

**Wobbe - Index**

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Projekt Orbit | Dr. W. Bidlingmaier | Bauhaus Universität Weimar | [www.orbit-online.net](http://www.orbit-online.net)**Wobbe - Index:**

The **Wobbe - Index** (WI) or **Wobbe number** is an indicator of the interchangeability of fuel gases such as natural gas, liquefied petroleum gas (LPG), and town gas and is frequently defined in the specifications of gas supply and transport utilities. The Wobbe - Index was defined 1927 by the engineer Goffredo Wobbe. It allows the compatibility of different fuels.

The Wobbe Index is used to compare the combustion energy output of different composition fuel gases in an appliance (fire, cooker etc.). If two fuels have identical Wobbe Indices then for given pressure and valve settings the energy output will also be identical. Typically variations of up to 5% are allowed as these would not be noticeable to the consumer.

The Wobbe-Index is the quotient of the square root of the relation density fuel / air and the upper calorific value.

To measure the Wobbe -Index a test gas is burned under standardized conditions. Hereby a gas mantle is heated and the temperature is measured. In comparison to a calibration gas the Wobbe-Index for a gas can be determined.

**Unit:**

$\text{kWh/Nm}^3 = 3,6 \text{ MJ/Nm}^3 = 3,6 \cdot 10^6 \text{ J/Nm}^3$  ( $1 \text{ Nm}^3 = 1 \text{ m}^3$  under normal pressure: 1.013,25 mbar, 0 °C)

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**Calculation:**

The Wobbe Index,  $W$ , is defined as:

$$W_o = \frac{H_o}{\sqrt{\frac{\rho_G}{\rho_L}}} \quad (\text{bzw. } W_u = \frac{H_u}{\sqrt{\frac{\rho_G}{\rho_L}}})$$

or

$$W_{on} = \frac{H_{on}}{\sqrt{d}} \quad \text{bzw} \quad W_{un} = \frac{H_{un}}{\sqrt{d}}$$

- $W_{o,n}$             upper Wobbe-Index
- $W_{u,n}$             lower Wobbe-Index
- $H_{o,n}$             upper calorific value
- $H_{u,n}$             lower calorific value
- $\rho_L$               density air
- $\rho_G$               density fuel
- $d$                  rel. Density of the gas (in relation to the density of air)

**Examples**

Gas	Upper calorific value (kJ/Nm³)	Lowe calorific value (kJ/Nm³)	Wobbe - Index (kJ/Nm³)
Converter Gas	4,080	3,975	4.,00
City Gas	18,000	16,120	26,540
Natural Gas	35,200	31,800	46,540
Propane	100,890	92,890	81,180
Methane	12,735	11,452	53,210
Bio methane (96% CH <sub>4</sub> )			51,030
Bio gas (65% CH <sub>4</sub> )			28,440