

P = pressure of the atmosphere or suction pressure
(absolute) in pounds per square foot,

P_1 = pressure of compression (absolute) in pounds
per square foot.

Formula No. 1 gives the H. P. required when the air is
cooled during compression as in the ordinary air com-
pressor.

Formula No. 2, which has been explained, is used when

FLOW OF AIR THROUGH ORIFICES

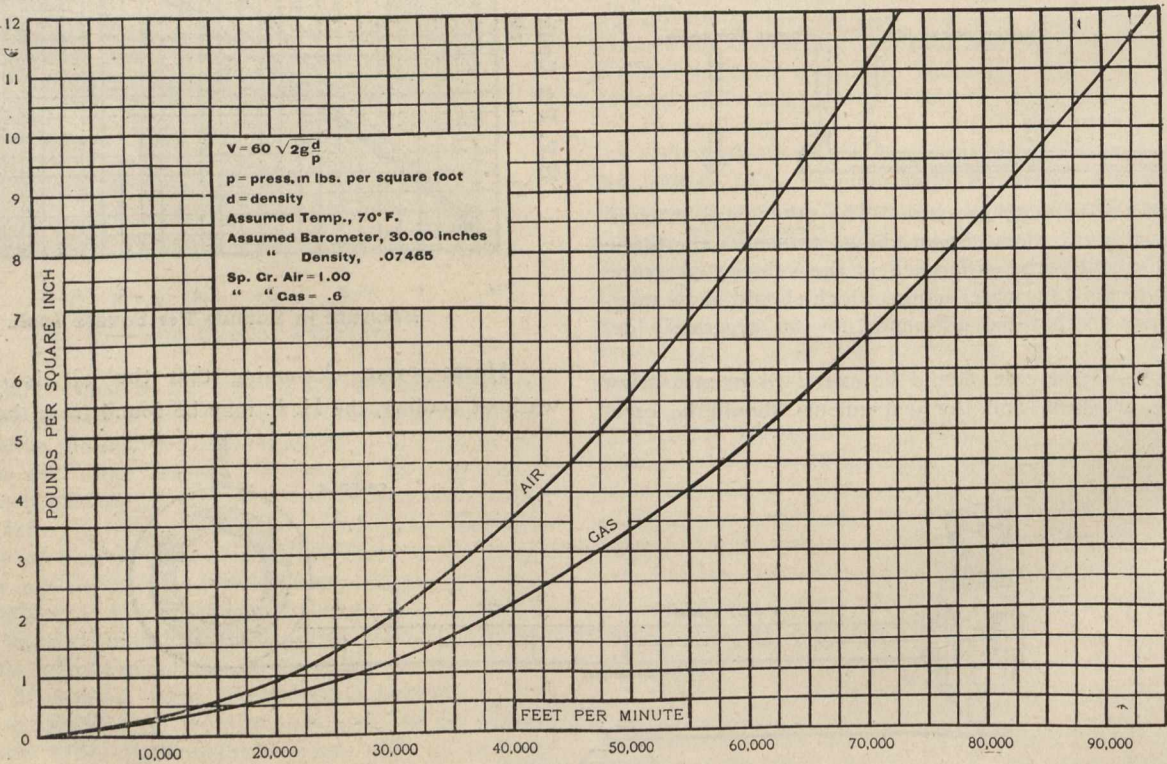
Flow is expressed in cubic feet per minute, and is assumed to take place from a receiver or other vessel in which air is contained under pressure into the atmosphere at sea level (29.92" Bar.) Temperature of air in receiver is assumed to be 50° Fahr. A coefficient of discharge of .60 was used, which is approximately correct for orifices with narrow edges.

