HOW TO SPECIFY BLASTING

Your coating supplier will always designate the degree of surface preparation required for his materials. The three basic standards used to describe surface preparation are: Steel Structure Painting Council (SSPC) “Surface Preparation Specifications”, the National Association of Corrosion Engineers Standards (N.A.C.E.) and the Swedish Pictorial Standards. Basically their definitions are:

SSPC	NACE	SWEDISH*	DESCRIPTION
SP 1, Solvent Cleaning	N/A	N/A	Removal of oil, grease, dirt, soil and contaminants by cleaning with solvent, vapor, alkali, emulsion or steam.
SP 2, Hand Tool Cleaning	N/A	St 2	Removal of loose rust, loose mill scale and loose paint by hand chipping, scraping, sanding and wire brushing.
SP 3, Power Tool Cleaning	N/A	St 3	Removal of loose rust, loose mill scale and loose paint by power tool chipping, descaling, sanding, wire brushing.and grinding.
SP 5, White Metal Blast Cleaning	1	Sa 3	Removal of all visible rust, mill scale, paint and foreign matter by blast cleaning.
SP 6, Commercial Blast Cleaning	3	Sa 2	Blast cleaning until at least two-thirds of each square inch is free of all visible residues.
SP 7, Brush-Off Blast Cleaning	4	Sa 1	Blast cleaning of all except tightly adhered residues of mill scale, rust, and coatings.
SP 8, Pickling			Complete removal of rust and mill scale by acid pickling, duplex pickling or electrolytic pickling.
SP 10, Near White Blast Cleaning	2	Sa 2½	Blast cleaning until at least 95% of each square inch is free of all visible rust, mill scale, paint and foreign matter.
SP 11-87T, Power Tool Cleaning to Bare Metal	N/A	N/A	Removal of all visible rust, mill scale, paint and foreign matter using power tools and producing a minimum profile of 1 mil.

*Also SSPCS-V is 1 Standard

ABRASIVE / PROFILE COMPARATIVE CHART

The following chart should be used only for approximating the abrasive size required to obtain a specified anchor pattern. The standard metal used to obtain these results was hot rolled steel with tightly adhering mill scale. The resulting depth of anchor pattern will vary with the method used for measuring depths as well as any one of numerous other variables (type and hardness of steel, thickness of mill scale, degree of cleaning specified, etc.) This information can be used for centrifugal wheel as well as pressure blasting. Pressure blasting should be done using 90-100 psi nozzle pressure. The depth of anchor pattern used in this chart is an average and not a minimum or maximum depth obtainable. Consult local abrasive suppliers for specific technical data.

1 Mil Profile

30/60 Mesh Silica Sand
G-80 Steel Grit
S-110 Steel Shot*
80 Mesh Garnet
100 Aluminum Oxide
Clemtex #4
Black Beauty 3060

1.5 Mil Profile

16/35 Mesh Silica Sand
G-50 Steel Grit
S-170 Steel Shot*
36 Mesh Garnet
50 Grit Aluminum Oxide
Clemtex #3
Black Beauty 3060

2 Mil Profile

16/35 Mesh Silica Sand
G-40 Steel Grit
S-230 Steel Shot*
36 Mesh Garnet
36 Grit Aluminum Oxide
Clemtex #3
Black Beauty 2040

2.5 Mil Profile

8/35 Mesh Silica Sand
G-40 Steel Grit
S-280 Steel Shot*
16 Mesh Garnet
24 Grit Aluminum Oxide
Clemtex #2
Black Beauty 2040

3 Mil Profile

8/20 Mesh Silica Sand
G-25 Steel Grit
S-330 or 390 Steel Shot*
16 Mesh Garnet
16 Aluminum Oxide
Clemtex #2
Black Beauty 1240

*Steel shot alone will not give a good angular anchor pattern and should be used in combination with steel grit for best results.

DEW POINT CALCULATION CHART
(FAHRENHEIT)

% RELATIVE HUMIDITY	AMBIENT AIR TEMPERATURE °F										
	20	30	40	50	60	70	80	90	100	110	120
90	18	28	37	47	57	67	77	87	97	107	117
85	17	26	36	45	55	65	75	84	95	104	113
80	16	25	34	44	54	63	73	82	93	102	110
75	15	24	33	42	52	62	71	80	91	100	108
70	13	22	31	40	50	60	68	78	88	96	105
65	12	20	29	38	47	57	66	76	85	93	103
60	11	19	27	36	45	55	64	73	83	92	101
55	9	17	25	34	43	53	61	70	80	89	98
50	6	15	23	31	40	50	59	67	77	86	94
45	4	13	21	29	37	47	56	64	73	82	91
40	1	11	18	26	35	43	52	61	69	78	87
35	-2	8	16	23	31	40	48	57	65	74	83
30	-6	4	13	20	28	36	44	52	61	69	77

Dew Point: Temperature at which moisture will condense on the surface. No coatings should be applied unless the surface temperature is a minimum of 5°F above this point. Temperature must be maintained during curing.

Example: If air temperature is 70°F and relative humidity is 65%, the dew point is 57°F. No coating should be applied unless the surface temperature is 62°F minimum.

DEW POINT CALCULATION CHART
(CENTIGRADE)

% RELATIVE HUMIDITY	AMBIENT AIR TEMPERATURE °C									
	-5	0	5	10	15	20	25	30	35	40
90	-6.5	-1.3	3.5	8.2	13.3	18.3	23.2	28.0	33.0	38.2
85	-7.2	-2.0	2.6	7.3	12.5	17.4	22.1	27.0	32.0	37.1
80	-7.7	-2.8	1.9	6.5	11.6	16.5	21.0	25.9	31.0	36.2
75	-8.4	-3.6	0.9	5.6	10.4	15.4	19.9	24.7	29.6	35.0
70	-9.2	-4.5	0.2	4.5	9.1	14.2	18.6	23.3	28.1	33.5
65	-10.0	-5.4	-1.0	3.3	8.0	13.0	17.4	22.0	26.8	32.0
60	-10.8	-6.5	-2.1	2.3	6.7	11.9	16.2	20.6	25.3	30.5
55	-11.6	-7.4	-3.2	1.0	5.6	10.4	14.8	19.1	23.9	28.9
50	-12.8	-8.4	-4.4	-0.3	4.1	8.6	13.3	17.5	22.2	27.1
45	-14.3	-9.6	-5.7	-1.5	2.6	7.0	11.7	16.0	20.2	25.2
40	-15.9	-10.8	-7.3	-3.1	0.9	5.4	9.5	14.0	18.2	23.0
35	-17.5	-12.1	-8.6	-4.7	-0.8	3.4	7.4	12.0	16.1	20.6
30	-19.0	-14.3	-10.2	-6.9	-2.9	1.3	5.2	9.2	13.7	18.0

Dew Point: Temperature at which moisture will condense on the surface. No coatings should be applied unless the surface temperature is a minimum of 3°C above this point. Temperature must be maintained during curing.

Example: If air temperature is 20°C and relative humidity is 65%, the dew point is 13°C. No coating should be applied unless the surface temperature is 16°C minimum.

