

**standards**

استاندارد 1995 smanca برای ضخامت ورق کانالهای اسپیرال

Duct diameter ( in )	2" WG		4" WG		10" WG	
	spiral canal	fittings	spiral canal	fittings	spiral canal	fittings
	( ga )	( ga )	( ga )	( ga )	( ga )	( ga )
4"-10"	26	26	26	26	26	26
11"-12"	26	26	26	26	26	24
13"-14"	26	26	26	24	26	24
15"-16"	24	24	24	24	24	22
17"-18"	24	24	24	24	24	22
19"-26"	24	24	24	22	24	22
27"-36"	24	22	22	20	22	20
37"-50"	22	20	20	20	20	20
51"-60"	20	18	18	18	18	18
61"-80"	18	16	18	16	18	16

1" WG = 0.0361 psi

gauge	thickness (in)
26	0.0217
24	0.0276
22	0.0336
20	0.0396
18	0.0516
16	0.0635

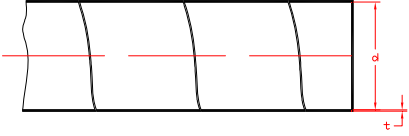
## standards

تفاوت استانداردهای مختلف برای ضخامت ورق کانالهای اسپیرال

Dimensions ( in )	BFS 1988 : 18	DW 142	Din 24145	NF p-50-401	DS 447	DVS 36002
	Swedish standard	British standard	German standard	French standard	Danish standard	Danish standard
	( mm )	( mm )	( mm )	( mm )	( mm )	( mm )
4	0.5	0.6	0.6	0.5	0.5	0.5
5	0.5	0.6	0.6	0.5	0.5	0.5
6	0.5	0.6	0.6	0.5	0.5	0.5
7	0.6	0.6	0.6	0.6	0.5	0.5
8	0.6	0.6	0.6	0.6	0.5	0.6
9	0.6	0.8	0.6	0.6	0.5	0.6
10	0.6	0.8	0.6	0.6	0.5	0.6
12	0.6	0.8	0.8	0.6	0.6	0.6
14	0.8	0.8	0.8	0.6	0.6	0.6
16	0.8	0.8	0.8	0.8	0.6	0.8
18	0.8	0.8	0.8	0.8	0.6	0.8
20	0.8	0.8	0.8	0.8	0.6	0.8
22	0.8	0.8	0.8	0.8	0.7	0.8
24	0.8	0.8	1	0.8	0.7	0.8
26	0.8	0.8	1	0.8	0.7	0.8
28	0.8	0.8	1	1	0.7	0.8
30	0.8	1	1	1	0.7	0.9
32	0.8	1	1	1	0.7	0.9
36	0.9	1	1	1	0.9	0.9
40	0.9	1	1.2	1	0.9	0.9
44	0.9	1.2	1.2	1	0.9	0.9
48	0.9	1.2	1.2	1.2	0.9	0.9
56		1.2	1.5			
64		1.2	1.5			

## Tolerances

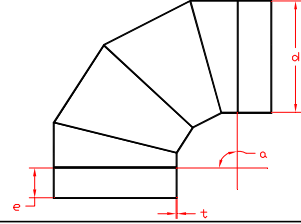
### Tolerances for ducts



d nominal (in)	Tol	
	min (mm)	max (mm)
4	0	0.5
5	0	0.5
6	0	0.6
7	0	0.7
8	0	0.7
9	0	0.8
10	0	0.8
12	0	0.9
14	0	1
16	0	1
18	0	1.1
20	0	1.1
22	0	1.2
24	0	1.3
26	0	1.4
28	0	1.5
30	0	1.6
32	0	1.8
36	0	2
40	0	2.2
44	0	2.5
48	0	3
56	0	3.5
64	0	4.5
72	0	6
80	0	7

d (in)	e (mm)
4	40
5	40
6	40
7	40
8	40
9	60
10	60
12	60
14	60
16	80
18	80
20	80
22	80
24	80
26	100
28	100
30	100
32	100
36	100
40	120
44	120

