C	P: CL engine operating temperature bar	CL circulation quantity, engine l/min
	T: CL inflow LT mixture cooler °C	T: CL outflow LT mixture cooler °C	P: CL LT mixture cooler operating temperature bar	CL circulation quantity, LT mixture cooler l/min
Ignition system	Ignition time control ° bef. TDC	Ignition time measurement ° bef. TDC	Ignition energy V	Spark plug electrode distance m

Operating data of engine at 50% rated power				
Emissions	NOx emissions mg/Nm³	CO emissions mg/Nm³	O2 content of exhaust gas %	Lambda value
Gas train	Gas pressure upstream of ZPR mbar	Gas pressure downstream of ZPR mbar	Gas moisture %	Gas temperature °C
Intake system	T: intake air °C	P: intake vacuum mbar	Δ P: gas mixer mbar	Throttle valve position %
Turbocharging	Δ P: mixture cooler mbar	P: charge air upstream of TV mbar	T: mixture downstream of cooler °C	T: exhaust gas upstream of ETC bank A/B °C
Exhaust system	T: exhaust gas upstream of ETC bank A/B °C	P: exhaust gas back pressure, bank A/B mbar	T: exhaust gas up/downstream of catalytic converter °C	T: exhaust gas up/downstream of exhaust heat exchanger °C
Lubrication	Measuring point, engine oil T	T: engine oil °C	P: engine oil bar	P: crank chamber mbar
Cooling circuit	T: CL engine inlet °C	T: CL engine outlet °C	P: CL engine operating temperature bar	CL circulation quantity, engine l/min
	T: CL inflow LT mixture cooler °C	T: CL outflow LT mixture cooler °C	P: CL LT mixture cooler operating temperature bar	CL circulation quantity, LT mixture cooler l/min

Place:	Date:	Customer's signature	Maintenance personnel signature
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	<h2 style="margin: 0;">Maintenance Record</h2>	<h2 style="margin: 0;">E3</h2> <p style="margin: 0;">Page 3 of 3</p>
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Type of system	System operating hours	Engine operating hours	Operating hours since last check
Engine type	Engine number	Plant number	Valve clearance Compression pressure

Valve clearance on "cold" engine (engine temp. <50 °C)												
cylinder	1	2	3	4	5	6	7	8	9	10	11	12
Inlet actual measurement												
Outlet actual measurement												
cylinder	1	2	3	4	5	6	7	8	9	10	11	12
Inlet adjusted value												
Outlet adjusted value												

Compression pressures		
Measurement conditions	Target	Actual
Engine temperature	>50 °C	
Starter speed	>140 rpm	

Throttle valve must be open when measuring compression pressure Check air filter and exhaust system before measuring

cylinder	1	2	3	4	5	6	7	8	9	10	11	12
Compression pressure before inspection												
Compression pressure after inspection												

Comment:

Place:	Date:	Customer's signature	Maintenance personnel signature
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Notes on Maintenance Record E3

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	Maintenance Record	E3
		Page 1 of 3

Basic data					
Appendix	Type of system	System operating hours <div style="text-align: right;">OH</div>		System construction year	Electrical power rating <div style="text-align: right;">KWh_{el}</div>
	Operating method	Reference variable / start requirements			Speed <div style="text-align: right;">rpm</div>
Installation conditions	Installation height <div style="text-align: right;">m</div>	Air pressure <div style="text-align: right;">mbar</div>	Air humidity <div style="text-align: right;">%</div>	Outside temperature <div style="text-align: right;">°C</div>	Unit compartment temperature <div style="text-align: right;">°C</div>

Engine	Engine type	Engine number	Plant number	Engine operating hours <div style="text-align: right;">OH</div>
				No. engine starts

The Components section should only be completed in the case of engine modifications

Components	Gas mixer type	Alternator type	Air filter type
	Ignition system type	Ignition coil type	Spark plug type
	Catalytic converter type	Silencer type	Exhaust heat exchanger type

Service products	Engine oil type	Engine oil change interval	Antifreeze / corrosion inhibitor type	Concentration <div style="text-align: right;">%</div>
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Fuel	Type of gas	Methane content CH4 <div style="text-align: right;">%</div>	Sulphur / hydrogen sulfide <div style="text-align: right;">ppm</div>	Lower calorific value, Hu <div style="text-align: right;">kWh/Nm³</div>
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Comment:

