# Stenter Drying: Water Evaporated and Heat

Water evaporated on a stenter from fabric speed, width, dry GSM and moisture in and out, the heat with a specific heat use per kg water, and fuel.

**Method:** Definitions and mass and energy balances

## Input parameters

Unit system: SI

| Parameter | Value | Unit |
|---|---|---|
| Fabric speed | 40.000 | m/min |
| Fabric width | 1.8000 | m |
| Dry fabric mass per m² | 180.00 | g/m² |
| Moisture entering (kg water per kg dry fabric) | 0.65000 | kg/kg |
| Moisture leaving | 0.070000 | kg/kg |
| Heat per kg of water evaporated<br>Fuel heat (on the LHV basis of the fuel value below) per kg of water evaporated. | 4.5000 | MJ/kg |
| Fuel heating value | 46.000 | MJ/kg |

## Calculated results

| Parameter | Value | Unit |
|---|---|---|
| Dry fabric | 777.60 | kg/h |
| Water evaporated | 451.01 | kg/h |
| Heat input | 563.76 | kW |
| Fuel | 44.120 | kg/h |

**Notes for this case**

- Better mangling (lower moisture in) saves far more than burner tuning; exhaust humidity control saves the rest.

## Formula and method

$$\dot{m}_{dry} = vWG, \quad \dot{E} = \dot{m}_{dry}(X_1 - X_2), \quad Q = \dot{E}q, \quad \dot{m}_f = \frac{Q}{LHV}$$

### Variables

| | | |
|---|---|---|
| $v$ | Fabric speed | m/s |
| $W$ | Fabric width | m |
| $G$ | Dry fabric mass per m² | kg/m² |
| $X_1$ | Moisture entering (kg water per kg dry fabric) | kg/kg |
| $X_2$ | Moisture leaving | kg/kg |
| $q$ | Heat per kg of water evaporated | J/kg |
| $LHV$ | Fuel heating value | J/kg |
| $\dot{m}_{dry}$ | Dry fabric | kg/s |
| $\dot{E}$ | Water evaporated | kg/s |
| $Q$ | Heat input | W |
| $\dot{m}_f$ | Fuel | kg/s |

### Method and standards

Water balance with specific heat use.

### Assumptions and limits

- Steady running.
- The heat use per kg of water is on the same (LHV) basis as the fuel heating value.

### References

- Definitions and mass and energy balances

## Report details

| | |
|---|---|
| Report reference | FCC-WEGE-SG9H (the same inputs always give the same reference) |
| Generated | 17 November 2026, 19:50 UTC |
| Calculator | Stenter Drying: Water Evaporated and Heat |
| Method last reviewed | 13 November 2026 |
| Software release | FireCAD Calc, release of 17 November 2026 |
| Release checks | 2 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/textile-rice-oil/stenter-drying-evaporation

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.