





PARTS LIST		
No.	DESCRIPTION & SPECIFICATION	QUANTITY
1	Hard Roll	1
2	Hard Roll	1
3	Canopy Hood	5
4	Tension Roll	1
5	Tension Roll	1
6	Canopy Hood	5
7	Emboss wedding ring	1
8	Emboss wedding ring	1
9	Slot Hood	2
10	Canopy Hood	3
11	Tension Roll	1
12	Emboss wormy	1
13	Slot Hood	2
14	Anvil Blade	1
15	Rider Roll	1
16	Frame	

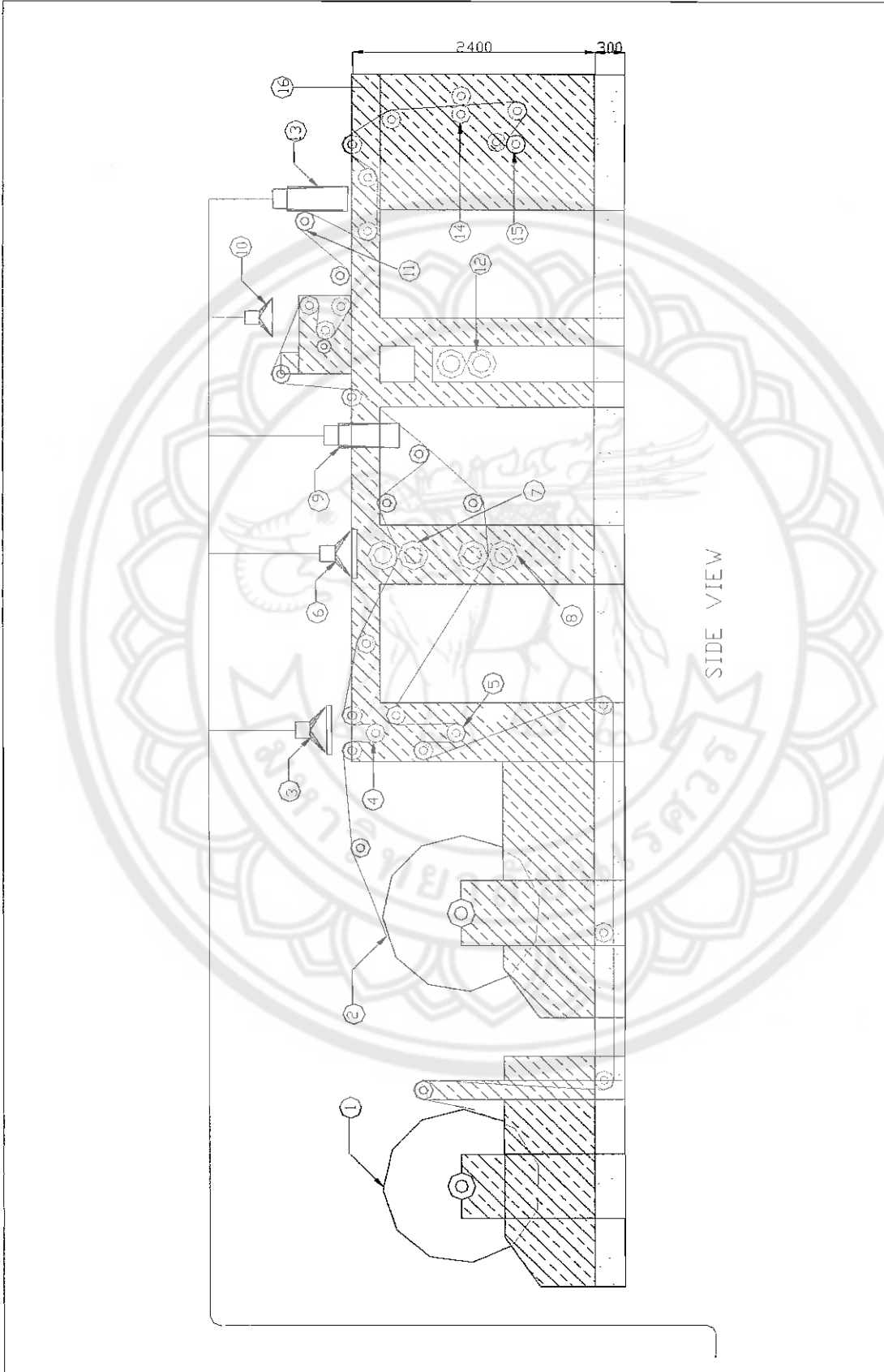
MECHANICAL ENGINEERING

PARTS LIST

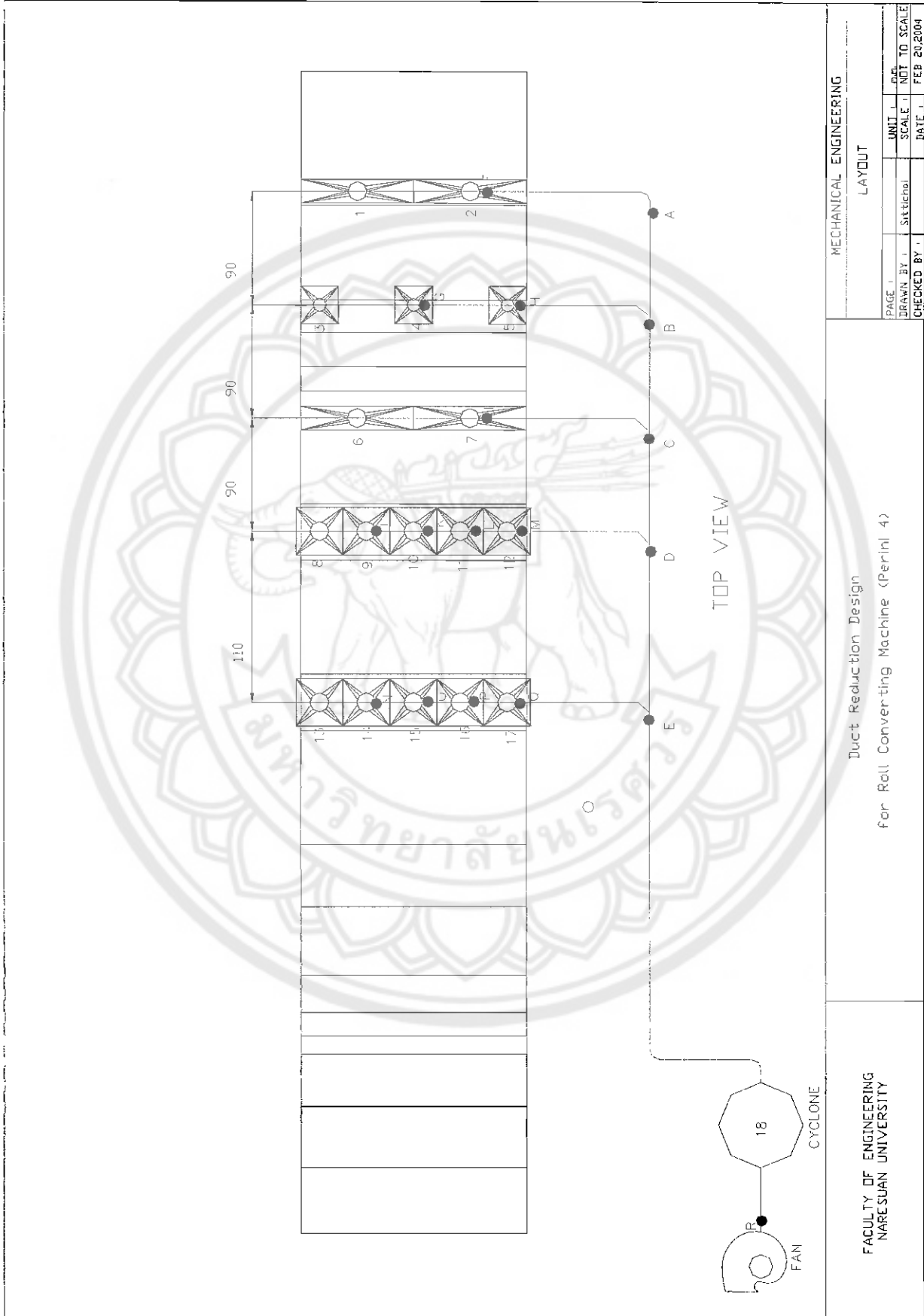
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CHECKED BY :	SCALE :	NOT TO SCALE
	DATE :	FEB 08/004

Duct Reduction Design
for Roll Converting Machine (Perml 4)

FACULTY OF ENGINEERING
NARESUAN UNIVERSITY



FACULTY OF ENGINEERING NARESUAN UNIVERSITY	Duct Reduction Design for Roll Converting Machine (Perini 4)		MECHANICAL ENGINEERING LAYOUT	
	PAGE : DRAWN BY : CHECKED BY :	SITICHAI	UNIT : SCALE : DATE :	MM : NOT TO SCALE FEB 20, 2004

