

Dehumidification and Ventilation Calculation Sheet

Use this worksheet to determine the dehumidification and ventilation needs of your poolroom.

A. Moisture Load from the Water Surface

- Look up the lbs. per ft² per hour evaporation rate from the [WATER EVAPORATION CHART](#) using the desired pool water temperature, air temperature and % relative humidity (RH)
 $\text{_____ lbs. of moisture load/ft}^2\text{/hr} \times \text{_____ ft}^2\text{ area of pool surface} = \text{_____ lbs/hr moisture load}$
- Covered Pool (for pools that are uncovered less than 2 hours/ 6 hours)
 $(\text{_____ lbs/hr moisture load} \times \text{_____ hrs/6 hours pool uncovered}) / 6 \text{ hrs/day} = \text{_____ lbs/hr (average)}$

B. Exhaust Ventilation to Prevent Moisture Penetration of the Structure and Remove Chemicals

- Calculate the natural air leakage
 - Volume of pool space
 $\text{_____ ft length} \times \text{_____ ft width} \times \text{_____ ft ceiling height} = \text{_____ ft}^3\text{ pool room volume}$
 - Estimate natural leakage, air changes per hour (ACH)
 $(\text{_____ ft}^3\text{ pool room volume} \times \text{_____ ACH natural leakage}) / 60 \text{ min/hr} = \text{_____ ft}^3\text{/min natural air leakage}$

Extremely Tight Construction = .1 ACH natural leakage
 Moderately Tight Construction = .2 ACH natural leakage
 Typical Construction = .3 ACH natural leakage
- Exhaust air flow required to prevent moist air penetration of the pool room insulation.
 Recommend air exhaust rate 1.5 (minimum) times greater than the natural leakage rate of the structure.
 $\text{_____ ft}^3\text{/min natural air leakage} \times \text{_____ (1.5)} = \text{_____ ft}^3\text{/min recommended exhaust air flow rate to depressurize the pool room (PREVENTS MOISTURE PENETRATION OF THE INSULATION)}$
- Moisture removed by ventilation
 - Look-up the lbs of moisture removed per hour per 100CFM of exhaust ventilation using the [VENTILATION CHART](#) at the desired room condition.
 $\text{_____ lbs moisture removed/100 CFM per hr of ventilation} \times (\text{_____ CFM of exhaust ventilation}/100 \text{ CFM}) = \text{_____ lbs of moisture per hour removed by ventilation}$

C. Determining the Amount of Dehumidification Needed

- First method (uncovered pool)
 Requires that the moisture removal rate equals the moisture load. The RH is maintained with the exception during times of high activity and pool apron splash. This may generate two times the humidity load.
 $\text{_____ lbs/hr moisture load} - \text{_____ lbs/hr moisture removed by ventilation} = \text{_____ lbs/hr of dehumidifier capacity}$
- Second method (covered pool with low usage - less than 2 hours per 12 hours)
 Allows a rise in the RH levels when pool is uncovered by provides a return to normal RH levels 2-3 hours after the pool is covered.
 $\text{_____ lbs/hr average moisture load} - \text{_____ lbs/hr moisture removed by ventilation} = \text{_____ lbs/hr, estimated dehumidifier capacity}$

_____ CFM exhaust fan model _____	cost \$ _____	installation \$ _____	= \$ _____
_____ lbs/hr HI-E DRY model _____	cost \$ _____	installation \$ _____	= \$ _____

TOTAL \$ _____

WATER EVAPORATION CHART

Use the below chart as a guideline to determine the moisture load and the dehumidification requirement for your pool room. This chart is based on low activity and splash. During times of high activity, up to 2 times more moisture may be generated.

POUNDS OF WATER PER HOUR PER SQ FT OF WATER SURFACE														
AIR TEMP	RH	DEW PT	Pool Water Temperature											
			76	78	80	82	84	86	88	90	92	94	100	104
68° F	40%	47	0.031	0.034	0.035	0.041	0.045	0.049	0.053	0.057	0.062	0.067	0.083	0.095
	50%	49	0.028	0.031	0.037	0.038	0.041	0.045	0.049	0.054	0.058	0.063	0.079	0.092
	60%	54	0.024	0.027	0.031	0.034	0.038	0.042	0.046	0.050	0.055	0.060	0.076	0.088
70° F	40%	45	0.030	0.033	0.037	0.040	0.044	0.048	0.052	0.056	0.061	0.066	0.082	0.094
	50%	51	0.026	0.030	0.033	0.036	0.040	0.044	0.048	0.052	0.057	0.062	0.075	0.090
	60%	55	0.023	0.027	0.030	0.033	0.037	0.041	0.045	0.049	0.054	0.059	0.075	0.087
72° F	40%	47	0.029	0.032	0.035	0.039	0.043	0.046	0.051	0.055	0.060	0.064	0.081	0.093
	50%	53	0.025	0.058	0.031	0.035	0.039	0.042	0.047	0.051	0.055	0.060	0.076	0.089
	60%	57	0.022	0.025	0.028	0.032	0.035	0.039	0.043	0.048	0.052	0.057	0.073	0.086
74° F	50%	54	0.024	0.027	0.031	0.034	0.038	0.042	0.046	0.050	0.055	0.060	0.076	0.088
	60%	59	0.020	0.023	0.026	0.030	0.034	0.038	0.042	0.046	0.051	0.055	0.072	0.084
	60%	62	0.017	0.020	0.024	0.027	0.031	0.035	0.039	0.043	0.048	0.053	0.067	0.081
78° F	50%	53	0.025	0.028	0.031	0.035	0.039	0.042	0.047	0.051	0.055	0.060	0.076	0.089
	60%	63	0.016	0.019	0.023	0.026	0.030	0.034	0.038	0.042	0.047	0.052	0.068	0.080
	60%	65	0.014	0.017	0.021	0.024	0.028	0.032	0.036	0.040	0.045	0.049	0.066	0.078
80° F	50%	60	0.019	0.022	0.026	0.029	0.033	0.037	0.041	0.045	0.050	0.054	0.071	0.083
	60%	65	0.014	0.017	0.021	0.024	0.028	0.032	0.036	0.040	0.045	0.049	0.066	0.078
	60%	67	0.012	0.015	0.018	0.022	0.025	0.029	0.033	0.038	0.042	0.047	0.063	0.076
82° F	50%	62	0.017	0.020	0.024	0.027	0.031	0.035	0.039	0.043	0.048	0.053	0.069	0.081
	60%	67	0.012	0.015	0.018	0.022	0.025	0.029	0.033	0.038	0.042	0.047	0.063	0.076
	60%	68	0.011	0.014	0.017	0.021	0.024	0.028	0.032	0.037	0.041	0.046	0.062	0.074
84° F	50%	64	0.015	0.018	0.022	0.025	0.029	0.033	0.037	0.041	0.046	0.051	0.067	0.079
	60%	68	0.011	0.014	0.017	0.021	0.024	0.028	0.032	0.037	0.041	0.046	0.062	0.074
	60%	71	0.007	0.010	0.013	0.017	0.021	0.024	0.029	0.033	0.037	0.042	0.058	0.071
86° F	50%	65	0.014	0.017	0.021	0.024	0.028	0.032	0.036	0.040	0.045	0.049	0.066	0.078
	60%	71	0.007	0.010	0.013	0.017	0.021	0.024	0.029	0.033	0.037	0.042	0.058	0.071
	60%	71	0.007	0.010	0.013	0.017	0.021	0.024	0.029	0.033	0.037	0.042	0.058	0.071

