Falling-Film Evaporator Wetting Rate

Wetting rate of a falling-film evaporator (juice per metre of tube circumference), juice per tube and the recirculation needed to reach the target (Hugot p. 620).

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

Input parameters

Unit system: SI

Parameter	Value	Unit
Juice fed	100.00	t/h
Number of tubes	1,800.0	
Tube diameter (wetted)	45.100	mm
Target wetting rate, kg/(h·m) Hugot: optimum 500–600 kg/(h·m), at most 1200–1500.	550.00	

Calculated results

Parameter	Value	Unit
Wetting rate, kg/(h·m)	392.10	
Juice per tube	55.556	kg/h
Recirculation to reach the target	40.269	t/h

Notes for this case

- Dry patches scale fast; recirculate juice when the feed alone cannot wet every tube.

Formula and method

$$m = \frac{Q}{n\pi d}, \quad Q_r = m^* n\pi d - Q$$

Variables

Q	Juice fed	kg/s
n	Number of tubes	-
d	Tube diameter (wetted)	m
m^*	Target wetting rate, kg/(h·m)	-
m	Wetting rate, kg/(h·m)	-
Q/n	Juice per tube	kg/s
Q_r	Recirculation to reach the target	kg/s

Method and standards

Definition of wetting rate as given by Hugot.

Assumptions and limits

- Wetting at the top of the tubes.
- Wetting rates are entered and shown in kg/(h·m) in every unit system. A note appears above Hugot's maximum of about 1500 kg/(h·m).

References

- Hugot
- Handbook of Cane Sugar Engineering
- 3rd ed. (Elsevier, 1986)
- ch. 32
- falling-film evaporators (Longuet)
- pp. 617–621

Report details

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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/evaporation/falling-film-wetting-rate

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.