# Tea Dryer: Water Evaporated and Fuel per kg of Made Tea

Water evaporated, heat and fuel per kg of made tea in a tea dryer, from made tea output, moisture of fermented leaf and made tea, dryer efficiency and fuel.

**Method:** Mass and energy balance of a tea dryer

## Input parameters

Unit system: SI

| Parameter | Value | Unit |
|---|---|---|
| Made tea output | 250.00 | kg/h |
| Moisture of fermented leaf (dhool, wet basis) | 62.000 | % |
| Moisture of made tea (wet basis) | 3.0000 | % |
| Dryer thermal efficiency | 50.000 | % |
| Fuel net calorific value | 15,000 | kJ/kg |
| Air heater efficiency | 70.000 | % |
| Heat per kg of water (latent plus sensible) | 2,600.0 | kJ/kg |

## Calculated results

| Parameter | Value | Unit |
|---|---|---|
| Water evaporated | 388.16 | kg/h |
| Water per kg of made tea | 1.5526 | |
| Heat to the dryer air | 560.67 | kW |
| Fuel use | 192.23 | kg/h |
| Fuel per kg of made tea | 0.76892 | |

### Notes for this case

• Each kg of made tea at about 3 % moisture comes from fermented leaf (dhool) at 60–65 % moisture, so around 1.5–1.7 kg of water is evaporated per kg of made tea. The heat to the dryer air is the evaporation duty over the dryer's thermal efficiency, and the fuel is that heat over the heater efficiency and the fuel's calorific value. Typical figures are 1.5–2.5 kg of firewood or 0.6–1 kg of coal per kg of made tea; higher figures show heat losses, wet fuel or excessive exhaust temperature.

## Formula and method

$$\dot{m}_w = \dot{m}_t(1-w_f)\left(\frac{w_i}{1-w_i}-\frac{w_f}{1-w_f}\right), \quad \dot{m}_{fuel} = \frac{\dot{m}_w \lambda}{\eta_d \eta_h NCV}$$

### Variables

| | | |
|---|---|---|
| $\dot{m}_t$ | Made tea output | kg/s |
| $w_i$ | Moisture of fermented leaf (dhool, wet basis) | - |
| $w_f$ | Moisture of made tea (wet basis) | - |
| $\eta_d$ | Dryer thermal efficiency | - |
| $NCV$ | Fuel net calorific value | J/kg |
| $\eta_h$ | Air heater efficiency | - |
| $\lambda$ | Heat per kg of water (latent plus sensible) | J/kg |
| $\dot{m}_w$ | Water evaporated | kg/s |
| $m_w/m_t$ | Water per kg of made tea | - |
| $\dot{Q}$ | Heat to the dryer air | W |

| | | |
|---|---|---|
| $\dot{m}_{fuel}$ | Fuel use | kg/s |
| $m_{fuel}/m_t$ | Fuel per kg of made tea | - |

### Method and standards

Tea dryer.

### Assumptions and limits

- Steady drying; efficiencies cover all losses.

### References

Mass and energy balance of a tea dryer

## Report details

| | |
|---|---|
| Report reference | FCC-M4P9-0Z6Y (the same inputs always give the same reference) |
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| Method last reviewed | 17 November 2026 |
| Software release | FireCAD Calc, release of 22 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/chemical/drying/tea-dryer-fuel-per-kg

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.