Rainfall Intensity from an Intensity–Duration–Frequency Equation

Rainfall intensity and depth for a return period and duration from a Sherman-type IDF equation i = KT^a/(t + b)^n with local coefficients.

Method: Sherman-type IDF relation i = KT^a/(t + b)^n (Chow, Maidment and Mays, Applied Hydrology, ch. 14)

Input parameters

Unit system: SI

Parameter	Value	Unit
Coefficient K (mm/h) For i in mm/h with t and b in minutes. Coefficients published for in/h: multiply K by 25.4; b must also be in minutes.	360.00	
Return period exponent	0.20000	
Duration offset (min)	10.000	
Duration exponent	0.75000	
Return period (years)	10.000	
Duration	30.000	min

Calculated results

Parameter	Value	Unit
Rainfall intensity	35.872	mm/h
Rainfall depth in the duration	17.936	mm

Notes for this case

- Coefficients K, a, b, n are fitted to local rain-gauge records (meteorological department or published regional studies); they are not transferable between cities. Duration for drainage design is the time of concentration.

Formula and method

$$i = \frac{KT^{a}}{(t+b)^{n}} \quad (\mathrm{mm/h},\ t \text{ in min})$$

Variables

K	Coefficient K (mm/h)	-
a	Return period exponent	-
b	Duration offset (min)	-
n	Duration exponent	-
T	Return period (years)	-
t	Duration	s
i	Rainfall intensity	m/s
P	Rainfall depth in the duration	m

Method and standards

Sherman IDF equation.

Assumptions and limits

- Point rainfall.
- K and b are entered as numbers in the equation's own units (i in mm/h, t and b in minutes); they are not converted. Coefficients fitted in inches per hour must be converted first (K × 25.4).

References

- Sherman-type IDF relation i = KT^a/(t + b)^n (Chow, Maidment and Mays, Applied Hydrology, ch. 14)

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/civil/hydraulics/rainfall-intensity-idf

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.