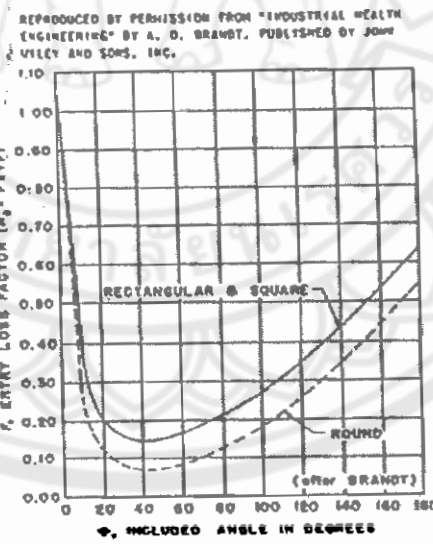
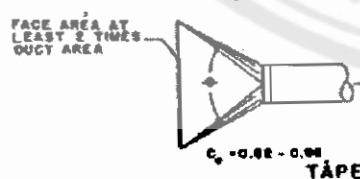
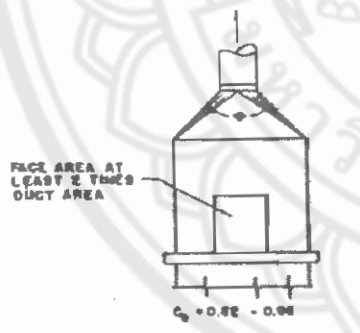
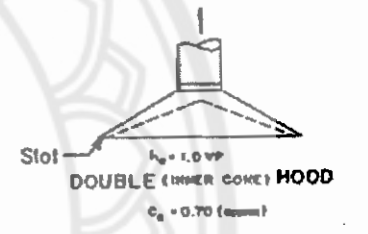
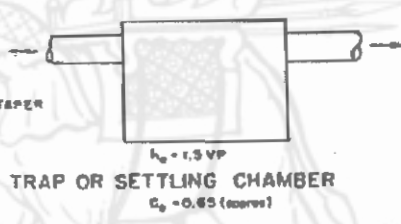
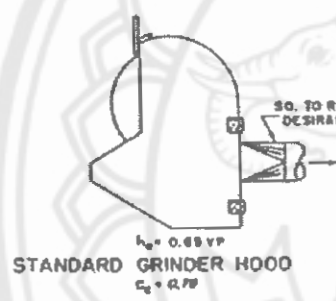
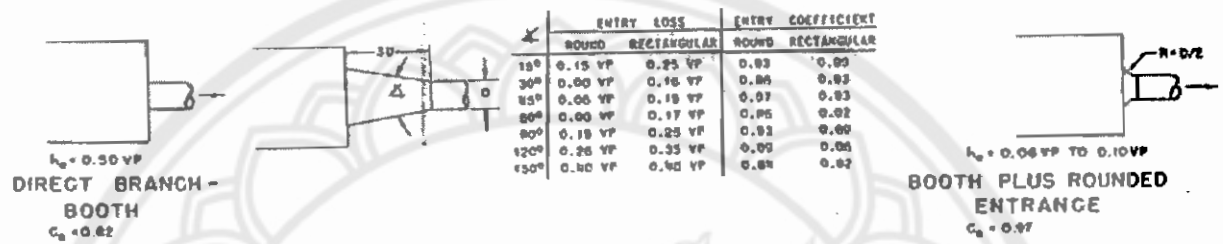
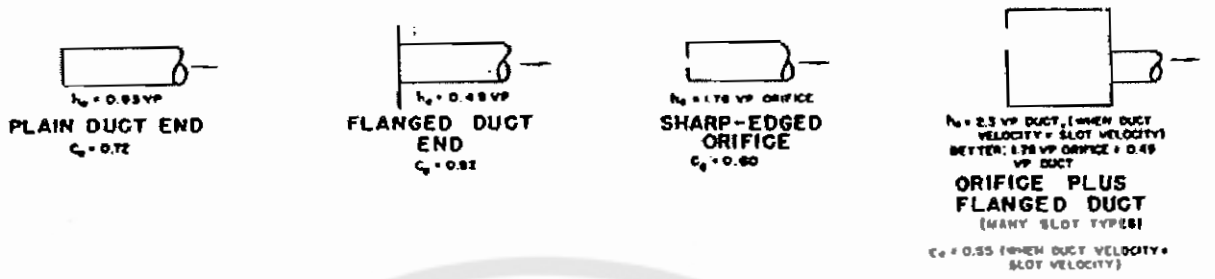


MECHANICAL ENGINEERING LAYOUT			
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Duct Reduction Design
for Roll Converting Machine (Perinl 4)

FACULTY OF ENGINEERING
NARESUAN UNIVERSITY





$$h_e = \frac{1 - C_e^2}{C_e^2} VP$$

$$F = \frac{1 - C_e^2}{C_e^2}$$

$$h_e = F \cdot VP$$

$$D = 4CDS + C_e \sqrt{FA}$$

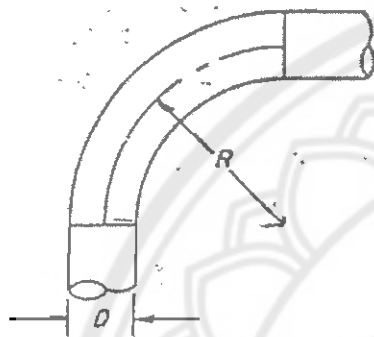
F = ENTRY LOSS FACTOR
 VP = VELOCITY PRESSURE IN DUCT
 SP = STATIC PRESSURE AT THROAT, INCHES WATER GAGE
 h_e = ENTRY LOSS, INCHES WATER GAGE
 D = AIR VOLUME, CFM
 A = CROSS SECTION AT THROAT, SQUARE FEET
 C_e = COEFFICIENT OF ENTRY

ENTRY LOSS FOR COMPLICATED HOOD SHAPES:
 1. BREAK HOOD INTO SIMPLE COMPONENTS
 2. CALCULATE h_e FOR EACH COMPONENT
 3. ADD VALUES OF h_e

MISCELLANEOUS VALVES

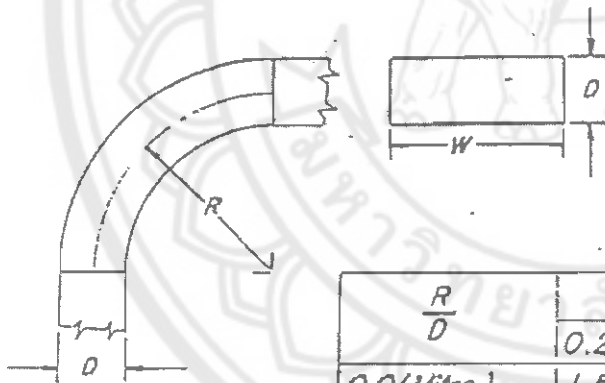
HOOD	ENTRY LOSS, F
ADHESIVE BLAST CHAMBER	1.0
ADHESIVE BLAST ELEVATOR	2.5
ADHESIVE SEPARATOR	2.2
ELEVATORS (EMULSIFIERS)	0.80
FLANGED PIPE PLUS CLOSED ELBOW	0.8
PLAIN PIPE PLUS CLOSED ELBOW	1.00
TUMBLING WHEELS (VARIES WITH DESIGN OF WHEEL)	AV. 2.0

รูปที่ ข.1 สัมประสิทธิ์ความเสียดทานของปากท่อชุดในลักษณะต่างๆ
 ที่มา : American Conference of Governmental Industrial Hygienists, 1970



R , No. of Diameters	Loss Fraction of VP
2.75 D	0.26
2.50 D	0.22
2.25 D	0.26
2.00 D	0.27
1.75 D	0.32
1.50 D	0.39
1.25 D	0.55

ROUND ELBOWS

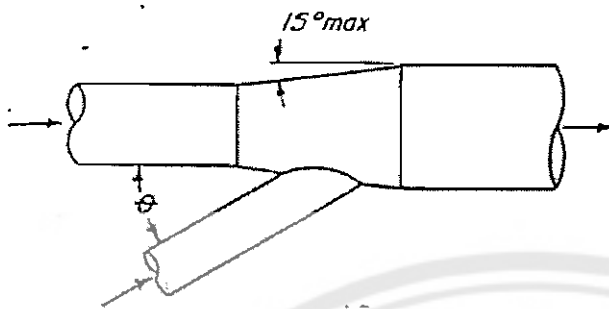


Loss, Fraction of VP

$\frac{R}{D}$	Aspect Ratio, W/D					
	0.25	0.5	1.0	2.0	3.0	4.0
0.0 (Mitre)	1.50	1.32	1.15	1.04	0.92	0.86
0.5	1.36	1.21	1.05	0.95	0.84	0.79
1.0	0.45	0.28	0.21	0.21	0.20	0.19
1.5	0.28	0.18	0.13	0.13	0.12	0.12
2.0	0.24	0.15	0.11	0.11	0.10	0.10
3.0	0.24	0.15	0.11	0.11	0.10	0.10

รูปที่ ข.2 สัมประสิทธิ์ความเสียหายของความดันเนื่องจากความเร็วในท่อลักษณะต่างๆ

ที่มา : American Conference of Governmental Industrial Hygienists, 1970

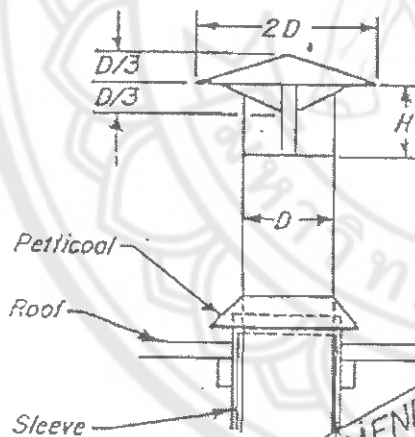


Note: Branch entry loss assumed to occur in branch and is so calculated.

Do not include an enlargement regain calculation for branch entry enlargements.

