Important Rainfall Intensity Formulas PDF

Formulas
Examples
with Units

List of 16
Important Rainfall Intensity Formulas

1) Intensity of Rain for Intensity Duration Curve Formula

Evaluate Formula

Formula

$$i_{idf} = \frac{K}{\left(T_m + b_m\right)^{0.8}}$$

Example with Units

$$0.2488\,\text{mm/h} = \frac{100\,\text{mm/h}}{\left(20\,\text{min} + 10\,\text{min}\right)^{0.8}}$$

2) Intensity of Rain given Time Varying between 20 to 100 Minutes Formula

Evaluate Formula

Formula

$$i_{vt} = \left(\frac{K}{\left(T_m + b_m\right)^{0.5}}\right)$$

Example with Units

$$141.4214\,\text{mm/h} = \left(\frac{100\,\text{mm/h}}{\left(20\,\text{min} + 10\,\text{min}\right)^{0.5}}\right)$$

3) Intensity of Rain when Time Varying between 5 to 20 Minutes Formula

Evaluate Formula

Formula

$$i_{5\text{-}20} = \left(\frac{k_{5\text{-}20}}{\left(T_m + b_{5\text{-}20}\right)^{0.5}}\right)$$

Example with Units

$$13.6931\,\text{mm/h} = \left(\frac{75\,\text{mm/h}}{\left(20\,\text{min} + 10.0\,\text{min}\right)^{0.5}}\right)$$

4) Rainfall Intensity for Localities where Rainfall is Frequent Formula

Evaluate Formula

Formula

$$i_{freq\_rain} = \left(\frac{k_{freq\_rain}}{\left(T_m + b_{freq\_rain}\right)^{0.5}}\right)$$

Example with Units

$$7.1833\,\text{mm/h} = \left(\frac{343\,\text{mm/h}}{\left(20\,\text{min} + 18\,\text{min}\right)^{0.5}}\right)$$

5) Rainfall Intensity for Rain having Frequency of 1 Years Formula

Evaluate Formula

Formula

$$i_{1year} = \left(\frac{K_{1year}}{\left(T_m + b_{1year}\right)^{0.5}}\right)$$

Example with Units

$$10.9109\,\text{mm/h} = \left(\frac{500.0\,\text{mm/h}}{\left(20\,\text{min} + 15\,\text{min}\right)^{0.5}}\right)$$

6) Rainfall Intensity for Rain having Frequency of 10 Years Formula

Evaluate Formula

Formula

$$i_{10year} = \left(\frac{K_{10year}}{\left(T_m + b_{10year} \right)^{0.5}} \right)$$

Example with Units

$$10.2062\,\text{mm/h} = \left(\frac{500\,\text{mm/h}}{\left(20\,\text{min} + 20.00\,\text{min} \right)^{0.5}} \right)$$

7) Rainfall Intensity for Storms having Frequency of 10 Years Formula

Evaluate Formula

Formula

$$i_{storm} = \left(\frac{K_{s10}}{\left(T_m + 20 \right)^{0.7}} \right)$$

Example with Units

$$10.3667\,\text{mm/h} = \left(\frac{1500\,\text{mm/h}}{\left(20\,\text{min} + 20 \right)^{0.7}} \right)$$

8) Rainfall Intensity for Storms having Frequency of 15 Years Formula

Evaluate Formula

Formula

$$i_{st} = \left(\frac{K_{s15}}{\left(T_m + 20 \right)^{0.65}} \right)$$

Example with Units

$$15.7756\,\text{mm/h} = \left(\frac{1600\,\text{mm/h}}{\left(20\,\text{min} + 20 \right)^{0.65}} \right)$$

9) Time given Intensity of Rain Formula

Evaluate Formula

Formula

$$T_m = \left(\frac{K}{i_{idf}} \right)^{\frac{1}{0.8}} - b_{5\text{-}20}$$

Example with Units

$$21.3751\,\text{min} = \left(\frac{100\,\text{mm/h}}{0.24\,\text{mm/h}} \right)^{\frac{1}{0.8}} - 10.0\,\text{min}$$

10) Time given Rainfall Intensity for Localities where Rainfall is Frequent Formula

Evaluate Formula

Formula

$$T_m = \left(\frac{k_{freq\_rain}}{i_{freq\_rain}} \right)^{\frac{1}{0.5}} - b_{freq\_rain}$$

Example with Units

$$20.0354\,\text{min} = \left(\frac{343\,\text{mm/h}}{7.18\,\text{mm/h}} \right)^{\frac{1}{0.5}} - 18\,\text{min}$$

11) Time given Rainfall Intensity for Rain having Frequency of 1 Year Formula

Evaluate Formula

Formula

$$T_m = \left(\frac{K_{1year}}{i_{1year}} \right)^{\frac{1}{0.5}} - b_{1year}$$

Example with Units

$$25.1273\,\text{min} = \left(\frac{500.0\,\text{mm/h}}{10.19\,\text{mm/h}} \right)^{\frac{1}{0.5}} - 15\,\text{min}$$