REDUCTION IN SOLIDS CONTENT BY ADDING THINNER

Original Solids Content of Material Before Adding Thinner	THINNER ADDED										
	2%	5%	7%	10%	12%	15%	17%	20%	25%	30%	35%
100%	98	95	93	91	89	87	85	83	80	77	74
95	93	90	89	86	85	83	81	79	76	73	70
90	88	86	84	82	80	78	77	75	72	69	67
85	83	81	79	77	76	74	73	71	68	65	63
80	78	76	75	73	71	70	68	67	64	62	59
75	74	71	70	68	67	65	64	63	60	58	56
70	69	67	65	64	63	61	60	59	56	54	52
65	64	62	61	59	58	57	56	54	52	50	48
60	59	57	56	55	54	52	51	50	48	46	44
55	54	52	51	50	49	48	47	46	44	42	41
50	49	48	47	46	45	44	43	42	40	39	37
45	44	43	42	41	40	39	38	37	36	35	33
40	39	38	37	36	36	35	34	33	32	31	30
35	34	33	32	31	31	30	30	29	28	27	26
30	29	29	28	27	27	26	26	25	24	23	22
25	24	24	23	23	22	22	21	21	20	19	19

Solids Content After Thinner

VOLUME OF THINNER REQUIRED
TO THIN PERCENTAGE SHOWN

1 Gallon Kit

%	Oz.	Liter
2	2.6	.08
5	6.5	.19
7	9.0	.27
10	12.8	.38
12	15.4	.46
15	19.2	.57
17	21.8	.64
20	25.6	.76
25	32.0	.95
30	38.4	1.14
35	44.8	1.32

5 Gallon Kit

%	Oz.	Liter
2	13.0	.40
5	32.5	.95
7	45.0	1.35
10	64.0	1.90
12	77.0	2.30
15	96.0	2.85
17	109.0	3.20
20	128.0	3.80
25	160.0	4.75
30	192.0	5.70
35	224.0	6.60

5 Liter Kit

%	Liter	Oz.
2	.10	3.5
5	.25	8.5
7	.35	12.0
10	.50	17.0
12	.60	20.5
15	.75	25.5
17	.85	29.0
20	1.00	34.0
25	1.25	42.5
30	1.50	50.5
35	1.75	59.0

20 Liter Kit

%	Liter	Oz.
2	0.4	14.0
5	1.0	34.0
7	1.4	48.0
10	2.0	68.0
12	2.4	82.0
15	3.0	102.0
17	3.4	116.0
20	4.0	136.0
25	5.0	170.0
30	6.0	202.0
35	7.0	236.0

WET FILM THICKNESS REQUIREMENTS

Required Dry Film Thickness (Mils)

Solids Content of Material After Thinning	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
100%	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0	16.0	17.0
95	2.1	3.2	4.2	5.3	6.3	7.4	8.4	9.5	10.5	11.6	12.6	13.7	14.7	15.8	16.8	17.9
90	2.2	3.3	4.4	5.6	6.7	7.8	8.9	10.0	11.1	12.2	13.3	14.4	15.6	16.7	17.8	18.9
85	2.4	3.5	4.7	5.9	7.1	8.2	9.4	10.6	11.8	12.9	14.1	15.3	16.5	17.7	18.8	20.9
80	2.5	3.8	5.0	6.3	7.5	8.8	10.0	11.3	12.5	13.7	15.0	16.3	17.5	18.8	20.0	21.3
75	2.7	4.0	5.3	6.7	8.0	9.3	10.7	12.0	13.3	14.6	16.0	17.3	18.7	20.0	21.3	22.7
70	2.9	4.3	5.7	7.1	8.6	10.0	11.4	12.9	14.3	15.7	17.1	18.6	20.0	21.4	22.9	24.3
65	3.1	4.6	6.2	7.7	9.2	10.8	12.3	13.9	15.4	16.9	18.5					
60	3.3	5.0	6.7	8.3	10.0	11.7	13.3	15.0	16.7	18.3						
55	3.6	5.5	7.3	9.1	10.9	12.7	14.6	16.4	18.2							
50	4.0	6.0	8.0	10.0	12.0	14.0	16.0	18.0								
45	4.4	6.7	8.9	11.1	13.3	15.6	17.8									
40	5.0	7.5	10.0	12.5	15.0	17.5										
35	5.7	8.6	11.4	14.3	17.1											
30	6.7	10.0	13.3	16.7												
25	8.0	12.0	16.0													

Wet Film Thickness Required

Example

Matl. = 70% Solids

DFT = 6 mils

Wet Film = 8.6 mils

Note: Dry film thicknesses are minimum. No allowance is made for evaporation of solvents during application.

WET FILM THICKNESS REQUIREMENTS

Required Dry Film Thickness (Microns)

Solids Content of Material After Thinning	50	75	100	125	150	175	200	225	250	275	300	325	350	375	400	425
100%	50	75	100	125	150	175	200	225	250	275	300	325	350	375	400	425
95	53	80	105	132	158	184	211	237	263	290	316	342	368	395	421	447
90	56	83	111	139	167	194	222	250	278	306	333	361	389	417	444	472
85	59	88	118	147	177	206	235	265	294	324	353	382	412	441	471	500
80	63	94	125	156	188	219	250	281	313	344	375	406	438	469	500	531
75	67	100	133	167	200	233	267	300	333	367	400	433	467	500	533	567
70	71	107	143	179	214	250	286	321	357	393	429	464	500	536	571	607
65	77	115	154	192	231	269	308	346	385	423	462	500	539	577	615	654
60	83	125	167	208	250	292	333	375	417	458						
55	91	136	182	227	273	318	364	409	455							
50	100	150	200	250	300	350	400	450								
45	111	167	222	278	333	389	444									
40	125	188	250	313	375	438										
35	143	214	286	357	429											
30	167	250	333	417												
25	200	300	400													

Wet Film Thickness Required

Example

Matl. = 70% Solids

DFT = 150 mic

Wet Film = 214 mic

Note: Dry film thicknesses are minimum. No allowance is made for evaporation of solvents during application.

THEORETICAL COVERAGE IN SQUARE FEET PER U.S. GALLON

Required Dry Film Thickness Per Coat (Mils)

Solids Content by Volume	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
100%	1604	802	535	401	321	267	229	201	178	160	146	135	123	115	107	100
95	1524	762	511	381	305	254	218	191	169	152	139	127	117	109	102	95
90	1444	722	481	361	289	241	206	181	160	144	131	120	111	104	96	90
85	1363	682	455	341	273	227	195	170	152	136	124	114	105	98	91	85
80	1283	642	428	321	257	214	183	160	143	128	117	107	98	92	86	80
75	1203	602	401	301	241	201	172	150	134	120	109	100	92	86	80	75
70	1123	561	374	281	225	187	160	140	125	112	102	94	86	80	75	70
65	1043	521	348	261	209	174	149	130	116	104	95	87	80	75	70	65
60	962	481	321	241	193	160	138	120	107	96	88	80	74	69	64	60
55	882	441	294	221	176	147	126	110	98	88	80	74	68	63	59	55
50	802	401	267	201	160	134	115	100	89	80	73	67	62	58	54	50
45	772	361	241	181	144	120	103	90	80	72	66	60	55	52	48	45
40	642	321	214	160	128	107	92	80	71	64	58	54	49	46	43	40
35	561	281	187	140	112	94	80	70	62	56	51	47	43	40	37	35
30	481	241	160	120	96	80	69	60	54	48	44	40	37	35	32	30
25	401	201	134	100	80	67	57	50	45	40	37	33	31	29	27	25

Theoretical Coverage Per Gallon

THEORETICAL COVERAGE IN SQUARE METERS PER LITER

Required Dry Film Thickness Per Coat (Microns)