Angle θ Degrees	Loss Fraction of VP in Branch
10	0.06
15	0.09
20	0.12
25	0.15
30	0.18
35	0.21
40	0.25
45	0.28
50	0.32
60	0.44
90	1.00

BRANCH ENTRY LOSSES:



H, No. of Diameters	Loss Fraction of VP
1.0 D	0.10
0.75 D	0.18
0.70 D	0.22
0.65 D	0.30
0.60 D	0.41
0.55 D	0.56
0.50 D	0.73
0.45 D	1.0

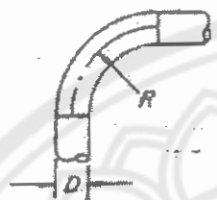

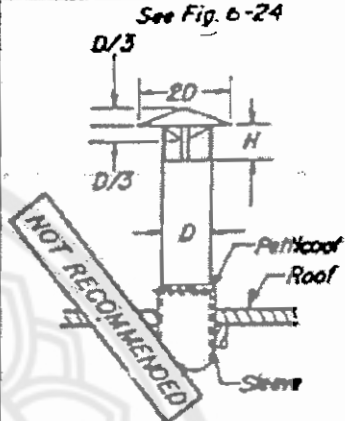
NOT RECOMMENDED

WEATHER CAP LOSSES

รูปที่ ข.3 สัมประสิทธิ์ความเสียหายของความดันเนื่องจากความเร็วในท่อแยกลักษณะต่างๆ

ที่มา : American Conference of Governmental Industrial Hygienists, 1970

EQUIVALENT RESISTANCE IN FEET OF STRAIGHT PIPE

Pipe D	90° Elbow * Centerline Radius			Angle of Entry		H, No of Diameters		
	1.5 D	2.0 D	2.5 D	30°	45°	1 D	.75 D	.5 D
3"	5	3	3	2	3	2	2	9
4"	6	4	4	3	5	2	3	12
5"	9	6	5	4	6	2	4	16
6"	12	7	6	5	7	3	5	20
7"	13	9	7	6	9	3	6	23
8"	15	10	8	7	11	4	7	26
10"	20	14	11	9	14	5	9	36
12"	25	17	14	11	17	6	11	44
14"	30	21	17	13	21	7	13	53
16"	36	24	20	16	25	9	15	62
18"	41	28	23	18	28	10	18	71
20"	46	32	26	20	32	11	20	80
24"	57	40	32			13	24	92
30"	74	51	41			17	31	126
36"	93	64	52			22	39	159
40"	105	72	59					
48"	130	89	73					

* For 60° elbows — 0.67 x loss for 90°
 45° elbows — 0.5 x loss for 90°
 30° elbows — 0.33 x loss for 90°

รูปที่ ข.4 ลักษณะข้ออและทางเข้าของท่อแยกขนาดต่างๆที่เทียบเป็นความยาวของท่อตรง
 ที่มา : American Conference of Governmental Industrial Hygienists, 1970

STATIC PRESSURE REGAINS FOR EXPANSIONS



Within duct

Regain (R), fraction of VP difference

Taper angle degrees	Diameter ratios D_2/D_1				
	1.25:1	1.5:1	1.75:1	2:1	2.5:1
3 1/2	0.92	0.88	0.84	0.81	0.75
5	0.88	0.84	0.80	0.76	0.68
10	0.85	0.76	0.70	0.63	0.53
15	0.83	0.70	0.62	0.55	0.43
20	0.81	0.67	0.57	0.48	0.43
25	0.80	0.65	0.53	0.44	0.28
30	0.79	0.63	0.51	0.41	0.25
Abrupt 90	0.77	0.62	0.50	0.40	0.25

Where: $SP_2 = SP_1 + R(VP_1 - VP_2)$

At end of duct

Regain (R), fraction of inlet VP

Taper length to inlet diam L/D	Diameter ratios D_2/D_1					
	1.2:1	1.3:1	1.4:1	1.5:1	1.6:1	1.7:1
10:1	0.37	0.39	0.38	0.35	0.31	0.27
15:1	0.39	0.46	0.47	0.46	0.44	0.41
20:1	0.42	0.49	0.52	0.52	0.51	0.49
3.0:1	0.44	0.52	0.57	0.59	0.60	0.59
4.0:1	0.45	0.55	0.60	0.63	0.63	0.64
5.0:1	0.47	0.56	0.62	0.65	0.66	0.68
7.5:1	0.48	0.58	0.64	0.68	0.70	0.72

Where: $SP_1 = SP_2 - R(VP_1)^*$

* When $SP_2 = 0$ (atmosphere) SP_1 will be (-)

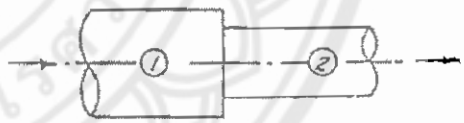
The regain (R) will only be 70% of value shown above when expansion follows a disturbance or elbow (including a fan) by less than 5 duct diameters.

STATIC PRESSURE LOSSES FOR CONTRACTIONS



Tapered contraction
 $SP_2 = SP_1 - (VP_2 - VP_1) - L(VP_2 - VP_1)$

Taper angle degrees	L(loss)
5	0.05
10	0.06
15	0.08
20	0.10
25	0.11
30	0.13
45	0.20
60	0.30
over 60	Abrupt contraction



Abrupt contraction
 $SP_2 = SP_1 - (VP_2 - VP_1) - K(VP_2)$

Ratio A_2/A_1	K
0.1	0.48
0.2	0.46
0.3	0.42
0.4	0.37
0.5	0.32
0.6	0.26
0.7	0.20

A = duct area, sq ft

รูปที่ ข. สัมประสิทธิ์ความเสียดทานของข้อลดและข้อขยาย

ที่มา : American Conference of Governmental Industrial Hygienists, 1970

ตารางที่ ข.1 แสดงความกว้างของท่อลมกับความหนาของแผ่นเหล็กประกอบ

DIMENSION OF LONGEST SIDE OF DUCT	STEEL METAL GAUGES	AT JOINTS						REINFORCING ANGLE SIZE AND MAXIMUM LONGITUDINAL SPACING BETWEEN TRANSVERSE JOINTS AND/OR INTERMEDIATE REINFORCING
		PLAIN "S" SLIP (B)	HEMMED "S" SLIP (C)	ANGLE SLIP (H)	COMPANION ANGLE (M)	RIVET OR WELD GASKET	ANGLE REINFORCED STANDING SEAM (J)	
THRU 12"	26	A-B	-	-	-	-	-	
13" THRU 18"	24	A-B	-	-	-	-	-	
19" THRU 30"	24	K	C-E	-	-	-	1"X1"XV8" @ 5" CC.	
31" THRU 42"	22	K	E, G, K	-	-	-	1"X1"XV8" @ 5" CC.	
43" THRU 54"	22	K	E	G	-	-	1 1/2"X1 1/2"XV8" @ 5" CC.	
55" THRU 60"	20	K	E	G	-	-	1 1/2"X1 1/2"XV8" @ 2'-6" CC.	
61" THRU 84"	20	-	-	G	-	J	-	
85" THRU 96"	18	-	-	-	-	M	1 1/2"X1 1/2"XV16" @ 2'-6" CC.	
OVER 96"	18	-	-	-	-	M	2"X2"X1/4" @ 2'-6" CC.	

H (HEIGHT DIMENSION) UP TO 42" = 1"
 H (HEIGHT DIMENSION) 43" TO 96" = 1 1/2"
 H (HEIGHT DIMENSION) OVER 96" = 2"

ที่มา : American Conference of Governmental Industrial Hygienists, 1970

ตารางที่ ข.2 แสดงเกจสำหรับแผ่นโลหะตามมาตรฐานต่างๆ

NO.	S.W.G.		B.G.		B.S.		U.S.G.		B.W.G.	
	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm
0	0.324	8.230	0.3964	10.07	0.3249	8.25	0.3125	7.938	0.340	8.64
1	0.300	7.620	0.3532	8.971	0.2893	7.35	0.2812	7.144	0.300	7.62
2	0.276	7.010	0.3147	7.993	0.2576	6.54	0.2656	6.747	0.284	7.21
3	0.252	6.401	0.2804	7.122	0.2294	5.83	0.2500	6.35	0.259	6.58
4	0.232	5.893	0.250	6.350	0.2043	5.19	0.2344	5.953	0.238	6.05
5	0.212	5.385	0.2275	5.652	0.1819	4.62	0.2187	5.556	0.220	5.59
6	0.192	4.877	0.1921	5.032	0.1620	4.11	0.2031	5.159	0.203	5.16
7	0.176	4.470	0.1764	4.481	0.1443	3.67	0.1875	4.762	0.180	4.57
8	0.160	4.054	0.1570	3.988	0.1285	3.26	0.1719	4.366	0.167	4.19
9	0.144	3.658	0.1398	3.551	0.1144	2.91	0.1562	3.969	0.148	3.76
10	0.128	3.251	0.1250	3.175	0.1019	2.59	0.1406	3.572	0.134	3.40
11	0.116	2.946	0.1113	2.827	0.09074	2.30	0.1250	3.175	0.120	3.05
12	0.104	2.642	0.0991	2.517	0.08081	2.05	0.1094	2.778	0.109	2.77
13	0.092	2.337	0.0882	2.240	0.07196	1.83	0.0937	2.381	0.095	2.41
14	0.080	2.032	0.0785	1.994	0.06408	1.63	0.0781	1.984	0.083	2.11
15	0.072	1.829	0.0699	1.775	0.05707	1.45	0.0703	1.786	0.072	1.83
16	0.064	1.626	0.0625	1.588	0.05087	1.29	0.0625	1.588	0.065	1.65
17	0.056	1.422	0.0556	1.412	0.04526	1.15	0.0562	1.429	0.058	1.47
18	0.048	1.219	0.0495	1.257	0.04030	1.02	0.05	1.270	0.049	1.24
19	0.040	1.016	0.0440	1.118	0.03589	0.91	0.0437	1.111	0.042	1.07

