# Centrifugal Washing: Sugar Purity and Steam

Purity of washed sugar from the water used (Benz, Hugot eqn 35.44) and the steam a washing nozzle passes (eqn 35.45), per cycle and per hour.

**Method:** Hugot; Handbook of Cane Sugar Engineering; ...

## Input parameters

Unit system: SI

| Parameter | Value | Unit |
|---|---|---|
| Purity of the sugar unwashed | 97.000 | % |
| Wash water % massecuite<br>Per cent of the massecuite, as Benz's formula uses it. Hugot quotes modern washing as 2–5 % on sugar (Deerr up to 10 %): multiply a figure on sugar by the sugar share of the massecuite first. | 2.0000 | % |
| Steam pressure at the nozzle (gauge) | 3.0000 | kg/cm² g |
| Nozzle area | 1.0000 | cm² |
| Steaming time per cycle | 20.000 | s |
| Cycles per hour | 20.000 | |

## Calculated results

| Parameter | Value | Unit |
|---|---|---|
| Purity of the washed sugar | 99.000 | % |
| Steam per cycle | 1.0000 | kg |
| Steam per hour | 20.000 | kg/h |

**Notes for this case**

- Hugot's nozzle rule: steam in kg/min per cm² of nozzle roughly equals the steam pressure in kg/cm².

## Formula and method

$$P' = 100 - \frac{100 - P}{1 + W}\ [\%], \quad q\ [\mathrm{kg/(min\,cm^2)}] \approx p\ [\mathrm{kg/cm^2}]$$

### Variables

| | | |
|---|---|---|
| $P$ | Purity of the sugar unwashed | - |
| $W$ | Wash water % massecuite | - |
| $p$ | Steam pressure at the nozzle (gauge) | Pa |
| $a$ | Nozzle area | m² |
| $t_s$ | Steaming time per cycle | s |
| $N$ | Cycles per hour | - |
| $P'$ | Purity of the washed sugar | - |
| $m_s$ | Steam per cycle | kg |
| $\dot{m}_s$ | Steam per hour | kg/s |

### Method and standards

Benz's correlation and Hugot's nozzle rule.

### Assumptions and limits

- Empirical correlations; no validity range is given for Benz's formula. The first per cent of water already halves the impurity, so treat results at very low or high washing (above about 5 %) as indicative.
- W is per cent of massecuite; a wash figure on sugar must be converted first.

### References


- Hugot
- Handbook of Cane Sugar Engineering
- 3rd ed. (Elsevier, 1986)
- ch. 35
- washing
- eqns 35.44–35.45
- pp. 790–792


## Report details

| | |
|---|---|
| Report reference | FCC-0AQZ-7G7D (the same inputs always give the same reference) |
| Generated | 17 November 2026, 19:50 UTC |
| Calculator | Centrifugal Washing: Sugar Purity and Steam |
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| 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/sugar-ethanol/centrifugals-sugar-house/centrifugal-wash-purity

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.