

Calculation of CO₂ emission factors from proportional composition of city gas

In the case of 13A city gas

Calorific value: 45 MJ/m³N

| | Proportional composition (%) | CO ₂ emission factor | | |
|--------------------------------|------------------------------|--------------------------------------|-----------------------|--------|
| | | kg-CO ₂ /m ³ N | t-CO ₂ /GJ | t-C/GJ |
| CH ₄ | 89.6 | 1.76 | 0.0391 | 0.0107 |
| C ₂ H ₆ | 5.6 | 0.22 | 0.0049 | 0.0013 |
| C ₃ H ₈ | 3.4 | 0.20 | 0.0045 | 0.0012 |
| C ₄ H ₁₀ | 1.4 | 0.11 | 0.0024 | 0.0007 |
| Total | 100.0 | 2.29 | 0.0509 | 0.0139 |

$$= \sum (\% \text{ composition} \times \text{C number} \times \text{CO}_2 \text{ molecular weight} / 22.4)$$

Example: CO₂ (kg) per 1m³ of C₂H₆ at standard conditions (0°C, 101.325 kPa (1atm))
 $= 0.056 \times 2 \times \frac{44}{22.4}$
 $= 0.22$

Low pressure (15°C, 2 kPa gauge pressure) CO₂ emission factor (kg-CO₂/m³N)

$$2.29 \times \underbrace{\frac{273.15}{273.15+15}}_{\text{Temperature correction}} \times \underbrace{\left(1 + 2 \times \frac{9.869}{1000}\right)}_{\text{Pressure correction}}$$

$$= 2.29 \times 0.967$$

$$= 2.21$$

Medium pressure (15°C, 100 mmH₂O gauge pressure) CO₂ emission factor (kg-CO₂/m³N)

$$= 2.29 \times \underbrace{\frac{273.15}{273.15+15}}_{\text{Temperature correction}} \times \underbrace{\left(1 + 100 \times \frac{0.9678}{10000}\right)}_{\text{Pressure correction}}$$

$$= 2.29 \times 0.957$$

$$= 2.19$$

Although the CO₂ emission factor of city gas is set at 0.0136 t-C/GJ in the Act on Promotion of Global Warming Countermeasures, the Act states that “the emission factor may also be found by actual measurement or by calculation using a method such as actual measurement.”
 When notifying local authorities, please use the factor specified by the authority concerned.