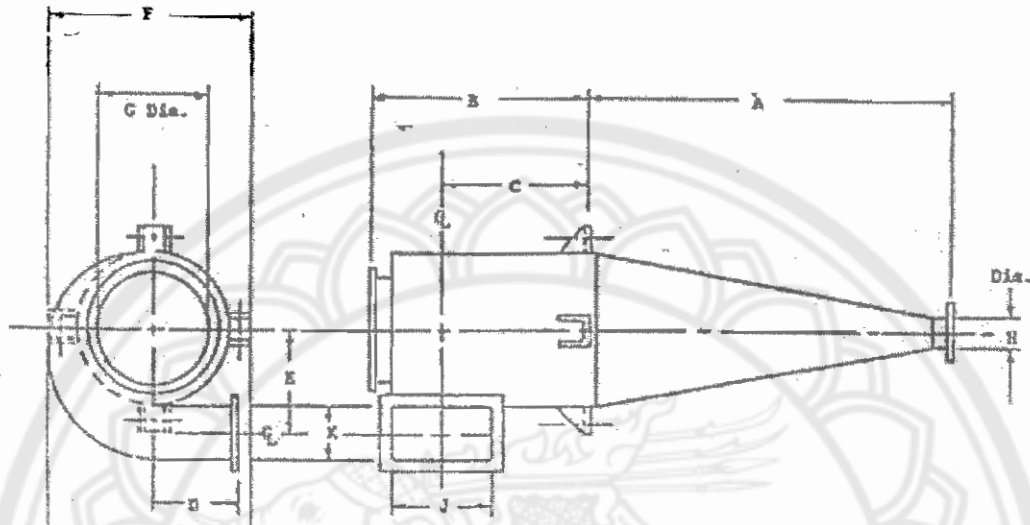
ตารางที่ ข.2 (ต่อ) แสดงเกจสำหรับแผ่น โลหะตามมาตรฐานต่างๆ

NO.	S.W.G.		B.G.		B.S.		U.S.G.		B.W.G.	
	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm
20	0.036	0.914	0.0392	0.9957	0.03196	0.812	0.0375	0.952	0.035	0.89
21	0.032	0.813	0.0349	0.8865	0.02846	0.723	0.0344	0.873	0.032	0.81
22	0.028	0.711	0.03125	0.7938	0.02535	0.644	0.03125	0.794	0.028	0.71
23	0.024	0.610	0.02782	0.7066	0.02257	0.573	0.0281	0.714	0.025	0.64
24	0.022	0.559	0.02476	0.6289	0.02010	0.511	0.025	0.635	0.022	0.56
25	0.020	0.508	0.02204	0.5598	0.01790	0.455	0.0219	0.556	0.020	0.51
26	0.018	0.457	0.01961	0.4981	0.01594	0.405	0.0188	0.476	0.018	0.46
27	0.0164	0.4166	0.01745	0.4432	0.01420	0.361	0.0172	0.437	0.016	0.41
28	0.0148	0.3759	0.015625	0.3969	0.01264	0.321	0.0156	0.397	0.014	0.36
29	0.0136	0.3454	0.0139	0.3531	0.01126	0.286	0.0141	0.357	0.013	0.33
30	0.0124	0.3150	0.0123	0.3124	0.01003	0.255	0.0125	0.318	0.012	0.30
31	0.0116	0.2946	0.0110	0.2794	0.008928	0.227	0.0109	0.278	0.010	0.25
32	0.0108	0.2743	0.0098	0.2480	0.007950	0.202	0.0102	0.258	0.009	0.23
33	0.0100	0.2540	0.0087	0.2210	0.007080	0.180	0.0094	0.238	0.008	0.20
34	0.0092	0.2337	0.0077	0.1956	0.006304	0.160	0.0086	0.218	0.007	0.18
35	0.0084	0.2134	0.0069	0.1753	0.005615	0.143	0.0078	0.198	0.005	0.13

S.W.G. Standard Wire Gauge
 B.G. Birmingham Gauge
 B.S. American Brown and Sharpe's Gauge
 U.S.G. United Standard Gauge
 B.W.G. Birmingham Wire Gauge

ที่มา : American Conference of Governmental Industrial Hygienists, 1970

ตารางที่ ข.3 แสดงลักษณะส่วนประกอบของไซโคลน

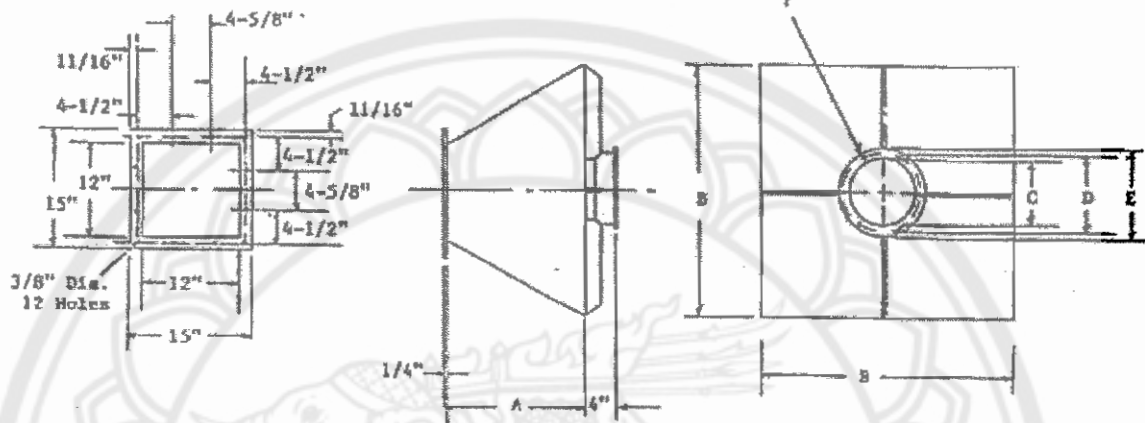


XQ-665 SERIES SINGLE CYCLONES
DIMENSIONS (In Inches)

SIZE	PERFORMANCE DATA				A	B	C	D	E	F	G	H	J	K	Mntp. Hole Dia.	Wt. In Lb.
	At 2.5" Pressure Drop - Critical		At 6.0" Pressure Drop - Critical													
	Capacity (C.F.H.)	Partical Size (Microns)	Capacity (C.F.H.)	Partical Size (Microns)												
3	69	7.9	104	6.0	10 1/2	7 1/2	4	5	2-7/8	8 1/2	3	2	3	1 1/2	1/2	5
4	121	9.1	184	6.9	13 1/2	9 1/2	5 1/2	6	3-3/4	10	4	2	4	2	1/2	8
5	192	10.2	288	7.8	17 1/2	11 1/2	7	6	4-11/16	11	5	3	5	2 1/2	1/2	13
6	276	11.2	415	8.5	20 1/2	13 1/2	8 1/2	6	5-5/8	12 1/2	6	3	6	3	1/2	19
7	375	12.1	565	9.2	23 1/2	15 1/2	10	7	6-9/16	14	7	4	7	3 1/2	1/2	25
8	492	12.9	738	9.9	27 1/2	17 1/2	11 1/2	7	7-7/16	15 1/2	8	4	8	4	1/2	42
9	622	13.7	934	10.4	30 1/2	19 1/2	13	8	8-3/8	16 1/2	9	5	9	4 1/2	1/2	48
10	768	14.4	1153	11.0	34 1/2	21 1/2	14 1/2	6	9-3/8	18	10	5	10	5	1/2	63
11	929	15.1	1395	11.5	37 1/2	23 1/2	16	9	10-1/4	19 1/2	11	6	11	5 1/2	1/2	70
12	1105	15.8	1660	12.0	40 1/2	25 1/2	16 1/2	9	11-1/8	21	12	6	12	6	1/2	79
13	1298	16.4	1949	12.5	43 1/2	27 1/2	17 1/2	10	12	24	13	7	13	6 1/2	1/2	88
14	1505	17.1	2260	13.0	47 1/2	29 1/2	18	10	12-7/8	25	14	7	14	7	1/2	102
15	1723	17.7	2594	13.4	51 1/2	31 1/2	19 1/2	11	13-7/8	26 1/2	15	8	15	7 1/2	1/2	120
16	1955	18.2	2952	13.7	55 1/2	33 1/2	21	11	14-7/8	28	16	8	16	8	1/2	135
17	2200	18.8	3332	14.3	59 1/2	35 1/2	22 1/2	11	15-5/8	29	17	9	17	8 1/2	1/2	158
18	2468	19.3	3736	14.7	63 1/2	37 1/2	24	12	16-5/8	30 1/2	18	10	18	9	1/2	180
19	2752	19.9	4162	15.1	67 1/2	39 1/2	25 1/2	12	17-5/8	32	19	10	19	9 1/2	1/2	195
20	3052	20.4	4612	15.5	71 1/2	41 1/2	27	12	18-3/8	33	20	10	20	10	1/2	205
21	3367	20.9	5085	15.9	75 1/2	43 1/2	28 1/2	13	19-3/8	34 1/2	21	11	21	10 1/2	1/2	210
22	3707	21.4	5581	16.3	79 1/2	45 1/2	30	13	20-3/8	36	22	11	22	11	1/2	250
23	4063	21.9	6099	16.6	83 1/2	47 1/2	31 1/2	13	21-1/8	37	23	12	23	11 1/2	1/2	270
24	4424	22.3	6641	17.0	87 1/2	49 1/2	33	13	22-1/8	39	24	12	24	12	1/2	300
25	4800	22.8	7205	17.4	91 1/2	51 1/2	34 1/2	14	23-1/8	42	25	13	25	12 1/2	1	345
26	5192	23.3	7794	17.7	95 1/2	53 1/2	36	14	23-7/8	43	26	14	26	13	1	390
28	6021	24.1	9040	18.4	103 1/2	57 1/2	39	14	25-7/8	46	28	15	28	14	1	435
30	6912	25.0	10377	19.0	109 1/2	61 1/2	42	15	27-5/8	48 1/2	30	16	30	15	1	496
32	7864	25.8	11607	19.6	115 1/2	65 1/2	45	15	29-3/8	51	32	17	32	16	1	555
34	8878	26.6	13229	20.2	121 1/2	69 1/2	48	15	31-3/8	54	34	18	34	17	1	615
36	9953	27.4	14943	20.8	127 1/2	73 1/2	51	16	33-1/8	56	36	19	36	18	1	670
38	11090	28.1	16649	21.4	133 1/2	77 1/2	54	16	34-7/8	59	38	19	38	19	1	820
40	12288	28.8	18448	21.9	139 1/2	81 1/2	57	16	36-7/8	62	40	20	40	20	1	970
42	13548	29.6	20339	22.5	145 1/2	85 1/2	60	17	38-5/8	65	42	21	42	21	1 1/2	1120
44	14868	30.2	22322	23.0	151 1/2	89 1/2	63	17	40-3/8	71	44	23	44	22	1 1/2	1250
46	16251	30.9	24397	23.5	157 1/2	93 1/2	66	18	42-3/8	74	46	24	46	23	1 1/2	1530
48	17695	31.6	26565	24.0	163 1/2	97 1/2	69	18	44-3/16	77	48	25	48	24	1 1/2	1810
50	19200	32.2	28825	24.5	169 1/2	101 1/2	72	19	45-15/16	79	50	26	50	25	1 1/2	2090
52	20767	32.8	31177	25.0	175 1/2	105 1/2	75	19	47-15/16	82	52	27	52	26	1 1/2	2370
54	22395	33.5	33621	25.5	181 1/2	109 1/2	78	20	49-11/16	85	54	28	54	27	1 1/2	2650
56	24084	34.1	36158	26.0	187 1/2	113 1/2	81	20	51-7/16	87	56	29	56	28	1 1/2	3000
58	25836	34.7	38787	26.4	193 1/2	117 1/2	84	21	53-7/16	90	58	30	58	29	1 1/2	3400
60	27648	35.3	41508	26.9	199 1/2	121 1/2	87	21	55-3/16	92 1/2	60	31	60	30	1 1/2	3850

