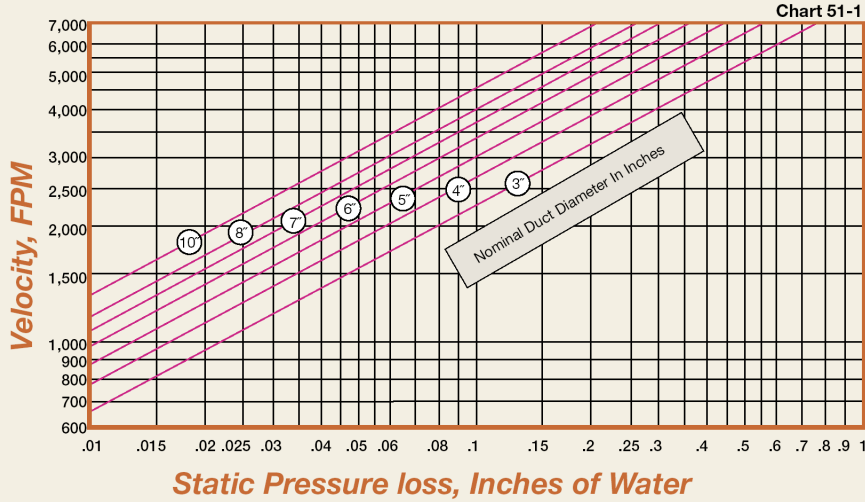


# Engineering Data

## Static Pressure (SP) Loss for 90° and 45° Die-Formed Elbows

Static Pressure Loss of Die-Formed 90° Elbows



Static Pressure Loss of Die-Formed 45° Elbows

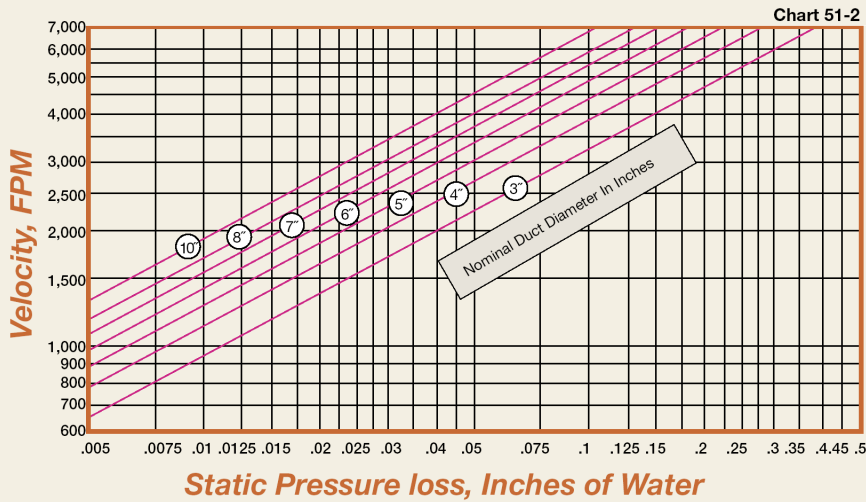


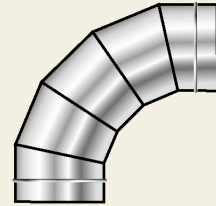
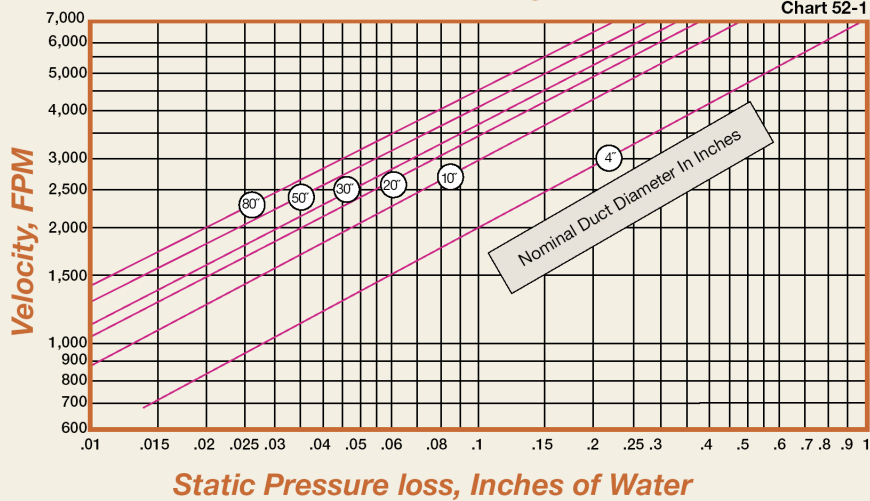
Table 51-1: Duct Pressure Loss Results for Stamped (1.5CLR) Elbows @ 4000 ft/min with .999 (VP)

Size	3"	4"	5"	6"	7"	8"	9"	10"	12"	14"	Elbow Loss Factor
<b>Straight Duct Loss (inches Water):</b>	10.15	7.04	5.31	4.22	3.49	2.95	2.55	2.24	1.79	1.48	
<b>Total Duct Loss (wg) 90° Stamped</b>	10.30	7.18	5.46	4.37	3.63	3.01	2.70	2.39	1.94	1.63	0.15
<b>Total Duct Loss (wg) 45° Stamped</b>	10.22	7.11	5.38	4.30	3.56	3.14	2.62	2.32	1.86	1.56	0.075
<b>Flow Rate: SCFM</b>	192.5	342.3	534.8	770.2	1068	1396	1732.5	2140	3080	4194	