ASHRAE Recommended Conditions

VENTILATION CHART

The following chart should be used as a guide to determine the ventilation impact in your pool room. This chart is based on an average 80% outside relative humidity.

POOL ROOM AIR TEMPERATURE
% RELATIVE HUMIDITY

POUNDS OF WATER REMOVED / HOUR / 100 CFM OF VENTILATION												
AIR TEMP	RH	OUTSIDE AIR TEMPERATURE										
		-10	0	10	20	30	40	50	60	70	80	
68° F	50%	3.0	2.9	2.7	2.4	1.9	1.3	0.5	-0.6	-2.3	-4.6	
	60%	3.6	3.5	3.3	3.0	2.6	2.0	1.1	0.0	-1.6	-3.9	
70° F	50%	3.2	3.1	2.9	2.6	2.1	1.5	0.7	-0.4	-2.1	-4.4	
	60%	3.9	3.8	3.6	3.3	2.8	2.2	1.4	0.3	-1.4	-3.7	
72° F	50%	3.3	3.3	3.1	2.8	2.3	1.7	0.9	-0.3	-1.9	-4.2	
	60%	4.1	4.0	3.9	3.6	3.1	2.5	1.6	0.5	-1.1	-3.4	
74° F	50%	3.7	3.6	3.4	3.1	2.7	2.1	1.2	0.1	-1.5	-3.9	
	60%	4.5	4.4	4.2	3.9	3.4	2.8	2.0	0.9	-0.8	-3.1	
76° F	50%	4.1	4.0	3.9	3.6	3.1	2.5	1.6	0.5	-1.1	-3.4	
	60%	4.9	4.8	4.6	4.3	3.9	3.3	2.4	1.3	-0.3	-2.7	
78° F	50%	4.2	4.1	3.9	3.6	3.2	2.6	1.7	0.6	-1.0	-3.3	
	60%	5.1	5.1	4.9	4.6	4.1	3.5	2.7	1.5	-0.1	-2.4	
80° F	50%	4.5	4.5	4.3	4.0	3.5	2.9	2.1	0.9	-0.7	-3.0	
	60%	5.5	5.4	5.2	4.9	4.5	3.9	3.0	1.9	0.3	-2.1	
82° F	50%	4.8	4.8	4.6	4.3	3.8	3.2	2.4	1.2	-0.4	-2.7	
	60%	5.8	5.7	5.6	5.3	4.8	4.2	3.3	2.2	0.6	-1.7	
84° F	50%	5.2	5.1	4.9	4.6	4.2	3.6	2.7	1.6	0.0	-2.4	
	60%	5.8	5.7	5.6	5.3	4.8	4.2	3.3	2.2	0.6	-1.7	
86° F	50%	5.6	5.5	5.3	5.0	4.5	3.9	3.1	2.0	0.3	-2.0	
	60%	6.7	6.6	6.4	6.1	5.7	5.1	4.2	3.1	1.5	-0.9	
88° F	50%	5.9	5.8	5.7	5.4	4.9	4.3	3.4	2.3	0.7	-1.6	
	60%	7.2	7.1	6.9	6.6	6.2	5.6	4.7	3.6	2.0	-0.3	
90° F	50%	6.3	6.3	6.1	5.8	5.3	4.7	3.9	2.7	1.1	-1.2	
	60%	7.7	7.6	7.5	7.2	6.7	6.1	5.2	4.1	2.5	0.2	
92° F	50%	6.8	6.7	6.5	6.2	5.7	5.1	4.3	3.2	1.5	-0.8	
	60%	7.8	7.7	7.5	7.2	6.8	6.2	5.3	4.2	2.6	0.3	
94° F	50%	7.2	7.1	6.9	6.6	6.2	5.6	4.7	3.6	2.0	-0.3	
	60%	8.7	8.7	8.5	8.2	7.7	7.1	6.3	5.1	3.5	1.2	

ASHRAE Recommended Conditions