

## Intensity-Duration-Frequency Equations Developed by SEWRPC, May 2016

Intensity-duration-frequency (IDF) equations expressed in the following form,

$$i = \frac{a}{t^k + b}$$

where  $i$  is the rainfall intensity (inches/hour);  $t$  is the duration (minutes);  $a$ ,  $b$ , and  $k$  are constant parameters

Kenosha County IDF Equation Parameters						
Recurrence Interval (Years)	Duration of 5 minutes or more but less than 60 minutes			Duration of 60 minutes or more through 24 hours		
	$a$	$b$	$k$	$a$	$b$	$k$
1	22.262	2.370	0.708	24.069	0.777	0.754
2	23.052	1.892	0.675	40.481	4.543	0.806
5	25.989	1.566	0.648	78.184	13.073	0.868
10	26.885	1.199	0.618	109.108	17.782	0.892
25	30.483	1.043	0.603	155.500	23.614	0.913
50	35.380	1.118	0.606	184.546	25.466	0.917
100	34.852	0.786	0.576	215.407	27.166	0.921

Milwaukee County IDF Equation Parameters						
Recurrence Interval (Years)	Duration of 5 minutes or more but less than 60 minutes			Duration of 60 minutes or more through 24 hours		
	$a$	$b$	$k$	$a$	$b$	$k$
1	19.662	2.025	0.683	29.823	3.823	0.782
2	22.612	1.865	0.674	46.461	7.149	0.828
5	28.138	1.818	0.668	74.758	11.435	0.868
10	30.188	1.518	0.646	95.190	13.156	0.880
25	36.244	1.532	0.644	122.810	15.389	0.886
50	35.717	1.131	0.613	146.180	17.441	0.888
100	40.822	1.224	0.618	167.292	18.945	0.886

Ozaukee County IDF Equation Parameters						
Recurrence Interval (Years)	Duration of 5 minutes or more but less than 60 minutes			Duration of 60 minutes or more through 24 hours		
	$a$	$b$	$k$	$a$	$b$	$k$
1	22.079	2.438	0.717	27.407	3.041	0.772
2	26.988	2.500	0.719	39.922	4.809	0.808
5	32.693	2.288	0.705	59.812	6.719	0.838
10	38.430	2.314	0.705	75.558	8.084	0.847
25	41.527	1.927	0.679	93.635	9.378	0.846
50	46.109	1.904	0.675	103.980	9.595	0.837
100	44.002	1.412	0.640	109.023	9.009	0.820

<b>Racine County IDF Equation Parameters</b>						
<b>Recurrence Interval (Years)</b>	<b>Duration of 5 minutes or more but less than 60 minutes</b>			<b>Duration of 60 minutes or more through 24 hours</b>		
	<i>a</i>	<i>b</i>	<i>k</i>	<i>a</i>	<i>b</i>	<i>k</i>
<b>1</b>	21.977	2.385	0.710	23.577	0.917	0.752
<b>2</b>	23.391	1.980	0.682	41.866	5.329	0.813
<b>5</b>	26.362	1.614	0.653	79.095	13.289	0.872
<b>10</b>	29.110	1.445	0.636	111.275	18.218	0.898
<b>25</b>	31.641	1.142	0.612	158.291	24.359	0.919
<b>50</b>	33.243	0.950	0.594	180.299	24.507	0.916
<b>100</b>	39.283	1.108	0.605	213.968	27.377	0.922

<b>Walworth County IDF Equation Parameters</b>						
<b>Recurrence Interval (Years)</b>	<b>Duration of 5 minutes or more but less than 60 minutes</b>			<b>Duration of 60 minutes or more through 24 hours</b>		
	<i>a</i>	<i>b</i>	<i>k</i>	<i>a</i>	<i>b</i>	<i>k</i>
<b>1</b>	20.657	1.936	0.677	30.684	2.501	0.783
<b>2</b>	23.650	1.861	0.672	45.888	5.876	0.819
<b>5</b>	26.961	1.577	0.650	74.163	11.044	0.857
<b>10</b>	28.927	1.330	0.630	92.462	12.366	0.866
<b>25</b>	33.876	1.284	0.623	120.056	14.631	0.874
<b>50</b>	36.545	1.157	0.612	140.708	15.958	0.877
<b>100</b>	38.692	1.022	0.600	159.007	16.552	0.875

<b>Washington County IDF Equation Parameters</b>						
<b>Recurrence Interval (Years)</b>	<b>Duration of 5 minutes or more but less than 60 minutes</b>			<b>Duration of 60 minutes or more through 24 hours</b>		
	<i>a</i>	<i>b</i>	<i>k</i>	<i>a</i>	<i>b</i>	<i>k</i>
<b>1</b>	26.031	3.018	0.757	22.925	1.191	0.745
<b>2</b>	31.855	3.116	0.759	38.186	4.233	0.801
<b>5</b>	37.665	2.770	0.738	58.825	6.292	0.835
<b>10</b>	43.413	2.704	0.732	73.662	7.523	0.842
<b>25</b>	46.810	2.263	0.706	94.434	9.154	0.846
<b>50</b>	48.282	1.937	0.684	107.152	9.746	0.840
<b>100</b>	48.766	1.629	0.661	117.467	10.027	0.830

<b>Waukesha County IDF Equation Parameters</b>						
<b>Recurrence Interval (Years)</b>	<b>Duration of 5 minutes or more but less than 60 minutes</b>			<b>Duration of 60 minutes or more through 24 hours</b>		
	<i>a</i>	<i>b</i>	<i>k</i>	<i>a</i>	<i>b</i>	<i>k</i>
<b>1</b>	22.639	2.380	0.714	26.026	1.867	0.760
<b>2</b>	27.427	2.453	0.716	41.363	4.828	0.809
<b>5</b>	32.233	2.151	0.696	68.958	8.984	0.855
<b>10</b>	35.227	1.895	0.679	92.328	11.900	0.873
<b>25</b>	37.612	1.510	0.649	125.969	15.632	0.887
<b>50</b>	40.620	1.396	0.638	149.231	17.464	0.889
<b>100</b>	44.075	1.341	0.631	172.008	19.207	0.887