Maintenance Record

MAN Industrial Gas Engines

51.99597-8072
Version 02

Translation of the Original Maintenance Record

Imprint

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Editorial Department: 2W Technische Informations GmbH & Co. KG / Version: 07/2014

51.99597-8072

Content

Dear customer,

Congratulations on deciding to purchase an MAN gas engine! These engines are characterised 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 authorised 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
Δ P	Pressure differential
° bef. TDC	Degrees crank angle before top dead centre

General details

The General Details form must be completed by the authorised 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 authorised MAN Truck & Bus AG workshop or by the unit 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 inspection record from the unit manufacturer and the MAN gas engine start-up log will then be passed on to the authorised MAN Truck & Bus AG workshop.

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

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

Service products	Engine oil type	Engine oil change interval	Antifreeze / corrosion inhibitor type	Concentration **%**

Fuel	Type of gas	Methane content CH4 **%**	Sulphur / hydrogen sulphide **ppm**	Lower calorific value, Hu **kWh/Nm^3**

Place:	Date:	Customer's signature	Maintenance personnel signature

	Start-up measurement sheet	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

Return to service after Revision R2

	Return to service after Revision R2	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

Service products	Engine oil type	Engine oil change interval	Antifreeze / corrosion inhibitor type	Concentration **%**

Fuel	Type of gas	Methane content CH4 **%**	Sulphur / hydrogen sulphide **ppm**	Lower calorific value, Hu **kWh/Nm^3**

Place:	Date:	Customer's signature	Maintenance personnel signature

	Return to service after Revision R2	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

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

Service products	Engine oil type	Engine oil change interval	Antifreeze / corrosion inhibitor type	Concentration **%**

Fuel	Type of gas	Methane content CH4 **%**	Sulphur / hydrogen sulphide **ppm**	Lower calorific value, Hu **kWh/Nm^3**

Place:	Date:	Customer's signature	Maintenance personnel signature

	Return to service after Revision R3	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**
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	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

	Return to service after temporary withdrawal	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

Service products	Engine oil type	Engine oil change interval	Antifreeze / corrosion inhibitor type	Concentration **%**

Fuel	Type of gas	Methane content CH4 **%**	Sulphur / hydrogen sulphide **ppm**	Lower calorific value, Hu **kWh/Nm^3**

Place:	Date:	Customer's signature	Maintenance personnel signature

	Return to service after temporary withdrawal	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
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	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

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 CH4 **%**	Sulphur / hydrogen sulphide **ppm**	Lower calorific value, Hu **kWh/Nm^3**

Place:	Date:	Customer's signature	Maintenance personnel signature

	Return to service after change of customer/location	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**
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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**
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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 authorised 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 authorised 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 authorised workshop or the unit manufacturer and forwarded to MAN Truck & Bus AG as part of the start-up process.

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. aluminium 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 authorised 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

Notes

Maintenance schedules and maintenance records

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

	After start-up and R1-R2	All	All	up to	up to	up to
Interval after operating hours at 1500 rpm	20-50	800	1,600	10,000	30,000	60,000
Interval after operating hours at 1800 rpm	20-50	600	1,200	10,000	20,000	40,000
Service interval	**E1**	**E2**	**E3**	**R1***)**	**R2***)**	**R3***)**
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			
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, E0836 LE202/LE302 "Special gas"

	After start-up and R1-R2	All	All	up to	up to	up to
Interval after operating hours at 1500 rpm	20-50	300	1,500	10,000	30,000	60,000
Interval after operating hours at 1800 rpm	20-50	300	1,200	10,000	20,000	40,000
Service interval	**E1**	**E2**	**E3**	**R1***)**	**R2***)**	**R3***)**
Carry out a leak test	X	X				
Check bolt connections	X	X				
Change engine oil*)	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			
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 E0834 E302/312, E0836 E302/312 "Natural gas"

