Mill Hydraulic Load and Specific Pressure (Hugot)

Total hydraulic load on the top roller from ram size and oil pressure less packing friction, its specific pressure in t/dm², journal pressure and Hugot normal load.

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

Input parameters

Unit system: SI

Parameter	Value	Unit
Ram (piston) diameter	380.00	mm
Number of rams	2.0000	
Oil pressure (gauge) Hugot: design 250–350 kg/cm², commonly 300.	300.00	kgf/cm²
Packing friction as a share of the load Hugot: 3–5 %.	4.0000	%
Roller length	2.1340	m
Roller diameter	1.0670	m
Journal diameter	560.00	mm
Journal (bearing) length	600.00	mm

Calculated results

Parameter	Value	Unit
Total hydraulic load on the top roller	653.25	tf
Specific hydraulic pressure F/(LD/10)	28.689	t/dm²
Journal bearing pressure (half the load / journal area)	97.210	kgf/cm²
Hugot's mean load 250 L D tonnes (25 t/dm²)	569.24	tf

Notes for this case

- Hugot keeps journal pressures below about 110 kg/cm² for mills (70–80 for crushers); most mills run at 20–25 t/dm² specific pressure.

Formula and method

$$F = n_r\, p_o\, \frac{\pi d_r^2}{4}(1-\varphi), \quad p = \frac{F}{LD/10}, \quad p_j = \frac{F/2}{d_j\, l_j}, \quad F_n = 250\, LD \text{ t}$$

Variables

d_r	Ram (piston) diameter	m
n_r	Number of rams	-
p_o	Oil pressure (gauge)	Pa
φ	Packing friction as a share of the load	-
L	Roller length	m
D	Roller diameter	m
d_j	Journal diameter	m
l_j	Journal (bearing) length	m
F	Total hydraulic load on the top roller	N
p	Specific hydraulic pressure F/(LD/10)	Pa
p_j	Journal bearing pressure (load of one ram / journal area)	Pa
F_n	Hugot's mean load 250 L D tonnes (25 t/dm²)	N

Method and standards

Ram force less packing friction (Hugot eqns 10.1–10.2) over the roller and journal areas.

Assumptions and limits

- Static load; roller floating freely.
- The top roller rests on two journals, so each carries half the total load whatever the number of rams. A note appears above Hugot's 110 kg/cm².

References

- Hugot
- Handbook of Cane Sugar Engineering
- 3rd ed. (Elsevier, 1986)
- ch. 10
- eqns 10.1–10.6
- 10.82–10.83 and journal pressures
- pp. 117–125 and 172–174

Report details

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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-hydraulic-load

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Reopens the calculator with the inputs of this report.