# Sugar Factory Water Requirements (Hugot)

Water a raw sugar factory needs per hour by use from the crush (Hugot, p. 891) and the condenser cold water from vapour and temperatures (40.27–40.30).

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

## Input parameters

Unit system: SI

| Parameter | Value | Unit |
|---|---|---|
| Crushing rate | 100.00 | t/h |
| Imbibition water per tonne cane | 0.30000 | m³/t |
| Vapour to the condensers per tonne cane | 300.00 | kg/t |
| Vapour temperature | 54.000 | °C |
| Cold water temperature | 21.000 | °C |
| Margin on condenser water<br>Hugot: 30Q for central condensers, 60Q for individual ones (×1.5 and ×3 of the theoretical 20Q). | 1.5000 | |

## Calculated results

| Parameter | Value | Unit |
|---|---|---|
| Process water (bearings, filters, cooling, centrifugals, boilers) | 97.000 | m³/h |
| Imbibition water | 30.000 | m³/h |
| Water per kg vapour 650/(t_v − t₁) | 19.697 | |
| Condenser cold water | 886.36 | m³/h |
| Condenser water per tonne cane | 8.8636 | m³/t |

**Notes for this case**

- Hugot's process coefficients per t cane/h: boilers 0.05, bearings 0.20, filters 0.04, A cooling 0.20, B 0.09, C 0.06, movement water 0.02, sugar coolers 0.30, centrifugals 0.01 m³/h (0.97 in all), plus imbibition.

## Formula and method

$$\dot{V}_p = 0.97A, \quad W = \frac{650}{t_v - t_1}, \quad \dot{V}_c = k\,W\,Q\,A$$

### Variables

| | | |
|---|---|---|
| $A$ | Crushing rate | kg/s |
| $w$ | Imbibition water per tonne cane | m³/kg |
| $Q$ | Vapour to the condensers per tonne cane | kg/kg |
| $t_v$ | Vapour temperature | K |
| $t_1$ | Cold water temperature | K |
| $k$ | Margin on condenser water | - |
| $\dot{V}_p$ | Process water (bearings, filters, cooling, centrifugals, boilers) | m³/s |
| $\dot{V}_i$ | Imbibition water | m³/s |
| $W$ | Water per kg vapour 650/(t_v − t₁) | - |
| $\dot{V}_c$ | Condenser cold water | m³/s |
| $\dot{V}_c/A$ | Condenser water per tonne cane | m³/kg |

### Method and standards

Hugot's coefficients and condenser balance.

### Assumptions and limits

- Raw sugar factory with crystallisers cooled by water.
- W = 650/(t_v − $t_1$) assumes the water leaves at the vapour temperature (no approach); the margin k must cover the real approach.
- With no crush the water per tonne is not shown.

### References

• Hugot
• Handbook of Cane Sugar Engineering
• 3rd ed. (Elsevier, 1986)
• ch. 40
• factory water requirements
• eqns 40.27–40.30 and p. 891

## Report details

| | |
|---|---|
| Report reference | FCC-NQEQ-DS59 (the same inputs always give the same reference) |
| Generated | 17 November 2026, 19:50 UTC |
| Calculator | Sugar Factory Water Requirements (Hugot) |
| 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/sugar-ethanol/vacuum-water/sugar-factory-water-needs

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.