12) Time given Rainfall Intensity for Rain having Frequency of 10 Years Formula

Evaluate Formula

Formula

$$T_m = \left(\frac{K_{10year}}{i_{10year}} \right)^{\frac{1}{0.5}} - b_{10year}$$

Example with Units

$$20.0016\,\text{min} = \left(\frac{500\,\text{mm/h}}{10.206\,\text{mm/h}} \right)^{\frac{1}{0.5}} - 20.00\,\text{min}$$

13) Time given Rainfall Intensity for Storms having Frequency of 10 Years Formula

Evaluate Formula

Formula

$$T_m = \left(\frac{K_{s10}}{i_{storm}} \right)^{\frac{1}{0.7}} - 20$$

Example with Units

$$20.0019\,\text{min} = \left(\frac{1500\,\text{mm/h}}{10.366\,\text{mm/h}} \right)^{\frac{1}{0.7}} - 20$$

14) Time given Rainfall Intensity for Storms having Frequency of 15 Years Formula

Evaluate Formula

Formula

$$T_m = \left(\frac{K_{s15}}{i_{st}} \right)^{\frac{1}{0.65}} - 20$$

Example with Units

$$20.0111\,\text{min} = \left(\frac{1600\,\text{mm/h}}{15.77\,\text{mm/h}} \right)^{\frac{1}{0.65}} - 20$$

15) Time in Minutes given Intensity of Rain Formula

Evaluate Formula

Formula

$$T_m = \left(\frac{k_{5\text{-}20}}{i_{5\text{-}20}} \right)^{\frac{1}{0.5}} - 10$$

Example with Units

$$0.3336\,\text{min} = \left(\frac{75\,\text{mm/h}}{13.69\,\text{mm/h}} \right)^{\frac{1}{0.5}} - 10$$

16) Time Varying between 20 to 100 Minutes given Intensity of Rain Formula

Evaluate Formula

Formula

$$T_m = \left(\left(\frac{K}{i_{20\text{-}100}} \right)^{\frac{1}{0.5}} \right) - b_m$$

Example with Units

$$20.8642\,\text{min} = \left(\left(\frac{100\,\text{mm/h}}{18.0\,\text{mm/h}} \right)^{\frac{1}{0.5}} \right) - 10\,\text{min}$$

Variables used in list of Rainfall Intensity Formulas above

- b_{10year} Constant b when Rain having Frequency of 10 Year *(Minute)*
- b_{1year} Constant b when Rain having Frequency of 1 Year *(Minute)*
- b_{5-20} Constant b when Time Varying between 5 to 20 Min *(Minute)*
- b_{freq_rain} Constant b when Rainfall is Frequent *(Minute)*
- b_m Empirical Constant b *(Minute)*
- i_{10year} Rainfall Intensity for Rain Freq of 10 Years *(Millimeter per Hour)*
- i_{1year} Rainfall Intensity for Rain Frequency of 1 Year *(Millimeter per Hour)*
- i_{20-100} Intensity of Rain (Time between 20 to 100 Min) *(Millimeter per Hour)*
- i_{5-20} Intensity of Rain (Time between 5 to 20 Min) *(Millimeter per Hour)*
- i_{freq_rain} Intensity of Rainfall where Rainfall is Frequent *(Millimeter per Hour)*
- i_{idf} Intensity of Rain for Intensity Duration Curve *(Millimeter per Hour)*
- i_{st} Rainfall Intensity for Storms Freq of 15 Years *(Millimeter per Hour)*
- i_{storm} Rainfall Intensity for Storms Freq of 10 Years *(Millimeter per Hour)*
- i_{vt} Intensity of Rain given Varying Time *(Millimeter per Hour)*
- K K Constant *(Millimeter per Hour)*
- K_{10year} K Constant when Rain having Frequency of 10 Year *(Millimeter per Hour)*
- K_{1year} K Constant when Rain having Frequency of 1 Year *(Millimeter per Hour)*
- k_{5-20} K Constant when Time Varying between 5 to 20 Min *(Millimeter per Hour)*
- k_{freq_rain} K Constant when Rainfall is Frequent *(Millimeter per Hour)*

Constants, Functions, Measurements used in list of Rainfall Intensity Formulas above

- Measurement: **Time** in Minute (min)
  Time Unit Conversion
- Measurement: **Speed** in Millimeter per Hour (mm/h)
  Speed Unit Conversion

- K_{s10} K Constant when Storm having Frequency of 10 Year *(Millimeter per Hour)*
- K_{s15} K Constant when Storm having Frequency of 15 Year *(Millimeter per Hour)*
- T_m Time in Minutes *(Minute)*

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