Solids Content by Volume	25	50	75	100	125	150	175	200	225	250	275	300	325	350	375	400
100%	40.0	20.0	13.3	10.0	8.0	6.7	5.7	5.0	4.4	4.0	3.6	3.3	3.1	2.9	2.7	2.5
95	38.0	19.0	12.6	9.5	7.6	6.4	5.4	4.8	4.2	3.8	3.4	3.1	3.0	2.8	2.6	2.4
90	36.0	18.0	12.0	9.0	7.2	6.1	5.1	4.5	4.0	3.6	3.2	3.0	2.8	2.6	2.4	2.3
85	34.0	17.0	11.3	8.5	6.8	5.7	4.9	4.3	3.7	3.4	3.1	2.8	2.6	2.5	2.3	2.1
80	32.0	16.0	10.5	8.0	6.4	5.4	4.6	4.0	3.5	3.2	2.9	2.6	2.5	2.3	2.2	2.0
75	30.0	15.0	10.0	7.5	6.0	5.0	4.3	3.8	3.3	3.0	2.7	2.5	2.3	2.2	2.0	1.9
70	28.0	14.0	9.3	7.0	5.6	4.7	4.0	3.5	3.1	2.8	2.5	2.3	2.2	2.0	1.9	1.8
65	26.0	13.0	8.7	6.5	5.2	4.4	3.7	3.3	2.9	2.6	2.3	2.2	2.0	1.9	1.8	1.6
60	24.0	12.0	8.0	6.0	4.8	4.0	3.4	3.0	2.6	2.4	2.2	2.0	1.9	1.7	1.6	1.5
55	22.0	11.0	7.3	5.5	4.4	3.7	3.1	2.8	2.4	2.2	2.0	1.8	1.7	1.6	1.5	1.4
50	20.0	10.0	6.7	5.0	4.0	3.4	2.9	2.5	2.2	2.0	1.8	1.7	1.6	1.5	1.4	1.3
45	18.0	9.0	6.0	4.5	3.6	3.0	2.6	2.3	2.0	1.8	1.6	1.5	1.4	1.3	1.2	1.1
40	16.0	8.0	5.3	4.0	3.2	2.7	2.3	2.0	1.8	1.6	1.4	1.3	1.2	1.16	1.08	1.0
35	14.0	7.0	4.7	3.5	2.8	2.3	2.0	1.8	1.5	1.4	1.3	1.2	1.1	1.00	0.95	0.88
30	12.0	6.0	4.0	3.0	2.4	2.0	1.7	1.5	1.3	1.2	1.1	1.0	0.9	0.87	0.81	0.75
25	10.0	5.0	3.3	2.5	2.0	1.7	1.4	1.3	1.1	1.0	0.9	0.83	0.78	0.73	0.68	0.63

Theoretical Coverage Per Liter

COATING COVERAGE CALCULATIONS

Theoretical Coverage (on Smooth Surface)

$$ft^2/U.S.\ gal = \frac{\%\ SBV/100 \times 1604}{dft\ (mils)}$$

$$m^2/1 = \frac{\%\ SBV/100 \times 1000}{dft\ (microns)}$$

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$$\text{Practical Coverage} = \text{Theoretical Coverage} - \frac{\text{Theoretical Coverage} \times \%\ \text{Loss}}{100}$$

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$$\text{Consumption} = \frac{\text{Area } (ft^2 \text{ or } m^2)}{\text{Practical Coverage (gallons or liters)}}$$

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Film Thickness

Wet to Dry $\frac{wft \times \%\ SBV}{100}$ Dry to Wet $\frac{dft \times 100}{\%SBV}$

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% Solids by Volume and wet film thickness adjustments due to thinning

$$W = \frac{X}{1+Y} \qquad A = \frac{Z}{W}$$

A = adjusted WFT required for thinned material
W = adjusted % solids by volume due to thinning
X = original materials % solids by volume
Y = % thinner added
Z = required dry film thickness

EXAMPLES OF WATERBLAST CLEANING RATES*

Square Feet Per Hour

SURFACE CONDITION	Water Only - W Sand Injection - S1	0-2000 PSI @5 GPM	3000-6000 PSI 6-8 GPM	10,000 PSI 10 GPM
Easy to clean, dusty settlement, flaky flat surface, light oil or grease	W	150	250	500
	S1	200	450	650
Average rusty surface angles and piping	W	75	200	250
	S1	100	225	350
Heavily corroded surface rust scale, irregular shape	W	20	75	125
	S1	25	100	175

* Hydroblast surface comparable to SSPC-SP 6 condition. Abrasive cleaned surface comparable to SSPC-SP 10 condition.

Note: The speed of cleaning is dependent upon the highest manageable working pressure and volume of water. Depending on surface condition, hydroblasting compares favorably with dry or wet sandblasting.

ABRASIVE CONSUMPTION PER HOUR AND AIR CONSUMPTION IN CUBIC FEET PER MINUTE

Pressure at Nozzle

Orifice Size	60 PSI	70 PSI	80 PSI	90 PSI	100 PSI	
3/16"	30	33	38	41	45	Air (CFM)
(5mm)	171	196	216	238	264	Sand (lb/hr)
	7	7.5	8.5	9.5	10.0	H.P.*
1/4"	54	61	68	74	81	Air
(6mm)	312	354	408	448	494	Sand
	12	13.5	15	16.5	18	H.P.
5/16"	89	101	113	126	137	Air
(8mm)	534	604	672	740	812	Sand
	20	22.5	25.5	28.0	30.5	H.P.
3/8"	126	143	161	173	196	Air
(10mm)	764	864	960	1052	1152	Sand
	28	32	36	38.5	44	H.P.
7/16 "	170	194	217	240	254	Air
(11mm)	1032	1176	1312	1448	1584	Sand
	38	43.5	48.5	53.5	56.5	H.P.
1/2 "	224	252	280	309	338	Air
(13mm)	1336	1512	1680	1856	2024	Sand
	50	56	62.5	69	75	H.P.
5/8"	356	404	452	504	548	Air
(16mm)	2140	2422	2690	2973	3250	Sand
	80	90	100	112	122	H.P.
3/4 "	504	572	644	692	784	Air
(19mm)	3056	3456	3840	4208	4608	Sand
	112	127	143	154	175	H.P.

*Electric motor horsepower required to product indicated C.F

EXAMPLES OF ABRASIVE CLEANING RATES[1]

Abrasive	Abrasive Consumption	Production Rate	Comments
Silica Sand 16 / 40 Mesh	2.6 lbs / sq ft	275 ft² / hr	1½ mil profile dusty
Crushed Flint 12 / 30 Mesh	3.6 lbs / sq ft	161 ft² / hr	3 mils
Staurolite 50 / 100 Mesh	3.1 lbs / sq ft	291 ft² / hr	1½ mil profile smooth surface
Coal Slag 16 / 40 Mesh	3.2 lbs / sq ft	230 ft² / hr	2½ mil profile
Copper Slag 16 / 40 Mesh	3.1 lbs / sq ft	262 ft² / hr	2 mil profile
*Garnet 36 Grit	*3.6 lbs / sq ft	213 ft² / hr	1½ mil profile very little dust
*Aluminum Oxide 36 Grit	*3.1 lbs / sq ft	275 ft² / hr	1½ mil profile very little dust
*G-40 Steel Grit	*5.5 lbs / sq ft	184 ft² / hr	2½ mil profile no dust

*These abrasives are normally reused

[1]Newly fabricated steel using a ⅜" I.D. orifice nozzle and 100 psi to a SSPC-SP 10 near white condition

EXAMPLES OF CLEANING PRODUCTION RATES[1]

	Method	Production Rate	Abrasive Used
1.	SSPC-SP 1	500 ft² / hour	1 gal / hour
2.	SSPC-SP 2	250-300 ft² / hour	4 units / day
3.	SSPC-SP 3	100 ft² / hour	2 units / day
4.	SSPC-SP 5	1000 ft² [1]	10,000 lbs.
5.	SSPC-SP 6	2500 ft² [1]	8,000 lbs.
6.	SSPC-SP 7	5200 ft² [1]	7,000 lbs.
7.	SSPC-SP 10	1500 ft² [1]	12,500 lbs.

[1]Per a 3 person crew day on lightly rusted steel, using 30 / 40 mesh medium hardness abrasive, ⅜" orifice nozzle at 80 psi.