ตารางที่ ข.3(ต่อ) แสดงลักษณะส่วนประกอบของไซโคลน

DUST HOPPERS FOR XQ CYCLONES



DIMENSIONS (In Inches)

Size	Collector(s)	A	B	Std. Construction		Heavy Construction		D (S.C.)	E (O.D.)	F No. & Dia. Holes*		
				Metal Thkns.	C (I.D.)	Weight Lbs.	Metal Thkns.				C (I.D.)	Weight Lbs.
3	XQ3-10, Incl	12	12	.0598	2-15/16	22	.1345	2-13/16	38	4-5/16	5-1/8	6 @ 9/32
4	XQ11-15 Incl	12	16	.0598	3-15/16	27	.1345	3-13/16	48	5-1/4	6-1/8	6 @ 9/32
5	XQ16, 17 & 18	12	20	.0598	4-15/16	33	.1345	4-13/16	61	6-5/16	7-1/8	6 @ 9/32
6	XQ19-22 Incl	12	24	.0598	5-15/16	40	3/16	5-11/16	95	7-1/4	8-1/8	6 @ 9/32
7	XQ23-26 Incl	14	28	.0598	6-15/16	51	3/16	6-11/16	123	8-1/2	9-3/8	6 @ 3/8
8	XQ28 & 30	18	32	.0598	7-15/16	65	3/16	7-11/16	170	9-7/16	10-3/8	6 @ 3/8
9	XQ32	21	36	.0598	8-15/16	80	3/16	8-11/16	215	10-9/16	11-5/8	6 @ 7/16
10	XQ34, XQ36	25	40	.0598	9-15/16	100	3/16	9-11/16	265	11-11/16	12-7/8	6 @ 7/16
11	XQ38, XQ40	28	44	.0747	10-15/16	140	3/16	10-11/16	315	12-3/4	13-5/8	6 @ 7/16
12	XQ42, XQ44	32	48	.0747	11-15/16	165	3/16	11-11/16	375	14	15-1/8	8 @ 7/16
13	XQ46, XQ48	35	52	.1046	12-7/8	260	3/16	12-11/16	440	15-1/4	16-1/8	8 @ 7/16
14	XQ50, XQ52	39	56	.1046	13-7/8	305	3/16	13-11/16	515	16	17-1/8	8 @ 7/16
15	XQ54, XQ56	42	60	.1046	14-7/8	350	3/16	14-11/16	590	17	18-1/8	8 @ 7/16
16	XQ58	46	64	.1046	15-7/8	395	3/16	15-11/16	670	18	19-1/8	8 @ 7/16
17	XQ60	49	68	.1046	16-7/8	445	3/16	16-11/16	755	19	20-1/8	8 @ 7/16

ESTIMATING PRICES

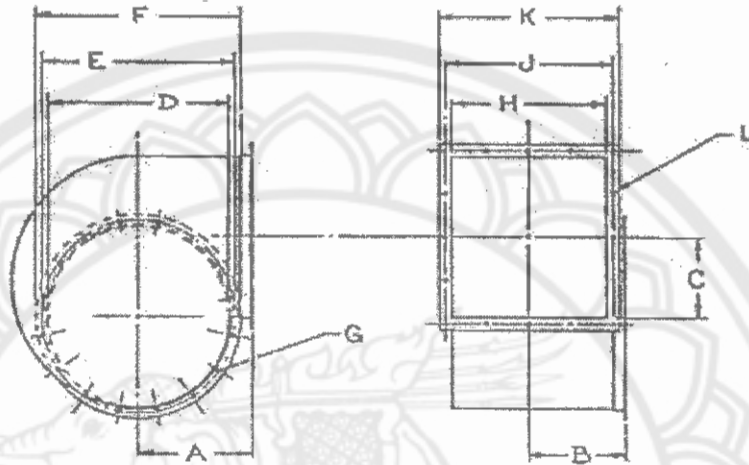
Hopper Estimating Prices; Hot Rolled Steel Construction and Type 304 S.S. Construction

Hopper Size*	Cost Each In Hot Rolled Steel					Cost Each In Type 304 S.S.				
	16 GA.	14 GA.	12 GA.	10 GA.	3/16" Plate	16 GA.	14 GA.	12 GA.	10 GA.	3/16" Plate
No. 3	\$210.	\$230.	\$250.	\$270.	\$290.	\$270.	\$300.	\$340.	\$380.	\$450.
No. 4	220.	240.	260.	280.	310.	290.	320.	370.	420.	490.
No. 5	270.	290.	270.	290.	320.	300.	340.	400.	450.	540.
No. 6	330.	250.	280.	300.	340.	320.	360.	420.	480.	590.
No. 7	240.	260.	300.	320.	360.	350.	390.	470.	550.	650.
No. 8	260.	280.	310.	350.	400.	380.	430.	530.	610.	720.
No. 9	270.	290.	340.	370.	430.	420.	480.	590.	690.	880.
No. 10	280.	310.	360.	400.	470.	460.	530.	650.	770.	1000.
No. 11	310.	350.	410.	460.	560.	600.	710.	900.	1090.	1440.
No. 12	320.	360.	420.	480.	570.	610.	720.	910.	1100.	1460.
No. 13	330.	370.	430.	490.	590.	620.	730.	920.	1110.	1470.
No. 14	410.	460.	560.	650.	810.	960.	1140.	1500.	1840.	2480.
No. 15	420.	470.	580.	670.	840.	970.	1160.	1520.	1860.	2510.
No. 16	430.	490.	590.	690.	860.	980.	1170.	1530.	1880.	2530.
No. 17	440.	500.	610.	710.	880.	990.	1180.	1550.	1890.	2550.

*See Dimension Table above for relationship of Hopper Size to XQ Cyclone Size.

ตารางที่ ข.3(ต่อ) แสดงลักษณะส่วนประกอบของไซโคลน

SCROLL OUTLETS FOR XQ CYCLONES

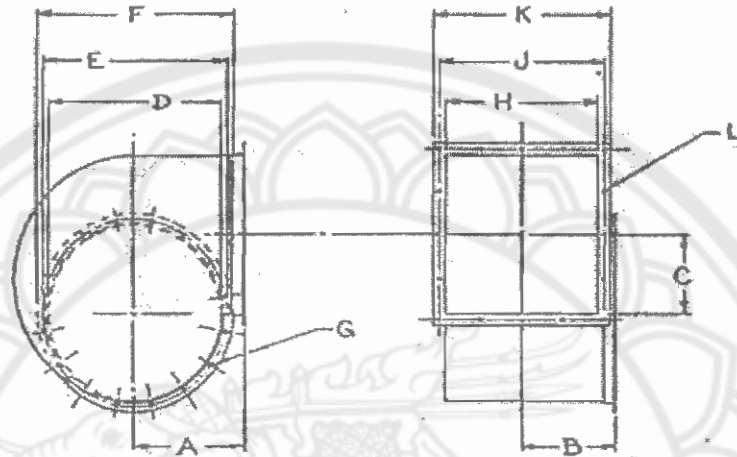


DIMENSIONS (In Inches)