### Tolerances for fittings



d nominal (in)	Tol	
	min (mm)	max (mm)
4	-1.2	-0.7
5	-1.2	-0.7
6	-1.3	-0.7
7	-1.4	-0.7
8	-1.4	-0.7
9	-1.5	-0.7
10	-1.5	-0.7
12	-1.6	-0.7
14	-1.7	-0.7
16	-1.7	-0.7
18	-1.8	-0.7
20	-1.8	-0.7
22	-1.9	-0.7
24	-1.9	-0.7
26	-2	-0.7
28	-2	-0.7
30	-2	-0.7
32	-2	-0.7
36	-2.1	-0.7
40	-2.1	-0.7
44	-2.1	-0.7

	min	max
Angel tolerance	-2°	2°
Length tolerance	-0.50%	0.50%
Thickness tolerance	-10%	10%

Data									
Friction Loss In Inches Of Water (W G) Per 100 Feet Of Spiral Pipe									
Duct Dia.	Velocity FPM				Duct Dia.	Velocity FPM			
	3500	4000	4500	5000		3500	4000	4500	5000
4"	5.46	7.03	8.80	10.75	22"	0.68	0.88	1.01	1.34
5"	4.16	5.36	6.70	8.19	24"	0.61	0.79	0.99	1.21
6"	3.33	4.29	5.36	6.55	26"	0.56	0.72	0.90	1.01
7"	2.76	3.55	4.44	5.43	28"	0.51	0.65	0.82	1.00
8"	2.34	3.02	3.78	4.61	30"	0.47	0.60	0.75	0.92
9"	2.03	2.62	3.27	4.00	32"	0.43	0.56	0.70	0.85
10"	1.78	2.30	2.88	3.51	36"	0.37	0.48	0.60	0.74
12"	1.43	1.84	2.30	2.81	40"	0.33	0.42	0.53	0.65
14"	1.18	1.53	1.91	2.33	44"	0.29	0.38	0.47	0.58
16"	1.01	1.30	1.62	1.98	48"	0.26	0.34	0.42	0.52
18"	0.87	1.12	1.40	1.72	56"	0.22	0.28	0.35	0.43
20"	0.77	0.99	1.23	1.51	60"	0.20	0.26	0.32	0.39

**Data**

**Elbow Equivalent Resistance In Feet Of Straight Pipe By Center Line Radius**

Size	R/D=1				R/D=1.5				R/D=2			
	90° Elbow	60° Elbow	45° Elbow	30° Elbow	90° Elbow	60° Elbow	45° Elbow	30° Elbow	90° Elbow	60° Elbow	45° Elbow	30° Elbow
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

**Data**

**Capacity of Rond Pipe 4 to 60 Inches Diameter , 4200 to 7000 FPM**

$Q = AV$ $Q = \text{CFM}$ $V = \text{VELCOSITY}$ $A = \text{AREA IN FT}^2$			PULVERIZED COAL, FOUNDRY DUST, METAL DUST, OATS, RUBBER BUFFINGS, DRY SAWDUST AND SHAVINGS, WOOD DUST			ALUMINUM DUST, COTTON SEED, KNOTS, GREEN SHAVINGS, WOOD CHIPS, WOOL			BARLEY, CORN, GRANITE DUST, HOG WASTE, RYE, WET, SAWDUST, SUGAR, WHEAT, WOOD BLOCK AND FIBER		CEMENT DUST, SALT, SAND		
			4200	4400	4600	4800	5000	5200	5600	6000	6400	6800	7000
Velocity FPM	AREA		QUANTITY OF AIR FLOWING , IN CFM										
Dia. In.	Sq. In.	Sq. Ft.											
4"	12.566	0.0873	367	384	401	419	436	454	489	524	559	593	611
5"	19.635	0.1364	573	600	627	655	682	709	764	818	873	927	954
6"	28.274	0.1964	825	864	903	942	982	1021	1100	1178	1257	1335	1374
7"	38.485	0.2673	1122	1176	1229	1283	1336	1390	1497	1604	1710	1817	1871
8"	50.266	0.3491	1466	1536	1606	1676	1745	1815	1955	2094	2234	2374	2443
9"	63.617	0.4418	1856	1944	2032	2121	2209	2297	2474	2651	2827	3004	3093
10"	78.540	0.5454	2291	2400	2509	2618	2727	2836	3054	3273	3491	3709	3818
12"	113.098	0.7854	3299	3456	3613	3770	3927	4084	4398	4712	5027	5341	5498
14"	153.938	1.0690	4490	4704	4917	5131	5345	5559	5986	6414	6842	7269	7483
16"	201.062	1.3963	5864	6144	6423	6702	6981	7261	7819	8378	8936	9495	9774
18"	254.470	1.7672	7422	7775	8129	8482	8836	9189	9896	10603	11310	12017	12370
20"	314.160	2.1817	9163	9599	10036	10472	10908	11345	12217	13090	13963	14835	15272
22"	380.134	2.6398	11087	11615	12143	12671	13199	13727	14783	15839	16895	17951	18479
24"	452.390	3.1416	13195	13823	14451	15080	15708	16336	17593	18850	20106	21363	21991
26"	530.930	3.6870	15485	16223	16960	17698	18435	19172	20647	22122	23597	25072	25809
28"	615.754	4.2761	17959	18815	19670	20525	21380	22236	23946	25656	27367	29077	29932
30"	706.860	4.9088	20617	21599	22580	23562	24544	25526	27489	29453	31416	33380	34361
32"	804.250	5.5851	23457	24574	25691	26808	27925	29042	31276	33510	35744	37978	39095
36"	1017.878	7.0686	29688	31102	32516	33929	35343	36757	39584	42412	45239	48066	49480
40"	1256.640	8.7267	36652	38397	40143	41888	43633	45379	48869	52360	55851	59341	61087
44"	1520.534	10.5593	44349	46461	48573	50684	52796	54908	59132	63356	67579	71803	73915
48"	1809.562	12.5664	52779	55292	57805	60319	62832	65345	70372	75398	80425	85452	87965
56"	2463.014	17.1043	71838	75259	78680	82100	85521	88942	95784	102626	109467	116309	119730
60"	2827.440	19.6350	82467	86394	90321	94248	98175	102102	109956	117810	125664	133518	137445