TYPICAL AVERAGE AREA COATED PER DAY*

Method	Square Feet
Brush	650
Roller	1,200 – 2,600
Air Spray	4,000 – 8,000
Airless Spray	6,000 – 10,000

CONVENTIONAL VS. AIRLESS SPRAY*

	Conventional	Airless
Coverage, ft^2 / day	4 – 8,000	6 – 10,000
Overspray, %	20 to 40	10 to 15
Portability	Fair	Excellent
Direct Drive Units	No	Yes
Hoses	2	Usually
Masking	Considerable	Moderate
Penetration of Corners & Voids	Fair	Good
Thinning Before Spray	Usual	Sometimes
Film Build per Coat	Lower	Higher
Moisture (Compressor)	Possible	None
Versatility	More	Less
Paint Clogging Problems	Slight	Possible
Safety During Cleaning	Excellent	Poor

*Per Person

CALCULATE THE PRESSURE DROP IN FLUID HOSE

$$P = \frac{0.0273\ QVL}{D^4}$$

P = Pressure drop in psi
Q = Flow rate in G.P.M.
L = Length of hose (in feet)
V = Viscosity in poise
D^4 = Tube, pipe or hose factor (4th power of diameter in inches)

D^4 Factors

1/4" = .0039	3/4 " = .34
3/8" = .020	7/8 " = .59
1/2" = .062	1" = 1.00

SURFACE AREA PER TON OF STEEL DIFFERENT TYPES OF CONSTRUCTION

Type Construction	Average Sq Ft Per Ton
Light construction	300 to 500
Medium construction	150 to 300
Heavy construction	100 to 150
Extra heavy construction	50 to 100

Note: The average in industrial plants is possibly around 200 to 250 ft^2 per ton.

DECIMAL AND METRIC EQUIVALENTS OF FRACTIONS

	Inches	MM		Inches	MM
1/64	.015625	.39688	33/64	.5156	13.09688
1/32	.03125	.97375	17/32	.5312	13.49375
3/64	.046875	1.19063	35/64	.5468	13.89063
1/16	.0625	1.58750	9/16	.5625	14.28750
5/64	.078125	1.98438	37/64	.5781	14.68438
3/32	.09375	2.38175	19/32	.5937	15.08125
7/64	.109375	2.77813	39/64	.6093	15.47813
1/8	.125	3.17500	5/8	.675	15.87500
9/64	.140625	3.57188	41/64	.6406	16.27188
5/32	.15625	3.9687	21/32	.6562	16.66875
11/64	.171875	4.36563	43/64	.6718	17.06563
3/16	.1875	4.76250	11/16	.6875	17.46250
13/64	.203125	5.15938	45/64	.7031	17.85938
7/32	.21875	5.55625	23/32	.7187	18.25625
15/64	.234375	5.95313	47/64	.7343	18.65313
1/4	.250	6.35000	3/4	.750	19.0500
17/64	.2656	6.74688	49/64	.7656	19.44688
9/32	.2812	7.14375	25/32	.7812	19.84375
19/64	.2968	7.54063	51/64	.7968	20.24063
5/16	.3125	7.93750	13/16	.8125	20.63750
21/64	.3281	8.33438	53/64	.8281	21.03438
11/32	.3437	8.73125	27/32	.8437	21.43125
23/64	.3593	9.12813	55/64	.8593	21.8281
3/8	.375	9.52500	7/8	.875	22.22500
25/64	.3906	9.92188	57/64	.8906	22.62188
13/32	.4062	10.31875	29/32	.9062	23.01875
27/64	.4218	10.71563	59/64	.9218	23.41563
7/16	.4375	11.11250	15/16	.9375	23.81250
29/64	.4531	11.50938	61/64	.9531	24.2093
15/32	.4687	11.90625	31/32	.9687	24.60625
31/64	.4843	13.30313	63/64	.9843	25.00313
1/2	.500	12.70000	1.0	1.0000	25.40000

CONVERSION FACTORS

TO CONVERT LENGTH

from	to	multiply by
inches	centimeters	2.54
centimeters	inches	0.04
feet	centimeters	30.48
feet	meters	0.3048
centimeters	feet	0.03281
meters	feet	3.2808
mils	microns	25.0
microns	mils	0.04

TO CONVERT AREA

from	to	multiply by
sq. ft.	sq. meters (m^2)	0.0929
sq. meters (m^2)	sq. ft.	10.764

TO CONVERT VOLUME

from	to	multiply by
U.S. gal.	liter	3.785
U.S. gal.	Imp. gal.	0.833
liter	U.S. gal.	0.264
liter	Imp. gal.	0.22
Imp. gal.	U.S. gal.	1.20
Imp. gal.	liter	4.55

TO CONVERT AREA/VOLUME

from	to	multiply by
sq. ft./U.S. gal.	m^2/liter	0.0245
sq. ft./U.S. gal.	m^2/Imp. gal.	0.112
m^2/liter	sq. ft./U.S. gal.	40.76
m^2/liter	sq. ft./Imp. gal.	48.93
m^2/Imp. gal.	m^2/liter	0.2197

TO CONVERT WEIGHT

from	to	multiply by
pounds	kilograms	0.4536
kilograms	pounds	2.2046
long tons	pounds	2240.0
short tons	pounds	2000.0
long tons	short tons	1.12
short tons	long tons	0.8928

TO CONVERT PRESSURE

from	to	multiply by
p.s.i.	kg/cm^2	0.0703
kg/cm^2	p.s.i.	14.223

TO CONVERT TEMPERATURE

from	to	calculate
Celsius	Fahrenheit	$\frac{C° \times 9}{5} + 32$
Fahrenheit	Celsius	$\frac{(F° - 32 \times 5)}{9}$

TO CONVERT FILM THICKNESS

from	to	calculate
Wet	Dry	w.f.t. x SV%
Dry	Wet	$\frac{\text{d.f.t.}}{\text{SV\%}}$

TEMPERATURE CONVERSION

Fahrenheit to centigrade

°F	°C	°F	°C	°F	°C
Zero	-17.8	41	5.0	82	27.8
1	-17.2	42	5.6	83	28.3
2	-16.7	43	6.1	84	28.9
3	-16.1	44	6.7	85	29.4
4	-15.6	45	7.2	86	30.0
5	-15.0	46	7.8	87	30.5
6	-14.4	47	8.3	88	31.1
7	-13.9	48	8.9	89	31.7
8	-13.3	49	9.4	90	32.2
9	-12.8	50	10.0	91	32.8
10	-12.2	51	10.6	92	33.3
11	-11.7	52	11.1	93	33.9
12	-11.1	53	11.7	94	34.4
13	-10.6	54	12.2	95	35.0
14	-10.0	55	12.8	96	35.6
15	-9.4	56	13.3	97	36.1
16	-8.9	57	13.9	98	36.7
17	-8.3	58	14.4	99	37.2
18	-7.8	59	15.0	100	37.8
19	-7.2	60	15.6	110	43.3
20	-6.7	61	16.1	120	48.9
21	-6.1	62	16.7	130	54.4
22	-5.6	63	17.2	140	60.0
23	-5.0	64	17.8	150	65.6
24	-4.4	65	18.3	160	71.1
25	-3.9	66	18.9	170	76.7
26	-3.3	67	19.4	180	82.2
27	-2.8	68	20.0	190	87.8
28	-2.2	69	20.6	200	93.3
29	-1.7	70	21.1	210	98.9
30	-1.1	71	21.7	220	104.4
31	-0.6	72	22.2	230	110.0
US 32	Zero	73	22.8	240	115.6
33	0.6	74	23.3	250	121.1
34	1.1	75	23.9	300	148.8
35	1.7	76	24.4	350	176.6
36	2.2	77	25.0	400	204.4
37	2.8	78	25.6	450	232.2
38	3.3	79	26.1	500	260.0
39	3.9	80	26.7	750	398.8
40	4.4	81	27.2	1000	537.7

COMMONLY USED FORMULAS FOR CALCULATING SURFACE AREA

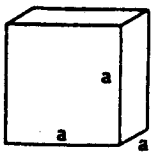
Squares and rectangles

The area of a square and of a rectangle is obtained by multiplying the length of one side by the length of the other. *i.e.*

square = a × a;

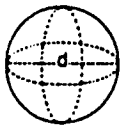
rectangle = a × b.

