Rotary Bottle Filler Output and Filling Time

Bottles per minute and per hour of a rotary filler from the number of filling valves and turret speed, the filling time each valve has, and the flow it must deliver.

Method: Rotary filler kinematics

Input parameters

Unit system: SI

Parameter	Value	Unit
Number of filling valves	40.000	
Turret speed	5.0000	rpm
Turret angle available for filling	270.00	°
Fill volume per container	1.0000	L
Line efficiency	90.000	%

Calculated results

Parameter	Value	Unit
Theoretical output (per minute)	200.00	
Actual output (per hour)	10,800	
Filling time per container	9.0000	s
Valve flow needed	0.11111	L/s

Notes for this case

• Each valve fills one container per turret revolution, so output is valves × revolutions per minute. A container is filled only over the arc between infeed and discharge, so the time available is that angle divided by the turret's angular speed; the valve must deliver the fill volume in that time. Foaming products (beer, carbonated drinks) fill slowly and need more valves for the same output. Line efficiency covers stoppages, changeovers and rejects.

Formula and method

$$Q = N_v n, \quad t_f = \frac{\theta_f}{2\pi n}, \quad \dot{V} = \frac{V}{t_f}$$

Variables

N_v	Number of filling valves	-
n	Turret speed	rad/s
θ_f	Turret angle available for filling	rad
V	Fill volume per container	m³
η	Line efficiency	-
Q_t	Theoretical output (per minute)	-
Q_h	Actual output (per hour)	-
t_f	Filling time per container	s
$\dot{V}$	Valve flow needed	m³/s

Method and standards

Filler output.

Assumptions and limits

- Uniform turret speed.

References

Rotary filler kinematics

Report details

Report reference	FCC-2VEJ-55YN (the same inputs always give the same reference)
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Calculator	Rotary Bottle Filler Output and Filling Time
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Release checks	3 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/food-dairy/bottle-filler-capacity

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.