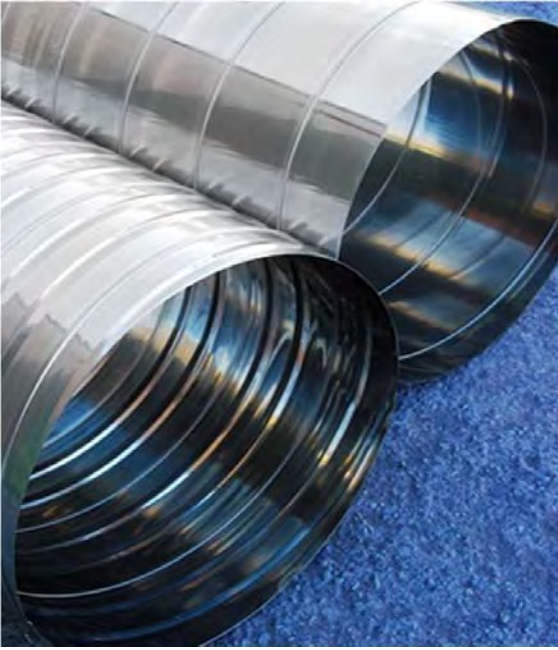
Data											
Capacity of Rond Pipe 4 to 60 Inches Diameter , 2500 to 4000 FPM											
$Q = AV$ $Q = \text{CFM}$ $V = \text{VELCOSITY}$ $A = \text{AREA IN FT}^2$			GAS & FUMES			LINT, BAKELITE POWDER, COTTON, FLOOR					
Velocity FPM			2500	2600	2800	3000	3200	3400	3600	3800	4000
Dia. In.	AREA		QUANTITY OF AIR FLOWING , IN CFM								
	Sq. In.	Sq. Ft.									
4"	12.566	0.0873	218	227	244	262	279	297	314	332	349
5"	19.635	0.1364	341	355	382	409	436	464	491	518	545
6"	28.274	0.1964	491	511	550	589	628	668	707	746	785
7"	38.485	0.2673	668	695	748	802	855	909	962	1016	1069
8"	50.266	0.3491	873	908	977	1047	1117	1187	1257	1326	1396
9"	63.617	0.4418	1104	1149	1237	1325	1414	1502	1590	1679	1767
10"	78.540	0.5454	1364	1418	1527	1636	1745	1854	1964	2073	2182
12"	113.098	0.7854	1964	2042	2199	2356	2513	2670	2827	2985	3142
14"	153.938	1.0690	2673	2779	2993	3207	3421	3635	3848	4062	4276
16"	201.062	1.3963	3491	3630	3910	4189	4468	4747	5027	5306	5585
18"	254.470	1.7672	4418	4595	4948	5301	5655	6008	6362	6715	7069
20"	314.160	2.1817	5454	5672	6109	6545	6981	7418	7854	8290	8727
22"	380.134	2.6398	6600	6864	7391	7919	8447	8975	9503	10031	10559
24"	452.390	3.1416	7854	8168	8796	9425	10053	10681	11310	11938	12566
26"	530.930	3.6870	9218	9586	10324	11061	11798	12538	13273	14011	14748
28"	615.754	4.2761	10690	11118	11973	12828	13683	14539	15394	16249	17104
30"	706.860	4.9088	12272	12763	13745	14726	15708	16690	17672	18653	19635
32"	804.250	5.5851	13963	14521	15638	16755	17872	18989	20106	21223	22340
36"	1017.878	7.0686	17672	18378	19792	21206	22620	24033	25447	26861	28274
40"	1256.640	8.7267	21817	22689	24435	26180	27925	29671	31416	33161	34907
44"	1520.534	10.5593	26398	27454	29566	31678	33709	35902	38013	40125	42237
48"	1809.562	12.5664	31416	32673	35186	37699	40212	42726	45239	47752	50266
56"	2463.014	17.1043	42761	44471	47892	51313	54734	58155	61575	64996	68417
60"	2827.440	19.6350	49088	51051	54978	58905	62832	66759	70686	74613	78540