Size	A	B	C	Round Flange				G No. & Dia. Holes
				D (I.D.)		E (S.C.)	F (O.D.)	
				Standard Consn.	Heavy Consn.			
XQ3	3	2-3/4	1-1/4	2-15/16	2-13/16	4-5/16	5-1/8	6 @ 9/32
XQ4	3-1/2	3-1/4	1-3/4	3-15/16	3-13/16	5-1/4	6-1/8	6 @ 9/32
XQ5	4	3-3/4	2-1/4	4-15/16	4-13/16	6-5/16	7-1/8	6 @ 9/32
XQ6	4-1/2	4-1/4	2-3/4	5-15/16	5-13/16	7-1/4	8-1/8	6 @ 9/32
XQ7	5	4-1/2	3	6-15/16	6-13/16	8-1/2	9-3/8	6 @ 3/8
XQ8	5-1/2	5	3-1/2	7-15/16	7-13/16	9-7/16	10-3/8	6 @ 3/8
XQ9	6	5-1/2	4	8-15/16	8-13/16	10-9/16	11-5/8	6 @ 7/16
XQ10	8	7-1/2	4-1/2	9-15/16	9-13/16	11-11/16	12-7/8	6 @ 7/16
XQ11	8-1/2	7-3/4	4-3/4	10-15/16	10-13/16	12-3/4	13-5/8	6 @ 7/16
XQ12	9	8-1/4	5-1/4	11-15/16	11-13/16	14	15-1/8	8 @ 7/16
XQ13	9-1/2	8-3/4	5-3/4	12-15/16	12-13/16	15-1/4	16-1/8	8 @ 7/16
XQ14	10	9-1/4	6-1/4	13-15/16	13-13/16	16	17-1/8	8 @ 7/16
XQ15	10-1/2	9-3/4	6-3/4	14-15/16	14-13/16	17	18-1/8	8 @ 7/16
XQ16	11	10	7	15-15/16	15-13/16	18	19-1/8	8 @ 7/16
XQ17	11-1/2	10-1/2	7-1/2	16-15/16	16-13/16	19	20-1/8	8 @ 7/16
XQ18	12	11	8	17-15/16	17-13/16	20	21-1/8	8 @ 7/16
XQ19	12-1/2	11-1/2	8-1/2	18-15/16	18-13/16	20-3/4	22-1/8	12 @ 7/16
XQ20	13	12	9	19-15/16	19-13/16	21-3/4	23-1/8	12 @ 7/16
XQ21	13-1/2	12-1/4	9-1/4	20-15/16	20-13/16	22-3/4	24-1/8	12 @ 7/16
XQ22	14	12-3/4	9-3/4	21-15/16	21-13/16	23-3/4	25-1/8	12 @ 7/16
XQ23	14-1/2	13	10	22-15/16	22-13/16	24-7/8	26-1/8	12 @ 7/16
XQ24	15	13-1/2	10-1/2	23-15/16	23-13/16	25-7/8	27-1/8	12 @ 7/16
XQ25	15-1/2	14	11	24-15/16	24-13/16	26-7/8	28-1/8	16 @ 7/16
XQ26	16	14-1/2	11-1/2	25-15/16	25-13/16	28-3/8	30-1/8	16 @ 7/16
XQ28	17	15-1/2	12-1/2	27-15/16	27-13/16	30-3/8	32-1/8	16 @ 7/16
XQ30	18	16-1/2	13-1/2	29-15/16	29-13/16	32-3/8	34-1/8	16 @ 7/16
XQ32	19	17	14	31-15/16	31-13/16	34-3/8	36-1/8	16 @ 7/16
XQ34	20	18	15	33-15/16	33-13/16	36-3/8	38-1/8	16 @ 7/16
XQ36	21	19	16	35-15/16	35-13/16	38-3/8	40-1/8	16 @ 7/16
XQ38	22	20	17	37-15/16	37-13/16	40-3/8	42-1/8	20 @ 7/16
XQ40	23	20-1/2	17-1/2	39-15/16	39-13/16	42-3/8	44-1/8	20 @ 7/16
XQ42	24	21-1/2	18-1/2	41-15/16	41-13/16	44-3/8	46-1/8	20 @ 7/16
XQ44	25	22-1/2	19-1/2	43-15/16	43-13/16	46-3/8	48-1/8	24 @ 7/16
XQ46	26	23-1/2	20-1/2	45-15/16	45-13/16	48-3/8	50-1/8	24 @ 7/16
XQ48	27	24-1/2	21-1/2	47-15/16	47-5/8	50-3/8	52-1/8	24 @ 7/16
XQ50	28	25	22	49-15/16	49-5/8	52-3/8	54-1/8	30 @ 9/16
XQ52	29	26	23	51-7/8	51-11/16	54-3/8	56-3/8	30 @ 9/16
XQ54	30	27	24	53-7/8	53-11/16	56-3/8	58-1/8	30 @ 9/16
XQ56	31	28	25	55-7/8	55-11/16	58-3/8	60-1/8	30 @ 9/16
XQ58	32	28-1/2	25-1/2	57-7/8	57-11/16	60-3/8	62-1/8	30 @ 9/16
XQ60	33	29-1/2	26-1/2	59-7/8	59-11/16	62-3/8	64-1/8	36 @ 9/16

ตารางที่ ข.3(ต่อ) แสดงลักษณะส่วนประกอบของไซโคลน

SCROLL OUTLETS FOR XQ CYCLONES

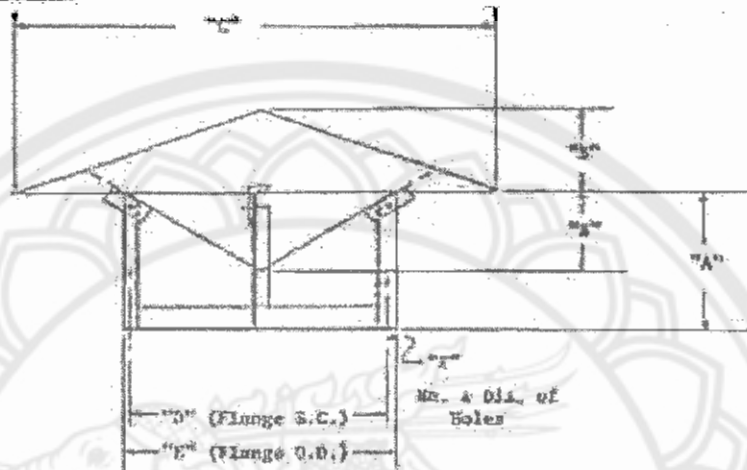


DIMENSIONS (In Inches)

Size	Square Flange				L No. & Dia. Holes	Metal Thickness		Weight	
	H Standard Constn.	Heavy Constn.	J Inches & No. Eq. Sp.	K		Standard Constn.	Heavy Constn.	Standard Constn.	Heavy Constn.
XQ3	2-1/2	2-1/4	3-1/4 - 1	4-3/4	4 @ 7/16	.0598	.1345	3	5
XQ4	3-1/2	3-1/4	4-1/4 - 1	5-3/4	4 @ 7/16	.0598	.1345	4	7
XQ5	4-1/2	4-1/4	5-1/4 - 1	6-3/4	4 @ 7/16	.0598	.1345	6	10
XQ6	5-1/2	5-1/4	6-1/4 - 1	7-3/4	4 @ 7/16	.0598	.1345	7	13
XQ7	6	5-7/8	6-3/4 - 2	8-1/4	6 @ 7/16	.0598	.1345	9	16
XQ8	7	6-7/8	7-3/4 - 2	9-1/4	6 @ 7/16	.0598	.1345	11	19
XQ9	8	7-7/8	8-3/4 - 2	10-1/4	6 @ 7/16	.0598	.1345	13	23
XQ10	9	8-7/8	11-1/2 - 2	13-1/4	6 @ 9/16	.0598	.1345	24	36
XQ11	9-1/2	9-1/4	12 - 3	13-3/4	12 @ 9/16	.0598	.1345	27	41
XQ12	10-1/2	10-1/4	13 - 3	14-3/4	12 @ 9/16	.0598	.1345	30	46
XQ13	11-1/2	11-1/4	14 - 3	15-3/4	12 @ 9/16	.0598	.1345	34	52
XQ14	12-1/2	12-1/4	15 - 3	16-3/4	12 @ 9/16	.0598	.1345	37	58
XQ15	13-1/2	13-1/4	16 - 3	17-3/4	12 @ 9/16	.0598	.1345	42	66
XQ16	14	13-7/8	16-1/2 - 3	18-1/4	12 @ 9/16	.0598	.1345	46	72
XQ17	15	14-7/8	17-1/2 - 3	19-1/4	12 @ 9/16	.0598	.1345	50	79
XQ18	16	15-7/8	18-1/2 - 4	20-1/4	16 @ 9/16	.0598	.1345	54	86
XQ19	17	16-3/4	19-1/2 - 4	21-1/4	16 @ 9/16	.0598	3/16	58	117
XQ20	18	17-3/4	20-1/2 - 4	22-1/4	16 @ 9/16	.0598	3/16	62	126
XQ21	18-1/2	18-1/4	21 - 4	22-3/4	16 @ 9/16	.0598	3/16	66	137
XQ22	19-1/2	19-1/4	22 - 4	23-3/4	16 @ 9/16	.0598	3/16	71	148
XQ23	20	19-3/4	22-1/2 - 4	24-1/4	16 @ 9/16	.0598	3/16	75	159
XQ24	21	20-3/4	23-1/2 - 4	25-1/4	16 @ 9/16	.0598	3/16	80	170
XQ25	22	21-3/4	24-1/2 - 5	26-1/4	20 @ 9/16	.0598	3/16	88	175
XQ26	23	22-3/4	25-1/2 - 5	27-1/4	20 @ 9/16	.0598	3/16	94	198
XQ28	25	24-3/4	27-1/2 - 5	29-1/4	20 @ 9/16	.0598	3/16	105	224
XQ30	27	26-3/4	29-1/2 - 6	31-1/4	24 @ 9/16	.0598	3/16	120	255
XQ32	28	27-3/4	30-1/2 - 6	32-1/4	24 @ 9/16	.0598	3/16	130	280
XQ34	30	29-3/4	32-1/2 - 6	34-1/4	24 @ 9/16	.0598	3/16	140	315
XQ36	32	31-3/4	34-1/2 - 6	36-1/4	24 @ 9/16	.0598	3/16	155	345
XQ38	34	33-3/4	36-1/2 - 7	38-1/4	28 @ 9/16	.0747	3/16	195	380
XQ40	35	34-3/4	37-1/2 - 7	39-1/4	28 @ 9/16	.0747	3/16	210	410
XQ42	37	36-3/4	39-1/2 - 7	41-1/4	28 @ 9/16	.0747	3/16	225	450
XQ44	39	38-3/4	41-1/2 - 8	43-1/4	32 @ 9/16	.0747	3/16	245	485
XQ46	41	40-3/4	43-1/2 - 8	45-1/4	32 @ 9/16	.0747	3/16	260	525
XQ48	43	42-13/16	45-5/8 - 8	47-3/8	32 @ 9/16	.1046	3/16	360	565
XQ50	44	43-13/16	46-5/8 - 8	48-3/8	32 @ 9/16	.1046	3/16	395	620
XQ52	46	45-13/16	48-5/8 - 9	50-3/8	36 @ 9/16	.1046	3/16	420	665
XQ54	48	47-13/16	50-5/8 - 9	52-3/8	36 @ 9/16	.1046	3/16	450	710
XQ56	50	49-13/16	52-5/8 - 9	54-3/8	36 @ 9/16	.1046	3/16	480	760
XQ58	51	50-13/16	53-5/8 - 10	55-3/8	40 @ 9/16	.1046	3/16	510	805
XQ60	53	52-13/16	55-5/8 - 10	57-3/8	40 @ 9/16	.1046	3/16	540	855

