Local Exhaust Hood Flow for a Capture Velocity (Dalla Valle)

Exhaust flow for a plain or flanged hood to reach a capture velocity at a distance from its face (Dalla Valle), face velocity and duct transport velocity.

Method: Dalla Valle centreline velocity equation; ACGIH; ...

Input parameters

Unit system: SI

Parameter	Value	Unit
Capture velocity at the source	0.75000	m/s
Distance from hood face to source	300.00	mm
Hood face area	0.12000	m²
Hood type	Flanged opening	
Duct diameter	250.00	mm

Calculated results

Parameter	Value	Unit
Exhaust flow	2,065.5	m³/h
Face velocity	4.7812	m/s
Duct transport velocity	11.688	m/s

Notes for this case

• Dalla Valle: Q = V_c(10x² + A) for a plain opening, 25 % less with a flange; valid for x up to about 1.5 times the face diameter. Flow rises with the square of distance, so move hoods close to the source. Capture velocities run from about 0.25–0.5 m/s for quiet release to 2.5–10 m/s for grinding; duct velocities must also keep dust airborne.

Formula and method

$$Q = V_c(10x^2 + A)\ \text{(plain)}, \quad Q = 0.75V_c(10x^2 + A)\ \text{(flanged)}$$

Variables

V_c	Capture velocity at the source	m/s
x	Distance from hood face to source	m
A	Hood face area	m²
type	Hood type	-
d	Duct diameter	m
Q	Exhaust flow	m³/s
V_f	Face velocity	m/s
V_d	Duct transport velocity	m/s

Method and standards

Hood flow.

Assumptions and limits

- Free-standing opening; x up to about 1.5 face diameters.

References

Dalla Valle centreline velocity equation, ACGIH, Industrial Ventilation: A Manual of Recommended Practice for Design (ACGIH)

Report details

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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/hvac/ducts/exhaust-hood-capture-velocity

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.