# Technical datasheet of CHP unit

# KE-MNG 100-AE

| 400 V / 50 Hz | Natural gas | |
|---|---|---|
| Electrical power | kW | 105 |
| Total thermal output | kW | 143 |
| Energy input | kW | 284 |
| Fuel consumption | $m_N^3/h$ | 30,1 |
| Electrical efficiency | % | 37,0 |
| Thermal efficiency with LT | % | 54,1 |
| Thermal efficiency without LT | % | 50,5 |
| **Overall efficiency with LT** | **%** | **91,1** |

## *Engine: MAN Type: E0836 LE302*

| | | |
|---|---|---|
| No. of cylinders / configuration | - | 6 in line |
| Engine speed | $min^{-1}$ | 1500 |
| Bore / stroke / displacement | mm / mm / $dm^3$ | 108/125/6,87 |
| Compression ratio | - | 11 |
| Engine power max. | kW | 110 |
| Spark plugs type | - | M14 |
| Lube oil consumption max. | kg/h | 0,065 |
| Lube oil filling quantity max. | $dm^3$ | 34 |

## *Alternator: Leroy-Somer Type: LSA 44.3 L10*

| | | |
|---|---|---|
| Voltage / frequency | V/Hz | 400/50 |
| PF (leading / lagging) | - | 0,9 / 0,8 |
| Alternator efficiency at rated power | % | 95,4 |
| Max. ambient temperature | °C | 40 |

## *Energy balance*

| | | | | | | **CHP unit performance parameters at rated load** |
|---|---|---|---|---|---|---|
| Load | % | **100** | **75** | **50** | **100** |
| ISO standard engine power | kW | 110 | 83 | 55 | **110** |
| Electrical power | kW | 105 | 79 | 52 | **105** |
| Engine cooling thermal output | kW | 87 | 71 | 55 | **87** |
| Exhaust gas thermal output (120 °C) | kW | 53 | 42 | 30 | **53** |
| Thermal output mixture cooling - HT | kW | 3 | 0 | 0 | **3** |
| Thermal output mixture cooling - LT | kW | 10 | 7 | 5 | **10** |
| Total thermal output | kW | 143 | 113 | 84 | **143** |
| Radiation heat max. | kW | 3 | 3 | 4 | **3** |
| Energy input 1) | kW | 284 | 220 | 157 | **284** |
| Fuel consumption | $m_N^3/h$ | 30,1 | 23,3 | 16,6 | **30,1** |
| Combustion air mass flow | kg/h | 556 | 426 | 293 | **556** |
| Exhaust gas mass flow, wet | kg/h | 578 | 443 | 305 | **578** |
| Exhaust temperature after turbocharger | °C | 404 | 412 | 416 | **404** |
| Alternator efficiency at PF=1 | % | 95,4 | 95,2 | 94 | **95,4** |
| Electrical efficiency 1) | % | 37,0 | 35,9 | 32,9 | **37,0** |
| Thermal efficiency | % | 50,5 | 51,5 | 53,6 | **50,5** |
| **Overall efficiency without LT** | **%** | **87,5** | **87,4** | **86,5** | **87,5** |

*1) According to ISO 3046.*

## *Fuel: Natural gas*

| | | |
|---|---|---|
| Min. methane number | - | 80 |
| Lower calorific value | $MJ/m_N^3$ | 34 |
| Gas pressure at gas regulation line inlet 1) | kPa | 1,5÷10 |
| Max. gas temperature | °C | 30 |

*1) The gas regulation line for MAN engines is standardly dimensioned at 4 ÷ 5 kPa.*

## *Heating water circuit*

| | | |
|---|---|---|
| Thermal output | kW | 143 |
| Temperature gradient | °C / °C | 90 / 70 |
| Min. cooling medium volume flow | $m^3/h$ | 6,33 |
| Pressure loss of heating circuit 1) | kPa | 12 |
| Heat transfer medium | - | Treated water |
| Max. operating pressure | bar | 6 |

*1) Pressure loss of all heating water circuit components at GENTEC CHP scope of supply.*

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## *LT mixture cooling circuit*

| | | |
|---|---|---|
| Thermal output | kW | 10 |
| Temperature gradient | °C / °C | 44 / 40 |
| Cooling medium volume flow | $m^3/h$ | 2,41 |
| Max. allowable pressure loss 1) | kPa | 20 |
| Heat transfer medium - ethylene glycol/water | $\%_{vol.}/\%_{vol.}$ | 40/60 |
| Max. operating pressure | bar | 3 |
| Dry cooler acoustic sound pressure level 2) | dB(A) at 10 m | 65 |
| Max. ambient temperature | °C | 35 |

*1) Pipework between CHP unit and dry cooler.*

*2) The value of the sound pressure level is considered in free field.*

## *Emergency cooler*

| | | |
|---|---|---|
| Thermal output | kW | 143 |
| Heat transfer medium - ethylene glycol/water | $\%_{vol.}/\%_{vol.}$ | 40/60 |
| Max. allowable pressure loss 1) | kPa | 15 |
| Dry cooler acoustic sound pressure level 2) | dB(A) at 10 m | 65 |
| Max. ambient temperature | °C | 35 |

*1) Pipework between CHP unit and dry cooler.*

*2) The value of the sound pressure level is considered in free field*

## *Ventilation and combustion air*

| | | |
|---|---|---|
| Fan air volume flow 1) | $m^3/h$ | 2100 |
| Max. allowable pressure loss of air duct 2) | Pa | 50 |
| Max. inlet air temperature | °C | 35 |