	After start-up and R1-R2	All	All	up to	up to	up to
Interval after operating hours at 1500 rpm	20-50	800	2,400	15,000	30,000	60,000
Interval after operating hours at 1800 rpm	20-50	600	1,800	12,000	20,000	40,000
Service interval	**E1**	**E2**	**E3**	**R1***)**	**R2***)**	**R3***)**
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			
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 E2876 E312, E2842 E312, E2676 E302, E3262 E302 "Natural gas"

	After start-up and R1-R2	All	All	up to	up to	up to
Interval after operating hours at 1500 rpm	20-50	800**)	2,400	15,000	25,000	50,000
Interval after operating hours at 1800 rpm	20-50	600**)	1,800	12,000	20,000	40,000
Service interval	**E1**	**E2**	**E3**	**R1***)**	**R2***)**	**R3***)**
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			
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 E2876 TE302 "Special gas"

	After start-up and R1-R2	All	All	up to	up to	up to
Interval after operating hours at 1500 rpm	20-50	300**)	1,500	15,000	30,000	60,000
Interval after operating hours at 1800 rpm	20-50	300**)	1,200	12,000	20,000	40,000
Service interval	**E1**	**E2**	**E3**	**R1***)**	**R2***)**	**R3***)**
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			
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	up to	up to	up to
Interval after operating hours at 1500 rpm	20-50	800**)	1,600	15,000	25,000	50,000
Interval after operating hours at 1800 rpm	20-50	600**)	1,200	12,000	20,000	40,000
Service interval	**E1**	**E2**	**E3**	**R1***)**	**R2***)**	**R3***)**
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			
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	up to	up to	up to
Interval after operating hours at 1500 rpm	20-50	300**)	1,500	15,000	30,000	60,000
Interval after operating hours at 1800 rpm	20-50	300**)	1,200	12,000	20,000	40,000
Service interval	**E1**	**E2**	**E3**	**R1***)**	**R2***)**	**R3***)**
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			
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	up to	up to	up to
Interval after operating hours at 1500 rpm	20-50	300**)	1,500	15,000	25,000	30,000
Service interval	**E1**	**E2**	**E3**	**R1***)**	**R2***)**	**R3***)**
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			
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	up to	up to	up to
Interval after operating hours at 1500 rpm	20-50	800**)	1,600	15,000	25,000	50,000
Interval after operating hours at 1800 rpm	20-50	600**)	1,200	12,000	20,000	40,000
Service interval	**E1**	**E2**	**E3**	**R1***)**	**R2***)**	**R3***)**
Check flexible steel lines	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			
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	up to	up to	up to
Interval after operating hours at 1500 rpm	20-50	300**)	1,500	15,000	30,000	60,000
Interval after operating hours at 1800 rpm	20-50	300**)	1,200	12,000	20,000	40,000
Service interval	**E1**	**E2**	**E3**	**R1***)**	**R2***)**	**R3***)**
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		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			
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	up to	up to	up to
Interval after operating hours at 1500 rpm	20-50	800**)	1,600	15,000	25,000	50,000
Interval after operating hours at 1800 rpm	20-50	600**)	1,200	12,000	20,000	40,000
Service interval	**E1**	**E2**	**E3**	**R1***)**	**R2***)**	**R3***)**
Check flexible steel lines	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			
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 exhaust pipe				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	up to	up to	up to
Interval after operating hours at 1500 rpm	20-50	300**)	1,500	15,000	30,000	60,000
Interval after operating hours at 1800 rpm	20-50	300**)	1,200	12,000	20,000	40,000
Service interval	**E1**	**E2**	**E3**	**R1***)**	**R2***)**	**R3***)**
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			
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 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	up to	up to	up to
Interval after operating hours at 1500 rpm	20-50	800	1,600	15,000	25,000	50,000
Interval after operating hours at 1800 rpm	20-50	600	1,200	15,000	20,000	40,000
Service interval	**E1**	**E2**	**E3**	**R1***)**	**R2***)**	**R3***)**
Check flexible steel lines	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			
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 E2676 LE202/LE212 "Special gas"

