Dry-Crushing (First-Mill) Extraction (Hugot)

Juice and sugar extraction of dry crushing from fibre in cane and bagasse (Hugot 19.3–19.4), his empirical estimate (21.6) and juice-analysis method (21.3).

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

Input parameters

Unit system: SI

Parameter	Value	Unit
Fibre per unit cane	14.500	%
Fibre in first-mill bagasse	33.000	%
Sugar/juice extraction ratio Hugot: 1.05–1.10.	1.0700	
Sugar % primary juice	18.000	%
Sugar % secondary juice	10.000	%
Sugar % mixed juice	14.000	%
Total extraction of the tandem	95.500	%

Calculated results

Parameter	Value	Unit
Juice extraction by dry crushing	65.568	%
Sugar extraction by dry crushing	70.158	%
Empirical estimate 1 − 0.06/(0.34 − f)	69.231	%
Share of mixed-juice sugar in primary juice	64.286	%
Primary juice extraction from juice analyses	61.393	%

Notes for this case

- Queensland finds 1 % more first-mill extraction gives about 0.10–0.12 % more total extraction.

Formula and method

$$e' = \frac{m - f}{m(1 - f)}, \quad e = \min(1, \alpha e'), \quad e_{1,est} = 1 - \frac{0.06}{0.34 - f}, \quad x = \frac{S_1(S_m - S_2)}{S_m(S_1 - S_2)}, \quad e_1 = x\,e$$

Variables

f	Fibre per unit cane	-
m	Fibre in first-mill bagasse	-
α	Sugar/juice extraction ratio	-
S_1	Sugar % primary juice	-
S_2	Sugar % secondary juice	-
S_m	Sugar % mixed juice	-
e	Total extraction of the tandem	-
e'	Juice extraction by dry crushing	-
$e_{1,est}$	Empirical estimate 1 − 0.06/(0.34 − f)	-
x	Share of mixed-juice sugar in primary juice	-
e_1	Primary juice extraction from juice analyses	-

Method and standards

Hugot's dry-crushing balance and his empirical and juice-analysis methods.

Assumptions and limits

- No losses between mills.
- The empirical estimate is not shown where it gives zero or less (fibre above 28 %); the sugar extraction is capped at 100 % with a note.

References

- Hugot
- Handbook of Cane Sugar Engineering
- 3rd ed. (Elsevier, 1986)
- ch. 19
- eqns 19.3–19.4
- pp. 282–283; ch. 21
- eqns 21.1–21.6
- pp. 328–330

Report details

Report reference	FCC-7X6S-8TEH (the same inputs always give the same reference)
Generated	17 November 2026, 19:49 UTC
Calculator	Dry-Crushing (First-Mill) Extraction (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/milling/dry-crushing-extraction

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.