ตารางที่ ข.3(ต่อ) แสดงลักษณะส่วนประกอบของไซโคลน

HEATHLE CAPS FOR XQ CYCLONES

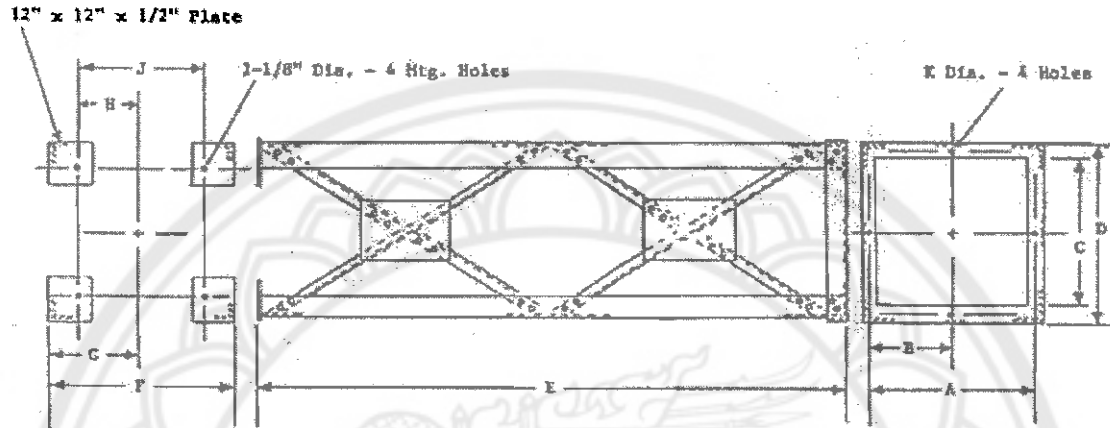


DIMENSIONS (In inches)

Size	"A"	"B"	"C"	"D"	"E"	"F"	Weight Lbs.
XQ3	2-1/2	1	6	2-5/16	3-1/8	6 # 9/32	2
XQ4	3	1-1/8	8	3-1/4	4-1/8	6 # 9/32	3
XQ5	3-1/2	1-5/8	10	4-5/16	5-1/8	6 # 9/32	5
XQ6	4	2	12	5-1/4	6-1/8	6 # 9/32	6
XQ7	4-5/8	2-3/8	14	6-1/2	7-1/8	6 # 3/8	8
XQ8	5-1/8	2-5/8	16	7-7/16	8-3/8	6 # 3/8	10
XQ9	5-3/4	3	18	8-9/16	9-5/8	6 # 7/16	13
XQ10	6-3/8	3-3/8	20	10-11/16	11-7/8	6 # 7/16	15
XQ11	6-3/4	3-5/8	22	11-1/4	12-5/8	8 # 7/16	17
XQ12	7-1/2	4	24	12	13-1/8	8 # 7/16	22
XQ13	8	4-3/8	26	13-1/4	14-1/8	8 # 7/16	25
XQ14	8-1/2	4-5/8	28	14	15-1/8	8 # 7/16	28
XQ15	9	5	30	15	16-1/8	8 # 7/16	36
XQ16	9-1/2	5-3/8	32	16	17-1/8	8 # 7/16	40
XQ17	10	5-5/8	34	17	18-1/8	8 # 7/16	44
XQ18	10-1/2	6	36	18	19-1/8	8 # 7/16	48
XQ19	11	6-3/8	38	19-3/4	20-1/8	12 # 7/16	52
XQ20	11-1/2	6-5/8	40	21-3/4	21-3/8	12 # 7/16	57
XQ21	12	7	42	22-3/4	22-1/8	12 # 7/16	62
XQ22	12-1/2	7-3/8	44	23-3/4	23-1/8	12 # 7/16	67
XQ23	13	7-5/8	46	24-7/8	24-1/8	12 # 7/16	72
XQ24	13-1/2	8	48	25-7/8	25-1/8	12 # 7/16	77
XQ25	14	8-1/2	50	26-7/8	26-1/8	16 # 7/16	87
XQ26	15	9	52	28-3/8	28-1/8	16 # 7/16	98
XQ28	16	9-1/2	56	30-1/8	30-1/8	16 # 7/16	110
XQ30	17	10	60	32-3/8	32-1/8	16 # 7/16	124
XQ32	18	10-5/8	64	34-3/8	34-1/8	16 # 7/16	138
XQ34	19	11-3/8	68	36-1/8	36-1/8	16 # 7/16	153
XQ36	20	12	72	38-3/8	38-1/8	16 # 7/16	169
XQ38	21	12-5/8	76	40-3/8	40-1/8	20 # 7/16	218
XQ40	22	13-3/8	80	42-3/8	42-1/8	20 # 7/16	239
XQ42	23	14	84	44-3/8	44-1/8	20 # 7/16	261
XQ44	24	14-5/8	88	46-3/8	46-1/8	24 # 7/16	286
XQ46	25	15-3/8	92	48-3/8	48-1/8	24 # 7/16	307
XQ48	26	16	96	50-3/8	50-1/8	24 # 7/16	336
XQ50	27	16-5/8	100	52-3/8	52-1/8	30 # 9/16	495
XQ52	28	17-3/8	104	54-3/8	54-1/8	30 # 9/16	532
XQ54	29	18	108	56-3/8	56-1/8	30 # 9/16	569
XQ56	30	18-5/8	112	58-3/8	58-1/8	30 # 9/16	609
XQ58	31	19-3/8	116	60-3/8	60-1/8	30 # 9/16	649
XQ60	32	20	120	62-3/8	62-1/8	36 # 9/16	691