Cubes



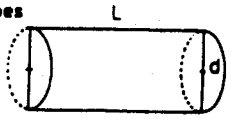
A cube has 6 sides which are all identical squares. Total surface area is 6 multiplied by the square of the length (a) of one of the sides *i.e.*, 6 × a × a.

Spheres



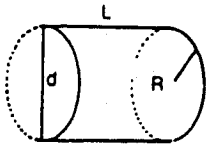
The surface area of a sphere is 3.1416 multiplied by the square of the diameter *i.e.*, 3.1416 × d × d.

Pipes



The surface area of a pipe is 3.1416 multiplied by the diameter (d) and by the length (L) *i.e.*, 3.1416 × d × L.

Cylindrical tanks

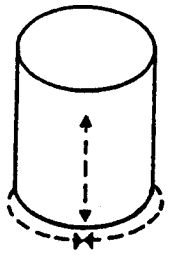


The surface area consists of the cylindric shell plus the top and bottom area *i.e.*: 3.1416 × d × L + 2 × (3.1416 × R × R).

ESTIMATING SQUARE FOOTAGE IN VARIOUS SHAPES

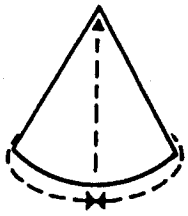
CYLINDER

a. Determine area of both ends of cylinder (circles) by multiplying 3.1416 times radius (in feet) squared.
b. Determine area of side of cylinder, by multiplying circumference in feet times height in feet.
c. Add square feet in both ends to square feet in side—for total square feet in cylinder.



CONE

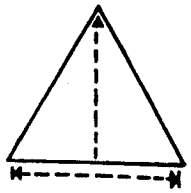
a. Determine area of base by multiplying 3.1416 times radius (in feet) squared.
b. Determine area of side of cone by multiplying circumference of base (in feet) times one-half of the slant height (in feet).
c. Add the square foot area of the base to the square foot area of the cone side for total square foot area.



Estimating Square Footage from Tonnage

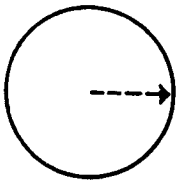
Many times structures will have unusual shapes or be too difficult to accurately measure. In such instances, if the tonnage and thickness of the steel can be determined, fairly accurate estimates of area can be determined from the table below:

TRIANGLE: Multiply the base measurement in feet times one-half the altitude in feet.

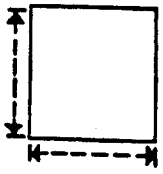


CIRCLE: Multiply 3.1416 times the radius (in feet) squared.

CIRCUMFERENCE: Multiply 3.1416 times the diameter.



SQUARE-RECTANGLE: Multiply the base measurement in feet times the height in feet.



THICKNESS OF STEEL (inches)	⅛	3/16	¼	5/16	⅜	½	⅝	¾	⅞	1	1½	2
SQUARE FT. AREA PER TON	800	533	400	320	267	200	160	133	114	100	67	50

APPROXIMATE SQUARE FEET PER LINEAR FOOT AND PER TON FOR DIFFERENT STEEL MEMBERS

SIZE	WEIGHT	SQ. FT./ LIN. FT.	SQ. FT. PER TON
24 WF	160	8.9	110
(24x14)	145	8.8	121
	130	8.7	135
24 WF	120	8.1	133
(24x12)	110	8.0	144
	100	8.0	160
24 WF	94	7.1	149
(24x9)	84	7.0	167
	76	7.0	184
21 WF	142	7.9	111
(21x13)	127	7.9	124
	112	7.8	139
21 WF	95	6.5	135
(21x9)	82	6.5	159
21 WF	73	6.3	173
(21x8 1/4)	68	6.3	185
	62	6.2	200
18 WF	114	7.0	123
(18x11 3/4)	105	7.0	133
	96	7.0	146
18 WF	85	6.0	141
(18x8 3/4)	77	6.0	156
	70	5.9	169
	64	5.9	184
18 WF	60	5.5	183
(18x7 1/2)	55	5.5	200
	50	5.5	220
16 WF	96	6.6	137
(16x11 1/2)	88	6.5	148
16 WF	78	5.6	144
16x8 1/2	71	5.5	155
	64	5.5	172
	58	5.5	190
16 WF	50	5.1	204
(16x7)	45	5.0	222
	40	5.0	250
	36	5.0	278
14 WF	426	8.5	40
(14x16)	398	8.5	43
	370	8.5	46
	342	8.5	50
	314	8.5	54
14 WF	287	8.0	56
(14x16)	264	8.0	61
	246	8.0	65
	237	8.0	68
	228	8.0	70
14 WF	219	7.9	72
(14x16)	211	7.9	75
	202	7.9	78
	193	7.9	82
	184	7.9	86
14 WF	176	7.7	87
(14x16)	167	7.7	92
	158	7.7	97
	150	7.7	103
	142	7.7	108
14 WF	136	7.3	107
(14x14 1/2)	127	7.3	115
	119	7.3	123
	111	7.3	132
	103	7.3	142
	95	7.3	154
	87	7.3	168

APPROXIMATE SQUARE FEET PER LINEAR FOOT AND PER TON FOR DIFFERENT STEEL MEMBERS

(continued)

SIZE	WEIGHT	SQ. FT./ LIN. FT.	SQ. FT. PER TON
14 WF (14x12)	84	6.4	152
	78	6.3	162
14 WF (14x10)	74	5.7	154
	68	5.7	168
	61	5.7	187
14 WF (14x8)	53	5.0	189
	48	5.0	208
	43	4.9	228
14 WF (14x16 3/4)	38	4.6	242
	34	4.6	271
	30	4.6	307
12 WF (12x12)	190	6.6	69
	161	6.5	81
	133	6.4	96
	120	6.3	105
12 WF (12x12)	106	6.2	117
	99	6.2	125
	92	6.2	135
	85	6.1	144
	79	6.1	154
	72	6.1	169
	65	6.0	185
12 WF (12x10)	58	5.4	186
	53	5.3	200
12 WF (12x8)	50	4.7	188
	45	4.7	209
	40	4.7	235
12 WF (12x6 1/2)	36	4.2	233
	31	4.2	271
	27	4.2	311
10 WF (10x10)	112	5.4	96
	100	5.3	106
	89	5.2	117
	77	5.2	124
10 WF (10x10)	72	5.1	142
	66	5.1	155
	60	5.1	170
	54	5.0	185
	49	5.0	204
10 WF (10x8)	45	4.4	196
	39	4.3	221
	33	4.3	261
10 WF (10x5 3/4)	29	3.6	248
	25	3.6	288
	21	3.6	343
8 WF (8x8)	67	4.3	128
	58	4.2	145
	48	4.1	171
8 WF (8x8)	40	4.1	205
	35	4.0	229
	31	4.0	258
8 WF (8x6 1/2)	28	3.5	250
	24	3.5	292
8 WF (8x5 1/4)	20	3.1	310
	17	3.1	365
6 WF (6x6)	25	3.1	248
	20	3.0	300
	15.5	3.0	387
5 WF (5x5)	18.5	2.5	270
	16	2.5	313
4 WF	13	2	308

APPROXIMATE SQUARE FEET PER LINEAR FOOT AND PER TON FOR DIFFERENT STEEL MEMBERS

(continued)

SIZE	WEIGHT	SQ. FT./ LIN. FT.	SQ. FT. PER TON
	I-BEAMS		
24 I	120	6.7	112
	106	6.6	125
24 I	100	6.4	128
	90	6.4	142
	79.9	6.3	158
20 I	95	5.7	120
	85	5.7	134
20 I	75	5.5	147
	65.4	5.4	165
18 I	70	5.1	148
	54.7	5.0	183
15 I	50	4.4	176
	42.9	4.3	200
12 I	50	3.8	152
	40.8	3.8	186
12 I	35	3.7	211
	31.8	3.7	233
10 I	35	3.3	189
	25.4	3.2	252
8 I	23	2.7	322
	18.4	2.7	402
7 I	20	2.5	250
	15.3	2.4	314
6 I	17.25	2.2	255
	12.5	2.1	336
5 I	14.75	1.9	258
	10	1.8	360