	After start-up and R1-R2	All	All	up to	up to	up to
Interval after operating hours at 1500 rpm	20-50	300	1,500	15,000	25,000	30,000
Interval after operating hours at 1800 rpm	20-50	300	1,200	12,000	20,000	40,000
Service interval	**E1**	**E2**	**E3**	**R1***)**	**R2***)**	**R3***)**
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			
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 E3268 LE212, E3262 LE202/LE232 "Natural gas"

	After start-up and R1-R2	All	All	up to	up to	up to
Interval after operating hours at 1500 rpm	20-50	800	1,600	15,000	25,000	50,000
Interval after operating hours at 1800 rpm	20-50	600	1,200	15,000	20,000	40,000
Service interval	**E1**	**E2**	**E3**	**R1***)**	**R2***)**	**R3***)**
Check flexible steel lines	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			
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 E3268 LE222/LE232, E3262 LE212/LE242 "Special gas"

	After start-up and R1-R2	All	All	up to	up to	up to
Interval after operating hours at 1500 rpm	20-50	300	1,500	15,000	20,000	30,000
Interval after operating hours at 1800 rpm	20-50	300	1,200	12,000	20,000	40,000
Service interval	**E1**	**E2**	**E3**	**R1***)**	**R2***)**	**R3***)**
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			
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 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

Information on service intervals

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

*) Engine oil change times should be calculated based on routine oil analyses subject to operating conditions and the engine oil used in accordance with MAN works standard M37271-2 for natural gas and M3271-4 for special gas.
**) 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

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	Oil change
Max. 400 operating hours	Max. 800 operating hours	Oil change with oil analysis as check
Gradual increase in oil change times possible with oil analysis (in stages up to max. 100 operating hours)*)		

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
Gradual increase in oil change times possible with oil analysis (in stages up to max. 100 operating hours)*)		

*) Only in consultation with MAN Truck & Bus AG, Customer Services department at the Nuremberg plant.

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

Notes

Maintenance record E2

	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 sulphide **ppm**	Lower calorific value, Hu **kWh/Nm^3**

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

	Maintenance record	**E2** Page 1 of 2

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Appendix	Type of system	System operating hours **OH**		System construction year	Electrical power rating **KWh_{el}**
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Place:	Date:	Customer's signature	Maintenance personnel signature

	Maintenance record	**E2** Page 2 of 2

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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**
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	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
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Service products	Engine oil type	Engine oil change interval	Antifreeze / corrosion inhibitor type	Concentration **%**

Fuel	Type of gas	Methane content CH4 **%**	Sulphur / hydrogen sulphide **ppm**	Lower calorific value, Hu **kWh/Nm^3**

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**
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	Maintenance record	**E2** Page 1 of 2

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Appendix	Type of system	System operating hours **OH**		System construction year	Electrical power rating **KWh_{el}**
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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 **%**
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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**
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Operating data of engine at 50% rated power				
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Intake system	T: intake air **°C**	P: intake vacuum **mbar**	Δ P: gas mixer **mbar**	Throttle valve position **%**
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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**
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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**
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Fuel	Type of gas	Methane content CH4 **%**	Sulphur / hydrogen sulphide **ppm**	Lower calorific value, Hu **kWh/Nm^3**

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

	Maintenance record	**E2** Page 1 of 2

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	Maintenance record	**E2** Page 2 of 2

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Operating data of engine at 50% rated power				
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	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}**
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Installation conditions	Installation height **m**	Air pressure **mbar**	Air humidity **%**	Outside temperature **°C**	Unit compartment temperature **°C**

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Fuel	Type of gas	Methane content CH4 **%**	Sulphur / hydrogen sulphide **ppm**	Lower calorific value, Hu **kWh/Nm^3**

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**

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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 sulphide **ppm**	Lower calorific value, Hu **kWh/Nm^3**

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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 sulphide **ppm**	Lower calorific value, Hu **kWh/Nm^3**

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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 sulphide **ppm**	Lower calorific value, Hu **kWh/Nm^3**