Data												
Capacity of Round Pipe 3 to 60 Inches Diameter, 800 to 2400 FPM												
Q= AV			EXHAUST MAINS					GASED AND FUMES				
Q=CFM												
V=VELOCITY A=AREA IN FT <sup>2</sup>			HORIZONTAL SUPPLY DUCTS									
Velocity FPM			800	900	1000	1200	1400	1500	1800	2200	2200	2400
Dia. In.	AREA		QUANTITY OF AIR FLOWING , IN CFM									
	Sq.In.	Sq.Ft.										
4"	12.566	0.0873	70	79	87	105	122	131	157	175	192	209
5"	19.635	0.1364	109	123	136	164	191	205	245	273	300	327
6"	28.274	0.1964	157	177	196	236	275	295	353	393	432	471
7"	38.485	0.2673	214	241	267	321	374	401	481	535	588	641
8"	50.266	0.3491	279	314	349	419	489	524	628	698	768	838
9"	63.617	0.4418	353	398	442	530	619	663	795	884	972	1060
10"	78.540	0.5454	436	491	545	655	764	818	982	1091	1200	1309
12"	113.098	0.7854	628	707	785	942	1100	1178	1414	1571	1728	1885
14"	153.938	1.0690	855	962	1069	1283	1497	1604	1924	2138	2352	2566
16"	201.062	1.3963	1117	1257	1396	1676	1955	2094	2513	2793	3072	3351
18"	254.470	1.7672	1414	1590	1767	2121	2474	2651	3181	3534	3888	4241
20"	314.160	2.1817	1745	1964	2182	2618	3054	3273	3927	4363	4800	5236
22"	380.134	2.6398	2112	2376	2640	3168	3696	3960	4752	5280	5808	6336
24"	452.390	3.1416	2513	2827	3142	3770	4398	4712	5655	6283	6912	7540
26"	530.930	3.6870	2950	3318	3687	4424	5162	5531	6637	7374	8111	8849
28"	615.754	4.2761	3421	3848	4276	5131	5986	6414	7697	8552	9407	10263
30"	706.860	4.9088	3927	4418	4909	5891	6872	7363	8836	9818	10799	11781
32"	804.250	5.5851	4468	5027	5585	6702	7819	8378	10053	11170	12287	13404
36"	1017.878	7.0686	5655	6362	7069	8482	9896	10603	12723	14137	15551	16965
40"	1256.640	8.7267	6981	7854	8727	10472	12217	13090	15708	17453	19199	20944
44"	1520.534	10.5593	8447	9503	10559	12671	14783	15839	19007	21119	23230	25342
48"	1809.562	12.5664	10053	11310	12566	15080	17593	18850	22620	25133	27646	30159
56'	2463.014	17.1043	13683	15394	17104	20525	23946	25656	30788	34209	37629	41050
60"	2827.440	19.6350	15708	17672	19635	23562	27489	29453	35434	39270	43197	47124



