# Wobbe Index and Gas Interchangeability

Wobbe index of two fuel gases from their gross calorific value and relative density, and the change in burner heat input when one replaces the other.

**Method:** Wobbe index definition W = HHV / √d

## Input parameters

Unit system: SI

| Parameter | Value | Unit |
|---|---|---|
| Gross calorific value, gas now | 39.000 | MJ/Nm³ |
| Relative density (air = 1), gas now | 0.60000 | |
| Gross calorific value, new gas | 41.500 | MJ/Nm³ |
| Relative density (air = 1), new gas | 0.63000 | |

## Calculated results

| Parameter | Value | Unit |
|---|---|---|
| Wobbe index, gas now | 50.349 | MJ/Nm³ |
| Wobbe index, new gas | 52.285 | MJ/Nm³ |
| Heat input ratio at the same burner pressure | 1.0385 | |
| Change in Wobbe index | 3.8458 | % |

## Formula and method

$$W = \frac{H}{\sqrt{d}} \qquad \frac{W_2}{W_1} = \frac{\dot{Q}_2}{\dot{Q}_1}\ \text{(same orifice and pressure)} \qquad \Delta W = \frac{W_2}{W_1} - 1$$

### Variables

| | | |
|---|---|---|
| $H_1\$, \$H_2$ | gross calorific value, gas now and new gas | J/m³ |
| $d_1\$, \$d_2$ | relative density (air = 1) | – |
| $W_1$ | Wobbe index, gas now | J/m³ |
| $W_2$ | Wobbe index, new gas | J/m³ |
| $W_2/W_1$ | heat input ratio | – |
| $\Delta W$ | change in Wobbe index | – |
| $W\$, \$H\$, \$d$ | Wobbe index, calorific value, relative density in general | J/m³, J/m³, – |
| $\dot{Q}$ | burner heat input | W |

### Method and standards

Definition of the Wobbe index; flow through an orifice at fixed pressure scales with 1/√d, so heat input scales with W.

### Assumptions and limits

- Same burner, orifice and supply pressure and temperature; combustion stability, lift and yellow-tipping indices not covered.
- The 5 % warning is a FireCAD prompt, not a sourced limit: interchangeability limits come from your national gas quality rules and the burner maker.

### References

- Wobbe index definition W = HHV / √d

## Report details

| | |
|---|---|
| Report reference | FCC-QCMA-EBPW (the same inputs always give the same reference) |
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| Calculator | Wobbe Index and Gas Interchangeability |
| Method last reviewed | 11 November 2026 |
| Software release | FireCAD Calc, release of 17 November 2026 |
| Release checks | 3 reference cases of this calculator, computed independently, are checked on every release |

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

### This calculator online

https://calc.firecad.com/boilers-power-plant/combustion/wobbe-index

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.