*1) At temperature 35 °C and pressure 101,3 kPa.*

*2) Air ducts between CHP unit and air inlet/air outlet.*

## *Exhaust gas system*

| | | |
|---|---|---|
| Exhaust gas mass flow, wet | kg/h | 578 |
| Exhaust gas temperature at CHP unit outlet | °C | 120 |
| Max. allowable pressure loss 1) | mbar | 6 |
| Silencer flanges 2) | - | DN125-PN10 |
| Max. allowed exhaust gas velocity donstream silencer | m/s | 40 |

*1) Exhaust gas pipe between CHP unit and outlet excluding components at GENTEC CHP scope of supply.*

*2) According to EN 1092-1.*

## *Emissions with SCR used*

| | | |
|---|---|---|
| CO | $mg/m_N^3$ @ 5 % $O_2$ | <150 |
| $NO_x$ | $mg/m_N^3$ @ 5 % $O_2$ | <50 |

## *Noise level*

| | | |
|---|---|---|
| CHP unit design without canopy | dB(A) at 1 m | 83,1 |
| CHP unit design with canopy | dB(A) at 1 m | 74 |
| Exhaust gas system | dB(A) at 1 m | 80 |
| Input/Output air ventilation | dB(A) at 1 m | 80/80 |

*All values of the sound pressure level is considered in free field.*

## *Dimensions and weight*

| | | |
|---|---|---|
| Canopy dimensions L/W/H | mm | 3535/1308/1805 |
| Dry weight of CHP unit design with canopy | kg | 3800 |

# Technical datasheet of CHP unit

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## *Standard conditions and tolerances*

| | | |
|---|---|---|
| Atmospheric pressure | kPa | 100 |
| Air temperature | °C | 25 |
| Relative air humidity | % | 30 |
| Tolerance for the electrical power | % | ±3 |
| Tolerance for the usable thermal output | % | ±7 |
| Tolerance for the specific fuel consumption | % | +5 |

*The energy balance parameters listed in this data sheet are related to the standard conditions.*

*Detailed technical specifications of components on demand.*

*Change of technical parameters and printing errors reserved.*

*All values in the data sheet related to Normal conditions assume T = 273,15 K; p = 101,325 kPa*

## *Minimum requirements for gas quality*

| **Parameter** | **Unit** | **Limit value** | **Unit** | **Comment** |
|---|---|---|---|---|
| Methane number[1)] | MN | > 80 | - | Consult GENTEC CHP in case of lower methane numbers |
| Lower calorific value | $H_u$ | > 5 | $kWh/m_N^3$ | |
| Chlorine concentration* | Cl | < 80 | $mg/m_N^3$ | Chlorine exists as a volatile compound |
| Fluorine concentration* | F | < 40 | $mg/m_N^3$ | Fluorine exists as a volatile compound |
| Total Chlorine - Fluorine content* | Σ(Cl, F) | < 80 | $mg/m_N^3$ | |
| Dust content < 5 µm* | | < 10 | $mg/m_N^3$ | |
| Oil vapour* | | < 400 | $mg/m_N^3$ | Condensation must not occur in the mixture section |
| Volatile organic compounds* | VOC | < 25 | $mg/m_N^3$ | Without saturated hydrocarbon compounds |
| Silicion content[2)]* | Si | < 2 | $mg/m_N^3$ | In the case of high concentrations, please consult GENTEC CHP |
| Total sulphur content* | S | < 200 | $mg/m_N^3$ | Hydrogen sulfide is included in the total sulfur content |
| Hydrogen sulphide content[3)]* | $H_2S$ | < 150 | ppm | Consult GENTEC CHP in case of higher concentrations |
| | | < 228 | $mg/m_N^3$ | |
| Ammonia content* | $NH_3$ | < 40 | ppm | |
| | | < 30 | $mg/m_N^3$ | |
| Relative humidity | φ | < 60 | % | Condensation must not occur in the mixture section |
| Temperature of the gas mixture after the gas mixer | $T_G$ | 10 ÷ 30 | °C | |
| Hydrogen[4)]* | $H_2$ | < 2 | $\%_{vol.}$ | |

** If these components are also part of the intake air, they need to be allocated to the fuel gas as components. The limit values mentioned above yield a limit value for the total of components contained from intake air and fuel gas.*

*1) For all fuel gases, except natural gas, please contact GENTEC CHP*

*2) The engine oil may contain silicon due to additives (defoamers) being added. However, silicon may also have been diffused into the engine oil in form of dust due to insufficient air filtering or gas filtering. Therefore, the concentration of silicone in the gas shall always be evaluated together with the oil analyses. Depending on the occurrence in organic or inorganic form, high concentrations of silicone in the engine oil can result in increased component wear. The contents of wear elements such as iron, chromium and aluminum shall also be included in the evaluation in case of increased silicon content in the engine oil.*

*3) If catalyst is used, maximum allowed hydrogen sulphide is < 3 ppm (5 mg/ $m_N$ 3)*

*4) In case of higher hydrogen content, contact GENTEC CHP s.r.o.*

| **Release date** | **Created** | **Revision** | **Project / Offer** |
|---|---|---|---|
| 24.07.2024 | MO | 1 | |