Gauge Pres. in Receiver. Lbs. per Sq. In.	DIAMETER OF ORIFICE IN INCHES																				
	$\frac{1}{16}$	$\frac{1}{8}$	$\frac{3}{16}$	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1	$1\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{3}{8}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2	$2\frac{1}{4}$	$2\frac{1}{2}$		
$\frac{1}{2}$	.0118	.0478	.106	.190	.428	.763	1.73	3.45	6.86	12.2	19.0	27.4	37.4	48.8	62.0	76.3	92.2	110	150	195	345
1	.0170	.0686	.154	.274	.615	1.10	2.48	4.37	9.84	17.5	28.6	39.4	53.6	70.	89.1	110	132	157	214	280	437
$1\frac{1}{2}$	.0211	.0855	.192	.340	.775	1.36	3.09	5.44	12.3	21.7	34.0	49.0	66.6	87.	111	135	164	196	266	348	545
2	.0247	.100	.225	.399	.896	1.60	3.61	6.37	14.4	25.5	39.8	57.5	78.1	103	130	160	193	233	312	409	638
$2\frac{1}{2}$	.0280	.114	.255	.453	1.02	1.81	4.06	7.23	16.3	29.0	45.3	65.1	88.7	116	147	181	218	260	355	463	723
3	.0311	.126	.283	.501	1.13	2.01	4.54	8.03	18.1	32.1	50.1	72.3	98.1	128	163	201	243	289	393	514	803
$3\frac{1}{2}$	.0341	.138	.310	.530	1.23	2.20	5.00	8.80	19.8	35.2	55.1	79.3	108	141	179	220	266	317	431	564	880
4	.0370	.150	.336	.596	1.34	2.38	5.40	9.55	21.4	38.3	59.6	86.0	118	153	194	239	289	344	469	612	960
$4\frac{1}{2}$	.0397	.161	.360	.642	1.44	2.56	5.81	10.3	23.0	41.0	64.0	92.4	126	164	209	256	310	369	503	656	1030
5	.0423	.171	.386	.685	1.54	2.74	6.20	10.9	24.6	43.8	68.4	98.5	134	176	223	274	330	394	536	700	1100
$5\frac{1}{2}$	.0450	.184	.410	.727	1.63	2.90	6.58	11.6	26.1	46.5	72.6	105	143	186	236	290	351	418	570	744	1160
6	.0478	.194	.435	.770	1.74	3.08	6.99	12.4	27.7	49.4	77.1	111	151	198	251	308	374	444	605	790	1230
$6\frac{1}{2}$	.0501	.202	.455	.808	1.82	3.23	7.31	12.9	29.1	51.7	80.7	116	158	207	264	322	390	464	634	827	1290
7	.0538	.213	.479	.849	1.91	3.40	7.70	13.6	30.6	54.4	84.9	121	166	217	276	340	411	490	666	870	1360
$7\frac{1}{2}$	.0552	.224	.503	.890	2.00	3.56	8.07	14.2	32.1	57.0	89.0	128	175	227	290	356	431	512	698	911	1420
8	.0574	.233	.523	.925	2.08	3.70	8.39	14.9	33.3	59.3	92.5	134	182	238	302	372	448	535	726	949	1490
$8\frac{1}{2}$	.0601	.244	.546	.970	2.17	3.86	8.78	15.5	34.9	62.1	96.8	139	190	248	316	389	468	558	761	994	1560
9	.0634	.255	.570	1.01	2.26	4.02	9.15	16.1	35.4	65.1	101	146	197	260	331	407	489	585	795	1040	1630
$9\frac{1}{2}$	.0659	.265	.590	1.05	2.35	4.16	9.48	16.6	37.8	67.1	105	152	205	271	344	424	507	607	826	1080	1700
10	.0686	.274	.609	1.09	2.42	4.28	9.78	17.1	39.0	69.4	109	157	212	281	358	439	526	628	859	1120	1760

For other orifices, the flow varies directly as the area, and may be computed from the table by multiplying the area in square inches by the value given for a 1-inch orifice, which has an area of one square inch.

Formulas.—Including the preceding, there are four formulas sometimes used in computing the power required. Values obtained from these formulas have been placed in the

it may be assumed that the air is compressed so quickly that it does not have time to cool the atmospheric temperature as in nearly all blower work.



Sturtevant High Pressure Blowers.

form of curves and are shown in the accompanying engraving.

(1) H.P. = $\frac{VPe^{\left(\frac{P_1}{P}\right)}}{33000}$

(2) H.P. = $\frac{VP\left[\left(\frac{P_1}{P}\right)^{\frac{1}{\gamma}} - 1\right]}{11000}$

(3) H.P. = $\frac{V(P_1 - P)}{33000}$

(4) H.P. = $\frac{\text{lbs. per sq. in.} \times V}{200}$

Formula No. 3, the ordinary "hydraulic" formula, is ordinarily used for pressures up to 5 ounces.

Formula No. 4 is frequently used by other makers of positive or rotary blowers, for determining the H.P. required for operating their machines. In this formula V = the volume of air displaced by the impellers, no allowance being made for slippage.