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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 sulphide **ppm**	Lower calorific value, Hu **kWh/Nm^3**

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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 sulphide **ppm**	Lower calorific value, Hu **kWh/Nm^3**

Comment:

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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 sulphide **ppm**	Lower calorific value, Hu **kWh/Nm^3**

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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 sulphide **ppm**	Lower calorific value, Hu **kWh/Nm^3**

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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

	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 sulphide **ppm**	Lower calorific value, Hu **kWh/Nm^3**

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

Maintenance Record E3

	Maintenance Record	E3 Page 1 of 3

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 sulphide **ppm**	Lower calorific value, Hu **kWh/Nm^3**

Comment:

Place:	Date:	Customer's signature	Maintenance personnel signature

	Maintenance record	**E3** Page 2 of 3

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	**E3** Page 3 of 3

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

Notes on Maintenance Record E3

	Maintenance record	**E3** Page 1 of 3

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 sulphide **ppm**	Lower calorific value, Hu **kWh/Nm^3**

Comment:

Place:	Date:	Customer's signature	Maintenance personnel signature

	Maintenance record	**E3** Page 2 of 3

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

Notes on Maintenance Record E3

Maintenance Record	E3

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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 sulphide **ppm**	Lower calorific value, Hu **kWh/Nm^3**

Comment:

Place:	Date:	Customer's signature	Maintenance personnel signature

	Maintenance record	**E3** Page 2 of 3

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	E3 Page 3 of 3

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

Notes on Maintenance Record E3

	Maintenance record	**E3** Page 1 of 3

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 sulphide **ppm**	Lower calorific value, Hu **kWh/Nm^3**

Comment:

Place:	Date:	Customer's signature	Maintenance personnel signature

	Maintenance record	**E3** Page 2 of 3

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	E3 Page 3 of 3

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

Notes on Maintenance Record E3

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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 sulphide **ppm**	Lower calorific value, Hu **kWh/Nm^3**

Comment:

Place:	Date:	Customer's signature	Maintenance personnel signature

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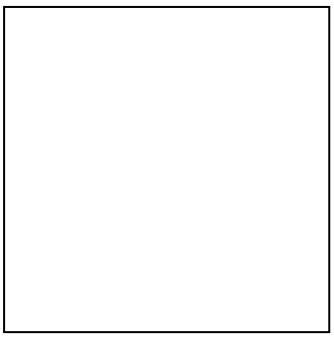
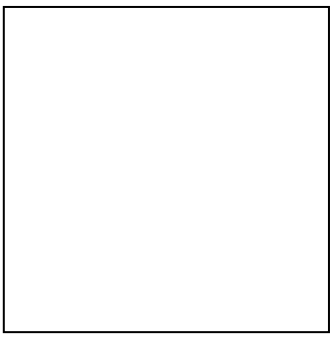
Type of system	System operating hours	Engine operating hours	Operating hours since last check
Engine type	Engine number	Plant number	Valve clearance Compression pressure

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

Notes on Maintenance Record E3

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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 sulphide **ppm**	Lower calorific value, Hu **kWh/Nm^3**

Comment:

Place:	Date:	Customer's signature	Maintenance personnel signature

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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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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

Notes on Maintenance Record E3

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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 sulphide **ppm**	Lower calorific value, Hu **kWh/Nm^3**

Comment:

Place:	Date:	Customer's signature	Maintenance personnel signature

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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

Notes on Maintenance Record E3

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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 sulphide **ppm**	Lower calorific value, Hu **kWh/Nm^3**

Comment:

Place:	Date:	Customer's signature	Maintenance personnel signature

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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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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 sulphide **ppm**	Lower calorific value, Hu **kWh/Nm^3**

Comment:

Place:	Date:	Customer's signature	Maintenance personnel signature

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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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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 sulphide **ppm**	Lower calorific value, Hu **kWh/Nm^3**

Comment:

Place:	Date:	Customer's signature	Maintenance personnel signature

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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

Maintenance Record

E3

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

Notes on Maintenance Record E3

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