Screen Efficiency and Circulating Load

Screen efficiency from the fines in feed, oversize and undersize, the mass split between the two products, and the circulating load of a closed circuit.

Method: Perry's Chemical Engineers' Handbook; 9th ed. (McGraw-Hill, 2019); ...

Input parameters

Unit system: SI

Parameter	Value	Unit
Fines (passing size) in the feed	60.000	%
Fines in the oversize (reject)	10.000	%
Fines in the undersize (product)	95.000	%
Feed rate	100.00	t/h

Calculated results

Parameter	Value	Unit
Undersize (product) rate	58.824	t/h
Oversize rate	41.176	t/h
Screen efficiency	86.289	%
Circulating load (oversize/undersize = recycle/new feed at steady state)	70.000	%

Notes for this case

- Efficiency here is the product of fines recovery to the undersize and coarse recovery to the oversize (Perry's). Fractions are of the cut size.

Formula and method

$$\dot{m}_U = \dot{m}_F \frac{f - c}{u - c}, \quad E = \frac{u\dot{m}_U}{f\dot{m}_F} \cdot \frac{(1-c)\dot{m}_O}{(1-f)\dot{m}_F}$$

Variables

f	Fines (passing size) in the feed	-
c	Fines in the oversize (reject)	-
u	Fines in the undersize (product)	-
$\dot{m}_F$	Feed rate	kg/s
$\dot{m}_U$	Undersize (product) rate	kg/s
$\dot{m}_O$	Oversize rate	kg/s
E	Screen efficiency	-
CL	Circulating load (oversize/undersize = recycle/new feed at steady state)	-

Method and standards

Material balance on the cut size.

Assumptions and limits

- Steady state; two products.
- The circulating load is oversize over undersize. In a closed mill circuit it equals mill recycle over new feed only at steady state, when the screen product equals the new feed.

References

- Perry's Chemical Engineers' Handbook
- 9th ed. (McGraw-Hill, 2019)

- sec. 19 (screening efficiency and material balance)

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/chemical/unit-operations/screen-efficiency

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.