SIZE	WEIGHT	SQ. FT./ LIN.FT.	SQ. FT. PER TON
	I-BEAMS		
4 I	9.5	1.6	337
	7.7	1.6	416
3 I	7.5	1.3	347
	5.7	1.3	456
	CHANNELS		
18	58	4.4	152
	51.9	4.4	172
	45.8	4.3	188
	42.7	4.3	201
15	50	3.7	148
	40	3.7	185
	33.9	3.6	212
13	50	3.6	144
	31.8	3.5	220
12	30	3.1	207
	25	3.0	240
	20.7	3.0	290
10	30	2.7	180
	25	2.6	208
	20	2.6	260
9	20	2.4	240
	15	2.3	307
	13.4	2.3	343
8	18.75	2.2	235
	13.75	2.1	305
	11.5	2.1	365
7	14.75	1.9	258
	12.25	1.9	310
	9.8	1.9	388

APPROXIMATE SQUARE FEET PER LINEAR FOOT AND PER TON FOR DIFFERENT STEEL MEMBERS

(continued)

SIZE	WEIGHT	SQ. FT./ LIN. FT.	SQ. FT. PER TON
CHANNELS			
6	13.0	1.7	262
	10.5	1.7	324
	8.2	1.6	390
5	9.0	1.5	333
	6.7	1.4	418
4	7.25	1.2	331
	5.4	1.2	444
3	6.0	1.0	333
	5.0	1.0	400
	4.1	1.0	488
ANGLES EQUAL LEG			
8x8x½	26.4	2.7	205
6x6x5/16	12.5	2.0	320
5x5x5/16	10.3	1.7	330
4x4x¼	6.6	1.3	394
3½x3½x¼	5.8	1.2	414
3x3x3/16	3.71	1.0	539
2½x2¼x3/16	3.07	0.8	521
2x2x⅛	1.65	0.7	848
1¼x1¼x⅛	1.23	0.5	813
1x1x⅛	0.80	0.3	750
ANGLES UNEQUAL LEG			
8x6x½	23.0	2.3	200
8x4x½	19.6	2.0	204
7x4x⅜	13.6	1.8	265
6x4x5/16	10.3	1.7	330
6x3½x5/16	9.8	1.6	327
5x3½x5/16	8.7	1.4	322
5x3x¼	6.6	1.3	394
4x3½x¼	6.2	1.25	403
4x3x¼	5.8	1.17	403
3½x3¼	5.4	1.08	400
3x2½x¼	4.5	0.92	409
3x2x3/16	3.07	0.83	541
2½x2½x3/16	2.75	0.75	545

SIZE	WEIGHT	SQ. FT./ LIN.FT.	SQ. FT. PER TON
ANGLES UNEQUAL LEG (cont.)			
2½x1½x3/16	2.44	0.67	549
2x1½x⅛	1.44	0.58	806
1½x1¼x3/16	1.67	0.31	371
1x¾x⅛	0.70	0.15	429
1x⅝x⅛	0.64	0.14	438

FLAT 1 – Surface Only, 1 Foot Wide*

	Wt. Lbs./ Sq. Ft.		
1/16"	2.55	1.0	784
⅛"	5.10	1.0	392
3/16"	7.65	1.0	261
¼"	10.20	1.0	196
⅜"	15.30	1.0	131
½"	20.40	1.0	98
⅝"	25.50	1.0	78
¾"	30.60	1.0	65
⅞"	35.70	1.0	56
1"	40.80	1.0	49

* If 2 surfaces (top and bottom) are desired, multiply figures in the 2 columns at right above by 2. This is for flat material only, such as plates.

SQUARE FEET OF AREA AND GALLON CAPACITY PER FOOT OF DEPTH IN CYLINDRICAL TANKS

Diameter feet	Circum-ference feet	Cross-Section Area Ft.^{2}	Gallons feet of Depth
5.0	15.708	19.635	146.88
5.5	17.279	23.758	177.72
6.0	18.850	28.274	211.51
6.5	20.420	33.183	248.23
7.0	21.991	38.485	287.88
7.5	23.562	44.179	330.48
8.0	25.133	50.265	376.01
8.5	26.704	56.745	424.48
9.0	28.274	63.617	475.89
9.5	29.845	70.882	530.24
10.0	31.416	78.540	587.52
10.5	32.987	86.590	647.74
11.0	34.558	95.033	710.90
11.5	36.128	103.87	776.99
12.0	37.699	113.10	846.03
12.5	39.270	122.72	918.00
13.0	40.841	132.73	992.91
13.5	42.412	143.14	1070.8
14.0	43.982	153.94	1151.5
14.5	45.553	165.13	1235.3
15.0	47.124	176.71	1321.9
15.5	48.695	188.69	1411.5
16.0	50.265	201.06	1504.1
16.5	51.836	213.82	1599.5
17.0	53.407	226.98	1697.9
17.5	54.978	240.53	1799.3
18.0	56.549	254.47	1903.6
18.5	58.119	268.80	2010.8
19.0	59.690	283.53	2120.9
19.5	61.261	298.65	2234.0
20.0	62.832	314.16	2350.1
20.5	64.403	330.06	2469.1
21.0	65.973	346.46	2591.0
21.5	67.544	363.05	2715.8
22.0	69.115	380.13	2843.6
22.5	70.686	397.61	2974.3
23.0	72.257	415.48	3108.0

Diameter feet	Circum-ference feet	Cross-Section Area Ft.^{2}	Gallons feet of Depth
23.5	73.827	433.74	3244.6
24.0	75.398	452.39	3384.1
24.5	76.969	471.44	3526.6
25.0	78.540	490.87	3672.0
25.5	80.111	510.71	3820.3
26.0	81.681	530.93	3971.6
26.5	83.252	551.55	4125.9
27.0	84.823	572.56	4283.0
27.5	86.394	593.96	4443.1
28.0	87.965	615.75	4606.2
28.5	89.535	637.94	4772.1
29.0	91.106	660.52	4941.0
29.5	92.677	683.49	5112.9
30.0	94.248	706.86	5287.7
30.5	95.819	730.62	5465.6

FORMULA:

Total area = circumference x length + area of two ends.
(Use area of one end for open top tanks.)

EXAMPLES:

1. Horizontal tank (or vertical tank with closed top)
   20.0 ft. diameter and 12.0 ft. long or high.

Shell of tank	=	62.832 x 12.0	=	753.98 sq. ft.
Top & Bottom	=	314.16 sq. ft. x 2	=	628.32 sq. ft.
			TOTAL	1382.30 sq. ft.

2. Vertical tank 20.0 ft. diameter, 12.0 ft. high with open top.

Shell of tank	=	62.832 x 12.0	=	753.98 sq. ft.
Bottom of tank	=			314.16 sq. ft.
			TOTAL	1068.14 sq. ft.

SURFACE AREA OF PIPE AND SQUARE FEET PER LINEAR FOOT

Size Inches	Diameters External Inches	Diameters Internal Inches	Square feet per linear foot of pipe External	Square feet per linear foot of pipe Internal
1/4	0.540	0.364	0.141	0.096
1/2	0.840	0.622	0.219	0.168
3/4	1.050	0.825	0.276	0.216
1	1.315	1.049	0.344	0.275
1 1/2	1.900	1.610	0.497	0.422
2	2.375	2.067	0.622	0.541
2 1/2	2.875	2.469	0.753	0.647
3	3.500	3.068	0.916	0.804
4	4.600	4.026	1.178	1.053
5	5.563	5.047	1.456	1.32
6	6.625	6.065	1.734	1.59
8	8.625	7.871	2.258	2.07
10	10.750	10.020	2.814	2.62
12	12.750	12.000	3.35	3.14
18	18.000	17.250	4.71	4.52
24	24.000	23.250	6.28	6.09
36	36.000	35.250	9.42	9.23
48	48.000	47.250	12.57	12.40
60	60.000	59.250	15.71	15.53

EXAMPLE:

Pipe sections of 3" diameter and 20 ft. long, each section to be coated inside and outside.