ตารางที่ ข.3(ต่อ) แสดงลักษณะส่วนประกอบของไซโคลน

SUPPORT STANDS FOR XO CYCLONES

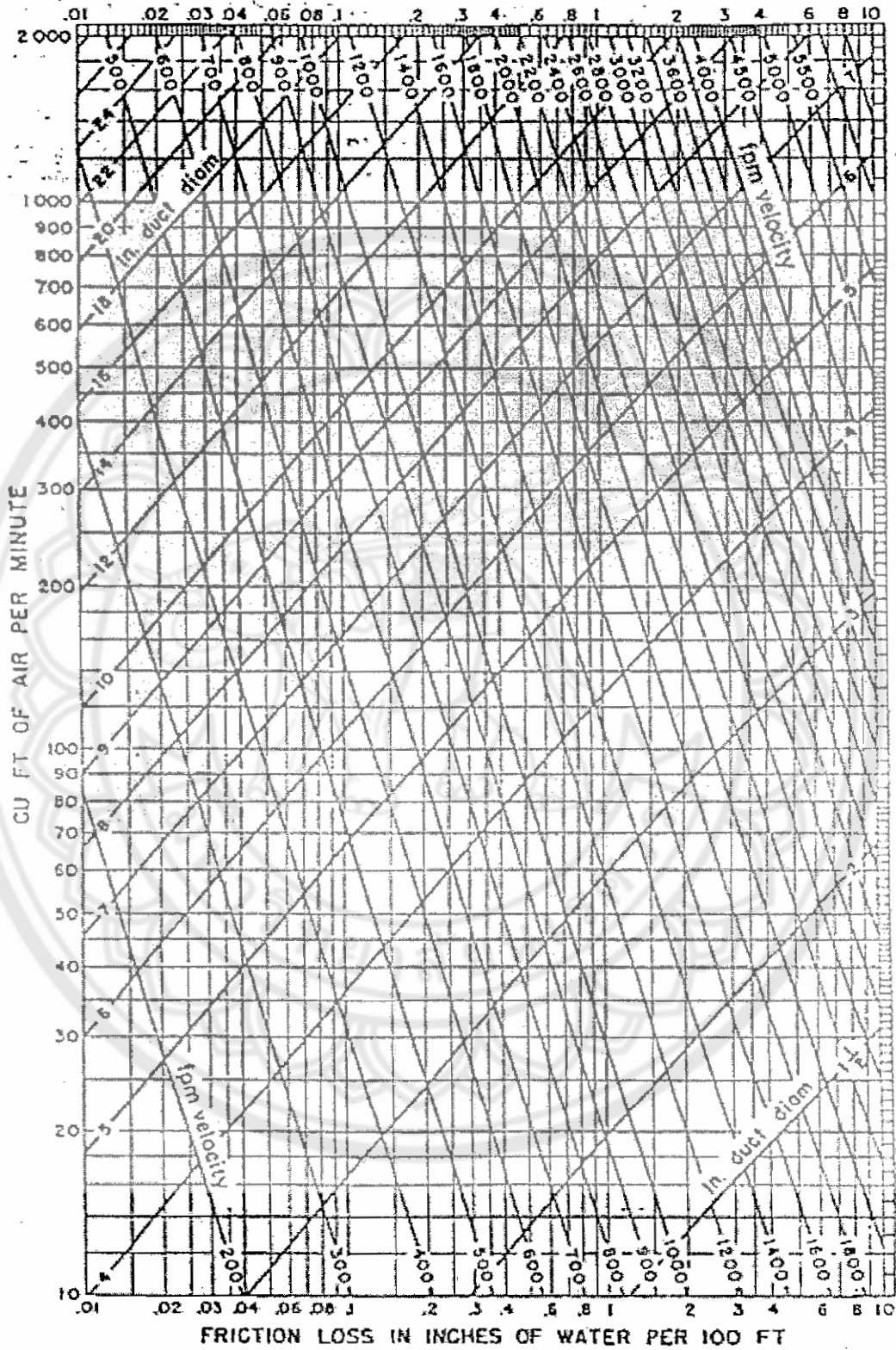


DIMENSIONS (In Inches)

Collector	A	B	C	D	E	F	G	H	J	K	Weight Lbs.
XQ9	14-3/4	7-3/8	13	17	82-1/2	27	13-1/2	4-3/4	9-1/2	1/2	390
XQ10	15-3/4	7-7/8	14	18	86-1/2	28	14	5-1/4	10-1/2	1/2	405
XQ11	16-3/8	8-3/8	15	19	88-1/2	29	14-1/2	5-3/4	11-1/2	1/2	410
XQ12	18-3/4	9-3/8	17	21	92-1/2	31	15-1/2	6-3/4	13-1/2	1/2	430
XQ13	20-1/2	10-1/4	18	24	99	26	13	4-1/4	8-1/2	3/4	565
XQ14	21-1/2	10-3/4	19	25	101	27	13-1/2	4-3/4	9-1/2	3/4	575
XQ15	23-1/2	11-3/4	21	27	105	29	14-1/2	5-3/4	11-1/2	3/4	600
XQ16	24-1/2	12-1/4	22	28	109	30	15	6-1/4	12-1/2	3/4	615
XQ17	25-1/2	12-3/4	23	29	111	31	15-1/2	6-3/4	13-1/2	3/4	630
XQ18	27-1/2	13-3/4	25	31	115	33	16-1/2	7-3/4	15-1/2	3/4	655
XQ19	28-1/2	14-1/4	26	32	119	34	17	8-1/4	16-1/2	3/4	670
XQ20	29-1/2	14-3/4	27	33	121	35	17-1/2	8-3/4	17-1/2	3/4	680
XQ21	31-1/2	15-3/4	29	35	125	37	18-1/2	9-3/4	19-1/2	3/4	705
XQ22	32-1/2	16-1/4	30	36	129	38	19	10-1/4	20-1/2	3/4	720
XQ23	33-1/2	16-3/4	31	37	133	39	19-1/2	10-3/4	21-1/2	3/4	740
XQ24	35-1/2	17-3/4	33	39	137	41	20-1/2	11-3/4	23-1/2	3/4	765
XQ25	37	18-1/2	34	42	141	43-3/4	21-7/8	13-1/8	26-1/4	1	1255
XQ26	38	19	35	43	143	44-3/4	22-3/8	13-5/8	27-1/4	1	1275
XQ28	41	20-1/2	38	46	155	47-3/4	23-7/8	15-1/8	30-1/4	1	1385
XQ30	44	22	41	49	161	50-3/4	25-3/8	16-5/8	33-1/4	1	1455
XQ32	46	23	43	51	170	52-3/4	26-3/8	17-5/8	35-1/4	1	1520
XQ34	49	24-1/2	46	54	182	55-3/4	27-7/8	19-1/8	38-1/4	1	1605
XQ36	52	26	49	57	188	58-3/4	29-3/8	20-5/8	41-1/4	1	1665
XQ38	54	27	51	59	197	60-3/4	30-3/8	21-5/8	43-1/4	1	1725
XQ40	57	28-1/2	54	62	205	63-3/4	31-7/8	23-1/8	46-1/4	1	1795
XQ42	62	31	57	69	215	70-3/4	35-3/8	25-5/8	51-1/4	1-1/2	2820
XQ44	64	32	59	71	221	72-3/4	36-3/8	26-5/8	53-1/4	1-1/2	2895
XQ46	67	33-1/2	62	74	232	75-3/4	37-7/8	28-1/8	56-1/4	1-1/2	3025
XQ48	70	35	65	77	238	78-3/4	39-3/8	29-5/8	59-1/4	1-1/2	3110
XQ50	72	36	67	79	248	80-3/4	40-3/8	31-1/8	62-1/4	1-1/2	3220
XQ52	75	37-1/2	70	82	256	83-3/4	41-7/8	32-1/8	64-1/4	1-1/2	3325
XQ54	78	39	73	85	265	86-3/4	43-3/8	33-5/8	67-1/4	1-1/2	3435
XQ56	80	40	75	87	271	88-3/4	44-3/8	34-5/8	69-1/4	1-1/2	3510
XQ58	83	41-1/2	78	90	283	91-3/4	45-7/8	36-1/8	72-1/4	1-1/2	3650
XQ60	86	43	81	93	292	94-3/4	47-3/4	37-5/8	75-1/4	1-1/2	3760

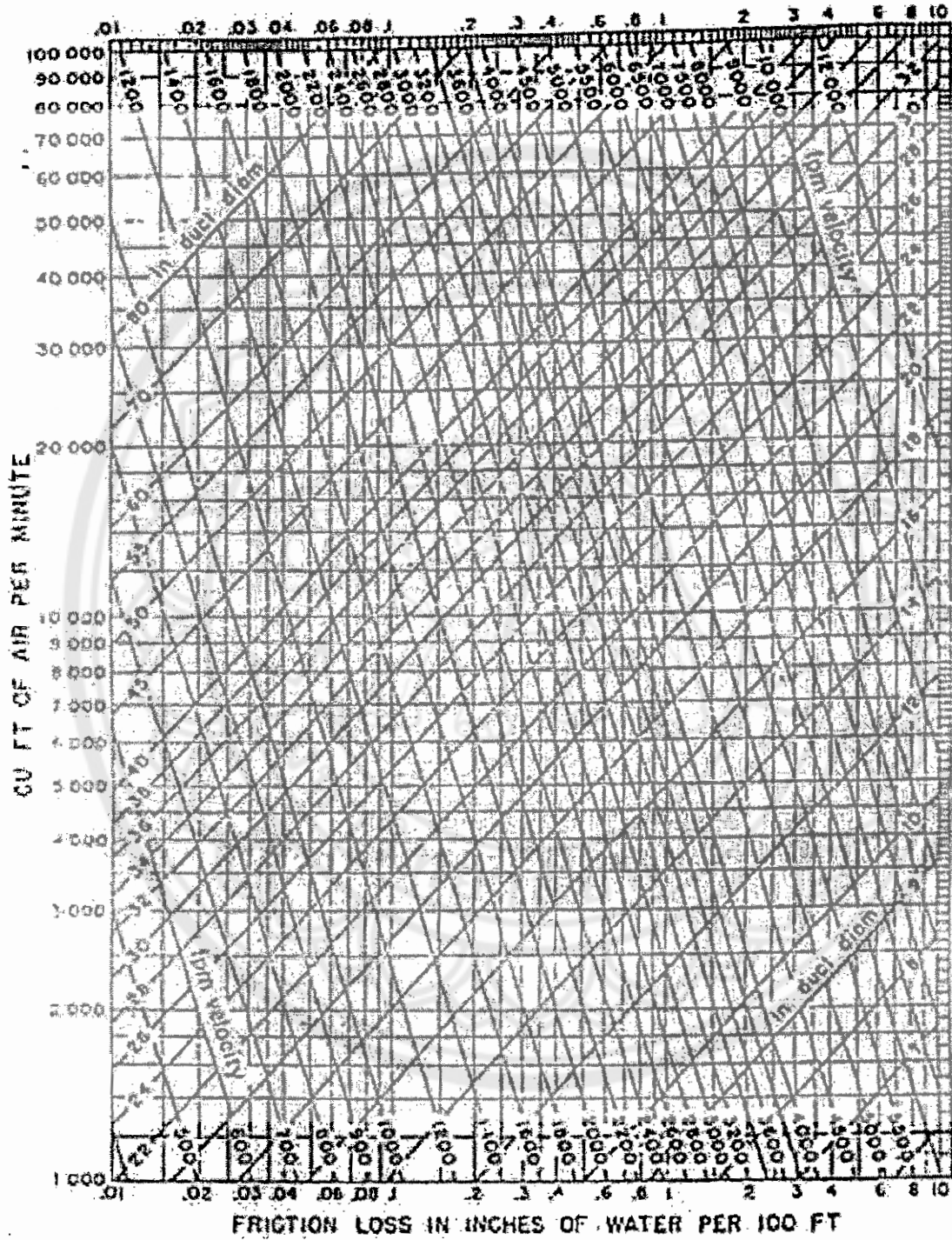
ที่มา : American Conference of Governmental Industrial Hygienists, 1970





กราฟที่ ค.1 แสดงสัมประสิทธิ์แรงเสียดทานในท่อ

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