Data													
Capacity of Round Pipe 3 to 60 Inches Diameter, 300 to 750 FPM													
Q= AV			EXHAUST GRILLES					EHAUST RISERS AND VENT STACKS					
Q=CFM			SUPPLY FLUES AND RISERS										
V=VELOCITY A=AREA IN FT <sup>2</sup>												HORIZONTAL SUPPLY DUCTS	
Velocity FPM			300	350	400	450	500	550	600	650	700	750	
Dia. In.	AREA		QUANTITY OF AIR FLOWING , IN CFM										
	Sq.In.	Sq.Ft.											
4"	12.566	0.0873	26	31	35	39	44	48	52	57	61	65	
5"	19.635	0.1364	41	48	55	61	68	75	82	89	95	102	
6"	28.274	0.1964	59	69	79	88	98	108	118	128	137	147	
7"	38.485	0.2673	80	94	107	120	134	147	160	174	187	200	
8"	50.266	0.3491	105	122	140	157	175	192	209	227	244	262	
9"	63.617	0.4418	133	155	177	199	221	243	265	287	309	331	
10"	78.540	0.5454	164	191	218	245	273	300	327	355	382	409	
12"	113.098	0.7854	236	275	314	353	393	432	471	511	550	589	
14"	153.938	1.0690	321	374	428	481	535	588	641	695	748	802	
16"	201.062	1.3963	419	489	559	628	698	768	838	908	977	1047	
18"	254.470	1.7672	530	619	707	795	884	972	1060	1149	1237	1325	
20"	314.160	2.1817	655	764	873	982	1091	1200	1309	1418	1527	1636	
22"	380.134	2.6398	792	924	1056	1188	1320	1452	1584	1716	1848	1980	
24"	452.390	3.1416	942	1100	1257	1414	1571	1728	1885	2042	2199	2356	
26"	530.930	3.6870	1106	1290	1475	1659	1844	2028	2212	2397	2581	2765	
28"	615.754	4.2761	1283	1497	1710	1924	2138	2352	2566	2779	2993	3207	
30"	706.860	4.9088	1473	1718	1964	2209	2454	2700	2945	3191	3436	3682	
32"	804.250	5.5851	1676	1955	2234	2513	2793	3072	3351	3630	3910	4189	
36"	1017.878	7.0686	2121	2474	2827	3181	3534	3888	4241	4595	4948	5301	
40"	1256.640	8.7267	2618	3054	3491	3927	4363	4800	5236	5672	6109	6545	
44"	1520.534	10.5593	3168	3696	4224	4752	5280	5808	6336	6864	7391	7919	
48"	1809.562	12.5664	3770	4398	5027	5655	6283	6912	7540	8168	8796	9425	
56'	2463.014	17.1043	5131	5986	6842	7697	8552	9407	10263	11118	11973	12828	
60"	2827.440	19.6350	5891	6872	7854	8836	9818	10799	11781	12763	13745	14726	

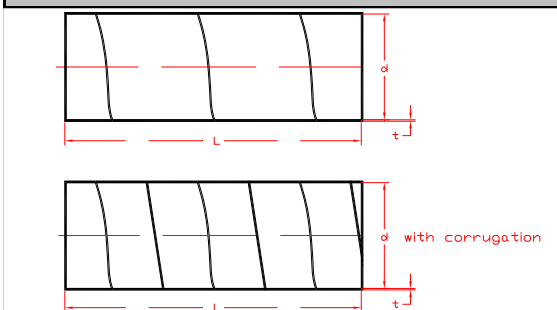
## DUCTS



## Dimensions

$d$ nominal ( in )	$\pi d$ ( m )	$\pi d^2/4$ ( m <sup>2</sup> )
4	0.319	0.008
5	0.399	0.013
6	0.479	0.018
7	0.558	0.025
8	0.638	0.032
9	0.718	0.041
10	0.798	0.051
12	0.957	0.073
14	1.117	0.099
16	1.276	0.13
18	1.436	0.164
20	1.595	0.203
22	1.755	0.245
24	1.914	0.292
26	2.074	0.342
28	2.233	0.397
30	2.393	0.456
32	2.552	0.519
36	2.871	0.656
40	3.19	0.81
44	3.509	0.98
48	3.828	1.167
56	4.466	1.588
64	5.104	2.074
72	5.742	2.625
80	6.38	3.241

## Dimensions





### Static Pressure (Friction) Loss of Spiral Pipe

