



CRITICAL VELOCITY FOR FLUMES

HOW TO DETERMINE CRITICAL VELOCITY

Critical Velocity for a flume is determined on the flow rate for a given water depth. Velocity is critical to the accurate performance of a flume. Too high a velocity will accelerate the water flow through the flume without allowing the flume to operate properly. Once velocity has surpassed the Critical Velocity as determined by the water depth, the flow rate is inaccurate and non-determinable.

To determine Critical Velocity:

1. For a given flow rate (for example 100 GPM) calculate the expected velocity (fps) of the flow from the pipe as it enters the flume. This will be determined by the slope and upstream conditions.
2. Using the Flow Chart for the Size and Type of Flume being considered, determine the water depth at the corresponding flow rate (0.48 feet of head at 100 gpm in an XL 60* Trapezoidal Flume)
3. Use the Critical Velocity Chart to get the corresponding critical velocity (fps) at the given water depth determined in step 2. (2.006 fps at 0.48 feet of head)
4. Use the velocity at the measuring point for comparison to the velocity calculated in Step 1.
5. Compare the Critical Velocity to the expected Velocity.
 - If your expected velocity is greater than the given critical velocity at the same water depth, the design will need to be altered or an energy baffling system needs to be installed.
 - If your expected velocity is less than the given critical velocity at the same water depth, the design is adequate to meet Velocity requirements.

Please consult Plasti-Fab for design review if you have any questions.

Disclaimer: Plasti-Fab uses the conservative approach of using the head at the measuring point. Flow has draw-down effect in throat, corresponding with a slightly lower elevation at the throat than the measuring point. Plasti-Fab uses the rule of thumb that the Critical velocity at the measurement point is 1/2 the velocity at the throat.

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CRITICAL VELOCITY CHART

Depth (ft)	Critical Velocity				Depth (ft)	Critical Velocity			
	at Throat		At measuring point			at Throat		At measuring point	
0.10	1.794	fps	0.897	fps	2.10	8.223	fps	4.112	fps
0.15	2.198	fps	1.099	fps	2.15	8.320	fps	4.160	fps
0.20	2.538	fps	1.269	fps	2.20	8.417	fps	4.208	fps
0.25	2.837	fps	1.419	fps	2.25	8.512	fps	4.256	fps
0.3	3.108	fps	1.554	fps	2.30	8.606	fps	4.303	fps
0.35	3.357	fps	1.679	fps	2.35	8.699	fps	4.349	fps
0.40	3.589	fps	1.794	fps	2.40	8.791	fps	4.395	fps
0.45	3.807	fps	1.903	fps	2.45	8.882	fps	4.441	fps
0.50	4.012	fps	2.006	fps	2.50	8.972	fps	4.486	fps
0.55	4.208	fps	2.104	fps	2.55	9.061	fps	4.531	fps
0.6	4.395	fps	2.198	fps	2.60	9.150	fps	4.575	fps
0.65	4.575	fps	2.287	fps	2.65	9.237	fps	4.619	fps
0.7	4.748	fps	2.374	fps	2.70	9.324	fps	4.662	fps
0.75	4.914	fps	2.457	fps	2.75	9.410	fps	4.705	fps
0.80	5.075	fps	2.538	fps	2.80	9.495	fps	4.748	fps
0.85	5.232	fps	2.616	fps	2.85	9.580	fps	4.790	fps
0.90	5.383	fps	2.692	fps	2.90	9.663	fps	4.832	fps
0.95	5.531	fps	2.765	fps	2.95	9.746	fps	4.873	fps
1	5.675	fps	2.837	fps	3.00	9.829	fps	4.914	fps
1.05	5.815	fps	2.907	fps	3.05	9.910	fps	4.955	fps
1.10	5.951	fps	2.976	fps	3.10	9.991	fps	4.995	fps
1.15	6.085	fps	3.043	fps	3.15	10.071	fps	5.036	fps
1.20	6.216	fps	3.108	fps	3.20	10.151	fps	5.075	fps
1.25	6.344	fps	3.172	fps	3.25	10.230	fps	5.115	fps
1.30	6.470	fps	3.235	fps	3.30	10.308	fps	5.154	fps
1.35	6.593	fps	3.297	fps	3.35	10.386	fps	5.193	fps
1.4	6.714	fps	3.357	fps	3.40	10.463	fps	5.232	fps
1.45	6.833	fps	3.417	fps	3.45	10.540	fps	5.270	fps
1.50	6.950	fps	3.475	fps	3.50	10.616	fps	5.308	fps
1.55	7.065	fps	3.532	fps	3.55	10.692	fps	5.346	fps
1.60	7.178	fps	3.589	fps	3.60	10.767	fps	5.383	fps
1.65	7.289	fps	3.645	fps	3.65	10.841	fps	5.421	fps
1.7	7.399	fps	3.699	fps	3.70	10.915	fps	5.458	fps
1.75	7.507	fps	3.753	fps	3.75	10.989	fps	5.494	fps
1.8	7.613	fps	3.807	fps	3.80	11.062	fps	5.531	fps
1.85	7.718	fps	3.859	fps	3.85	11.134	fps	5.567	fps
1.90	7.822	fps	3.911	fps	3.90	11.206	fps	5.603	fps
1.95	7.924	fps	3.962	fps	3.95	11.278	fps	5.639	fps
2.00	8.025	fps	4.012	fps	4.00	11.349	fps	5.675	fps
2.05	8.125	fps	4.062	fps	4.05	11.420	fps	5.710	fps

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