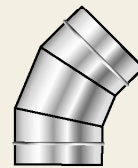
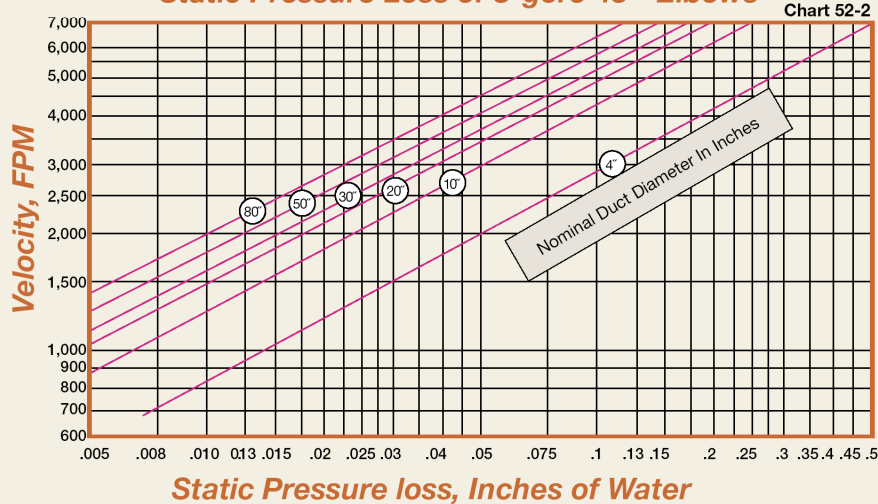
Based per 100 feet duct length • viscosity (cP).018 • Inlet pressure (psig) 0 • Temp (F) 70° • Galvanized metal roughness (ft) .0005 • Flow region Turbulent, 4000fpm • friction factor 0.02 • velocity pressure .999

# Static Pressure (SP) Loss for 90° and 45°, 5-Gore and 3-Gore Elbows

### Static Pressure Loss of 5-gore 90° Elbows



### Static Pressure Loss of 3-gore 45° Elbows



**Table 52-1: Duct Pressure Loss Results for Gored (1.5CLR) Elbows @ 4000 ft/min with .999 (VP)**

Size	3"	4"	5"	6"	7"	8"	9"	10"	12"	14"	Elbow Loss Factor
<b>Straight Duct Loss (inches Water):</b>	10.15	7.04	5.31	4.22	3.49	2.95	2.55	2.24	1.79	1.48	
<b>Total Duct Loss ("wg) 90° 5 Gore</b>	10.39	7.25	5.55	4.46	3.72	3.19	2.79	2.48	2.03	1.72	0.24
<b>Total Duct Loss ("wg) 45° 3 Gore</b>	10.32	7.21	5.48	4.39	3.65	3.21	2.72	2.41	1.96	1.65	0.17
<b>Flow Rate: SCFM</b>	192.5	342.3	534.8	770.2	1068	1396	1732	2140	3080	4194	

Based per 100 feet duct length • viscosity (cP).018 • Inlet pressure (psig) 0 • Temp (F) 70° • Galvanized metal roughness (ft) .0005 • Flow region Turbulent, 4000fpm • friction factor 0.02 • velocity pressure .999

# Engineering Data

## Equivalent Resistance & Friction Loss Quick Reference Charts

**Table 55-1: Elbow Equivalent Resistance In Feet Of Straight Pipe By Center Line Radius (CLR)**

Size	1.5 CLR				2.0 CLR				2.5 CLR			
	90° Elbow	60° Elbow	45° Elbow	30° Elbow	90° Elbow	60° Elbow	45° Elbow	30° Elbow	90° Elbow	60° Elbow	45° Elbow	30° Elbow
3"	5	3	3	2	3	2	2	1	3	2	2	1
4"	6	4	3	2	4	3	2	1	4	3	2	1
5"	9	6	5	3	6	4	3	2	5	3	3	2
6"	12	8	6	4	7	5	4	2	6	4	3	2
8"	13	9	7	4	9	6	5	3	7	5	4	2
10"	15	10	8	5	10	7	5	3	8	5	4	3
12"	20	13	10	7	14	9	7	5	11	7	6	4
14"	25	17	13	8	17	11	9	6	14	9	7	5
16"	30	20	15	10	21	14	11	7	17	11	9	6
18"	36	24	18	12	24	16	12	8	20	13	10	7
20"	41	28	21	14	28	19	14	9	23	15	12	8
22"	46	31	23	15	32	21	16	11	26	17	13	9
24"	57	38	29	19	40	27	20	13	32	21	16	11
30"	74	50	37	24	51	34	26	17	41	28	21	14
36"	93	62	47	31	64	43	32	21	52	35	26	17
40"	105	70	53	35	72	48	36	24	59	40	30	20
48"	130	87	65	43	89	60	45	29	73	49	37	24

**Losses in Elbows and Fittings.** When an air stream undergoes change of either direction or velocity, a dynamic loss occurs. Unlike friction losses in straight duct, fitting losses are due to internal turbulence rather than skin friction. Hence roughness of material has but slight effect over a wide range of moderately smooth materials. Fitting losses can be expressed as equivalent length of straight duct; or as a fraction of velocity pressure; or directly in inches of water gage ( $\bar{w}g$ ).