Place:	Date:	Customer's signature	Maintenance personnel signature
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	<h2 style="margin: 0;">Maintenance Record</h2>	<p style="margin: 0;">E3 Page 2 of 3</p>
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Operating data of engine at 100% rated power				
Emissions	NOx emissions mg/Nm³	CO emissions mg/Nm³	O2 content of exhaust gas %	Lambda value
Gas train	Gas pressure upstream of ZPR mbar	Gas pressure downstream of ZPR mbar	Gas moisture %	Gas temperature °C
Intake system	T: intake air °C	P: intake vacuum mbar	Δ P: gas mixer mbar	Throttle valve position %
Turbocharging	Δ P: mixture cooler mbar	P: charge air upstream of TV mbar	T: mixture downstream of cooler °C	T: exhaust gas upstream of ETC bank A/B °C
Exhaust system	T: exhaust gas upstream of ETC bank A/B °C	P: exhaust gas back pressure, bank A/B mbar	T: exhaust gas up/downstream of catalytic converter °C	T: exhaust gas up/downstream of exhaust heat exchanger °C
Lubrication	Measuring point, engine oil T	T: engine oil °C	P: engine oil bar	P: crank chamber mbar
Cooling circuit	T: CL engine inlet °C	T: CL engine outlet °C	P: CL engine operating temperature bar	CL circulation quantity, engine l/min
	T: CL inflow LT mixture cooler °C	T: CL outflow LT mixture cooler °C	P: CL LT mixture cooler operating temperature bar	CL circulation quantity, LT mixture cooler l/min
Ignition system	Ignition time control ° bef. TDC	Ignition time measurement ° bef. TDC	Ignition energy V	Spark plug electrode distance m

Operating data of engine at 50% rated power				
Emissions	NOx emissions mg/Nm³	CO emissions mg/Nm³	O2 content of exhaust gas %	Lambda value
Gas train	Gas pressure upstream of ZPR mbar	Gas pressure downstream of ZPR mbar	Gas moisture %	Gas temperature °C
Intake system	T: intake air °C	P: intake vacuum mbar	Δ P: gas mixer mbar	Throttle valve position %
Turbocharging	Δ P: mixture cooler mbar	P: charge air upstream of TV mbar	T: mixture downstream of cooler °C	T: exhaust gas upstream of ETC bank A/B °C
Exhaust system	T: exhaust gas upstream of ETC bank A/B °C	P: exhaust gas back pressure, bank A/B mbar	T: exhaust gas up/downstream of catalytic converter °C	T: exhaust gas up/downstream of exhaust heat exchanger °C
Lubrication	Measuring point, engine oil T	T: engine oil °C	P: engine oil bar	P: crank chamber mbar
Cooling circuit	T: CL engine inlet °C	T: CL engine outlet °C	P: CL engine operating temperature bar	CL circulation quantity, engine l/min
	T: CL inflow LT mixture cooler °C	T: CL outflow LT mixture cooler °C	P: CL LT mixture cooler operating temperature bar	CL circulation quantity, LT mixture cooler l/min

Place:	Date:	Customer's signature	Maintenance personnel signature
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	<h2 style="margin: 0;">Maintenance Record</h2>	<h2 style="margin: 0;">E3</h2> <p style="margin: 0;">Page 3 of 3</p>
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Type of system	System operating hours	Engine operating hours	Operating hours since last check
Engine type	Engine number	Plant number	Valve clearance Compression pressure

Valve clearance on "cold" engine (engine temp. <50 °C)												
cylinder	1	2	3	4	5	6	7	8	9	10	11	12
Inlet actual measurement												
Outlet actual measurement												
cylinder	1	2	3	4	5	6	7	8	9	10	11	12
Inlet adjusted value												
Outlet adjusted value												

Compression pressures		
Measurement conditions	Target	Actual
Engine temperature	>50 °C	
Starter speed	>140 rpm	

Throttle valve must be open when measuring compression pressure Check air filter and exhaust system before measuring

cylinder	1	2	3	4	5	6	7	8	9	10	11	12
Compression pressure before inspection												
Compression pressure after inspection												

Comment:

Place:	Date:	Customer's signature	Maintenance personnel signature
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Notes on Maintenance Record E3

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