Hydraulic Ram Pump Delivery

Water delivered by a hydraulic ram pump from the drive flow, the supply head (fall) and the delivery head, with the efficiency, waste flow and daily volume.

Method: Hydraulic ram energy balance

Input parameters

Unit system: SI

Parameter	Value	Unit
Drive flow	60.000	L/min
Supply head (fall to the ram)	3.0000	m
Delivery head above the ram	30.000	m
Ram efficiency q h/(Q H)	60.000	%

Calculated results

Parameter	Value	Unit
Delivered flow	3.6000	L/min
Waste flow	56.400	L/min
Water delivered per day	5.1840	m³
Head ratio	10.000	

Notes for this case

- Energy balance with efficiency η = qh/(QH); efficiency falls as the head ratio rises (about 0.6–0.7 at h/H = 4, 0.3–0.4 at 20). The ram runs on the water hammer of the drive pipe and needs no other power.

Formula and method

$$q = \eta Q \frac{H}{h}$$

Variables

Q	Drive flow	m³/s
H	Supply head (fall to the ram)	m
h	Delivery head above the ram	m
η	Ram efficiency q h/(Q H)	-
q	Delivered flow	m³/s
$Q - q$	Waste flow	m³/s
V_d	Water delivered per day	m³
h/H	Head ratio	-

Method and standards

Ram pump balance.

Assumptions and limits

- Steady average flows; efficiency entered.

References

Hydraulic ram energy balance

Report details

Report reference	FCC-4N0V-PAF9 (the same inputs always give the same reference)
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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/boilers-power-plant/hydro-power/hydraulic-ram-pump

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.