ISSCT Boiling House Performance and Reduced Recovery

Boiling-house recovery, theoretical and basic recovery, ESG, recovery ESG, reduced recovery to 85 purity and overall figures by the ISSCT method (Hugot).

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

Input parameters

Unit system: SI

Parameter	Value	Unit
Sucrose extracted (in mixed juice) % cane	12.200	%
Sucrose recovered in sugar % cane	11.000	%
Sucrose % cane	12.800	%
Gravity purity of mixed juice	85.000	%
Sugar purity	99.000	%
Final molasses gravity purity	38.000	%
Final molasses % cane	3.0000	%
Brix of final molasses	85.000	%
Mixed juice % cane	100.00	%
Brix of mixed juice	14.000	%
Reduced extraction	95.000	%

Calculated results

Parameter	Value	Unit
Boiling-house recovery	90.164	%
Theoretical recovery	89.740	%
Basic recovery 100(1.4 – 40/j)	92.941	%
Equivalent standard granulated 100(1.4 – 40/s)	99.596	%
Yield ESG % cane	10.956	%
Recovery ESG	89.800	%
Reduced recovery ESG (Gundu Rao, corrected)	89.800	%
Boiling-house efficiency	96.620	%
Overall recovery ESG	85.590	%
Reduced overall recovery ESG	85.310	%

Notes for this case

- Hugot's corrected Gundu Rao formula (115 in place of the ISSCT's 100) is used for the reduced recovery.

Formula and method

$$BHR = \frac{Z}{c},\quad r_t = \frac{s(j-m)}{j(s-m)},\quad L = 1.4 - \frac{0.40}{j},\quad G = 1.4 - \frac{0.40}{s},\quad H = GZ,\quad K = \frac{H}{c},\quad \frac{K}{L},\quad \frac{H}{r},\quad R = e_{12.5}\, r_{85}$$

$$r_{85} = K + \frac{115\, m(85-j)}{0.85\, j(100-j)} \cdot \frac{y B_m}{qB} \quad [m, j \text{ in } \%]$$

Variables

C	Sucrose extracted (in mixed juice) % cane	-

Z	Sucrose recovered in sugar % cane	-
r	Sucrose % cane	-
j	Gravity purity of mixed juice	-
s	Sugar purity	-
m	Final molasses gravity purity	-
y	Final molasses % cane	-
B_m	Brix of final molasses	-
q	Mixed juice % cane	-
B	Brix of mixed juice	-
$e_{12.5}$	Reduced extraction	-
$100Z/c$	Boiling-house recovery	-
r_t	Theoretical recovery	-
L	Basic recovery 100(1.4 − 40/j)	-
G	Equivalent standard granulated 100(1.4 − 40/s)	-
H	Yield ESG % cane	-
K	Recovery ESG	-
r_{85}	Reduced recovery ESG (Gundu Rao, corrected)	-
K/L	Boiling-house efficiency	-
H/r	Overall recovery ESG	-
$e_{12.5}r_{85}$	Reduced overall recovery ESG	-

Method and standards

ISSCT standard with Hugot's correction: Hugot eqn 39.16 (p. 846) and ISSCT list item 43 (p. 851) of the Handbook of Cane Sugar Engineering, 3rd ed. The ISSCT rules imply a factor of 100 in the reduced boiling-house recovery; Hugot uses 115, which he calls an approximation that gives a more realistic result, and notes that his corrected formula is not in the ISSCT recommendation (p. 851).

Assumptions and limits

- Gravity purities as the ISSCT intends.
- In the r_{85} formula m and j are in per cent, as Hugot prints it; all other quantities are fractions here. Recovery or extraction above 100 % (Z > c or c > r) is rejected.

References

- Hugot
- Handbook of Cane Sugar Engineering
- 3rd ed. (Elsevier, 1986)
- ch. 39
- eqns 39.1–39.17 and ISSCT items 37–46
- pp. 838–851

Report details

Report reference	FCC-NTBY-MYZ9 (the same inputs always give the same reference)
Generated	17 November 2026, 19:46 UTC
Calculator	ISSCT Boiling House Performance and Reduced Recovery
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/chemical-control/issct-boiling-house-performance

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.