External areas	=	0.916 x 20	=	18.32
Internal areas	=	0.804 x 20	=	16.08
		Total Area		34.40 sq. ft.

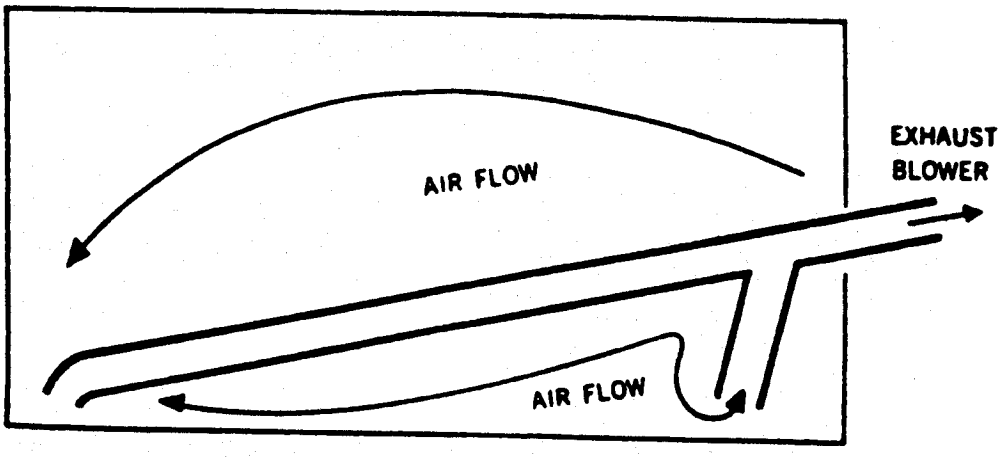
RECOMMENDED VENTILATION FOR VARIOUS SIZED TANKS

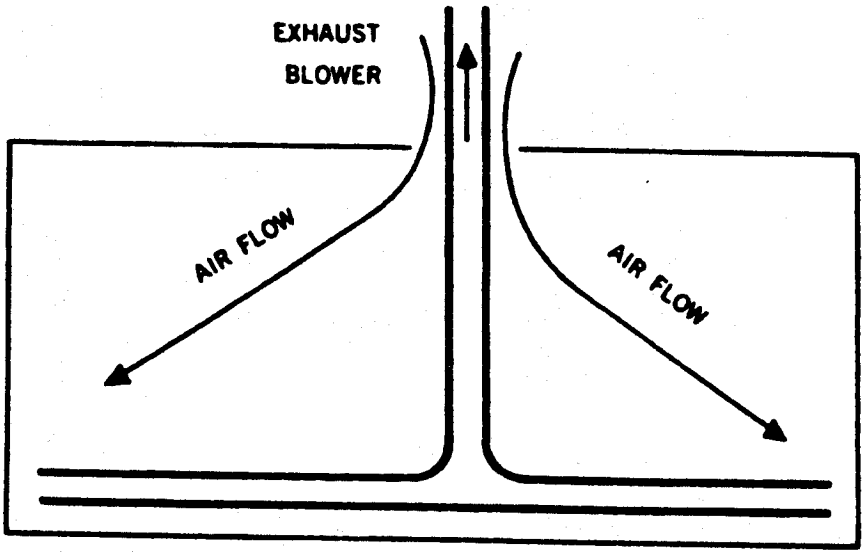
SIZE OF TANK	VOLUME IN CUBIC FEET	CUBIC FEET OF SOLVENT VAPOR TO MAKE 1% BY VOLUME	GALS COATING USED TO MAKE 1% BY VOLUME OF SOLVENT VAPOR IN AIR	AIR CHANGES PER HOUR NEEDED TO KEEP SOLVENT TO 1% BY VOLUME	GALLONS OF COATING SPRAYED IN ONE HOUR	MINUTES REQUIRED TO CHANGE AIR TO KEEP SOLVENT TO 1% BY VOLUME[1]	RECOMMENDED SUCTION FAN TO KEEP THE AIR FAR BELOW ANY EXPLOSIVE LIMIT (CU FT PER MINUTE)	RECOMMENDED CHANGES OF AIR IN MINUTES TO KEEP SOLVENT FUMES FAR BELOW EXPLOSIVE LIMIT
5,000 gals	668	6.7	.26	19.30	5	3	1,000	40 seconds
10,000 gals	1,336	13.4	.52	9.60	5	6	2,000	40 seconds
25,000 gals	3,342	33.4	1.30	3.80	10	8	2,000	1.7 seconds
50,000 gals	6,684	66.8	2.60	3.80	10	16	3,000	2.2 minutes
100,000 gals	13,378	133.6	5.20	1.90	10	31	5,000	2.7 minutes
250,000 gals	33,420	334.2	13.00	0.77	20	40	10,000	3.3 minutes
400,000 gals	53,500	535.0	20.80	0.48	20	62	10,000	5.4 minutes
13,500 bbls	75,800	758.0	29.40	0.34	50	35	25,000	3.0 minutes
27,000 bbls	151,600	1516.0	58.80	0.26	50	70	35,000	4.3 minutes
50,000 bbls	280,000	2800.0	108.30	0.14	50	130	50,000	5.6 minutes

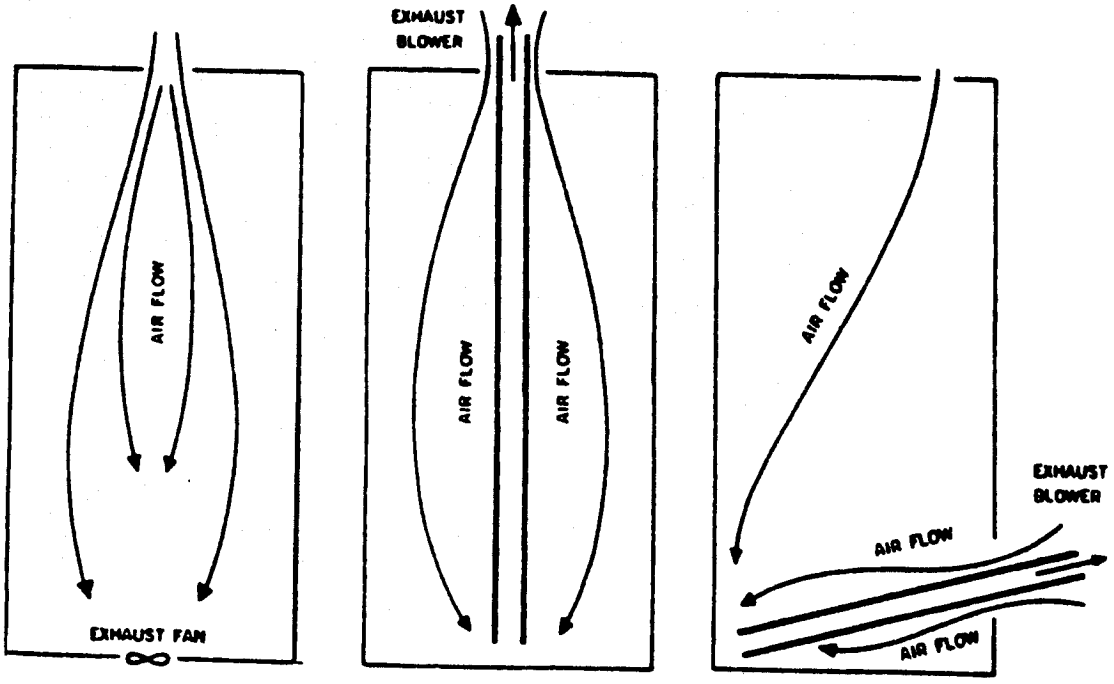
[1] This data is based on a specific coating. To obtain the gallons required of any coating to make 1% by volume of solvent vapor in air: (a) Multiply the percent solvents by volume by the cubic ft. of solvent vapor per gallon. If there is more than 1 solvent multiply the percentage of each by the cubic ft. of vapor per gallon and add them. This will give the cubic ft. of solvent vapor per gallon of coating (b) Divide the cubic ft. of solvent vapor to make 1% by volume by the cubic ft. of solvent vapor per gallon of coating. This will give the gallons of coating required to make 1% by volume of solvent vapor in air.

