# Mill Control Basic Equation and Dilution

Bagasse % cane and fibre % cane from the basic mill balance with yard and evaporation losses (Hugot eqns 21.12, 21.15), and dilution against imbibition (Shannon).

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

## Input parameters

Unit system: SI

| Parameter | Value | Unit |
|---|---|---|
| Imbibition water % cane | 29.060 | % |
| Mixed juice % cane | 102.00 | % |
| Cane weight lost in the yard % cane<br>Hugot: 0.5–1 %. | 0.75000 | % |
| Juice evaporated at the mills % cane<br>Hugot: 0.5–1 % cold imbibition, 1–2 % hot. | 0.75000 | % |
| Fibre % bagasse | 48.000 | % |
| Brix of primary juice | 19.160 | % |
| Brix of mixed juice | 14.980 | % |

## Calculated results

| Parameter | Value | Unit |
|---|---|---|
| Bagasse % cane, uncorrected 100 + W − Q | 27.060 | % |
| Bagasse % cane, corrected for losses | 25.560 | % |
| Fibre % cane, uncorrected | 12.989 | % |
| Fibre % cane, corrected | 12.269 | % |
| Dilution % primary juice 100(B₁ − B_m)/B_m | 27.904 | % |
| Dilution / imbibition (Shannon) | 0.96022 | |

**Notes for this case**

• Shannon: dilution/imbibition between 0.95 and 1.05 is normal; below, the imbibition figure is too high, above, too low. Hugot's example: 19.16 and 14.98 brix with 29.06 % imbibition give k = 0.96.

## Formula and method

$$B = 100 + W - Q, \quad B_c = B - (\gamma + \zeta), \quad f = f' \frac{B}{100}, \quad f_c = f' \frac{B_c}{100}, \quad D = \frac{100(B_1 - B_m)}{B_m}, \quad k = \frac{D}{W}$$

### Variables

| | | |
|---|---|---|
| $W$ | Imbibition water % cane | - |
| $Q$ | Mixed juice % cane | - |
| $\gamma$ | Cane weight lost in the yard % cane | - |
| $\zeta$ | Juice evaporated at the mills % cane | - |
| $f'$ | Fibre % bagasse | - |
| $B_1$ | Brix of primary juice | - |
| $B_m$ | Brix of mixed juice | - |
| $B$ | Bagasse % cane, uncorrected 100 + W − Q | - |
| $B_c$ | Bagasse % cane, corrected for losses | - |
| $f$ | Fibre % cane, uncorrected | - |
| $f_c$ | Fibre % cane, corrected | - |

| | | |
|---|---|---|
| $D$ | Dilution % primary juice 100($B_1$ − B_m)/B_m | - |
| $k$ | Dilution / imbibition (Shannon) | - |

### Method and standards

Hugot's basic equation for mills and Shannon's check.

### Assumptions and limits

- All quantities per 100 cane weighed.
- A note flags a mixed juice brix at or above the primary juice brix, and a Shannon ratio outside 0.95–1.05.

### References

- Hugot
- Handbook of Cane Sugar Engineering
- 3rd ed. (Elsevier, 1986)
- ch. 21
- eqns 21.7–21.15 and dilution (Shannon)
- pp. 333–341

## Report details

| | |
|---|---|
| Report reference | FCC-NAGR-F98G (the same inputs always give the same reference) |
| Generated | 17 November 2026, 19:44 UTC |
| Calculator | Mill Control Basic Equation and Dilution |
| 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/milling/mill-control-basic-equation

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.