HOW TO VENTILATE TANKS

Various arrangements of ventilating fan designed to ensure proper circulation of air and removal of combustible or toxic gases.







HEAT CALCULATION CHART

Thousands of BTU/hr. needed to raise area temperature the number of degrees shown.	Thousands of Cu. Ft. to be heated													
	5	10	20	30	40	50	60	70	80	90	100	200	300	400
10° F	7	14	28	42	56	70	84	98	112	126	140	280	420	560
20° F	14	28	56	84	112	140	168	196	224	252	280	560	840	1120
30° F	21	42	84	126	268	210	252	294	336	378	420	840	1260	1680
40° F	28	56	112	168	214	280	336	392	448	504	560	1120	1680	2240
50° F	35	70	140	210	280	350	420	490	560	630	700	1400	2100	2800
60° F	42	84	168	252	336	420	504	588	672	756	840	1680	2520	3360
70° F	49	98	196	294	392	490	588	686	784	882	980	1960	2940	3920
80° F	56	112	224	336	448	560	672	784	896	908	1120	2240	3360	4480
90° F	63	126	252	378	504	630	766	882	1008	1034	1260	2520	3780	5040

Example: An area that is 265,000 cubic feet and at an ambient temperature of 20°F which you wish to raise by 30°F to a total room temperature of 50°F, you would use the 30°F designation on Heat Calculation Chart and figure as per the following:

200,000	840,000
60,000	252,000
5,000	21,000
265,000 Total Cu. Ft.	1,113,000 Total BTU/hr.

PRESSURE LOSS IN HOSE

Lubrication Only at Tool – No Line Lubricator

Hose Length and Inside Diameter	cfm Free Air	Line Pressure – psig						
		60	80	100	120	150	200	300
50 Feet	60	3.1	2.4	2.0				
	80	5.3	4.2	3.5	2.9	2.4	1.8	1.2
3/4"	100	8.1	6.4	5.2	4.5	3.6	2.8	1.9
	120		9.0	7.4	6.3	5.1	3.9	2.7
	140		12.0	9.9	8.4	6.9	5.3	3.6
	160			12.7	10.8	8.9	6.8	4.6
	180				13.6	11.1	8.5	5.8
	200				16.6	13.5	10.5	7.1
	220					16.2	12.4	8.4
50 Feet	120	2.7	2.1					
	150	4.1	3.2	2.7	2.3			
1"	180	5.8	4.6	3.8	3.2	2.6	2.0	1.3
	210	7.7	6.1	4.0	4.3	3.5	2.7	1.8
	240		7.9	6.5	5.5	4.5	3.4	2.3
	270		9.8	8.1	6.9	5.6	4.3	2.9
	300		12.0	9.9	8.4	6.9	5.3	3.6
	330			11.8	10.0	8.2	6.3	4.3
	360			13.9	11.9	9.7	7.4	5.0
	390				13.8	11.3	8.7	5.9
	420				15.9	13.0	10.0	6.8
	450					14.8	11.4	7.7
50 Feet	200	2.4						
	250	3.7	2.9	2.4	2.0			
1 1/4"	300	5.2	4.1	3.4	2.9	2.3	1.8	1.2
	350	7.0	5.5	4.5	3.8	3.1	2.4	1.6
	400	8.9	7.0	5.8	4.9	4.0	3.1	2.1
	450		8.8	7.3	6.2	5.0	3.9	2.6
	500		10.8	8.9	7.6	6.2	4.7	3.2
	550			10.7	9.1	7.4	5.7	3.9
	600			12.6	10.7	8.7	5.7	4.6
	650			14.6	12.4	10.2	7.8	5.3
	700				14.3	11.7	9.0	6.1
	750					13.3	10.2	6.9
	800					15.0	11.5	7.8
50 Feet	300	2.1						
	400	3.7	2.9	2.4	2.0			
1 1/2"	500	5.6	4.4	3.7	3.1	2.5	1.9	1.3
	600	8.0	6.3	5.2	4.4	3.6	2.8	1.9
	700		8.5	7.0	5.9	4.9	3.7	2.5
	800		10.9	9.0	7.7	6.3	4.8	3.2
	900			11.2	9.5	7.8	6.0	4.1
	1000			13.6	11.6	9.5	7.3	4.9
	1100				14.0	11.4	8.8	6.0
	1200					13.6	10.4	7.1
	1300					15.8	12.1	8.3

PRESSURE LOSS IN HOSE

Lubrication Only at Tool – No Line Lubricator

Hose Length and Inside Diameter	cfm Free Air	Line Pressure – psig 60	80	100	120	150	200	300
50 Feet	600	1.9						
	800	3.2	2.5	2.1				
2"	1000	5.0	3.9	3.2	2.7	2.2	1.7	1.1
	1200	7.0	5.5	4.5	3.8	3.1	2.4	1.6
	1400	9.3	7.4	6.1	5.2	4.2	3.2	2.2
	1600		9.6	7.9	6.7	5.5	4.2	2.8
	1800		12.1	9.9	8.4	6.9	5.3	3.6
	2000			12.2	10.4	8.5	6.5	4.4
	2200			14.6	12.5	10.2	7.8	5.3
	2400				14.7	12.0	9.2	6.3
	2600					14.1	10.8	7.3
	2800					16.2	12.4	8.5
50 Feet	1000	1.7						
	1500	3.7	2.9	2.4	2.0			
2 1/2"	2000	6.5	5.1	4.2	3.6	2.9	2.2	1.5
	2500	10.0	7.9	6.5	5.5	4.5	3.4	2.3
	3000		11.2	9.3	7.9	6.4	4.9	3.3
	3500			12.4	10.6	8.7	6.6	4.5
	4000				13.7	11.2	8.6	5.8
	4500					14.0	10.7	7.3
50 Feet	2000	2.5	2.0					
	2500	3.9	3.0	2.5	2.1			
3"	3000	5.5	4.4	3.6	3.1	2.5	1.9	1.3
	3500	7.5	5.9	4.9	4.1	3.4	2.6	1.7
	4000	9.8	7.6	6.3	5.3	4.4	3.3	2.3
	4500		9.6	7.9	6.7	5.5	4.2	2.8
	5000		11.7	9.6	8.2	6.7	5.1	3.5
	5500			11.5	9.8	8.0	6.1	4.2
	6000			13.6	11.5	9.4	7.2	4.9
	6500				13.5	11.0	8.4	5.7
	7000				15.6	12.7	9.8	6.6
	7500					14.5	11.1	7.6
25 Feet	5000	1.9						
	6000	2.7	2.1	1.7				
4"	7000	3.6	2.8	2.3	2.0		1.2	
	8000	4.7	3.7	3.0	2.6	2.1	1.6	
	9000	5.9	4.6	3.8	3.2	2.6	2.0	
	10000	7.2	5.7	4.7	4.0	3.2	2.5	
	11000	8.7	6.8	5.6	4.8	3.9	3.0	
	12000		8.1	6.7	5.7	4.6	3.5	
	13000		9.4	7.8	6.6	5.4	4.1	
	14000			9.0	7.6	6.2	4.8	
	15000				8.7	7.1	5.4	
	16000				9.8	8.0	6.2	
	17000					9.1	6.9	